

---

# Logtalk APIs

*Release v3.84.0*

**Paulo Moura**

Oct 22, 2024



# CONTENTS

1	Libraries	1
1.1	arbitrary	1
1.1.1	arbitrary	1
1.2	assertions	7
1.2.1	assertions	8
1.2.2	assertions(Mode)	9
1.2.3	assertions_messages	11
1.3	assignvars	12
1.3.1	assignvars	12
1.3.2	assignvarsp	13
1.4	base64	17
1.4.1	base64	17
1.4.2	base64url	19
1.5	cbor	21
1.5.1	cbor	21
1.5.2	cbor(StringRepresentation)	22
1.6	code_metrics	24
1.6.1	cc_metric	24
1.6.2	code_metric	26
1.6.3	code_metrics	38
1.6.4	code_metrics_messages	40
1.6.5	code_metrics_utilities	41
1.6.6	coupling_metric	46
1.6.7	dit_metric	48
1.6.8	doc_metric	49
1.6.9	halstead_metric	53
1.6.10	halstead_metric(Stroud)	55
1.6.11	noc_metric	56
1.6.12	nor_metric	58
1.6.13	size_metric	59
1.6.14	upn_metric	61
1.7	core	62
1.7.1	core_messages	62
1.7.2	expanding	63
1.7.3	forwarding	65
1.7.4	logtalk	67
1.7.5	monitoring	81
1.7.6	user	83
1.8	coroutining	84
1.8.1	coroutining	84

1.9	csv	87
1.9.1	csv	88
1.9.2	csv(Header,Separator,IgnoreQuotes)	89
1.9.3	csv_guess_questions	90
1.9.4	csv_protocol	92
1.10	dates	102
1.10.1	date	102
1.10.2	datep	103
1.10.3	time	107
1.10.4	timep	108
1.11	dead_code_scanner	110
1.11.1	dead_code_scanner	110
1.11.2	dead_code_scanner_messages	118
1.12	debug_messages	119
1.12.1	debug_messages	119
1.13	debugger	123
1.13.1	debugger	123
1.13.2	debugger_messages	132
1.13.3	debuggerp	133
1.13.4	dump_trace	144
1.14	dependents	146
1.14.1	observer	146
1.14.2	subject	147
1.15	diagrams	151
1.15.1	diagram(Format)	151
1.15.2	diagrams	173
1.15.3	diagrams(Format)	174
1.15.4	directory_dependency_diagram	184
1.15.5	directory_dependency_diagram(Format)	186
1.15.6	directory_diagram(Format)	187
1.15.7	directory_load_diagram	191
1.15.8	directory_load_diagram(Format)	192
1.15.9	dot_graph_language	194
1.15.10	entity_diagram	196
1.15.11	entity_diagram(Format)	197
1.15.12	file_dependency_diagram	201
1.15.13	file_dependency_diagram(Format)	202
1.15.14	file_diagram(Format)	204
1.15.15	file_load_diagram	207
1.15.16	file_load_diagram(Format)	209
1.15.17	graph_language_protocol	211
1.15.18	graph_language_registry	215
1.15.19	inheritance_diagram	216
1.15.20	inheritance_diagram(Format)	218
1.15.21	library_dependency_diagram	219
1.15.22	library_dependency_diagram(Format)	220
1.15.23	library_diagram(Format)	222
1.15.24	library_load_diagram	227
1.15.25	library_load_diagram(Format)	228
1.15.26	modules_diagram_support	230
1.15.27	uses_diagram	232
1.15.28	uses_diagram(Format)	233
1.15.29	xref_diagram	235
1.15.30	xref_diagram(Format)	236

1.16	dictionaries . . . . .	239
1.16.1	avltree . . . . .	239
1.16.2	bintree . . . . .	241
1.16.3	dictionaryp . . . . .	243
1.16.4	rbtree . . . . .	255
1.17	dif . . . . .	257
1.17.1	dif . . . . .	257
1.18	doclet . . . . .	259
1.18.1	doclet . . . . .	259
1.19	edcg . . . . .	261
1.19.1	edcg . . . . .	261
1.20	events . . . . .	265
1.20.1	after_event_registry . . . . .	265
1.20.2	before_event_registry . . . . .	266
1.20.3	event_registry . . . . .	267
1.20.4	event_registryp . . . . .	268
1.20.5	monitor . . . . .	272
1.20.6	monitorp . . . . .	274
1.21	expand_library_alias_paths . . . . .	277
1.21.1	expand_library_alias_paths . . . . .	277
1.22	expecteds . . . . .	279
1.22.1	either . . . . .	279
1.22.2	expected . . . . .	281
1.22.3	expected(Expected) . . . . .	286
1.23	fcube . . . . .	294
1.23.1	fcube . . . . .	294
1.24	flags . . . . .	298
1.24.1	flags . . . . .	298
1.24.2	flags_validator . . . . .	305
1.25	format . . . . .	307
1.25.1	format . . . . .	307
1.26	genint . . . . .	309
1.26.1	genint . . . . .	309
1.26.2	genint_core . . . . .	311
1.27	gensym . . . . .	313
1.27.1	gensym . . . . .	313
1.27.2	gensym_core . . . . .	314
1.28	git . . . . .	317
1.28.1	git . . . . .	317
1.28.2	git_protocol . . . . .	318
1.29	grammars . . . . .	322
1.29.1	blank_grammars(Format) . . . . .	322
1.29.2	ip_grammars(Format) . . . . .	329
1.29.3	number_grammars(Format) . . . . .	330
1.29.4	sequence_grammars . . . . .	336
1.30	heaps . . . . .	340
1.30.1	heap(Order) . . . . .	340
1.30.2	heapp . . . . .	341
1.30.3	maxheap . . . . .	346
1.30.4	minheap . . . . .	348
1.31	help . . . . .	349
1.31.1	help . . . . .	349
1.31.2	help_info_support . . . . .	355
1.32	hierarchies . . . . .	358

1.32.1	class_hierarchy	358
1.32.2	class_hierarchyp	360
1.32.3	hierarchyp	367
1.32.4	proto_hierarchy	370
1.32.5	proto_hierarchyp	371
1.33	hook_flows	374
1.33.1	hook_pipeline(Pipeline)	374
1.33.2	hook_set(Set)	375
1.34	hook_objects	377
1.34.1	backend_adapter_hook	377
1.34.2	default_workflow_hook	378
1.34.3	grammar_rules_hook	379
1.34.4	identity_hook	381
1.34.5	object_wrapper_hook	382
1.34.6	object_wrapper_hook(Protocol)	383
1.34.7	object_wrapper_hook(Name,Relations)	385
1.34.8	print_goal_hook	386
1.34.9	prolog_module_hook(Module)	387
1.34.10	suppress_goal_hook	389
1.34.11	write_to_file_hook(File)	390
1.34.12	write_to_file_hook(File,Options)	391
1.34.13	write_to_stream_hook(Stream)	393
1.34.14	write_to_stream_hook(Stream,Options)	394
1.35	html	395
1.35.1	html	395
1.35.2	html5	398
1.35.3	xhtml11	399
1.36	ids	400
1.36.1	ids	400
1.36.2	ids(Representation,Bytes)	401
1.37	intervals	403
1.37.1	interval	403
1.37.2	intervalp	405
1.38	iso8601	411
1.38.1	iso8601	411
1.39	issue_creator	423
1.39.1	issue_creator	423
1.40	java	424
1.40.1	java	424
1.40.2	java(Reference)	425
1.40.3	java(Reference,ReturnValue)	427
1.40.4	java_access_protocol	428
1.40.5	java_hook	431
1.40.6	java_utils_protocol	433
1.41	json	442
1.41.1	json	442
1.41.2	json(StringRepresentation)	443
1.41.3	json(ObjectRepresentation,PairRepresentation,StringRepresentation)	444
1.41.4	json_protocol	446
1.42	lgtdoc	448
1.42.1	lgtdoc	448
1.42.2	lgtdoc_messages	451
1.42.3	lgtdocp	452
1.43	lgtunit	464

1.43.1	automation_report	464
1.43.2	coverage_report	465
1.43.3	lgtunit	467
1.43.4	lgtunit_messages	516
1.43.5	minimal_output	517
1.43.6	tap_output	519
1.43.7	tap_report	521
1.43.8	xunit_net_v2_output	523
1.43.9	xunit_net_v2_report	525
1.43.10	xunit_output	526
1.43.11	xunit_report	528
1.44	library	530
1.44.1	cloning	530
1.44.2	counters	531
1.44.3	streamvars	535
1.45	listing	538
1.45.1	listing	538
1.46	logging	541
1.46.1	logger	541
1.46.2	logging	543
1.46.3	loggingp	545
1.47	loops	549
1.47.1	loop	549
1.47.2	loopp	550
1.48	meta	556
1.48.1	meta	556
1.48.2	metap	557
1.49	meta_compiler	568
1.49.1	meta_compiler	568
1.50	metagol	570
1.50.1	metagol	570
1.50.2	metagol_example_protocol	577
1.51	mutations	579
1.51.1	default_atom_mutations	579
1.51.2	default_compound_mutations	581
1.51.3	default_float_mutations	582
1.51.4	default_integer_mutations	583
1.51.5	default_list_mutations	584
1.51.6	mutations	586
1.51.7	mutations_store	587
1.52	nested_dictionaries	590
1.52.1	navltree	590
1.52.2	nbintree	592
1.52.3	nested_dictionary_protocol	593
1.52.4	nrbtree	598
1.53	optionals	599
1.53.1	maybe	599
1.53.2	optional	601
1.53.3	optional(Optional)	605
1.54	options	612
1.54.1	options	613
1.54.2	options_protocol	614
1.55	os	620
1.55.1	os	620

1.55.2	os_types	622
1.55.3	osp	623
1.56	packs	641
1.56.1	pack_protocol	642
1.56.2	packs	646
1.56.3	packs_common	671
1.56.4	packs_messages	683
1.56.5	packs_specs_hook	684
1.56.6	registries	686
1.56.7	registry_loader_hook	697
1.56.8	registry_protocol	699
1.57	pddl_parser	702
1.57.1	pddl	702
1.57.2	read_file	705
1.58	ports_profiler	706
1.58.1	ports_profiler	707
1.59	queues	713
1.59.1	queue	713
1.59.2	queup	714
1.60	random	721
1.60.1	backend_random	721
1.60.2	fast_random	722
1.60.3	pseudo_random_protocol	725
1.60.4	random	727
1.60.5	random_protocol	729
1.61	reader	738
1.61.1	reader	739
1.62	recorded_database	748
1.62.1	recorded_database	748
1.62.2	recorded_database_core	749
1.63	redis	755
1.63.1	redis	755
1.64	sets	758
1.64.1	set	758
1.64.2	set(Type)	759
1.64.3	setp	762
1.65	statistics	772
1.65.1	population	772
1.65.2	sample	773
1.65.3	statistics	774
1.65.4	statisticsp	777
1.66	term_io	788
1.66.1	term_io	788
1.66.2	term_io_protocol	790
1.67	timeout	800
1.67.1	timeout	800
1.68	toychr	802
1.68.1	toychrdb	803
1.69	tsv	808
1.69.1	tsv	808
1.69.2	tsv(Header)	809
1.69.3	tsv_protocol	811
1.70	tutor	820
1.70.1	tutor	820

1.71	types	822
1.71.1	atom	822
1.71.2	atomic	824
1.71.3	callable	825
1.71.4	character	826
1.71.5	characterp	827
1.71.6	comparingp	836
1.71.7	compound	840
1.71.8	difflist	841
1.71.9	float	843
1.71.10	integer	845
1.71.11	list	848
1.71.12	list(Type)	850
1.71.13	listp	851
1.71.14	natural	874
1.71.15	number	875
1.71.16	numberlist	879
1.71.17	numberlistp	880
1.71.18	pairs	890
1.71.19	term	895
1.71.20	termp	897
1.71.21	type	904
1.71.22	varlist	909
1.71.23	varlistp	910
1.72	ulid	920
1.72.1	ulid	920
1.72.2	ulid(Representation)	921
1.72.3	ulid_protocol	923
1.72.4	ulid_types	926
1.73	union_find	927
1.73.1	union_find	927
1.73.2	union_find_protocol	929
1.74	uuid	933
1.74.1	uuid	933
1.74.2	uuid(Representation)	934
1.74.3	uuid_protocol	936
1.75	verdi_neruda	938
1.75.1	a_star_interpreter(W)	939
1.75.2	benchmark_generators	940
1.75.3	best_first	941
1.75.4	bfs_interpreter	943
1.75.5	bup_interpreter	944
1.75.6	counter	945
1.75.7	databasep	949
1.75.8	debug_expansion(Mode)	951
1.75.9	demodb	953
1.75.10	dfs_interpreter	954
1.75.11	flatting	955
1.75.12	heuristic_expansion(Mode)	957
1.75.13	iddfs_interpreter(Increment)	958
1.75.14	interpreterp	959
1.75.15	magic	961
1.75.16	magic_expansion(Mode)	963
1.75.17	rule_expansion(Mode)	964

1.75.18	shell	965
1.75.19	shell(Interpreters)	967
1.75.20	shell_expansion(Mode)	968
1.76	wrapper	969
1.76.1	wrapper	970
1.77	xml_parser	982
1.77.1	xml	982
1.78	zippers	990
1.78.1	zipperp	990
1.78.2	zlist	1000
2	Directories	1003
2.1	contributions/flags/	1005
2.2	contributions/iso8601/	1005
2.3	contributions/pddl_parser/	1005
2.4	contributions/verdi_neruda/	1005
2.5	contributions/xml_parser/	1005
2.6	core/	1005
2.7	library/	1005
2.8	library/arbitrary/	1005
2.9	library/assignvars/	1005
2.10	library/base64/	1005
2.11	library/cbor/	1005
2.12	library/coroutining/	1005
2.13	library/csv/	1005
2.14	library/dates/	1005
2.15	library/dependents/	1005
2.16	library/dictionaries/	1005
2.17	library/dif/	1005
2.18	library/edcg/	1005
2.19	library/events/	1005
2.20	library/expand_library_alias_paths/	1005
2.21	library/expecteds/	1005
2.22	library/format/	1005
2.23	library/genint/	1005
2.24	library/gensym/	1005
2.25	library/git/	1005
2.26	library/grammars/	1005
2.27	library/heaps/	1005
2.28	library/hierarchies/	1005
2.29	library/hook_flows/	1005
2.30	library/hook_objects/	1005
2.31	library/html/	1005
2.32	library/ids/	1005
2.33	library/intervals/	1005
2.34	library/java/	1005
2.35	library/json/	1005
2.36	library/listing/	1005
2.37	library/logging/	1005
2.38	library/loops/	1005
2.39	library/meta/	1005
2.40	library/meta_compiler/	1005
2.41	library/mutations/	1005
2.42	library/nested_dictionaries/	1005

2.43	library/optionals/	1005
2.44	library/options/	1005
2.45	library/os/	1005
2.46	library/queues/	1005
2.47	library/random/	1005
2.48	library/reader/	1005
2.49	library/recorded_database/	1005
2.50	library/redis/	1005
2.51	library/sets/	1005
2.52	library/statistics/	1005
2.53	library/term_io/	1005
2.54	library/timeout/	1005
2.55	library/tsv/	1005
2.56	library/types/	1005
2.57	library/ulid/	1005
2.58	library/union_find/	1005
2.59	library/uuid/	1005
2.60	library/zippers/	1005
2.61	ports/fcube/	1005
2.62	ports/metagol/	1005
2.63	ports/toychr/	1005
2.64	tools/assertions/	1005
2.65	tools/code_metrics/	1005
2.66	tools/dead_code_scanner/	1005
2.67	tools/debug_messages/	1005
2.68	tools/debugger/	1005
2.69	tools/diagrams/	1005
2.70	tools/doclet/	1005
2.71	tools/help/	1005
2.72	tools/issue_creator/	1005
2.73	tools/lgtdoc/	1005
2.74	tools/lgtunit/	1005
2.75	tools/packs/	1005
2.76	tools/ports_profiler/	1005
2.77	tools/tutor/	1005
2.78	tools/wrapper/	1005
3	Entities	1007
3.1	Categories	1007
3.2	Objects	1007
3.3	Protocols	1007
4	Predicates	1009
4.1	(/)/2	1009
4.2	(//)/2	1009
4.3	(<)/2	1009
4.4	(<=)/2	1009
4.5	(=:=)/2	1009
4.6	(=<)/2	1010
4.7	(=>)/2	1010
4.8	(=\=)/2	1010
4.9	==~/2	1010
4.10	(>)/2	1010
4.11	(>=)/2	1010

4.12	absolute_file_name/2	1010
4.13	activate_debug_handler/1	1010
4.14	activate_monitor/0	1011
4.15	active_debug_handler/1	1011
4.16	add/1	1011
4.17	add/2	1011
4.18	add/3	1011
4.19	addDependent/1	1011
4.20	after/2	1011
4.21	after/3	1011
4.22	all/0	1012
4.23	all/1	1012
4.24	all_files/0	1012
4.25	all_files/1	1012
4.26	all_libraries/0	1012
4.27	all_libraries/1	1012
4.28	all_score/1	1013
4.29	ancestor/1	1013
4.30	ancestors/1	1013
4.31	apis/0	1013
4.32	apis/1	1013
4.33	append/2	1013
4.34	append/3	1013
4.35	apply/2	1013
4.36	apply/4	1014
4.37	approximately_equal/2	1014
4.38	approximately_equal/3	1014
4.39	arbitrary/1	1014
4.40	arbitrary/2	1014
4.41	archive/1	1014
4.42	arithmetic_mean/2	1014
4.43	array_list/2	1014
4.44	array_to_list/2	1015
4.45	array_to_terms/2	1015
4.46	array_to_terms/3	1015
4.47	as_curly_bracketed/2	1015
4.48	as_dictionary/2	1015
4.49	as_difflist/2	1015
4.50	as_heap/2	1015
4.51	as_list/2	1015
4.52	as_nested_dictionary/2	1016
4.53	as_set/2	1016
4.54	ask_question/5	1016
4.55	assertion/1	1016
4.56	assertion/2	1016
4.57	assignable/1	1016
4.58	assignable/2	1016
4.59	available/0	1016
4.60	available/1	1017
4.61	available/2	1017
4.62	average/2	1017
4.63	average_deviation/3	1017
4.64	before/2	1017
4.65	before/3	1017

4.66	bench_goal/1	1017
4.67	benchmark/2	1017
4.68	benchmark/3	1018
4.69	benchmark/4	1018
4.70	benchmark_reified/3	1018
4.71	between/3	1018
4.72	bit//1	1018
4.73	bits//1	1018
4.74	blank//0	1018
4.75	blanks//0	1018
4.76	body_pred/1	1019
4.77	branch/2	1019
4.78	built_in_directive/4	1019
4.79	built_in_flag/2	1019
4.80	built_in_method/4	1019
4.81	built_in_non_terminal/4	1019
4.82	built_in_predicate/4	1019
4.83	calendar_month/3	1019
4.84	call_with_timeout/2	1020
4.85	call_with_timeout/3	1020
4.86	cat/2	1020
4.87	change_directory/1	1020
4.88	changed/0	1020
4.89	changed/1	1020
4.90	chebyshev_distance/3	1020
4.91	chebyshev_norm/2	1020
4.92	check/1	1021
4.93	check/2	1021
4.94	check/3	1021
4.95	check_option/1	1021
4.96	check_options/1	1021
4.97	chr_is/2	1021
4.98	chr_no_spy/1	1021
4.99	chr_nospy/0	1021
4.100	chr_notrace/0	1022
4.101	chr_option/2	1022
4.102	chr_spy/1	1022
4.103	chr_trace/0	1022
4.104	class/1	1022
4.105	classes/1	1022
4.106	clause/5	1022
4.107	clause_location/6	1022
4.108	clean/0	1023
4.109	clean/1	1023
4.110	clean/2	1023
4.111	clone/1	1023
4.112	clone/3	1023
4.113	clone/4	1023
4.114	coefficient_of_variation/2	1023
4.115	command_line_arguments/1	1024
4.116	commit_author/2	1024
4.117	commit_date/2	1024
4.118	commit_hash/2	1024
4.119	commit_hash_abbreviated/2	1024

4.120	commit_log/3	1024
4.121	commit_message/2	1024
4.122	compile_aux_clauses/1	1024
4.123	compile_predicate_heads/4	1025
4.124	compile_predicate_indicators/3	1025
4.125	completion/2	1025
4.126	completions/2	1025
4.127	connect/1	1025
4.128	connect/3	1025
4.129	console/1	1025
4.130	contains/2	1025
4.131	control//0	1026
4.132	control_construct/4	1026
4.133	controls//0	1026
4.134	copy_file/2	1026
4.135	counter/2	1026
4.136	cover/1	1026
4.137	cpu_time/1	1026
4.138	current/2	1026
4.139	data/0	1027
4.140	data/1	1027
4.141	data/2	1027
4.142	date/4	1027
4.143	date/5	1027
4.144	date/6	1027
4.145	date/7	1027
4.146	date_string/3	1027
4.147	date_time/7	1028
4.148	days_in_month/3	1028
4.149	deactivate_debug_handler/0	1028
4.150	debug/0	1028
4.151	debug_handler/1	1028
4.152	debug_handler/3	1028
4.153	debugging/0	1028
4.154	debugging/1	1028
4.155	decide/1	1029
4.156	decide/2	1029
4.157	decode_exception/2	1029
4.158	decode_exception/3	1029
4.159	decompile_predicate_heads/4	1029
4.160	decompile_predicate_indicators/4	1029
4.161	decompose_file_name/3	1029
4.162	decompose_file_name/4	1029
4.163	decrement_counter/1	1030
4.164	default_option/1	1030
4.165	default_options/1	1030
4.166	define_log_file/2	1030
4.167	defined/4	1030
4.168	defined_flag/6	1030
4.169	del_monitors/0	1030
4.170	del_monitors/4	1030
4.171	del_spy_points/4	1031
4.172	delete/0	1031
4.173	delete/1	1031

4.174 delete/2 . . . . .	1031
4.175 delete/3 . . . . .	1031
4.176 delete/4 . . . . .	1031
4.177 delete_all_after/2 . . . . .	1031
4.178 delete_all_after_and_unzip/2 . . . . .	1031
4.179 delete_all_before/2 . . . . .	1032
4.180 delete_all_before_and_unzip/2 . . . . .	1032
4.181 delete_and_next/2 . . . . .	1032
4.182 delete_and_previous/2 . . . . .	1032
4.183 delete_and_unzip/2 . . . . .	1032
4.184 delete_directory/1 . . . . .	1032
4.185 delete_directory_and_contents/1 . . . . .	1032
4.186 delete_directory_contents/1 . . . . .	1032
4.187 delete_file/1 . . . . .	1033
4.188 delete_in/4 . . . . .	1033
4.189 delete_matches/3 . . . . .	1033
4.190 delete_max/4 . . . . .	1033
4.191 delete_min/4 . . . . .	1033
4.192 dependents/1 . . . . .	1033
4.193 dependents/2 . . . . .	1033
4.194 dependents/3 . . . . .	1033
4.195 depth/2 . . . . .	1034
4.196 descendant/1 . . . . .	1034
4.197 descendant_class/1 . . . . .	1034
4.198 descendant_classes/1 . . . . .	1034
4.199 descendant_instance/1 . . . . .	1034
4.200 descendant_instances/1 . . . . .	1034
4.201 descendants/1 . . . . .	1034
4.202 describe/1 . . . . .	1034
4.203 describe/2 . . . . .	1035
4.204 description/1 . . . . .	1035
4.205 deterministic/1 . . . . .	1035
4.206 deterministic/2 . . . . .	1035
4.207 diagram_description/1 . . . . .	1035
4.208 diagram_name_suffix/1 . . . . .	1035
4.209 dif/1 . . . . .	1035
4.210 dif/2 . . . . .	1035
4.211 digit//1 . . . . .	1036
4.212 digits//1 . . . . .	1036
4.213 directories/1 . . . . .	1036
4.214 directories/2 . . . . .	1036
4.215 directories/3 . . . . .	1036
4.216 directory/1 . . . . .	1036
4.217 directory/2 . . . . .	1037
4.218 directory/3 . . . . .	1037
4.219 directory_exists/1 . . . . .	1037
4.220 directory_files/2 . . . . .	1037
4.221 directory_files/3 . . . . .	1037
4.222 directory_score/2 . . . . .	1037
4.223 disable/1 . . . . .	1038
4.224 disable/2 . . . . .	1038
4.225 disable_logging/1 . . . . .	1038
4.226 disconnect/1 . . . . .	1038
4.227 disjoint/2 . . . . .	1038

4.228 disjoint_sets/2	1038
4.229 doc_goal/1	1038
4.230 dot//1	1038
4.231 dowhile/2	1039
4.232 drop/3	1039
4.233 during/2	1039
4.234 easter_day/3	1039
4.235 edge/6	1039
4.236 edge_case/2	1039
4.237 either/3	1039
4.238 empty/1	1039
4.239 enable/1	1040
4.240 enable/2	1040
4.241 enable_logging/1	1040
4.242 enabled/1	1040
4.243 enabled/2	1040
4.244 ensure_directory/1	1040
4.245 ensure_file/1	1040
4.246 entity/1	1040
4.247 entity/2	1041
4.248 entity_info_pair_score_hook/3	1041
4.249 entity_info_score_hook/2	1041
4.250 entity_predicates_weights_hook/2	1041
4.251 entity_prefix/2	1041
4.252 entity_score/2	1041
4.253 enumerate/2	1041
4.254 environment_variable/2	1041
4.255 epsilon/1	1042
4.256 equal/2	1042
4.257 erase/1	1042
4.258 essentially_equal/3	1042
4.259 euclidean_distance/3	1042
4.260 euclidean_norm/2	1042
4.261 exclude/3	1042
4.262 execution_context/7	1042
4.263 expand_library_path/2	1043
4.264 expected/1	1043
4.265 expecteds/2	1043
4.266 explain//1	1043
4.267 extension/1	1043
4.268 extensions/1	1043
4.269 false/1	1043
4.270 fcube/0	1043
4.271 file/1	1044
4.272 file/2	1044
4.273 file_exists/1	1044
4.274 file_footer/3	1044
4.275 file_header/3	1044
4.276 file_modification_time/2	1044
4.277 file_permission/2	1045
4.278 file_score/2	1045
4.279 file_size/2	1045
4.280 file_to_bytes/2	1045
4.281 file_to_bytes/3	1045

4.282	file_to_chars/2	1045
4.283	file_to_chars/3	1045
4.284	file_to_codes/2	1045
4.285	file_to_codes/3	1046
4.286	file_to_terms/2	1046
4.287	file_to_terms/3	1046
4.288	file_type_extension/2	1046
4.289	files/1	1046
4.290	files/2	1046
4.291	files/3	1046
4.292	filter/2	1047
4.293	find/4	1047
4.294	find/5	1047
4.295	findall_member/4	1047
4.296	findall_member/5	1047
4.297	finished_by/2	1047
4.298	finishes/2	1047
4.299	flag_group_chk/1	1047
4.300	flag_groups/1	1048
4.301	flat_map/2	1048
4.302	flatten/2	1048
4.303	float//1	1048
4.304	fold_left/4	1048
4.305	fold_left_1/3	1048
4.306	fold_right/4	1048
4.307	fold_right_1/3	1048
4.308	fordownto/3	1049
4.309	fordownto/4	1049
4.310	fordownto/5	1049
4.311	foreach/3	1049
4.312	foreach/4	1049
4.313	format/2	1049
4.314	format/3	1049
4.315	format_entity_score//2	1049
4.316	format_object/1	1050
4.317	format_to_atom/3	1050
4.318	format_to_chars/3	1050
4.319	format_to_chars/4	1050
4.320	format_to_codes/3	1050
4.321	format_to_codes/4	1050
4.322	forto/3	1050
4.323	forto/4	1050
4.324	forto/5	1051
4.325	forward/1	1051
4.326	forward/2	1051
4.327	forward/3	1051
4.328	fractile/3	1051
4.329	freeze/2	1051
4.330	from_generator/2	1051
4.331	from_generator/3	1051
4.332	from_generator/4	1052
4.333	from_goal/2	1052
4.334	from_goal/3	1052
4.335	from_goal/4	1052

4.336 frozen/2	1052
4.337 full_device_path/1	1052
4.338 func_test/3	1052
4.339 functional/0	1052
4.340 generate/1	1053
4.341 generate/2	1053
4.342 generate/8	1053
4.343 genint/2	1053
4.344 gensym/2	1053
4.345 geometric_mean/2	1053
4.346 get/1	1053
4.347 get_field/2	1054
4.348 get_flag_value/2	1054
4.349 get_seed/1	1054
4.350 gnu/0	1054
4.351 goal_expansion/2	1054
4.352 graph_footer/5	1054
4.353 graph_header/5	1054
4.354 ground/1	1054
4.355 group_by_key/2	1055
4.356 group_consecutive_by_key/2	1055
4.357 group_sorted_by_key/2	1055
4.358 guess_arity/2	1055
4.359 guess_separator/2	1055
4.360 hamming_distance/3	1055
4.361 handbook/0	1055
4.362 handbook/1	1055
4.363 harmonic_mean/2	1056
4.364 head/2	1056
4.365 head_pred/1	1056
4.366 help/0	1056
4.367 hex_digit//1	1056
4.368 hex_digits//1	1056
4.369 home/1	1056
4.370 ibk/3	1056
4.371 if_empty/1	1057
4.372 if_expected/1	1057
4.373 if_expected_or_else/2	1057
4.374 if_present/1	1057
4.375 if_present_or_else/2	1057
4.376 if_unexpected/1	1057
4.377 include/3	1057
4.378 increase/1	1057
4.379 increment/0	1058
4.380 increment_counter/1	1058
4.381 init/0	1058
4.382 init_log_file/2	1058
4.383 inorder/2	1058
4.384 insert/3	1058
4.385 insert/4	1058
4.386 insert_after/3	1058
4.387 insert_all/3	1059
4.388 insert_before/3	1059
4.389 insert_in/4	1059

4.390	install/1	1059
4.391	install/2	1059
4.392	install/3	1059
4.393	install/4	1059
4.394	installed/0	1059
4.395	installed/1	1060
4.396	installed/3	1060
4.397	installed/4	1060
4.398	instance/1	1060
4.399	instance/2	1060
4.400	instances/1	1060
4.401	integer//1	1060
4.402	internal_os_path/2	1060
4.403	intersect/2	1061
4.404	intersection/2	1061
4.405	intersection/3	1061
4.406	intersection/4	1061
4.407	invoke/1	1061
4.408	invoke/2	1061
4.409	ipv4//1	1061
4.410	ipv6//1	1061
4.411	is_absolute_file_name/1	1062
4.412	is_alpha/1	1062
4.413	is_alphanumeric/1	1062
4.414	is_ascii/1	1062
4.415	is_bin_digit/1	1062
4.416	is_control/1	1062
4.417	is_dec_digit/1	1062
4.418	is_empty/0	1062
4.419	is_end_of_line/1	1063
4.420	is_expected/0	1063
4.421	is_false/1	1063
4.422	is_hex_digit/1	1063
4.423	is_layout/1	1063
4.424	is_letter/1	1063
4.425	is_lower_case/1	1063
4.426	is_newline/1	1063
4.427	is_null/1	1064
4.428	is_object/1	1064
4.429	is_octal_digit/1	1064
4.430	is_period/1	1064
4.431	is_present/0	1064
4.432	is_punctuation/1	1064
4.433	is_quote/1	1064
4.434	is_true/1	1064
4.435	is_unexpected/0	1065
4.436	is_upper_case/1	1065
4.437	is_void/1	1065
4.438	is_vowel/1	1065
4.439	is_white_space/1	1065
4.440	iterator_element/2	1065
4.441	join/3	1065
4.442	join_all/3	1065
4.443	jump/3	1066

4.444	jump_all/3	1066
4.445	jump_all_block/3	1066
4.446	key/2	1066
4.447	keys/2	1066
4.448	keys_values/3	1066
4.449	keysort/2	1066
4.450	kurtosis/2	1066
4.451	language_object/2	1067
4.452	last/2	1067
4.453	leaf/1	1067
4.454	leaf_class/1	1067
4.455	leaf_classes/1	1067
4.456	leaf_instance/1	1067
4.457	leaf_instances/1	1067
4.458	leap_year/1	1067
4.459	learn/0	1068
4.460	learn/1	1068
4.461	learn/2	1068
4.462	learn/3	1068
4.463	learn_seq/2	1068
4.464	learn_with_timeout/4	1068
4.465	leash/1	1068
4.466	leashing/1	1068
4.467	least_common_multiple/2	1069
4.468	leaves/1	1069
4.469	length/2	1069
4.470	libraries/1	1069
4.471	libraries/2	1069
4.472	libraries/3	1069
4.473	library/0	1070
4.474	library/1	1070
4.475	library/2	1070
4.476	library_score/2	1070
4.477	license/1	1070
4.478	line_to_chars/2	1070
4.479	line_to_chars/3	1071
4.480	line_to_codes/2	1071
4.481	line_to_codes/3	1071
4.482	lint/0	1071
4.483	lint/1	1071
4.484	lint/2	1071
4.485	list/0	1071
4.486	list_to_array/2	1071
4.487	listing/0	1072
4.488	listing/1	1072
4.489	loaded_file/1	1072
4.490	loaded_file_property/2	1072
4.491	log/3	1072
4.492	log_event/2	1072
4.493	log_file/2	1072
4.494	logging/1	1072
4.495	logging/3	1073
4.496	logtalk_packs/0	1073
4.497	logtalk_packs/1	1073

4.498	lookup/2	1073
4.499	lookup/3	1073
4.500	lookup_in/3	1073
4.501	lower_upper/2	1073
4.502	magic/2	1073
4.503	magicise/4	1074
4.504	make_directory/1	1074
4.505	make_directory_path/1	1074
4.506	make_set/3	1074
4.507	man/1	1074
4.508	manhattan_distance/3	1074
4.509	manhattan_norm/2	1074
4.510	manuals/0	1074
4.511	map/2	1075
4.512	map/3	1075
4.513	map/4	1075
4.514	map/5	1075
4.515	map/6	1075
4.516	map/7	1075
4.517	map/8	1076
4.518	map_element/2	1076
4.519	map_reduce/5	1076
4.520	max/2	1076
4.521	max/3	1076
4.522	max_clauses/1	1076
4.523	max_inv_preds/1	1076
4.524	max_size/1	1076
4.525	maybe/0	1077
4.526	maybe/1	1077
4.527	maybe/2	1077
4.528	maybe_call/1	1077
4.529	maybe_call/2	1077
4.530	mean_deviation/2	1077
4.531	median/2	1077
4.532	median_deviation/2	1077
4.533	meets/2	1078
4.534	member/2	1078
4.535	memberchk/2	1078
4.536	merge/3	1078
4.537	message_hook/4	1078
4.538	message_prefix_stream/4	1078
4.539	message_tokens//2	1078
4.540	met_by/2	1079
4.541	meta_type/3	1079
4.542	metarule/6	1079
4.543	metarule_next_id/1	1079
4.544	min/2	1079
4.545	min/3	1079
4.546	min_clauses/1	1079
4.547	min_max/3	1079
4.548	modes/2	1080
4.549	module_property/2	1080
4.550	monitor/1	1080
4.551	monitor/4	1080

4.552	monitor_activated/0	1080
4.553	monitored/1	1080
4.554	monitors/1	1080
4.555	msort/2	1080
4.556	msort/3	1081
4.557	mutation/3	1081
4.558	name/1	1081
4.559	name_of_day/3	1081
4.560	name_of_month/3	1081
4.561	natural//1	1081
4.562	new/1	1081
4.563	new/2	1082
4.564	new/3	1082
4.565	new_line//0	1082
4.566	new_lines//0	1082
4.567	next/2	1082
4.568	next/3	1082
4.569	next/4	1082
4.570	nextto/3	1082
4.571	node/7	1083
4.572	nodebug/0	1083
4.573	nolog/3	1083
4.574	nologall/0	1083
4.575	non_blank//1	1083
4.576	non_blanks//1	1083
4.577	normal_element/2	1083
4.578	normalize_range/2	1083
4.579	normalize_range/4	1084
4.580	normalize_scalar/2	1084
4.581	normalize_unit/2	1084
4.582	nosp/1	1084
4.583	nosp/3	1084
4.584	nosp/4	1084
4.585	nosp/all/0	1084
4.586	note/2	1084
4.587	note/3	1085
4.588	notrace/0	1085
4.589	now/3	1085
4.590	nth0/3	1085
4.591	nth0/4	1085
4.592	nth1/3	1085
4.593	nth1/4	1085
4.594	null/1	1086
4.595	null_device_path/1	1086
4.596	number//1	1086
4.597	number_of_tests/1	1086
4.598	numbervars/1	1086
4.599	numbervars/3	1086
4.600	occurrences/2	1086
4.601	occurrences/3	1086
4.602	occurs/2	1087
4.603	of/2	1087
4.604	of_expected/2	1087
4.605	of_unexpected/2	1087

4.606	one_or_more//0	1087
4.607	one_or_more//1	1087
4.608	one_or_more//2	1087
4.609	operating_system_machine/1	1087
4.610	operating_system_name/1	1088
4.611	operating_system_release/1	1088
4.612	operating_system_type/1	1088
4.613	option/2	1088
4.614	option/3	1088
4.615	or/2	1088
4.616	or_else/2	1088
4.617	or_else_call/2	1088
4.618	or_else_fail/1	1089
4.619	or_else_get/2	1089
4.620	or_else_throw/1	1089
4.621	or_else_throw/2	1089
4.622	orphaned/0	1089
4.623	orphaned/2	1089
4.624	outdated/0	1089
4.625	outdated/1	1089
4.626	outdated/4	1090
4.627	output_file_name/2	1090
4.628	overlapped_by/2	1090
4.629	overlaps/2	1090
4.630	parent/1	1090
4.631	parenthesis/2	1090
4.632	parents/1	1090
4.633	parse/2	1090
4.634	parse/3	1091
4.635	parse_domain/2	1091
4.636	parse_domain/3	1091
4.637	parse_problem/2	1091
4.638	parse_problem/3	1091
4.639	partial_map/4	1091
4.640	partition/3	1091
4.641	partition/4	1091
4.642	partition/5	1092
4.643	partition/6	1092
4.644	path_concat/3	1092
4.645	permutation/2	1092
4.646	pid/1	1092
4.647	pin/0	1092
4.648	pin/1	1092
4.649	pinned/1	1092
4.650	plus/3	1093
4.651	port/5	1093
4.652	portray_clause/1	1093
4.653	postorder/2	1093
4.654	powerset/2	1093
4.655	pp/1	1093
4.656	pprint/1	1093
4.657	predicate/2	1093
4.658	predicate_info_pair_score_hook/4	1094
4.659	predicate_info_score_hook/3	1094

4.660	predicate_mode_score_hook/3	1094
4.661	predicate_mode_score_hook/5	1094
4.662	predicates/2	1094
4.663	prefix/0	1094
4.664	prefix/1	1094
4.665	prefix/2	1094
4.666	prefix/3	1095
4.667	preorder/2	1095
4.668	previous/2	1095
4.669	previous/3	1095
4.670	previous/4	1095
4.671	print_flags/0	1095
4.672	print_flags/1	1095
4.673	print_message/3	1095
4.674	print_message_token/4	1096
4.675	print_message_tokens/3	1096
4.676	product/2	1096
4.677	product/3	1096
4.678	program_to_clauses/2	1096
4.679	proper_prefix/2	1096
4.680	proper_prefix/3	1096
4.681	proper_suffix/2	1096
4.682	proper_suffix/3	1097
4.683	prove/2	1097
4.684	prove/3	1097
4.685	provides/2	1097
4.686	question_hook/6	1097
4.687	question_prompt_stream/4	1097
4.688	quick_check/1	1097
4.689	quick_check/2	1097
4.690	quick_check/3	1098
4.691	random/1	1098
4.692	random/3	1098
4.693	random_node/1	1098
4.694	random_tree/1	1098
4.695	randomize/1	1098
4.696	randseq/4	1098
4.697	randset/4	1098
4.698	range/2	1099
4.699	rdirectories/1	1099
4.700	rdirectories/2	1099
4.701	rdirectory/1	1099
4.702	rdirectory/2	1099
4.703	rdirectory/3	1099
4.704	rdirectory_score/2	1100
4.705	read_file/2	1100
4.706	read_file/3	1100
4.707	read_file_by_line/2	1100
4.708	read_file_by_line/3	1100
4.709	read_from_atom/2	1100
4.710	read_from_chars/2	1100
4.711	read_from_codes/2	1101
4.712	read_only_device_path/1	1101
4.713	read_stream/2	1101

4.714 read_stream/3 . . . . .	1101
4.715 read_stream_by_line/2 . . . . .	1101
4.716 read_stream_by_line/3 . . . . .	1101
4.717 read_term_from_atom/3 . . . . .	1101
4.718 read_term_from_chars/3 . . . . .	1102
4.719 read_term_from_chars/4 . . . . .	1102
4.720 read_term_from_codes/3 . . . . .	1102
4.721 read_term_from_codes/4 . . . . .	1102
4.722 readme/1 . . . . .	1102
4.723 readme/2 . . . . .	1102
4.724 recorda/2 . . . . .	1102
4.725 recorda/3 . . . . .	1102
4.726 recorded/2 . . . . .	1103
4.727 recorded/3 . . . . .	1103
4.728 recordz/2 . . . . .	1103
4.729 recordz/3 . . . . .	1103
4.730 relative_standard_deviation/2 . . . . .	1103
4.731 removeDependent/1 . . . . .	1103
4.732 remove_duplicates/2 . . . . .	1103
4.733 rename_file/2 . . . . .	1103
4.734 replace/3 . . . . .	1104
4.735 replace_sub_atom/4 . . . . .	1104
4.736 rescale/3 . . . . .	1104
4.737 reset/0 . . . . .	1104
4.738 reset/1 . . . . .	1104
4.739 reset_counter/1 . . . . .	1104
4.740 reset_counters/0 . . . . .	1104
4.741 reset_flags/0 . . . . .	1104
4.742 reset_flags/1 . . . . .	1105
4.743 reset_genint/0 . . . . .	1105
4.744 reset_genint/1 . . . . .	1105
4.745 reset_gensym/0 . . . . .	1105
4.746 reset_gensym/1 . . . . .	1105
4.747 reset_monitor/0 . . . . .	1105
4.748 reset_seed/0 . . . . .	1105
4.749 restore/1 . . . . .	1105
4.750 restore/2 . . . . .	1106
4.751 reverse/2 . . . . .	1106
4.752 rewind/2 . . . . .	1106
4.753 rewind/3 . . . . .	1106
4.754 rlibraries/1 . . . . .	1106
4.755 rlibraries/2 . . . . .	1106
4.756 rlibrary/1 . . . . .	1106
4.757 rlibrary/2 . . . . .	1107
4.758 rlibrary_score/2 . . . . .	1107
4.759 rule/2 . . . . .	1107
4.760 rule/3 . . . . .	1107
4.761 rule/4 . . . . .	1107
4.762 run/0 . . . . .	1107
4.763 run/1 . . . . .	1107
4.764 run/2 . . . . .	1108
4.765 run_test_sets/1 . . . . .	1108
4.766 same_length/2 . . . . .	1108
4.767 same_length/3 . . . . .	1108

4.768	save/0	1108
4.769	save/1	1108
4.770	save/2	1108
4.771	scalar_product/3	1108
4.772	scan_left/4	1109
4.773	scan_left_1/3	1109
4.774	scan_right/4	1109
4.775	scan_right_1/3	1109
4.776	search/1	1109
4.777	select/3	1109
4.778	select/4	1109
4.779	selectchk/3	1110
4.780	selectchk/4	1110
4.781	send/3	1110
4.782	sequence/3	1110
4.783	sequence/4	1110
4.784	sequential_occurrences/2	1110
4.785	sequential_occurrences/3	1110
4.786	serve/3	1110
4.787	set/1	1111
4.788	set/4	1111
4.789	set_element/2	1111
4.790	set_field/2	1111
4.791	set_flag_value/2	1111
4.792	set_flag_value/3	1111
4.793	set_monitor/4	1111
4.794	set_seed/1	1111
4.795	set_spy_point/4	1112
4.796	setup/0	1112
4.797	shell/1	1112
4.798	shell/2	1112
4.799	shell_command/1	1112
4.800	shrink/3	1112
4.801	shrink_sequence/3	1112
4.802	shrinker/1	1112
4.803	sign//1	1113
4.804	singletons/2	1113
4.805	size/2	1113
4.806	skewness/2	1113
4.807	sleep/1	1113
4.808	sort/2	1113
4.809	sort/3	1113
4.810	sort/4	1113
4.811	source_file_extension/1	1114
4.812	space//0	1114
4.813	spaces//0	1114
4.814	split/3	1114
4.815	split/4	1114
4.816	spy/1	1114
4.817	spy/3	1114
4.818	spy/4	1114
4.819	spy_point/4	1115
4.820	spying/1	1115
4.821	spying/3	1115

4.822	spying/4	1115
4.823	standard_deviation/2	1115
4.824	start/0	1115
4.825	start_redirect_to_file/2	1115
4.826	started_by/2	1115
4.827	starts/2	1116
4.828	stop/0	1116
4.829	stop_redirect_to_file/0	1116
4.830	stream_to_bytes/2	1116
4.831	stream_to_bytes/3	1116
4.832	stream_to_chars/2	1116
4.833	stream_to_chars/3	1116
4.834	stream_to_codes/2	1116
4.835	stream_to_codes/3	1117
4.836	stream_to_terms/2	1117
4.837	stream_to_terms/3	1117
4.838	subclass/1	1117
4.839	subclasses/1	1117
4.840	sublist/2	1117
4.841	subsequence/3	1117
4.842	subsequence/4	1117
4.843	subset/2	1118
4.844	substitute/4	1118
4.845	subsumes/2	1118
4.846	subterm/2	1118
4.847	subtract/3	1118
4.848	succ/2	1118
4.849	suffix/2	1118
4.850	suffix/3	1119
4.851	sum/2	1119
4.852	superclass/1	1119
4.853	superclasses/1	1119
4.854	suspend_monitor/0	1119
4.855	swap/2	1119
4.856	swap_consecutive/2	1119
4.857	syndiff/3	1119
4.858	tab/0	1120
4.859	tabs//0	1120
4.860	take/3	1120
4.861	temporary_directory/1	1120
4.862	term_expansion/2	1120
4.863	terms_to_array/2	1120
4.864	test/1	1120
4.865	time_stamp/1	1120
4.866	timeout/1	1121
4.867	timestamp/2	1121
4.868	timestamp/8	1121
4.869	today/3	1121
4.870	tolerance_equal/4	1121
4.871	top/3	1121
4.872	top_next/5	1121
4.873	trace/0	1121
4.874	trace_event/2	1122
4.875	transpose/2	1122

4.876 true/1 . . . . .	1122
4.877 type/1 . . . . .	1122
4.878 unexpected/1 . . . . .	1122
4.879 unexpecteds/2 . . . . .	1122
4.880 uninstall/0 . . . . .	1122
4.881 uninstall/1 . . . . .	1122
4.882 uninstall/2 . . . . .	1123
4.883 union/3 . . . . .	1123
4.884 union/4 . . . . .	1123
4.885 union_all/3 . . . . .	1123
4.886 unpin/0 . . . . .	1123
4.887 unpin/1 . . . . .	1123
4.888 unzip/2 . . . . .	1123
4.889 update/0 . . . . .	1123
4.890 update/1 . . . . .	1124
4.891 update/2 . . . . .	1124
4.892 update/3 . . . . .	1124
4.893 update/4 . . . . .	1124
4.894 update/5 . . . . .	1124
4.895 update_in/4 . . . . .	1124
4.896 update_in/5 . . . . .	1124
4.897 uuid_null/1 . . . . .	1125
4.898 uuid_v1/2 . . . . .	1125
4.899 uuid_v4/1 . . . . .	1125
4.900 valid/1 . . . . .	1125
4.901 valid/2 . . . . .	1125
4.902 valid/3 . . . . .	1125
4.903 valid_date/3 . . . . .	1125
4.904 valid_option/1 . . . . .	1126
4.905 valid_options/1 . . . . .	1126
4.906 validate/1 . . . . .	1126
4.907 value/1 . . . . .	1126
4.908 value/3 . . . . .	1126
4.909 value_reference/2 . . . . .	1126
4.910 values/2 . . . . .	1126
4.911 variables/2 . . . . .	1126
4.912 variance/2 . . . . .	1127
4.913 variant/2 . . . . .	1127
4.914 varnumbers/2 . . . . .	1127
4.915 varnumbers/3 . . . . .	1127
4.916 verify_commands_availability/0 . . . . .	1127
4.917 version/6 . . . . .	1127
4.918 versions/3 . . . . .	1127
4.919 void/1 . . . . .	1127
4.920 void_element/1 . . . . .	1128
4.921 wall_time/1 . . . . .	1128
4.922 weighted_mean/3 . . . . .	1128
4.923 welcome/0 . . . . .	1128
4.924 when/2 . . . . .	1128
4.925 whiledo/2 . . . . .	1128
4.926 white_space//0 . . . . .	1128
4.927 white_spaces//0 . . . . .	1128
4.928 with_output_to/2 . . . . .	1129
4.929 without//2 . . . . .	1129

4.930	working_directory/1	1129
4.931	write_file/3	1129
4.932	write_stream/3	1129
4.933	write_term_to_atom/3	1129
4.934	write_term_to_chars/3	1129
4.935	write_term_to_chars/4	1129
4.936	write_term_to_codes/3	1130
4.937	write_term_to_codes/4	1130
4.938	write_to_atom/2	1130
4.939	write_to_chars/2	1130
4.940	write_to_codes/2	1130
4.941	z_normalization/2	1130
4.942	zero_or_more//0	1130
4.943	zero_or_more//1	1130
4.944	zero_or_more//2	1131
4.945	zip/2	1131
4.946	zip/3	1131
4.947	zip_at_index/4	1131
5	Indices and tables	1133
	Index	1135



## LIBRARIES

To load any library (including developer tools, ports, and contributions), use the goal `logtalk_load(library_name(loader))`. To run the library tests, use the goal `logtalk_load(library_name(tester))`. To load an entity, always load the loader file of the library that includes it to ensure that all required dependencies are also loaded and that any required flags are used. The loading goal can be found in the entity documentation.

### 1.1 arbitrary

category

#### 1.1.1 arbitrary

Adds predicates for generating and shrinking random values for selected types to the library type object. User extensible.

Availability:

```
logtalk_load(arbitrary(loader))
```

Author: Paulo Moura

Version: 2:35:1

Date: 2024-08-13

Compilation flags:

```
static
```

Complements:

```
type
```

Uses:

```
fast_random
```

```
integer
```

```
list
```

```
type
```

Remarks:

- Logtalk specific types: `entity`, `object`, `protocol`, `category`, `entity_identifier`, `object_identifier`, `protocol_identifier`, `category_identifier`, `event`, `predicate`.
- Prolog module related types (when the backend compiler supports modules): `module`, `module_identifier`, `qualified_callable`.
- Prolog base types: `term`, `var`, `nonvar`, `atomic`, `atom`, `number`, `integer`, `float`, `compound`, `callable`, `ground`.
- Atom derived types: `non_quoted_atom`, `non_empty_atom`, `non_empty_atom(CharSet)`, `boolean`, `character`, `in_character`, `char`, `operator_specifier`, `hex_char`.
- Atom derived parametric types: `atom(CharSet)`, `atom(CharSet,Length)`, `non_empty_atom(CharSet)`, `character(CharSet)`, `in_character(CharSet)`, `char(CharSet)`.
- Number derived types: `positive_number`, `negative_number`, `non_positive_number`, `non_negative_number`.
- Float derived types: `positive_float`, `negative_float`, `non_positive_float`, `non_negative_float`, `probability`.
- Integer derived types: `positive_integer`, `negative_integer`, `non_positive_integer`, `non_negative_integer`, `byte`, `in_byte`, `character_code`, `in_character_code`, `code`, `operator_priority`, `hex_code`.
- Integer derived parametric types: `character_code(CharSet)`, `in_character_code(CharSet)`, `code(CharSet)`.
- List types (compound derived types): `list`, `non_empty_list`, `partial_list`, `list_or_partial_list`, `list(Type)`, `list(Type,Length)`, `list(Type,Min,Max)`, `list(Type,Length,Min,Max)`, `non_empty_list(Type)`, `codes`, `chars`.
- Difference list types (compound derived types): `difference_list`, `difference_list(Type)`.
- List and difference list types length: The types that do not take a fixed length generate lists with a length in the `[0,MaxSize]` interval (`[1,MaxSize]` for non-empty list types).
- Predicate and non-terminal indicator types arity: These types generate indicators with an arity in the `[0,MaxSize]` interval.
- Other compound derived types: `compound(Name,Types)`, `predicate_indicator`, `non_terminal_indicator`, `predicate_or_non_terminal_indicator`, `clause`, `grammar_rule`, `pair`, `pair(KeyType,ValueType)`.
- Other types: `Object::Closure`, `between(Type,Lower,Upper)`, `property(Type,LambdaExpression)`, `one_of(Type,Set)`, `var_or(Type)`, `ground(Type)`, `types(Types)`, `types_frequency(Pairs)`, `transform(Type,Closure)`, `constrain(Type,Closure)`.
- Type `Object::Closure` notes: Allows calling public object predicates as generators and shrinkers. The `Closure` closure is extended with either a single argument, the generated arbitrary value, or with two arguments, when shrinking a value.
- Type `compound(Name,Types)` notes: Generate a random compound term with the given name with a random argument for each type.
- Type `types_frequency(Pairs)` notes: Generate a random term for one of the types in a list of Type-Frequency pairs. The type is randomly selected taking into account the types frequency.
- Type `transform(Type,Closure)` notes: Generate a random term by transforming the term generated for the given type using the given closure.

- Type constrain(Type,Closure) notes: Generate a random term for the given type that satisfy the given closure.
- Registering new types: Add clauses for the arbitrary/1-2 multifile predicates and optionally for the shrinker/1 and shrink/3 multifile predicates. The clauses must have a bound first argument to avoid introducing spurious choice-points.
- Shrinking values: The shrink/3 should either succeed or fail but never throw an exception.
- Character sets: ascii\_identifier, ascii\_printable, ascii\_full, byte, unicode\_bmp, unicode\_full.
- Default character sets: The default character set when using a parameterizable type that takes a character set parameter depends on the type.
- Default character sets: Entity, predicate, and non-terminal identifier types plus compound and callable types default to an ascii\_identifier functor. Character and character code types default to ascii\_full. Other types default to ascii\_printable.
- Caveats: The type argument (and any type parameterization) to the predicates is not type-checked (or checked for consistency) for performance reasons.
- Unicode limitations: Currently, correct character/code generation is only ensured for XVM and SWI-Prolog as other backends do not provide support for querying a Unicode code point category.

Inherited public predicates:

(none)

- Public predicates
  - arbitrary/1
  - arbitrary/2
  - shrinker/1
  - shrink/3
  - shrink\_sequence/3
  - edge\_case/2
  - get\_seed/1
  - set\_seed/1
  - max\_size/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

### arbitrary/1

Table of defined types for which an arbitrary value can be generated. A new type can be registered by defining a clause for this predicate and adding a clause for the arbitrary/2 multifile predicate.

Compilation flags:

static, multifile

Template:

arbitrary(Type)

Mode and number of proofs:

arbitrary(?callable) - zero\_or\_more

---

### arbitrary/2

Generates an arbitrary term of the specified type. Fails if the type is not supported. A new generator can be defined by adding a clause for this predicate and registering it via the arbitrary/1 predicate.

Compilation flags:

static, multifile

Template:

arbitrary(Type,Term)

Meta-predicate template:

arbitrary(:,\*)

Mode and number of proofs:

arbitrary(@callable,-term) - zero\_or\_one

---

### shrinker/1

Table of defined types for which a shrinker is provided. A new shrinker can be registered by defining a clause for this predicate and adding a definition for the shrink/3 multifile predicate.

Compilation flags:

static, multifile

---

Template:

shrinker(Type)

Mode and number of proofs:

shrinker(?callable) - zero\_or\_more

---

shrink/3

Shrinks a value to a smaller value if possible. Must generate a finite number of solutions. Fails if the type is not supported. A new shrinker can be defined by adding a clause for this predicate and registering it via the shrinker/1 predicate.

Compilation flags:

static, multifile

Template:

shrink(Type, Large, Small)

Mode and number of proofs:

shrink(@callable, @term, -term) - zero\_or\_more

---

shrink\_sequence/3

Shrinks a value repeatedly until shrinking is no longer possible returning the sequence of values (ordered from larger to smaller value). Fails if the type is not supported.

Compilation flags:

static

Template:

shrink\_sequence(Type, Value, Sequence)

Mode and number of proofs:

shrink\_sequence(@callable, @term, -list(term)) - zero\_or\_one

---

edge\_case/2

Table of type edge cases. Fails if the given type have no defined edge cases. New edge cases for existing or new types can be added by defining a clause for this multifile predicate.

Compilation flags:

static, multifile

Template:

edge\_case(Type,Term)

Mode and number of proofs:

edge\_case(?callable,?term) - zero\_or\_more

---

get\_seed/1

Gets the current random generator seed. Seed should be regarded as an opaque ground term.

Compilation flags:

static

Template:

get\_seed(Seed)

Mode and number of proofs:

get\_seed(-ground) - one

---

set\_seed/1

Sets the random generator seed to a given value returned by calling the get\_seed/1 predicate.

Compilation flags:

static

Template:

set\_seed(Seed)

Mode and number of proofs:

set\_seed(+ground) - one

---

`max_size/1`

User defined maximum size for types where its meaningful and implicit. When not defined, defaults to 42. When multiple definitions exist, the first valid one found is used.

Compilation flags:  
    `static, multifile`

Template:  
    `max_size(Size)`  
Mode and number of proofs:  
    `max_size(?positive_integer) - zero_or_one`

---

### **Protected predicates**

(no local declarations; see entity ancestors if any)

### **Private predicates**

(no local declarations; see entity ancestors if any)

### **Operators**

(none)

See also:

`type`

## **1.2 assertions**

object

### 1.2.1 assertions

Proxy object for simplifying the use of the assertion meta-predicates.

Availability:

```
logtalk_load(assertions(loader))
```

Author: Paulo Moura

Version: 2:0:0

Date: 2014-04-03

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public assertions(_)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
assertion/1 assertion/2 goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.2.2 assertions(Mode)

A simple assertions framework. Can be used as a hook object for either suppressing assertions (production mode) or expanding them with file context information (debug mode).

Availability:

```
logtalk_load(assertions(loader))
```

Author: Paulo Moura

Version: 2:2:2

Date: 2022-07-04

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Uses:

```
logtalk
```

Remarks:

(none)

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
  - assertion/1

- assertion/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

assertion/1

Checks that an assertion is true. Uses the structured message printing mechanism for printing the results using a silent message for assertion success and a error message for assertion failure.

Compilation flags:  
static

Template:  
assertion(Goal)

Meta-predicate template:  
assertion(0)

Mode and number of proofs:  
assertion(@callable) - one

---

assertion/2

Checks that an assertion is true. Uses the structured message printing mechanism for printing the results using a silent message for assertion success and a error message for assertion failure. The context argument can be used to e.g. pass location data.

Compilation flags:  
static

Template:  
assertion(Context,Goal)

Meta-predicate template:  
assertion(\*,0)

Mode and number of proofs:  
assertion(@term,@callable) - one

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

category

### 1.2.3 assertions\_messages

Assertions framework default message translations.

Availability:

```
logtalk_load(assertions(loader))
```

Author: Paulo Moura

Version: 2:2:0

Date: 2018-02-20

Compilation flags:

```
static
```

Provides:

```
logtalk::message_prefix_stream/4
```

```
logtalk::message_tokens//2
```

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates

- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.3 assignvars

object

### 1.3.1 assignvars

Assignable variables (supporting backtracable assignment of non-variable terms).

Availability:

```
logtalk_load(assignvars(loader))
```

Author: Nobukuni Kino and Paulo Moura

Version: 1:7:0

Date: 2018-07-11

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public assignvarsp
```

Remarks:

(none)

Inherited public predicates:

(<=)/2 (=>)/2 assignable/1 assignable/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.3.2 assignvarsp

Assignable variables (supporting backtracable assignment of non-variable terms) protocol.

Availability:

logtalk\_load(assignvars(loader))

Author: Nobukuni Kino and Paulo Moura

Version: 1:0:1

Date: 2019-06-10

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - assignable/1
  - assignable/2
  - (<=)/2
  - (=>)/2
- Protected predicates
- Private predicates
- Operators
  - op(100,xfx,<=)
  - op(100,xfx,=>)

## Public predicates

assignable/1

Makes Variable an assignable variable. Initial state will be empty.

Compilation flags:

static

Template:

assignable(Variable)

Mode and number of proofs:

assignable(--assignvar) - one

Exceptions:

Variable is not a variable:

type\_error(variable,Variable)

---

assignable/2

Makes Variable an assignable variable and sets its initial state to Value.

Compilation flags:

static

Template:

assignable(Variable, Value)

Mode and number of proofs:

assignable(--assignvar, @nonvar) - one

Exceptions:

Variable is not a variable:

type\_error(variable, Variable)

Value is not instantiated:

in instantiation\_error

---

(<=)/2

Sets the state of the assignable variable Variable to Value (initializing the variable if needed).

Compilation flags:

static

Template:

Variable<=Value

Mode and number of proofs:

(?assignvar)<=(@nonvar) - one

Exceptions:

Value is not instantiated:

in instantiation\_error

---

$(=>)/2$

Unifies Value with the current state of the assignable variable Variable.

Compilation flags:

static

Template:

Variable=>Value

Mode and number of proofs:

+assignvar=> ?nonvar - zero\_or\_one

Exceptions:

Variable is not instantiated:

instantiation\_error

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

op(100,xfx,<=)

Scope:

public

op(100,xfx,=>)

Scope:

public

See also:

assignvars

## 1.4 base64

object

### 1.4.1 base64

Base64 parser and generator.

Availability:

```
logtalk_load(base64(loader))
```

Author: Paulo Moura

Version: 0:10:0

Date: 2021-03-22

Compilation flags:

```
static, context_switching_calls
```

Uses:

```
reader
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - parse/2
  - generate/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

parse/2

Parses the Base64 data from the given source (atom(Atom), chars(List), codes(List), stream(Stream), or file(Path)) into a list of bytes.

Compilation flags:

static

Template:

parse(Source,Bytes)

Mode and number of proofs:

parse(++compound,--list(byte)) - one\_or\_error

---

generate/2

Generates Base64 in the representation specified in the first argument (atom(Atom), chars(List), codes(List), stream(Stream), or file(Path)) for the list of bytes in the second argument.

Compilation flags:

static

Template:

generate(Sink,Bytes)

Mode and number of proofs:

generate(+compound,+list(byte)) - one\_or\_error

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.4.2 base64url

Base64URL parser and generator.

Availability:

`logtalk_load(base64(loader))`

Author: Paulo Moura

Version: 0:9:0

Date: 2021-03-10

Compilation flags:

`static, context_switching_calls`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - `parse/2`
  - `generate/2`
- Protected predicates
- Private predicates
- Operators

## Public predicates

parse/2

Parses the Base64URL data from the given source (`atom(Atom)`, `chars(List)`, or `codes(List)`) into a URL (using the same format as the source).

Compilation flags:

static

Template:

parse(Source,URL)

Mode and number of proofs:

parse(++compound,--types([atom,chars,codes])) - one\_or\_error

---

generate/2

Generates Base64URL data in the representation specified in the first argument (`atom(Atom)`, `chars(List)`, or `codes(List)`) for the given URL (given in the same format as the sink).

Compilation flags:

static

Template:

generate(Sink,URL)

Mode and number of proofs:

generate(+compound,+types([atom,chars,codes])) - one\_or\_error

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

# 1.5 cbor

object

## 1.5.1 cbor

Concise Binary Object Representation (CBOR) format exporter and importer. Uses atoms to represent decoded CBOR strings.

Availability:

```
logtalk_load(cbor(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2021-03-04

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public cbor(atom)
```

Remarks:

(none)

Inherited public predicates:

```
generate/2 parse/2
```

- Public predicates
- Protected predicates
- Private predicates

- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.5.2 cbor(StringRepresentation)

- StringRepresentation - Text representation to be used when decoding CBOR strings. Possible values are atom (default), chars, and codes.

Concise Binary Object Representation (CBOR) format exporter and importer.

Availability:

```
logtalk_load(cbor(loader))
```

Author: Paulo Moura

Version: 0:11:1

Date: 2021-12-06

Compilation flags:

```
static, context_switching_calls
```

Uses:

```
list
```

Remarks:

```
(none)
```

Inherited public predicates:

(none)

- Public predicates
  - parse/2
  - generate/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

parse/2

Parses a list of bytes in the CBOR format returning the corresponding term representation. Throws an error when parsing is not possible (usually due to an invalid byte sequence).

Compilation flags:

static

Template:

parse(Bytes,Term)

Mode and number of proofs:

parse(@list(byte),-ground) - one\_or\_error

generate/2

Generates a list of bytes in the CBOR format representing the given term. Throws an error when generating is not possible (usually due to a term that have no CBOR corresponding representation).

Compilation flags:

static

Template:

generate(Term,Bytes)

Mode and number of proofs:

generate(@ground,-list(byte)) - one\_or\_error

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.6 code\_metrics

object

### 1.6.1 cc\_metric

Cyclomatic complexity metric. All defined predicates that are not called or updated are counted as graph connected components (the reasoning being that these predicates can be considered entry points). The score is represented by a non-negative integer.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Paulo Moura

Version: 0:5:2

Date: 2024-05-15

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public code_metrics_utilities  
public code_metric
```

Provides:

```
logtalk::message_tokens//2
```

Uses:

```
list  
logtalk
```

numberlist

Remarks:

(none)

Inherited public predicates:

all/0 all/1 all\_score/1 check\_option/1 check\_options/1 default\_option/1 default\_options/1  
 directory/1 directory/2 directory\_score/2 entity/1 entity\_score/2 file/1 file/2 file\_score/2  
 format\_entity\_score//2 library/1 library/2 library\_score/2 option/2 option/3 rdirectory/1  
 rdirectory/2 rdirectory\_score/2 rlibrary/1 rlibrary/2 rlibrary\_score/2 valid\_option/1  
 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

category

## 1.6.2 code\_metric

Core predicates for computing source code metrics.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Ebrahim Azarisooreh and Paulo Moura

Version: 0:12:1

Date: 2024-05-08

Compilation flags:

```
static
```

Extends:

```
public code_metrics_utilities
```

```
public options
```

Uses:

```
list
```

```
logtalk
```

```
os
```

```
type
```

Remarks:

```
(none)
```

Inherited public predicates:

```
check_option/1 check_options/1 default_option/1 default_options/1 option/2 option/3  
valid_option/1 valid_options/1
```

- Public predicates

- entity/1

- file/2

- file/1

- directory/2

- directory/1

- rdirectory/2

- rdirectory/1

- library/2

- library/1
- rlibrary/2
- rlibrary/1
- all/1
- all/0
- entity\_score/2
- library\_score/2
- rlibrary\_score/2
- file\_score/2
- directory\_score/2
- rdirectory\_score/2
- all\_score/1
- format\_entity\_score//2
- Protected predicates
  - process\_entity/2
  - process\_file/2
  - process\_directory/2
  - process\_rdirectory/2
  - process\_library/2
  - process\_rlibrary/2
  - process\_all/1
  - sub\_directory/2
  - sub\_library/2
- Private predicates
- Operators

### Public predicates

entity/1

Scans an entity and prints its metric score.

Compilation flags:

static

Template:

entity(Entity)

Mode and number of proofs:

entity(+term) - zero\_or\_one

---

file/2

Prints metric scores for all the entities defined in a loaded source file using the given options.

Compilation flags:

static

Template:

file(File,Options)

Mode and number of proofs:

file(+atom,+list(compound)) - zero\_or\_one

---

file/1

Prints metric scores for all the entities defined in a loaded source file using default options.

Compilation flags:

static

Template:

file(File)

Mode and number of proofs:

file(+atom) - zero\_or\_one

---

directory/2

Scans a directory and prints metric scores for all entities defined in its loaded source files using the given options.

Compilation flags:

static

---

---

Template:

directory(Directory,Options)

Mode and number of proofs:

directory(+atom,+list(compound)) - one

---

directory/1

Scans a directory and prints metric scores for all entities defined in its loaded source files using default options.

Compilation flags:

static

Template:

directory(Directory)

Mode and number of proofs:

directory(+atom) - one

---

rdirectory/2

Recursive version of the directory/1 predicate using the given options.

Compilation flags:

static

Template:

rdirectory(Directory,Options)

Mode and number of proofs:

rdirectory(+atom,+list(compound)) - one

---

rdirectory/1

Recursive version of the directory/1 predicate using default options.

Compilation flags:

static

Template:

rdirectory(Directory)

Mode and number of proofs:

rdirectory(+atom) - one

---

library/2

Prints metrics scores for all loaded entities from a given library using the given options.

Compilation flags:

static

Template:

library(Library,Options)

Mode and number of proofs:

library(+atom,+list(compound)) - one

---

library/1

Prints metrics scores for all loaded entities from a given library using default options.

Compilation flags:

static

Template:

library(Library)

Mode and number of proofs:

library(+atom) - one

---

rlibrary/2

Recursive version of the library/1 predicate using the given options.

Compilation flags:

static

Template:

rlibrary(Library,Options)

Mode and number of proofs:

rlibrary(+atom,+list(compound)) - one

---

rlibrary/1

Recursive version of the library/1 predicate using default options.

Compilation flags:

static

Template:

rlibrary(Library)

Mode and number of proofs:

rlibrary(+atom) - one

---

all/1

Scans all loaded entities and prints their metric scores using the given options.

Compilation flags:

static

Template:

all(Options)

Mode and number of proofs:

all(+list(compound)) - one

---

all/0

Scans all loaded entities and prints their metric scores using default options.

Compilation flags:

static

Mode and number of proofs:

all - one

---

entity\_score/2

Score is a term that represents the metric score associated with a loaded entity. Fails if the metric does not apply.

Compilation flags:

static

Template:

entity\_score(Entity,Score)

Mode and number of proofs:

entity\_score(@entity\_identifier,-ground) - zero\_or\_one

---

library\_score/2

Score is a term that represents the metric score associated with a loaded library source files. Fails if the metric does not apply.

Compilation flags:

static

Template:

library\_score(Library,Score)

Mode and number of proofs:

library\_score(@atom,-ground) - zero\_or\_one

---

rlibrary\_score/2

Score is a term that represents the metric score associated with loaded source files from a library and its sub-libraries. Fails if the metric does not apply.

Compilation flags:

static

Template:

rlibrary\_score(Library,Score)

Mode and number of proofs:

rlibrary\_score(@atom,-ground) - zero\_or\_one

---

file\_score/2

Score is a term that represents the metric score associated with a loaded source file. Fails if the metric does not apply.

Compilation flags:

static

Template:

file\_score(File,Score)

Mode and number of proofs:

file\_score(@atom,-ground) - zero\_or\_one

---

directory\_score/2

Score is a term that represents the metric score associated with loaded source files from a directory. Fails if the metric does not apply.

Compilation flags:

static

Template:

directory\_score(Directory,Score)

Mode and number of proofs:

directory\_score(@atom,-ground) - zero\_or\_one

---

rdirectory\_score/2

Score is a term that represents the metric score associated with loaded source files from a directory and its sub-directories. Fails if the metric does not apply.

Compilation flags:

static

Template:

rdirectory\_score(Directory,Score)

Mode and number of proofs:

rdirectory\_score(@atom,-ground) - zero\_or\_one

---

all\_score/1

Score is a term that represents the metric score associated with all loaded source files. Fails if the metric does not apply.

Compilation flags:

static

Template:

all\_score(Score)

Mode and number of proofs:

all\_score(-ground) - zero\_or\_one

---

---

`format_entity_score//2`

Formats the entity score for pretty printing.

Compilation flags:

`static`

Template:

`format_entity_score(Entity,Score)`

Mode and number of proofs:

`format_entity_score(@entity_identifier,+ground) - one`

---

### Protected predicates

`process_entity/2`

Processes an entity of the given kind.

Compilation flags:

`static`

Template:

`process_entity(Kind,Entity)`

Mode and number of proofs:

`process_entity(+atom,@entity_identifier) - one`

---

`process_file/2`

Processes a source file using the given options.

Compilation flags:

`static`

Template:

`process_file(Path,Options)`

Mode and number of proofs:

`process_file(+atom,+list(compound)) - one`

---

`process_directory/2`

Processes a directory of source files using the given options.

Compilation flags:

`static`

Template:

`process_directory(Path,Options)`

Mode and number of proofs:

`process_directory(+atom,+list(compound)) - one`

---

`process_rdirectory/2`

Recursively process a directory of source files using the given options.

Compilation flags:

`static`

Template:

`process_rdirectory(Path,Options)`

Mode and number of proofs:

`process_rdirectory(+atom,+list(compound)) - one`

---

`process_library/2`

Processes a library of source files using the given options.

Compilation flags:

`static`

Template:

`process_library(Library,Options)`

Mode and number of proofs:

`process_library(+atom,+list(compound)) - one`

---

`process_rlibrary/2`

Recursively process a library of source files using the given options.

Compilation flags:

`static`

Template:

`process_rlibrary(Library,Options)`

Mode and number of proofs:

`process_rlibrary(+atom,+list(compound)) - one`

---

`process_all/1`

Processes all loaded source code using the given options.

Compilation flags:

`static`

Template:

`process_all(Options)`

Mode and number of proofs:

`process_all(+list(compound)) - one`

---

`sub_directory/2`

Enumerates, by backtracking, all directory sub-directories containing loaded files.

Compilation flags:

`static`

Template:

sub\_directory(Directory,SubDirectory)

Mode and number of proofs:

sub\_directory(+atom,-atom) - one

---

sub\_library/2

Enumerates, by backtracking, all library sub-libraries.

Compilation flags:

static

Template:

sub\_library(Library,SubLibrary)

Mode and number of proofs:

sub\_library(+atom,-atom) - one

---

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.6.3 code\_metrics

Helper object to apply all loaded code metrics.

Availability:

logtalk\_load(code\_metrics(loader))

Author: Ebrahim Azarisooreh and Paulo Moura

Version: 0:1:0

Date: 2017-12-31

Compilation flags:

---

static, context\_switching\_calls

Imports:

public code\_metric

Uses:

logtalk

Remarks:

(none)

Inherited public predicates:

all/0 all/1 all\_score/1 check\_option/1 check\_options/1 default\_option/1 default\_options/1  
 directory/1 directory/2 directory\_score/2 entity/1 entity\_score/2 file/1 file/2 file\_score/2  
 format\_entity\_score//2 library/1 library/2 library\_score/2 option/2 option/3 rdirectory/1  
 rdirectory/2 rdirectory\_score/2 rlibrary/1 rlibrary/2 rlibrary\_score/2 valid\_option/1  
 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

category

### 1.6.4 code\_metrics\_messages

Message translations for the code\_metrics tool.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Ebrahim Azarisooreh and Paulo Moura

Version: 0:8:0

Date: 2022-05-05

Compilation flags:

```
static
```

Provides:

```
logtalk::message_prefix_stream/4
```

```
logtalk::message_tokens//2
```

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

category

## 1.6.5 code\_metrics\_utilities

Internal predicates for analyzing source code.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Ebrahim Azarisooreh

Version: 0:7:0

Date: 2024-03-28

Compilation flags:

```
static
```

Uses:

```
list
```

```
logtalk
```

Remarks:

- Usage: This is meant to be imported by any metric added to the system.
- Predicate Scope: This is meant for internal use by metrics only. As such, all provided predicates are protected.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
  - ancestor/4
  - current\_entity/1
  - declares\_predicate/2
  - defines\_predicate/2
  - defines\_predicate/3
  - entity\_calls/3
  - entity\_kind/2
  - entity\_property/2
  - entity\_updates/3
  - not\_excluded\_file/3
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

ancestor/4

True if Entity descends from Ancestor, and EntityKind and AncestorKind unify with their respective entity types.

Compilation flags:

static

Template:

ancestor(EntityKind,Entity,AncestorKind,Ancestor)

Mode and number of proofs:

ancestor(?entity,?entity\_identifier,?entity,?entity\_identifier) - zero\_or\_more

---

current\_entity/1

True if Entity is a currently loaded entity.

Compilation flags:

static

Template:

current\_entity(Entity)

Mode and number of proofs:

current\_entity(?entity\_identifier) - zero\_or\_more

---

declares\_predicate/2

True if Entity declares Predicate internally.

Compilation flags:

static

Template:

declares\_predicate(Entity,Predicate)

Mode and number of proofs:

declares\_predicate(?entity\_identifier,?predicate\_indicator) - zero\_or\_more

---

defines\_predicate/2

True if Entity defines an implementation of Predicate internally. Auxiliary predicates are excluded from results.

Compilation flags:

static

Template:

defines\_predicate(Entity,Predicate)

Mode and number of proofs:

defines\_predicate(?entity\_identifier,?predicate\_indicator) - zero\_or\_more

---

`defines_predicate/3`

Same as `defines_predicate/2`, except `Property` is unified with a property of the predicate.

Compilation flags:

`static`

Template:

`defines_predicate(Entity,Predicate,Property)`

Mode and number of proofs:

`defines_predicate(?entity_identifier,?predicate_indicator,?term) - zero_or_more`

---

`entity_calls/3`

True if a predicate `Caller` within `Entity` makes a `Call`.

Compilation flags:

`static`

Template:

`entity_calls(Entity,Caller,Call)`

Mode and number of proofs:

`entity_calls(?entity_identifier,?predicate_indicator,?predicate_indicator) - zero_or_one`

---

`entity_kind/2`

True if `Kind` defines `Entity` and is one of `category`, `protocol`, or `object`.

Compilation flags:

`static`

Template:

`entity_kind(Entity,Kind)`

Mode and number of proofs:

---

`entity_kind(+entity_identifier,-entity) - zero_or_one`

---

`entity_property/2`

True if Property is a valid property of Entity. Entity can be either a category, a protocol, or an object.

Compilation flags:

`static`

Template:

`entity_property(Entity,Property)`

Mode and number of proofs:

`entity_property(+entity_identifier,-term) - zero_or_more`

---

`entity_updates/3`

True if a predicate Updater within Entity makes a dynamic update to Updated (by using e.g. the `asserta/1` or `retract/1` predicates).

Compilation flags:

`static`

Template:

`entity_updates(Entity,Updater,Updated)`

Mode and number of proofs:

`entity_updates(+entity_identifier,?predicate_indicator,?predicate_indicator) - zero_or_one`

---

`not_excluded_file/3`

True if the file is not being excluded.

Compilation flags:

`static`

---

Template:

```
not_excluded_file(ExcludedFiles,Path,Basename)
```

Mode and number of proofs:

```
not_excluded_file(+list(atom),+atom,+atom) - zero_or_one
```

---

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.6.6 coupling\_metric

Computes entity efferent coupling, afferent coupling, and instability.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Ebrahim Azarisooreh and Paulo Moura

Version: 0:14:0

Date: 2024-03-27

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public code_metrics_utilities  
public code_metric
```

Uses:

```
list
```

Remarks:

- Efferent coupling (Ce): Number of entities that an entity depends on.
- Afferent coupling (Ca): Number of entities that depend on an entity.

- Instability (I): Computed as  $Ce / (Ce + Ca)$ . Measures the entity resilience to change. Ranging from 0 to 1, with 0 indicating a maximally stable entity and 1 indicating a maximally unstable entity. Ideally, an entity is either maximally stable or maximally unstable.
- Abstractness (A): Computed as the ratio between the number of static predicates with scope directives without a local definition and the number of static predicates with scope directives. Measures the rigidity of an entity. Ranging from 0 to 1, with 0 indicating a fully concrete entity and 1 indicating a fully abstract entity.
- Entity score: Represented as the compound term `ce_ca_i_a(Ce,Ca,I,A)`.
- Dependencies count: Includes direct entity relations plus calls or dynamic updates to predicates in external objects or categories.

Inherited public predicates:

```
all/0 all/1 all_score/1 check_option/1 check_options/1 default_option/1 default_options/1
directory/1 directory/2 directory_score/2 entity/1 entity_score/2 file/1 file/2 file_score/2
format_entity_score//2 library/1 library/2 library_score/2 option/2 option/3 rdirectory/1
rdirectory/2 rdirectory_score/2 rlibrary/1 rlibrary/2 rlibrary_score/2 valid_option/1
valid_options/1
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.6.7 dit\_metric

Analyzes the depth of inheritance for objects, protocols, and categories.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Ebrahim Azarisooreh

Version: 0:6:1

Date: 2024-03-28

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public code_metrics_utilities
```

```
public code_metric
```

Uses:

```
numberlist
```

Remarks:

- Depth: The depth is the maximum length of a node to the root entity. Lower scores are generally better.
- Inheritance: A level of inheritance defined by either one of specialization, instantiation, extension, importation, or implementation.
- Scoring: The maximum path length is determined for each entity in question.

Inherited public predicates:

```
all/0 all/1 all_score/1 check_option/1 check_options/1 default_option/1 default_options/1  
directory/1 directory/2 directory_score/2 entity/1 entity_score/2 file/1 file/2 file_score/2  
format_entity_score//2 library/1 library/2 library_score/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory_score/2 rlibrary/1 rlibrary/2 rlibrary_score/2 valid_option/1  
valid_options/1
```

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.6.8 doc\_metric

Entity and entity predicates documentation score.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Paulo Moura

Version: 0:13:0

Date: 2022-05-05

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public code_metrics_utilities  
public code_metric
```

Uses:

```
list
```

numberlist

Remarks:

- Score range: Score is a integer percentage where a 100% score means that all expected documentation information is present.
- Score weights: The score is split by default between 20% for the entity documentation and 80% for the entity predicates documentation, Can be customized using the predicate `entity_predicates_weights_hook/2`.
- Score customization: The individual scores of entity info/1 pairs and predicate info/2 pairs can be customized using the `entity_info_pair_score_hook/3` and `predicate_info_pair_score_hook/4` predicates.

Inherited public predicates:

`all/0 all/1 all_score/1 check_option/1 check_options/1 default_option/1 default_options/1 directory/1 directory/2 directory_score/2 entity/1 entity_score/2 file/1 file/2 file_score/2 format_entity_score/2 library/1 library/2 library_score/2 option/2 option/3 rdirectory/1 rdirectory/2 rdirectory_score/2 rlibrary/1 rlibrary/2 rlibrary_score/2 valid_option/1 valid_options/1`

- Public predicates
  - `entity_predicates_weights_hook/2`
  - `entity_info_score_hook/2`
  - `entity_info_pair_score_hook/3`
  - `predicate_mode_score_hook/3`
  - `predicate_mode_score_hook/5`
  - `predicate_info_score_hook/3`
  - `predicate_info_pair_score_hook/4`
- Protected predicates
- Private predicates
- Operators

## Public predicates

`entity_predicates_weights_hook/2`

Relative weight between entity documentation and predicates documentation in percentage. The sum of the two values must be equal to 100.

Compilation flags:

`dynamic, multifile`

Template:

entity\_predicates\_weights\_hook(EntityWeight,PredicatesWeight)

Mode and number of proofs:

entity\_predicates\_weights\_hook(?integer,?integer) - zero\_or\_one

---

entity\_info\_score\_hook/2

Maximum score for entity info/1 directives.

Compilation flags:

dynamic, multifile

Template:

entity\_info\_score\_hook(Entity,MaximumScore)

Mode and number of proofs:

entity\_info\_score\_hook(?term,?integer) - zero\_or\_one

---

entity\_info\_pair\_score\_hook/3

Score for relevant entity info/1 directive pairs. If defined, the entity\_info\_score\_hook/2 predicate should be defined accordingly.

Compilation flags:

dynamic, multifile

Template:

entity\_info\_pair\_score\_hook(Pair,Entity,Score)

Mode and number of proofs:

entity\_info\_pair\_score\_hook(?callable,?term,?integer) - zero\_or\_more

---

predicate\_mode\_score\_hook/3

Maximum score for predicate mode/2 directives.

Compilation flags:  
dynamic, multifile

Template:  
predicate\_mode\_score\_hook(Entity,Predicate,MaximumScore)

Mode and number of proofs:  
predicate\_mode\_score\_hook(?term,?term,?integer) - zero\_or\_more

---

predicate\_mode\_score\_hook/5

Score for a predicate mode/2 directive. If defined, the predicate\_mode\_score\_hook/3 predicate should be defined accordingly.

Compilation flags:  
dynamic, multifile

Template:  
predicate\_mode\_score\_hook(Template,Solutions,Entity,Predicate,Score)

Mode and number of proofs:  
predicate\_mode\_score\_hook(?term,?term,?term,?term,?integer) - zero\_or\_one

---

predicate\_info\_score\_hook/3

Maximum score for predicate info/2 directives.

Compilation flags:  
dynamic, multifile

Template:  
predicate\_info\_score\_hook(Entity,Predicate,MaximumScore)

Mode and number of proofs:  
predicate\_info\_score\_hook(?term,?term,?integer) - zero\_or\_one

---

predicate\_info\_pair\_score\_hook/4

Score for a predicate info/2 directive pairs. If defined, the predicate\_info\_score\_hook/3 predicate should be defined accordingly.

Compilation flags:

dynamic, multifile

Template:

predicate\_info\_pair\_score\_hook(Pair,Entity,Predicate,Score)

Mode and number of proofs:

predicate\_info\_pair\_score\_hook(?callable,?term,?term,?integer) - zero\_or\_more

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.6.9 halstead\_metric

Computes Halstead complexity numbers for an entity using a Stroud of 18.

Availability:

logtalk\_load(code\_metrics(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2018-06-08

Compilation flags:

static, context\_switching\_calls

Extends:

public halstead\_metric(18)

Remarks:

(none)

Inherited public predicates:

all/0 all/1 all\_score/1 check\_option/1 check\_options/1 default\_option/1 default\_options/1  
directory/1 directory/2 directory\_score/2 entity/1 entity\_score/2 file/1 file/2 file\_score/2  
format\_entity\_score//2 library/1 library/2 library\_score/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory\_score/2 rlibrary/1 rlibrary/2 rlibrary\_score/2 valid\_option/1  
valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.6.10 `halstead_metric`(Stroud)

- Stroud - Coefficient for computing the time required to program.

Computes Halstead complexity numbers for an entity.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Paulo Moura

Version: 0:9:0

Date: 2024-03-27

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public code_metrics_utilities
public code_metric
```

Uses:

```
list
numberlist
pairs
```

Remarks:

- Definition of operators: Predicates declared, user-defined, and called are interpreted as operators. Built-in predicates and built-in control constructs are ignored.
- Definition of operands: Predicate arguments are abstracted and interpreted as operands. Note that this definition of operands is a significant deviation from the original definition, which used syntactic literals.
- P<sub>n</sub>: Number of distinct predicates (declared, defined, called, or updated).
- PAn: Number of predicate arguments (assumed distinct).
- C<sub>n</sub>: Number of predicate calls/updates + number of clauses.
- CAn: Number of predicate call/update arguments + number of clause head arguments.
- EV: Entity vocabulary:  $EV = P_n + PAn$ .
- EL: Entity length:  $EL = C_n + CAn$ .
- V: Volume:  $V = EL * \log_2(EV)$ .
- D: Difficulty:  $D = (P_n/2) * (CAn/An)$ .
- E: Effort:  $E = D * V$ .
- T: Time required to program:  $T = E/k$  seconds (k is the Stroud number; defaults to 18).

- B: Number of delivered bugs:  $B = V/3000$ .
- Entity score: Represented as the compound term `pn_pan_cn_can_ev_el_v_d_e_t_b/11`.

Inherited public predicates:

`all/0 all/1 all_score/1 check_option/1 check_options/1 default_option/1 default_options/1  
directory/1 directory/2 directory_score/2 entity/1 entity_score/2 file/1 file/2 file_score/2  
format_entity_score//2 library/1 library/2 library_score/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory_score/2 rlibrary/1 rlibrary/2 rlibrary_score/2 valid_option/1  
valid_options/1`

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

#### 1.6.11 `noc_metric`

Number of entity clauses metric. The score is represented using the compound term `number_of_clauses(Total, User)`.

Availability:

`logtalk_load(code_metrics(loader))`

Author: Ebrahim Azarisooreh and Paulo Moura

Version: 0:14:1  
Date: 2024-05-08

Compilation flags:  
static, context\_switching\_calls

Imports:  
public code\_metrics\_utilities  
public code\_metric

Provides:  
logtalk::message\_tokens//2

Uses:  
list  
logtalk

Remarks:  
(none)

Inherited public predicates:  
all/0 all/1 all\_score/1 check\_option/1 check\_options/1 default\_option/1 default\_options/1  
directory/1 directory/2 directory\_score/2 entity/1 entity\_score/2 file/1 file/2 file\_score/2  
format\_entity\_score//2 library/1 library/2 library\_score/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory\_score/2 rlibrary/1 rlibrary/2 rlibrary\_score/2 valid\_option/1  
valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.6.12 `nor_metric`

Number of entity rules metric. The score is represented using the compound term `number_of_rules(Total, User)`.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Paulo Moura

Version: 0:5:1

Date: 2024-05-08

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public code_metrics_utilities
```

```
public code_metric
```

Provides:

```
logtalk::message_tokens//2
```

Uses:

```
list
```

```
logtalk
```

Remarks:

```
(none)
```

Inherited public predicates:

all/0 all/1 all\_score/1 check\_option/1 check\_options/1 default\_option/1 default\_options/1  
 directory/1 directory/2 directory\_score/2 entity/1 entity\_score/2 file/1 file/2 file\_score/2  
 format\_entity\_score//2 library/1 library/2 library\_score/2 option/2 option/3 rdirectory/1  
 rdirectory/2 rdirectory\_score/2 rlibrary/1 rlibrary/2 rlibrary\_score/2 valid\_option/1  
 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.6.13 size\_metric

Source code size metric. Returned scores are upper bounds and based solely in source file sizes (expressed in bytes).

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Paulo Moura

Version: 0:7:1

Date: 2024-05-08

Compilation flags:

static, context\_switching\_calls

Imports:

public code\_metrics\_utilities  
public code\_metric

Provides:

logtalk::message\_tokens//2

Uses:

list  
logtalk  
numberlist  
os

Remarks:

(none)

Inherited public predicates:

all/0 all/1 all\_score/1 check\_option/1 check\_options/1 default\_option/1 default\_options/1  
directory/1 directory/2 directory\_score/2 entity/1 entity\_score/2 file/1 file/2 file\_score/2  
format\_entity\_score//2 library/1 library/2 library\_score/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory\_score/2 rlibrary/1 rlibrary/2 rlibrary\_score/2 valid\_option/1  
valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

**Public predicates**

(no local declarations; see entity ancestors if any)

**Protected predicates**

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.6.14 upn\_metric

Number of unique predicates nodes metric. The nodes include called and updated predicates independently of where they are defined. The score is represented by a non-negative integer.

Availability:

```
logtalk_load(code_metrics(loader))
```

Author: Paulo Moura

Version: 0:6:2

Date: 2024-05-15

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public code_metrics_utilities
```

```
public code_metric
```

Provides:

```
logtalk::message_tokens//2
```

Uses:

```
list
```

```
logtalk
```

```
numberlist
```

Remarks:

(none)

Inherited public predicates:

```
all/0 all/1 all_score/1 check_option/1 check_options/1 default_option/1 default_options/1
directory/1 directory/2 directory_score/2 entity/1 entity_score/2 file/1 file/2 file_score/2
format_entity_score//2 library/1 library/2 library_score/2 option/2 option/3 rdirectory/1
rdirectory/2 rdirectory_score/2 rlibrary/1 rlibrary/2 rlibrary_score/2 valid_option/1
valid_options/1
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.7 core

category

### 1.7.1 core\_messages

Logtalk core (compiler and runtime) default message tokenization.

Availability:

`built_in`

Author: Paulo Moura

Version: 1:137:0

Date: 2024-09-17

Compilation flags:

`static`

Provides:

logtalk::message\_prefix\_stream/4  
logtalk::message\_tokens//2

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.7.2 expanding

Term and goal expansion protocol.

Availability:

built\_in

Author: Paulo Moura

Version: 1:1:0

Date: 2016-07-12

Compilation flags:  
static, built\_in

Dependencies:  
(none)

Remarks:  
(none)

Inherited public predicates:  
(none)

- Public predicates
  - goal\_expansion/2
  - term\_expansion/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

goal\_expansion/2

Defines a goal expansion. Called recursively until a fixed point is reached on goals found while compiling a source file (except for goals wrapped using the `{}/1` compiler bypass control construct).

Compilation flags:  
static

Template:  
goal\_expansion(Goal,ExpandedGoal)  
Mode and number of proofs:  
goal\_expansion(+callable,-callable) - zero\_or\_one

term\_expansion/2

Defines a term expansion. Called until it succeeds on all terms read while compiling a source file (except for terms skipped by using the conditional compilation directives or wrapped using the `{}/1` compiler bypass control construct).

Compilation flags:

static

Template:

term\_expansion(Term,ExpandedTerms)

Mode and number of proofs:

term\_expansion(+term,-term) - zero\_or\_one

term\_expansion(+term,-list(term)) - zero\_or\_one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

protocol

## 1.7.3 forwarding

Message forwarding protocol.

Availability:

built\_in

Author: Paulo Moura

Version: 1:0:0

Date: 2013-05-04

Compilation flags:

static, built\_in

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - forward/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

forward/1

User-defined message forwarding handler, automatically called (if defined) by the runtime for any message that the receiving object does not understand.

Compilation flags:

static

Template:

forward(Message)

Mode and number of proofs:

forward(@callable) - zero\_or\_more

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

object

## 1.7.4 logtalk

Built-in object providing message printing, debugging, library, source file, and hacking methods.

Availability:

`built_in`

Author: Paulo Moura

Version: 2:0:0

Date: 2024-05-18

Compilation flags:

`static, built_in, context_switching_calls, threaded`

Dependencies:

(none)

Remarks:

- Default message kinds: `silent`, `silent(Key)`, `banner`, `help`, `comment`, `comment(Key)`, `information`, `information(Key)`, `warning`, `warning(Key)`, `error`, `error(Key)`, `debug`, `debug(Key)`, `question`, and `question(Key)`.
- Printing of silent messages: By default, silent messages are not printed. These messages are only useful when intercepted.
- Printing of banner and comment messages: By default, banner and comment messages are only printed when the report flag is turned on.
- Printing of help, information, and question messages: These messages are always printed by default as they provide requested output.
- Printing of warning messages: By default, warning messages are not printed when the report flag is turned off.

- Printing of error messages: These messages are always printed by default.
- Printing of debug messages: By default, debug messages are only printed when the debug flag is turned on. The compiler suppresses debug message printing goals when compiling in optimized mode.
- Meta messages: A meta message is a message that have another message as argument and is typically used for debugging messages. Meta messages avoid the need of defining tokenizer rules for every message but can be intercepted as any other message.
- Meta message @Message: By default, the message is printed as passed to the write/1 predicate followed by a newline.
- Meta message Key-Value: By default, the message is printed as “Key: Value” followed by a newline. The key is printed as passed to the write/1 predicate while the value is printed as passed to the writeq/1 predicate.
- Meta message Format+Arguments: By default, the message is printed as passed to the format/2 predicate.
- Meta message List: By default, the list items are printed indented one per line. The items are preceded by a dash and can be @Message, Key-Value, or Format+Arguments messages. If that is not the case, the item is printed as passed to the writeq/1 predicate.
- Meta message Title::List: By default, the title is printed followed by a newline and the indented list items, one per line. The items are printed as in the List meta message.
- Meta message [Stream,Prefix]>>Goal: By default, call user-defined Goal in the context of user. The use of a lambda expression allows passing the message stream and prefix. Printing the prefix is delegated to the goal.
- Meta message [Stream]>>Goal: By default, call user-defined Goal in the context of user. The use of a lambda expression allows passing the message stream.
- Message tokens: at\_same\_line, tab(Expression), nl, flush, Format-Arguments, term(Term,Options), ansi(Attributes,Format,Arguments), begin(Kind,Variable), and end(Variable).

Inherited public predicates:

(none)

- Public predicates
  - print\_message/3
  - print\_message\_tokens/3
  - print\_message\_token/4
  - message\_tokens//2
  - message\_prefix\_stream/4
  - message\_hook/4
  - ask\_question/5
  - question\_hook/6
  - question\_prompt\_stream/4
  - trace\_event/2

- debug\_handler/1
- active\_debug\_handler/1
- activate\_debug\_handler/1
- deactivate\_debug\_handler/0
- debug\_handler/3
- expand\_library\_path/2
- loaded\_file/1
- loaded\_file\_property/2
- file\_type\_extension/2
- compile\_aux\_clauses/1
- entity\_prefix/2
- compile\_predicate\_heads/4
- compile\_predicate\_indicators/3
- decompile\_predicate\_heads/4
- decompile\_predicate\_indicators/4
- execution\_context/7
- Protected predicates
- Private predicates
  - active\_debug\_handler\_/1
- Operators

## Public predicates

print\_message/3

Prints a message of the given kind for the specified component.

Compilation flags:

static

Template:

print\_message(Kind,Component,Message)

Mode and number of proofs:

print\_message(+nonvar,+nonvar,+nonvar) - one

`print_message_tokens/3`

Print the messages tokens to the given stream, prefixing each line with the specified atom.

Compilation flags:

`static`

Template:

`print_message_tokens(Stream,Prefix,Tokens)`

Mode and number of proofs:

`print_message_tokens(@stream_or_alias,+atom,@list(nonvar)) - one`

---

`print_message_token/4`

User-defined hook predicate for printing a message token (see this object remarks).

Compilation flags:

`dynamic, multifile`

Template:

`print_message_token(Stream,Prefix,Token,Tokens)`

Mode and number of proofs:

`print_message_token(@stream_or_alias,@atom,@nonvar,@list(nonvar)) - zero_or_one`

---

`message_tokens//2`

User-defined hook grammar rule for converting a message into a list of tokens (see this object remarks).

Compilation flags:

`dynamic, multifile`

Template:

`message_tokens(Message,Component)`

Mode and number of proofs:

`message_tokens(+nonvar,+nonvar) - zero_or_one`

---

---

message\_prefix\_stream/4

Message line prefix and output stream to be used when printing a message given its kind and component.

Compilation flags:

dynamic, multifile

Template:

message\_prefix\_stream(Kind,Component,Prefix,Stream)

Mode and number of proofs:

message\_prefix\_stream(?nonvar,?nonvar,?atom,?stream\_or\_alias) - zero\_or\_more

---

message\_hook/4

User-defined hook predicate for intercepting message printing calls.

Compilation flags:

dynamic, multifile

Template:

message\_hook(Message,Kind,Component,Tokens)

Mode and number of proofs:

message\_hook(+nonvar,+nonvar,+nonvar,+list(nonvar)) - zero\_or\_one

---

ask\_question/5

Asks a question and reads the answer until the check predicate is true.

Compilation flags:

static

Template:

ask\_question(Kind,Component,Question,Check,Answer)

Meta-predicate template:

ask\_question(\*,\*,\*,1,\*)

Mode and number of proofs:

ask\_question(+nonvar,+nonvar,+nonvar,+callable,-term) - one

---

question\_hook/6

User-defined hook predicate for intercepting question asking calls.

Compilation flags:

dynamic, multifile

Template:

```
question_hook(Question,Kind,Component,Tokens,Check,Answer)
```

Meta-predicate template:

```
question_hook(*,*,*,*,1,*)
```

Mode and number of proofs:

```
question_hook(+nonvar,+nonvar,+nonvar,+list(nonvar),+callable,-term) - zero_or_one
```

---

question\_prompt\_stream/4

Prompt and input stream to be used when asking a question given its kind and component.

Compilation flags:

dynamic, multifile

Template:

```
question_prompt_stream(Kind,Component,Prompt,Stream)
```

Mode and number of proofs:

```
question_prompt_stream(?nonvar,?nonvar,?atom,?stream_or_alias) - zero_or_more
```

---

trace\_event/2

Trace event handler. The runtime calls all trace event handlers using a failure-driven loop before calling the debug event handler.

Compilation flags:

dynamic, multifile

Template:

```
trace_event(Event,ExecutionContext)
```

Mode and number of proofs:

```
trace_event(@callable,@execution_context) - zero
```

Remarks:

- Unification events: Generated after a successful unification with a fact - fact(Entity,Fact,Clause,File,Line) - or a rule head - rule(Entity,Head,Clause,File,Line).
- Goal events: Generated when calling a goal: top\_goal(Goal,CompiledGoal) or goal(Goal,CompiledGoal).

debug\_handler/1

Enumerates, by backtracking, all declared debug handler providers. Define a clause for this predicate to declare a new debug handler provider.

Compilation flags:

```
static, multifile
```

Template:

```
debug_handler(Provider)
```

Mode and number of proofs:

```
debug_handler(?object_identifier) - zero_or_more
```

```
debug_handler(?category_identifier) - zero_or_more
```

active\_debug\_handler/1

Current active debug handler provider if any. There is at most one active debug handler provider at any given moment.

Compilation flags:

```
static
```

Template:

```
active_debug_handler(Provider)
```

Mode and number of proofs:

```
active_debug_handler(?category_identifier) - zero_or_one
```

```
active_debug_handler(?category_identifier) - zero_or_one
```

---

`activate_debug_handler/1`

Activates the given debug handler provider. There is at most one active debug handler provider at any given moment. Fails if the object or category is not declared as a debug handler provider.

Compilation flags:

`static`

Template:

`activate_debug_handler(Provider)`

Mode and number of proofs:

`activate_debug_handler(@object_identifier) - zero_or_one`

`activate_debug_handler(@category_identifier) - zero_or_one`

---

`deactivate_debug_handler/0`

Deactivates the current debug handler provider if any.

Compilation flags:

`static`

Mode and number of proofs:

`deactivate_debug_handler - one`

---

`debug_handler/3`

Debug event handler. Called by the runtime when the given provider is active.

Compilation flags:

`static, multifile`

Template:

`debug_handler(Provider,Event,ExecutionContext)`

Mode and number of proofs:

---

debug\_handler(+object\_identifier,+callable,+execution\_context) - zero\_or\_more  
 debug\_handler(+category\_identifier,+callable,+execution\_context) - zero\_or\_more

Remarks:

- Unification events: Generated after a successful unification with a fact - fact(Entity,Fact,Clause,File,Line) - or a rule head - rule(Entity,Head,Clause,File,Line).
- Goal events: Generated when calling a goal: top\_goal(Goal,CompiledGoal) or goal(Goal,CompiledGoal).

---

expand\_library\_path/2

Expands a library alias or a library path into its absolute path. Uses a depth bound to prevent loops.

Compilation flags:

static

Template:

expand\_library\_path(LibraryPath,AbsolutePath)

Mode and number of proofs:

expand\_library\_path(+atom,?atom) - zero\_or\_one

expand\_library\_path(+callable,?atom) - zero\_or\_one

---

loaded\_file/1

Enumerates, by backtracking, all loaded files, returning their full paths.

Compilation flags:

static

Template:

loaded\_file(Path)

Mode and number of proofs:

loaded\_file(?atom) - zero\_or\_more

---

loaded\_file\_property/2

Enumerates, by backtracking, loaded file properties.

Compilation flags:

static

Template:

loaded\_file\_property(Path,Property)

Mode and number of proofs:

loaded\_file\_property(?atom,?compound) - zero\_or\_more

Remarks:

- Property basename/1: Basename of the file (includes the file extension, if any).
- Property directory/1: Directory of the file (ending with a slash).
- Property mode/1: Compilation mode of the file (possible values are optimal, normal, and debug).
- Property flags/1: Explicit flags used for compiling the file.
- Property text\_properties/1: List of the file text properties (encoding/1 and bom/1). Empty if no encoding/1 directive is present and the stream used for reading the file does not have a bom/1 (or equivalent) property.
- Property target/1: Full path of the generated intermediate Prolog file.
- Property modified/1: File modification time stamp (should be regarded as an opaque but otherwise comparable term).
- Property parent/1: Full path of the parent file that loaded the file.
- Property includes/1: Full path of a file included by the file.
- Property library/1: Library alias for the library that includes the file.
- Property object/1: Identifier for an object defined in the file.
- Property protocol/1: Identifier for a protocol defined in the file.
- Property category/1: Identifier for a category defined in the file.

---

file\_type\_extension/2

Enumerates, by backtracking, all defined file type extensions. The defined types are: source, object, logtalk, prolog, and tmp. The source type returns both logtalk and prolog type extensions.

Compilation flags:

static

Template:

`file_type_extension(Type,Extension)`

Mode and number of proofs:

`file_type_extension(?atom,?atom) - zero_or_more`

---

`compile_aux_clauses/1`

Compiles a list of auxiliary clauses. Can only be called during source file compilation, usually from `term_expansion/2` or `goal_expansion/2` hook predicate definitions.

Compilation flags:

`static`

Template:

`compile_aux_clauses(Clauses)`

Mode and number of proofs:

`compile_aux_clauses(@list(clause)) - one`

---

`entity_prefix/2`

Converts between an entity identifier and the entity prefix that is used for its compiled code. When none of the arguments is instantiated, it returns the identifier and the prefix of the entity under compilation, if any.

Compilation flags:

`static`

Template:

`entity_prefix(Entity,Prefix)`

Mode and number of proofs:

`entity_prefix(?entity_identifier,?atom) - zero_or_one`

---

`compile_predicate_heads/4`

Compiles clause heads. The heads are compiled in the context of the entity under compilation when the entity argument is not instantiated.

Compilation flags:

`static`

Template:

`compile_predicate_heads(Heads,Entity,CompiledHeads,ExecutionContext)`

Mode and number of proofs:

`compile_predicate_heads(@list(callable),?entity_identifier,-list(callable),@execution_context) - zero_or_one`

`compile_predicate_heads(@conjunction(callable),?entity_identifier,-conjunction(callable),@execution_context) - zero_or_one`

`compile_predicate_heads(@callable,?entity_identifier,-callable,@execution_context) - zero_or_one`

---

`compile_predicate_indicators/3`

Compiles predicate indicators. The predicate are compiled in the context of the entity under compilation when the entity argument is not instantiated.

Compilation flags:

`static`

Template:

`compile_predicate_indicators(PredicateIndicators,Entity,CompiledPredicateIndicators)`

Mode and number of proofs:

`compile_predicate_indicators(@list(predicate_indicator),?entity_identifier,-list(predicate_indicator)) - zero_or_one`

`compile_predicate_indicators(@conjunction(predicate_indicator),?entity_identifier,-conjunction(predicate_indicator)) - zero_or_one`

`compile_predicate_indicators(@predicate_indicator,?entity_identifier,-predicate_indicator) - zero_or_one`

---

---

decompile\_predicate\_heads/4

Decompiles clause heads. All compiled clause heads must belong to the same entity, which must be loaded.

Compilation flags:

static

Template:

decompile\_predicate\_heads(CompiledHeads,Entity,Type,Heads)

Mode and number of proofs:

decompile\_predicate\_heads(@list(callable),-entity\_identifier,-atom,-list(callable)) - zero\_or\_one

decompile\_predicate\_heads(@conjunction(callable),-entity\_identifier,-atom,-conjunction(callable)) - zero\_or\_one

decompile\_predicate\_heads(@callable,-entity\_identifier,-atom,-callable) - zero\_or\_one

---

decompile\_predicate\_indicators/4

Decompiles predicate indicators. All compiled predicate indicators must belong to the same entity, which must be loaded.

Compilation flags:

static

Template:

decompile\_predicate\_indicators(CompiledPredicateIndicators,Entity,Type,PredicateIndicators)

Mode and number of proofs:

decompile\_predicate\_indicators(@list(predicate\_indicator),-entity\_identifier,-atom,  
-list(predicate\_indicator)) - zero\_or\_one

decompile\_predicate\_indicators(@conjunction(predicate\_indicator),-entity\_identifier,-atom,  
-conjunction(predicate\_indicator)) - zero\_or\_one

decompile\_predicate\_indicators(@predicate\_indicator,-entity\_identifier,-atom,-predicate\_indicator)  
- zero\_or\_one

---

`execution_context/7`

Execution context term data. Execution context terms should be considered opaque terms subject to change without notice.

Compilation flags:

`static`

Template:

`execution_context(ExecutionContext,Entity,Sender,This,Self,MetaCallContext,CoinductionStack)`

Mode and number of proofs:

`execution_context(?nonvar,?entity_identifier,?object_identifier,?object_identifier,?object_identifier,  
@list(callable),@list(callable)) - zero_or_one`

---

## Protected predicates

(none)

## Private predicates

`active_debug_handler_/1`

Current active debug handler provider. There is at most one active debug handler provider at any given moment.

Compilation flags:

`dynamic`

Template:

`active_debug_handler_(Provider)`

Mode and number of proofs:

`active_debug_handler_(?entity_identifier) - zero_or_one`

---

## Operators

(none)

protocol

### 1.7.5 monitoring

Event handlers protocol. The handlers are automatically called by the runtime for messages sent using the `::/2` control construct from objects or categories compiled with the events flag set to allow.

Availability:

built\_in

Author: Paulo Moura

Version: 1:2:0

Date: 2018-11-29

Compilation flags:

static, built\_in

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - before/3
  - after/3
- Protected predicates
- Private predicates
- Operators

## Public predicates

before/3

Event handler for before events. A before event handler may prevent a method from being looked up or called by failing.

Compilation flags:

static

Template:

before(Object,Message,Sender)

Mode and number of proofs:

before(?term,?term,?term) - zero\_or\_more

---

after/3

Event handler for after events. An after event handler may prevent a method from succeeding by failing.

Compilation flags:

static

Template:

after(Object,Message,Sender)

Mode and number of proofs:

after(?term,?term,?term) - zero\_or\_more

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

object

### 1.7.6 user

Pseudo-object representing the plain Prolog database. Can be used as a monitor by defining `before/3` and `after/3` predicates. Can be used as a hook object by defining `term_expansion/2` and `goal_expansion/2` multifile and dynamic predicates.

Availability:

`built_in`

Author: Paulo Moura

Version: 1:5:0

Date: 2022-10-12

Compilation flags:

`static`, `built_in`, `context_switching_calls`, `dynamic_declarations`, `threaded`

Implements:

`public expanding`

`public forwarding`

`public monitoring`

Uses:

`user`

Remarks:

(none)

Inherited public predicates:

`after/3` `before/3` `forward/1` `goal_expansion/2` `term_expansion/2`

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)

- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.8 coroutining

object

### 1.8.1 coroutining

Coroutining predicates.

Availability:

`logtalk_load(coroutining(loader))`

Author: Paulo Moura

Version: 0:5:0

Date: 2021-12-17

Compilation flags:

`static, context_switching_calls`

Dependencies:

(none)

Remarks:

- Supported backend Prolog systems: ECLiPSe, XVM, SICStus Prolog, SWI-Prolog, Trealla Prolog, and YAP.

Inherited public predicates:

(none)

- Public predicates
  - dif/2
  - dif/1
  - freeze/2
  - frozen/2
  - when/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

dif/2

Sets a constraint that is true iff the two terms are different.

Compilation flags:

static

Template:

dif(Term1,Term2)

Mode and number of proofs:

dif(+term,+term) - zero\_or\_one

---

dif/1

Sets a set of constraints that are true iff all terms in a list are different.

Compilation flags:

static

Template:

dif(Terms)

Mode and number of proofs:

dif(+list(term)) - zero\_or\_one

---

freeze/2

Delays the execution of a goal until a variable is bound.

Compilation flags:

static

Template:

freeze(Variable,Goal)

Meta-predicate template:

freeze(\*,0)

Mode and number of proofs:

freeze(+term,+callable) - zero\_or\_more

---

frozen/2

Unifies Goal with the goal delayed by Variable. When no goals are frozen on Variable, Goal is unified with true.

Compilation flags:

static

Template:

frozen(Variable,Goal)

Mode and number of proofs:

frozen(@var,--callable) - one

---

when/2

Calls Goal when Condition becomes true. The portable conditions are: nonvar/1, ground/1, (,)/2, and (;)/2.

Compilation flags:

static

Template:

when(Condition,Goal)

Meta-predicate template:

when(\*,0)

Mode and number of proofs:

when(+callable,+callable) - zero\_or\_more

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.9 csv

object

### 1.9.1 CSV

CSV files reading and writing predicates using the options Header - keep, Separator - comma, and Ignore-Quotes - false.

Availability:

```
logtalk_load(csv(loader))
```

Author: Jacinto Dávila

Version: 1:0:0

Date: 2021-02-02

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public csv(keep,comma,false)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
guess_arity/2 guess_separator/2 read_file/2 read_file/3 read_file_by_line/2  
read_file_by_line/3 read_stream/2 read_stream/3 read_stream_by_line/2  
read_stream_by_line/3 write_file/3 write_stream/3
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.9.2 csv(Header,Separator,IgnoreQuotes)

- Header - Header handling option with possible values missing, skip, and keep (default).
- Separator - Separator handling option with possible values comma (default for non .tsv and non .tab files or when no file name extension is available), tab (default for .tsv and .tab files), semicolon, and colon.
- IgnoreQuotes - Double-quotes handling option to ignore (true) or preserve (false; default) double quotes surrounding data.

CSV file and stream reading and writing predicates.

Availability:

```
logtalk_load(csv(loader))
```

Author: Jacinto Dávila and Paulo Moura

Version: 2:1:0

Date: 2023-11-15

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public csv_protocol
```

Uses:

```
list
logtalk
os
reader
type
```

Remarks:

(none)

Inherited public predicates:

guess\_arity/2 guess\_separator/2 read\_file/2 read\_file/3 read\_file\_by\_line/2  
read\_file\_by\_line/3 read\_stream/2 read\_stream/3 read\_stream\_by\_line/2  
read\_stream\_by\_line/3 write\_file/3 write\_stream/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

category

## 1.9.3 csv\_guess\_questions

Support for asking questions when guessing the separator and the record arity of CSV files.

Availability:

logtalk\_load(csv(loader))

Author: Jacinto Dávila

Version: 1:0:0

Date: 2021-02-03

Compilation flags:

static

Provides:

logtalk::message\_tokens//2

logtalk::question\_prompt\_stream/4

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.9.4 csv\_protocol

CSV file and stream reading and writing protocol.

Availability:

```
logtalk_load(csv(loader))
```

Author: Jacinto Dávila and Paulo Moura

Version: 2:0:0

Date: 2023-03-13

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

- Type-checking: Some of the predicate file and stream argument type-checking exceptions depend on the Prolog backend compliance with standards.

Inherited public predicates:

```
(none)
```

- Public predicates
  - read\_file/3
  - read\_stream/3
  - read\_file/2
  - read\_stream/2
  - read\_file\_by\_line/3
  - read\_stream\_by\_line/3
  - read\_file\_by\_line/2
  - read\_stream\_by\_line/2
  - write\_file/3
  - write\_stream/3
  - guess\_separator/2
  - guess\_arity/2

- Protected predicates
- Private predicates
- Operators

## Public predicates

`read_file/3`

Reads a CSV file saving the data as clauses for the specified object predicate. Fails if the file cannot be parsed.

Compilation flags:

`static`

Template:

`read_file(File, Object, Predicate)`

Mode and number of proofs:

`read_file(+atom, +object_identifier, +predicate_indicator) - zero_or_one`

Exceptions:

File is a variable:

`instantiation_error`

File is neither a variable nor an atom:

`type_error(atom, File)`

File is an atom but not an existing file:

`existence_error(file, File)`

File is an existing file but cannot be opened for reading:

`permission_error(open, source_sink, File)`

Object is a variable:

`instantiation_error`

Object is neither a variable nor an object identifier:

`type_error(object_identifier, Object)`

Object is a valid object identifier but not an existing object:

`existence_error(object, Object)`

Predicate is a variable:

`instantiation_error`

Predicate is neither a variable nor a predicate indicator:

`type_error(predicate_indicator, Predicate)`

Predicate is a valid predicate indicator but not an existing public predicate:

`existence_error(predicate, Predicate)`

read\_stream/3

Reads a CSV stream saving the data as clauses for the specified object predicate. Fails if the stream cannot be parsed.

Compilation flags:

static

Template:

read\_stream(Stream, Object, Predicate)

Mode and number of proofs:

read\_stream(+stream\_or\_alias, +object\_identifier, +predicate\_indicator) - zero\_or\_one

Exceptions:

Stream is a variable:

instantiation\_error

Stream is neither a variable nor a stream-term or alias:

domain\_error(stream\_or\_alias, Stream)

Stream is not an open stream:

existence\_error(stream, Stream)

Stream is an output stream:

permission\_error(input, stream, Stream)

Stream is a binary stream:

permission\_error(input, binary\_stream, Stream)

Object is a variable:

instantiation\_error

Object is neither a variable nor an object identifier:

type\_error(object\_identifier, Object)

Object is a valid object identifier but not an existing object:

existence\_error(object, Object)

Predicate is a variable:

instantiation\_error

Predicate is neither a variable nor a predicate indicator:

type\_error(predicate\_indicator, Predicate)

Predicate is a valid predicate indicator but not an existing public predicate:

existence\_error(predicate, Predicate)

---

read\_file/2

Reads a CSV file returning the data as a list of rows, each row a list of fields. Fails if the file cannot be parsed.

Compilation flags:

static

Template:

read\_file(File,Rows)

Mode and number of proofs:

read\_file(+atom,-list(list)) - zero\_or\_one

Exceptions:

File is a variable:

instantiation\_error

File is neither a variable nor an atom:

type\_error(atom,File)

File is an atom but not an existing file:

existence\_error(file,File)

File is an existing file but cannot be opened for reading:

permission\_error(open,source\_sink,File)

---

read\_stream/2

Reads a CSV stream returning the data as a list of rows, each row a list of fields. Fails if the stream cannot be parsed.

Compilation flags:

static

Template:

read\_stream(Stream,Rows)

Mode and number of proofs:

read\_stream(+stream\_or\_alias,-list(list)) - zero\_or\_one

Exceptions:

Stream is a variable:

instantiation\_error

Stream is neither a variable nor a stream-term or alias:

domain\_error(stream\_or\_alias,Stream)  
Stream is not an open stream:  
existence\_error(stream,Stream)  
Stream is an output stream:  
permission\_error(input,stream,Stream)  
Stream is a binary stream:  
permission\_error(input,binary\_stream,Stream)

---

read\_file\_by\_line/3

Reads a CSV file saving the data as clauses for the specified object predicate. The file is read line by line. Fails if the file cannot be parsed.

Compilation flags:  
static

Template:

read\_file\_by\_line(File,Object,Predicate)

Mode and number of proofs:

read\_file\_by\_line(+atom,+object\_identifier,+predicate\_indicator) - zero\_or\_one

Exceptions:

File is a variable:

instantiation\_error

File is neither a variable nor an atom:

type\_error(atom,File)

File is an atom but not an existing file:

existence\_error(file,File)

File is an existing file but cannot be opened for reading:

permission\_error(open,source\_sink,File)

Object is a variable:

instantiation\_error

Object is neither a variable nor an object identifier:

type\_error(object\_identifier,Object)

Object is a valid object identifier but not an existing object:

existence\_error(object,Object)

Predicate is a variable:

instantiation\_error

Predicate is neither a variable nor a predicate indicator:

type\_error(predicate\_indicator,Predicate)

Predicate is a valid predicate indicator but not an existing public predicate:

existence\_error(predicate,Predicate)

`read_stream_by_line/3`

Reads a CSV stream saving the data as clauses for the specified object predicate. The stream is read line by line. Fails if the stream cannot be parsed.

Compilation flags:

`static`

Template:

`read_stream_by_line(Stream, Object, Predicate)`

Mode and number of proofs:

`read_stream_by_line(+stream_or_alias, +object_identifier, +predicate_indicator) - zero_or_one`

Exceptions:

Stream is a variable:

`instantiation_error`

Stream is neither a variable nor a stream-term or alias:

`domain_error(stream_or_alias, Stream)`

Stream is not an open stream:

`existence_error(stream, Stream)`

Stream is an output stream:

`permission_error(input, stream, Stream)`

Stream is a binary stream:

`permission_error(input, binary_stream, Stream)`

Object is a variable:

`instantiation_error`

Object is neither a variable nor an object identifier:

`type_error(object_identifier, Object)`

Object is a valid object identifier but not an existing object:

`existence_error(object, Object)`

Predicate is a variable:

`instantiation_error`

Predicate is neither a variable nor a predicate indicator:

`type_error(predicate_indicator, Predicate)`

Predicate is a valid predicate indicator but not an existing public predicate:

`existence_error(predicate, Predicate)`

---

`read_file_by_line/2`

Reads a CSV file returning the data as a list of rows, each row a list of fields. The file is read line by line. Fails if the file cannot be parsed.

Compilation flags:

`static`

Template:

`read_file_by_line(File,Rows)`

Mode and number of proofs:

`read_file_by_line(+atom,-list(list)) - zero_or_one`

Exceptions:

File is a variable:

`instantiation_error`

File is neither a variable nor an atom:

`type_error(atom,File)`

File is an atom but not an existing file:

`existence_error(file,File)`

File is an existing file but cannot be opened for reading:

`permission_error(open,source_sink,File)`

---

`read_stream_by_line/2`

Reads a CSV stream returning the data as a list of rows, each row a list of fields. The stream is read line by line. Fails if the stream cannot be parsed.

Compilation flags:

`static`

Template:

`read_stream_by_line(Stream,Rows)`

Mode and number of proofs:

`read_stream_by_line(+stream_or_alias,-list(list)) - zero_or_one`

Exceptions:

Stream is a variable:

`instantiation_error`

Stream is neither a variable nor a stream-term or alias:

---

```

    domain_error(stream_or_alias,Stream)
Stream is not an open stream:
    existence_error(stream,Stream)
Stream is an output stream:
    permission_error(input,stream,Stream)
Stream is a binary stream:
    permission_error(input,binary_stream,Stream)

```

---

write\_file/3

Writes a CSV file with the data represented by the clauses of the specified object predicate.

Compilation flags:

```
static
```

Template:

```
write_file(File,Object,Predicate)
```

Mode and number of proofs:

```
write_file(+atom,+object_identifier,+predicate_indicator) - one
```

Exceptions:

File is a variable:

```
instantiation_error
```

File is neither a variable nor an atom:

```
type_error(atom,File)
```

File is an atom but cannot be opened for writing:

```
permission_error(open,source_sink,File)
```

Object is a variable:

```
instantiation_error
```

Object is neither a variable nor an object identifier:

```
type_error(object_identifier,Object)
```

Object is a valid object identifier but not an existing object:

```
existence_error(object,Object)
```

Predicate is a variable:

```
instantiation_error
```

Predicate is neither a variable nor a predicate indicator:

```
type_error(predicate_indicator,Predicate)
```

Predicate is a valid predicate indicator but not an existing public predicate:

```
existence_error(predicate,Predicate)
```

---

write\_stream/3

Writes a CSV stream with the data represented by the clauses of the specified object predicate.

Compilation flags:

static

Template:

write\_stream(Stream, Object, Predicate)

Mode and number of proofs:

write\_stream(+stream\_or\_alias, +object\_identifier, +predicate\_indicator) - one

Exceptions:

Stream is a variable:

instantiation\_error

Stream is neither a variable nor a stream-term or alias:

domain\_error(stream\_or\_alias, Stream)

Stream is not an open stream:

existence\_error(stream, Stream)

Stream is an input stream:

permission\_error(output, stream, Stream)

Stream is a binary stream:

permission\_error(output, binary\_stream, Stream)

Object is a variable:

instantiation\_error

Object is neither a variable nor an object identifier:

type\_error(object\_identifier, Object)

Object is a valid object identifier but not an existing object:

existence\_error(object, Object)

Predicate is a variable:

instantiation\_error

Predicate is neither a variable nor a predicate indicator:

type\_error(predicate\_indicator, Predicate)

Predicate is a valid predicate indicator but not an existing public predicate:

existence\_error(predicate, Predicate)

---

`guess_separator/2`

Guesses the separator used in a given file, asking the user to confirm.

Compilation flags:

`static`

Template:

`guess_separator(File,Separator)`

Mode and number of proofs:

`guess_separator(+atom,-atom) - one`

Exceptions:

File is a variable:

`instantiate_1_error`

File is neither a variable nor an atom:

`type_error(atom,File)`

File is an atom but not an existing file:

`existence_error(file,File)`

File is an atom but cannot be opened for writing:

`permission_error(open,source_sink,File)`

---

`guess_arity/2`

Guesses the arity of records in a given file, asking the user to confirm.

Compilation flags:

`static`

Template:

`guess_arity(File,Arity)`

Mode and number of proofs:

`guess_arity(+atom,-number) - one`

Exceptions:

File is a variable:

`instantiate_1_error`

File is neither a variable nor an atom:

`type_error(atom,File)`

File is an atom but not an existing file:

existence\_error(file,File)  
File is an atom but cannot be opened for writing:  
permission\_error(open,source\_sink,File)

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.10 dates

object

### 1.10.1 date

Date predicates.

Availability:

logtalk\_load(dates(loader))

Author: Paulo Moura

Version: 1:2:0

Date: 2014-09-27

Compilation flags:

static, context\_switching\_calls

Implements:

public datep

Uses:

os

Remarks:

(none)

Inherited public predicates:

days\_in\_month/3 leap\_year/1 name\_of\_day/3 name\_of\_month/3 today/3 valid/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.10.2 datep

Date protocol.

Availability:

logtalk\_load(dates(loader))

Author: Paulo Moura

Version: 1:1:0

Date: 2005-03-17

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - today/3
  - leap\_year/1
  - name\_of\_day/3
  - name\_of\_month/3
  - days\_in\_month/3
  - valid/3
- Protected predicates
- Private predicates
- Operators

### Public predicates

today/3

Returns current date.

Compilation flags:

static

Template:

today(Year,Month,Day)

Mode and number of proofs:

today(-integer,-integer,-integer) - one

---

leap\_year/1

True if the argument is a leap year.

Compilation flags:

static

Template:

leap\_year(Year)

Mode and number of proofs:

leap\_year(+integer) - zero\_or\_one

---

name\_of\_day/3

Name and short name of day.

Compilation flags:

static

Template:

name\_of\_day(Index,Name,Short)

Mode and number of proofs:

name\_of\_day(?integer,?atom,?atom) - zero\_or\_more

---

name\_of\_month/3

Name and short name of month.

Compilation flags:

static

Template:

name\_of\_month(Index,Name,Short)

Mode and number of proofs:

name\_of\_month(?integer,?atom,?atom) - zero\_or\_more

---

days\_in\_month/3

Number of days in a month.

Compilation flags:

static

Template:

days\_in\_month(Month,Year,Days)

Mode and number of proofs:

days\_in\_month(?integer,+integer,?integer) - zero\_or\_more

---

valid/3

True if the arguments represent a valid date.

Compilation flags:

static

Template:

valid(Year,Month,Day)

Mode and number of proofs:

valid(@integer,@integer,@integer) - zero\_or\_one

---

### Protected predicates

(none)

### Private predicates

(none)

## Operators

(none)

See also:

[date](#), [timep](#)

[object](#)

### 1.10.3 time

Time predicates.

Availability:

```
logtalk_load(dates(loader))
```

Author: Paulo Moura

Version: 1:1:0

Date: 2014-09-27

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public timep
```

Uses:

```
os
```

Remarks:

(none)

Inherited public predicates:

```
cpu_time/1 now/3 valid/3
```

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

[datep](#)

[protocol](#)

### 1.10.4 timep

Time protocol.

Availability:

`logtalk_load(dates(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2000-07-24

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - now/3
  - cpu\_time/1
  - valid/3
- Protected predicates
- Private predicates
- Operators

### Public predicates

now/3

Returns current time.

Compilation flags:

static

Template:

now(Hours,Mins,Secs)

Mode and number of proofs:

now(-integer,-integer,-integer) - one

---

cpu\_time/1

Returns the current cpu time.

Compilation flags:

static

Template:

cpu\_time(Time)

Mode and number of proofs:

cpu\_time(-number) - one

---

valid/3

True if the arguments represent a valid time value.

Compilation flags:

static

Template:

valid(Hours,Mins,Secs)

Mode and number of proofs:

valid(+integer,+integer,+integer) - zero\_or\_one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

time, datep

## 1.11 dead\_code\_scanner

object

### 1.11.1 dead\_code\_scanner

A tool for detecting likely dead code in compiled Logtalk entities and Prolog modules compiled as objects.

Availability:

logtalk\_load(dead\_code\_scanner(loader))

Author: Barry Evans and Paulo Moura

Version: 0:15:2

Date: 2024-10-21

Compilation flags:

static, context\_switching\_calls

Imports:

public options

Uses:

list

logtalk

os

type

Remarks:

- Dead code: A predicate or non-terminal that is not called (directly or indirectly) by any scoped predicate or non-terminal. These predicates and non-terminals are not used, cannot be called without breaking encapsulation, and are thus considered dead code.
- Known issues: Use of local meta-calls with goal arguments only known at runtime can result in false positives. Calls from non-standard meta-predicates may be missed if the meta-calls are not optimized.
- Requirements: Source files must be compiled with the source\_data flag turned on. To avoid false positives due to meta-calls, compilation of source files with the optimized flag turned on is also advised.

Inherited public predicates:

check\_option/1 check\_options/1 default\_option/1 default\_options/1 option/2 option/3  
valid\_option/1 valid\_options/1

- Public predicates
  - entity/1
  - file/2
  - file/1
  - directory/2
  - directory/1
  - rdirectory/2
  - rdirectory/1
  - library/2
  - library/1
  - rlibrary/2
  - rlibrary/1

- all/1
- all/0
- predicates/2
- predicate/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

entity/1

Scans a loaded entity for dead code. Fails if the entity does not exist.

Compilation flags:

static

Template:

entity(Entity)

Mode and number of proofs:

entity(+entity\_identifier) - zero\_or\_one

---

file/2

Scans all entities in a loaded source file for dead code using the given options. The file can be given by name, basename, full path, or using library notation. Fails if the file is not loaded.

Compilation flags:

static

Template:

file(File,Options)

Mode and number of proofs:

file(+atom,+list(compound)) - zero\_or\_one

---

file/1

Scans all entities in a loaded source file for dead code using default options. The file can be given by name, basename, full path, or using library notation. Fails if the file is not loaded.

Compilation flags:

static

Template:

file(File)

Mode and number of proofs:

file(+atom) - zero\_or\_one

---

directory/2

Scans all entities in all loaded files from a given directory for dead code using the given options.

Compilation flags:

static

Template:

directory(Directory,Options)

Mode and number of proofs:

directory(+atom,+list(compound)) - one

---

directory/1

Scans all entities in all loaded files from a given directory for dead code using default options.

Compilation flags:

static

Template:

directory(Directory)

Mode and number of proofs:

directory(+atom) - one

---

---

rdirectory/2

Scans all entities in all loaded files from a given directory and its sub-directories for dead code using the given options.

Compilation flags:

static

Template:

rdirectory(Directory,Options)

Mode and number of proofs:

rdirectory(+atom,+list(compound)) - one

---

rdirectory/1

Scans all entities in all loaded files from a given directory and its sub-directories for dead code using default options.

Compilation flags:

static

Template:

rdirectory(Directory)

Mode and number of proofs:

rdirectory(+atom) - one

---

library/2

Scans all entities in all loaded files from a given library for dead code using the given options.

Compilation flags:

static

Template:

---

library(Library,Options)

Mode and number of proofs:

library(+atom,+list(compound)) - one

---

library/1

Scans all entities in all loaded files from a given library for dead code using default options.

Compilation flags:

static

Template:

library(Library)

Mode and number of proofs:

library(+atom) - one

---

rlibrary/2

Scans all entities in all loaded files in a loaded library and its sub-libraries for dead code using the given options.

Compilation flags:

static

Template:

rlibrary(Library,Options)

Mode and number of proofs:

rlibrary(+atom,+list(compound)) - one

---

rlibrary/1

Scans all entities in all loaded files in a loaded library and its sub-libraries for dead code using default options.

Compilation flags:

static

Template:

rlibrary(Library)

Mode and number of proofs:

rlibrary(+atom) - one

---

all/1

Scans all entities for dead code using the given options.

Compilation flags:

static

Template:

all(Options)

Mode and number of proofs:

all(+list(compound)) - one

---

all/0

Scans all entities for dead code using default options.

Compilation flags:

static

Mode and number of proofs:

all - one

---

predicates/2

Returns an ordered set of local predicates (and non-terminals) that are not used, directly or indirectly, by scoped predicates for a loaded entity.

Compilation flags:

static

Template:

predicates(Entity,Predicates)

Mode and number of proofs:

predicates(+entity\_\_identifier,-list(predicate\_\_indicator)) - one

---

predicate/2

Enumerates, by backtracking, local predicates (and non-terminals) that are not used, directly or indirectly, by scoped predicates for a loaded entity.

Compilation flags:

static

Template:

predicate(Entity,Predicate)

Mode and number of proofs:

predicate(+entity\_\_identifier,?predicate\_\_indicator) - zero\_or\_more

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

category

### 1.11.2 dead\_code\_scanner\_messages

Logtalk dead\_code\_scanner tool default message translations.

Availability:

```
logtalk_load(dead_code_scanner(loader))
```

Author: Barry Evans and Paulo Moura

Version: 0:8:0

Date: 2024-05-07

Compilation flags:

```
static
```

Provides:

```
logtalk::message_prefix_stream/4
```

```
logtalk::message_tokens//2
```

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.12 debug\_messages

object

### 1.12.1 debug\_messages

Supports selective enabling and disabling of debug and debug(Group) messages.

Availability:

```
logtalk_load(debug_messages(loader))
```

Author: Paulo Moura

Version: 1:0:1

Date: 2022-05-05

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
logtalk::message_hook/4
```

Uses:

```
logtalk
```

Remarks:

- Limitations: Debug messages are suppressed by the compiler when the optimize flag is turned on and thus cannot be enabled in this case.

Inherited public predicates:

(none)

- Public predicates
  - enable/1
  - disable/1
  - enabled/1
  - enable/2
  - disable/2
  - enabled/2
- Protected predicates
- Private predicates
  - enabled\_/1
  - enabled\_/2
- Operators

## Public predicates

enable/1

Enables all debug and debug(Group) messages for the given component.

Compilation flags:

static

Template:

enable(Component)

Mode and number of proofs:

enable(@term) - one

disable/1

Disables all debug and debug(Group) messages for the given component.

Compilation flags:

static

Template:

disable(Component)

Mode and number of proofs:

disable(@term) - one

---

enabled/1

Enumerates by backtracking the components with enabled debug and debug(Group) messages.

Compilation flags:

static

Template:

enabled(Component)

Mode and number of proofs:

enabled(?term) - zero\_or\_more

---

enable/2

Enables debug(Group) messages for the given component and group.

Compilation flags:

static

Template:

enable(Component,Group)

Mode and number of proofs:

enable(@term,@term) - one

---

disable/2

Disables debug(Group) messages for the given component and group.

Compilation flags:

static

Template:

disable(Component,Group)

Mode and number of proofs:

disable(@term,@term) - one

---

enabled/2

Enumerates by backtracking the enabled debug(Group) messages for each component.

Compilation flags:

static

Template:

enabled(Component,Group)

Mode and number of proofs:

enabled(?term,?term) - zero\_or\_more

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

enabled\_/1

Table of components with currently enabled debug and debug(Group) messages.

Compilation flags:

dynamic

---

Template:

enabled\_(Component)

Mode and number of proofs:

enabled\_(?term) - zero\_or\_more

---

enabled\_/2

Table of currently enabled debug(Group) per component.

Compilation flags:

dynamic

Template:

enabled\_(Component,Group)

Mode and number of proofs:

enabled\_(?term,?term) - zero\_or\_more

---

## Operators

(none)

## 1.13 debugger

object

### 1.13.1 debugger

Command-line debugger based on an extended procedure box model supporting execution tracing and spy points.

Availability:

logtalk\_load(debugger(loader))

Author: Paulo Moura

Version: 7:9:0

Date: 2024-07-01

Compilation flags:

static, context\_switching\_calls

Implements:

public debuggerp

Provides:

logtalk::debug\_handler/1

logtalk::debug\_handler/3

Uses:

logtalk

Remarks:

(none)

Inherited public predicates:

debug/0 debugging/0 debugging/1 leash/1 leashing/1 log/3 logging/3 nodebug/0 nolog/3  
nologall/0 nospy/1 nospy/3 nospy/4 nospyall/0 notrace/0 reset/0 spy/1 spy/3 spy/4 spying/1  
spying/3 spying/4 trace/0

- Public predicates
- Protected predicates
- Private predicates
  - debugging\_/0
  - tracing\_/0
  - skipping\_/0
  - skipping\_unleashed\_/1
  - quasi\_skipping\_/0
  - leaping\_/1
  - breakpoint\_/2
  - spying\_predicate\_/3
  - spying\_context\_/4
  - leashing\_/1
  - invocation\_number\_/1
  - jump\_to\_invocation\_number\_/1
  - zap\_to\_port\_/1
  - write\_max\_depth\_/1
  - log\_point\_/3
  - conditional\_breakpoint\_/3

- triggered\_breakpoint\_/4
- triggered\_breakpoint\_enabled\_/2
- file\_line\_hit\_count\_/3
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

debugging\_/0

True iff debug is on.

Compilation flags:

dynamic

Mode and number of proofs:

debugging\_ - zero\_or\_one

---

tracing\_/0

True iff tracing is on.

Compilation flags:

dynamic

Mode and number of proofs:

tracing\_ - zero\_or\_one

---

skipping\_/0

True iff skipping.

Compilation flags:

dynamic

Mode and number of proofs:

skipping\_ - zero\_or\_one

---

skipping\_unleashed\_/1

True iff skipping (a goal with invocation number N) but showing intermediate ports as unleashed.

Compilation flags:

dynamic

Template:

skipping\_unleashed\_(N)

Mode and number of proofs:

skipping\_unleashed\_(?integer) - zero\_or\_one

---

quasi\_skipping\_/0

True iff quasi-skipping.

Compilation flags:

dynamic

Mode and number of proofs:

quasi\_skipping\_ - zero\_or\_one

---

---

leaping\_/1

True iff leaping in tracing or debugging mode.

Compilation flags:

dynamic

Template:

leaping\_(Mode)

Mode and number of proofs:

leaping\_(?atom) - zero\_or\_one

---

breakpoint\_/2

Table of unconditional breakpoints.

Compilation flags:

dynamic

Template:

breakpoint\_(Entity,Line)

Mode and number of proofs:

breakpoint\_(?object\_identifier,?integer) - zero\_or\_more

breakpoint\_(?category\_identifier,?integer) - zero\_or\_more

---

spying\_predicate\_/3

Table of predicate spy points.

Compilation flags:

dynamic

Template:

spying\_predicate\_(Functor,Arity,Original)

Mode and number of proofs:

spying\_predicate\_(?atom,?integer,?predicate\_indicator) - zero\_or\_more

spying\_predicate\_(?atom,?integer,?non\_terminal\_indicator) - zero\_or\_more

---

spying\_context\_/4

Table of context spy points.

Compilation flags:  
dynamic

Template:  
spying\_context\_(Sender,This,Self,Goal)

Mode and number of proofs:

spying\_context\_(?object\_identifier,?object\_identifier,?object\_identifier,?callable) - zero\_or\_more

---

leashing\_/1

Table of currently leashed ports.

Compilation flags:  
dynamic

Template:  
leashing\_(Port)

Mode and number of proofs:

leashing\_(?atom) - zero\_or\_more

---

invocation\_number\_/1

Current call stack invocation number.

Compilation flags:  
dynamic

Template:  
invocation\_number\_(N)

Mode and number of proofs:

invocation\_number\_(?integer) - zero\_or\_one

---

jump\_to\_invocation\_number\_/1

Invocation number to jump to.

Compilation flags:

dynamic

Template:

jump\_to\_invocation\_number\_(N)

Mode and number of proofs:

jump\_to\_invocation\_number\_(?integer) - zero\_or\_one

---

zap\_to\_port\_/1

Port to zap to.

Compilation flags:

dynamic

Template:

zap\_to\_port\_(Port)

Mode and number of proofs:

zap\_to\_port\_(?integer) - zero\_or\_one

---

write\_max\_depth\_/1

Current term maximum depth.

Compilation flags:

dynamic

Template:

write\_max\_depth\_(MaxDepth)

Mode and number of proofs:

write\_max\_depth\_(?integer) - zero\_or\_one

---

log\_point\_/3

Table of log points.

Compilation flags:

dynamic

Template:

log\_point\_(Entity,Line,Message)

Mode and number of proofs:

log\_point\_(?object\_identifier,?integer,?atom) - zero\_or\_more

log\_point\_(?category\_identifier,?integer,?atom) - zero\_or\_more

---

conditional\_breakpoint\_/3

Table of conditional breakpoints.

Compilation flags:

dynamic

Template:

conditional\_breakpoint\_(Entity,Line,Condition)

Mode and number of proofs:

conditional\_breakpoint\_(?object\_identifier,?integer,?callable) - zero\_or\_more

conditional\_breakpoint\_(?category\_identifier,?integer,?callable) - zero\_or\_more

---

---

triggered\_breakpoint\_/4

Table of defined triggered breakpoints.

Compilation flags:

dynamic

Template:

triggered\_breakpoint\_(Entity,Line,TriggerEntity,TriggerLine)

Mode and number of proofs:

triggered\_breakpoint\_(?object\_identifier,?integer,?object\_identifier,?integer) - zero\_or\_more

triggered\_breakpoint\_(?object\_identifier,?integer,?category\_identifier,?integer) - zero\_or\_more

triggered\_breakpoint\_(?category\_identifier,?integer,?object\_identifier,?integer) - zero\_or\_more

triggered\_breakpoint\_(?category\_identifier,?integer,?category\_identifier,?integer) - zero\_or\_more

---

triggered\_breakpoint\_enabled\_/2

Table of enabled triggered breakpoints.

Compilation flags:

dynamic

Template:

triggered\_breakpoint\_enabled\_(Entity,Line)

Mode and number of proofs:

triggered\_breakpoint\_enabled\_(?object\_identifier,?integer) - zero\_or\_more

triggered\_breakpoint\_enabled\_(?category\_identifier,?integer) - zero\_or\_more

---

file\_line\_hit\_count\_/3

Table of file and line hit counts (successful unifications with clause heads).

Compilation flags:

dynamic

Template:

file\_line\_hit\_count\_(File,Line,Count)

---

Mode and number of proofs:

`file_line_hit_count_(?atom,?integer,?integer) - zero_or_one`

---

## Operators

(none)

category

### 1.13.2 debugger\_messages

Logtalk debugger tool default message translations.

Availability:

`logtalk_load(debugger(loader))`

Author: Paulo Moura

Version: 3:7:0

Date: 2024-06-19

Compilation flags:

`static`

Provides:

`logtalk::message_prefix_stream/4`

`logtalk::question_prompt_stream/4`

`logtalk::message_tokens//2`

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

### 1.13.3 debuggerp

Debugger protocol.

Availability:

```
logtalk_load(debugger(loader))
```

Author: Paulo Moura

Version: 3:3:0

Date: 2024-06-19

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

- Debugger help: Type the character h (condensed help) or the character ? (extended help) at a leashed port.
- Predicate breakpoint: Specified as a ground term Functor/Arity.
- Non-terminal breakpoint: Specified as a ground term Functor//Arity.
- Clause breakpoint: Specified as an Entity-Line term with both Entity and Line bound. Line must be the first source file line of an entity clause.

- Conditional breakpoint: Specified as an Entity-Line term with both Entity and Line bound and a condition. Line must be the first source file line of an entity clause.
- Hit count breakpoint: Specified as an Entity-Line term with both Entity and Line bound and an unification count expression as a condition. Line must be the first source file line of an entity clause.
- Triggered breakpoint: Specified as an Entity-Line term with both Entity and Line bound and another breakpoint as a condition. Line must be the first source file line of an entity clause.
- Context breakpoint: Specified as a (Sender, This, Self, Goal) tuple.
- Log point: Specified as an (Entity, Line, Message) tuple.
- Leash port shorthands: none - [], loose - [fact,rule,call], half - [fact,rule,call,redo], tight - [fact,rule,call,redo,fail,exception], and full - [fact,rule,call,exit,redo,fail,exception].

Inherited public predicates:

(none)

- Public predicates
  - reset/0
  - debug/0
  - nodebug/0
  - debugging/0
  - debugging/1
  - trace/0
  - notrace/0
  - leash/1
  - leashing/1
  - spy/1
  - spying/1
  - nospy/1
  - spy/3
  - spying/3
  - nospy/3
  - spy/4
  - spying/4
  - nospy/4
  - nospyall/0
  - log/3
  - logging/3
  - nolog/3

- nologall/0
- Protected predicates
- Private predicates
- Operators

### Public predicates

reset/0

Resets all debugging settings (including breakpoints, log points, and leashed ports) and turns off debugging.

Compilation flags:

static

Mode and number of proofs:

reset - one

See also:

nospyall/0

---

debug/0

Starts debugging for all defined breakpoints.

Compilation flags:

static

Mode and number of proofs:

debug - one

---

nodebug/0

Stops debugging for all defined breakpoints. Also turns off tracing. Does not remove defined breakpoints.

Compilation flags:

static

Mode and number of proofs:

nodebug - one

See also:

[reset/0](#)

---

debugging/0

Reports current debugging settings, including breakpoints and log points.

Compilation flags:

static

Mode and number of proofs:

debugging - one

---

debugging/1

Enumerates, by backtracking, all entities compiled in debug mode.

Compilation flags:

static

Template:

debugging(Entity)

Mode and number of proofs:

debugging(?entity\_identifier) - zero\_or\_more

---

trace/0

Starts tracing all calls compiled in debug mode.

Compilation flags:

static

Mode and number of proofs:

trace - one

---

notrace/0

Stops tracing of calls compiled in debug mode. Debugger will still stop at defined breakpoints.

Compilation flags:

static

Mode and number of proofs:

notrace - one

---

leash/1

Sets the debugger leash ports using an abbreviation (none, loose, half, tight, or full) or a list of ports (valid ports are fact, rule, call, exit, redo, fail, and exception).

Compilation flags:

static

Template:

leash(Ports)

Mode and number of proofs:

leash(+atom) - one

leash(+list(atom)) - one

---

leashing/1

Enumerates, by backtracking, all leashed ports (valid ports are fact, rule, call, exit, redo, fail, and exception).

Compilation flags:

static

Template:

leashing(Port)

Mode and number of proofs:

leashing(?atom) - zero\_or\_more

---

spy/1

Sets a predicate or clause breakpoint (removing any existing log point or breakpoint defined for the same location, or a list of breakpoints. Fails if a breakpoint is invalid.

Compilation flags:

static

Template:

spy(Breakpoint)

Mode and number of proofs:

spy(@spy\_point) - zero\_or\_one

spy(@list(spy\_point)) - zero\_or\_one

---

spying/1

Enumerates, by backtracking, all defined predicate and clause breakpoints.

Compilation flags:

static

Template:

spying(Breakpoint)

Mode and number of proofs:

spying(?spy\_point) - zero\_or\_more

---

nospy/1

Removes all matching predicate and clause breakpoints.

Compilation flags:

static

Template:

nospy(Breakpoint)

Mode and number of proofs:

nospy(@var) - one

nospy(@spy\_point) - one

nospy(@list(spy\_point)) - one

---

spy/3

Sets a conditional or triggered breakpoint (removing any existing log point or breakpoint defined for the same location). The condition can be a unification count expression, a lambda expression, or another breakpoint. Fails if the breakpoint is invalid.

Compilation flags:

static

Template:

spy(Entity,Line,Condition)

Mode and number of proofs:

spy(+atom,+integer,@callable) - zero\_or\_one

Remarks:

- Unification count expression conditions:  $>(Count)$ ,  $>=(Count)$ ,  $==(Count)$ ,  $=<(Count)$ ,  $<(Count)$ ,  $mod(M)$ , and  $Count$ .
  - Lambda expression conditions:  $[Count,N,Goal]>>Condition$  and  $[Goal]>>Condition$  where  $Count$  is the unification count,  $N$  is the invocation number, and  $Goal$  is the goal that unified with the clause head;  $Condition$  is called in the context of user.
  - Triggered breakpoint conditions:  $Entity-Line$ .
-

spying/3

Enumerates, by backtracking, all conditional and triggered breakpoints.

Compilation flags:

static

Template:

spying(Entity,Line,Condition)

Mode and number of proofs:

spying(?atom,?integer,?callable) - zero\_or\_more

---

nospy/3

Removes all matching conditional and triggered breakpoints.

Compilation flags:

static

Template:

nospy(Entity,Line,Condition)

Mode and number of proofs:

nospy(@term,@term,@term) - one

---

spy/4

Sets a context breakpoint.

Compilation flags:

static

Template:

spy(Sender,This,Self,Goal)

Mode and number of proofs:

spy(@term,@term,@term,@term) - one

---

spying/4

Enumerates, by backtracking, all defined context breakpoints.

Compilation flags:

static

Template:

spying(Sender,This,Self,Goal)

Mode and number of proofs:

spying(?term,?term,?term,?term) - zero\_or\_more

---

nospy/4

Removes all matching context breakpoints.

Compilation flags:

static

Template:

nospy(Sender,This,Self,Goal)

Mode and number of proofs:

nospy(@term,@term,@term,@term) - one

---

nospyall/0

Removes all breakpoints and log points.

Compilation flags:

static

Mode and number of proofs:

nospyall - one

See also:

[reset/0](#)

---

log/3

Sets a log point (removing any existing breakpoint defined for the same location). Fails if the log point is invalid.

Compilation flags:

static

Template:

log(Entity,Line,Message)

Mode and number of proofs:

log(@object\_identifier,+integer,+atom) - zero\_or\_one

log(@category\_identifier,+integer,+atom) - zero\_or\_one

log(?object\_identifier,?integer,?atom) - zero\_or\_more

log(?category\_identifier,?integer,?atom) - zero\_or\_more

log(@var\_or(object\_identifier),@var\_or(integer),@var\_or(atom)) - one

log(@var\_or(category\_identifier),@var\_or(integer),@var\_or(atom)) - one

---

logging/3

Enumerates, by backtracking, all defined log points.

Compilation flags:

static

Template:

logging(Entity,Line,Message)

---

nolog/3

Removes all matching log points.

Compilation flags:

static

Template:

nolog(Entity,Line,Message)

---

nologall/0

Removes all log points.

Compilation flags:

static

Mode and number of proofs:

nologall - one

See also:

[reset/0](#)

---

### Protected predicates

(none)

### Private predicates

(none)

## Operators

(none)

See also:

[debugger](#)

object

### 1.13.4 dump\_trace

Simple solution for redirecting a debugger trace to a file.

Availability:

```
logtalk_load(debugger(loader))
```

Author: Paulo Moura

Version: 1:0:1

Date: 2021-11-12

Compilation flags:

```
static, context_switching_calls
```

Uses:

[debugger](#)

Remarks:

(none)

Inherited public predicates:

(none)

- [Public predicates](#)
  - [start\\_redirect\\_to\\_file/2](#)
  - [stop\\_redirect\\_to\\_file/0](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

`start_redirect_to_file/2`

Starts redirecting debugger trace messages to a file.

Compilation flags:

`static`

Template:

`start_redirect_to_file(File,Goal)`

Meta-predicate template:

`start_redirect_to_file(*,0)`

Mode and number of proofs:

`start_redirect_to_file(+atom,+callable) - zero_or_more`

---

`stop_redirect_to_file/0`

Stops redirecting debugger trace messages to a file.

Compilation flags:

`static`

Mode and number of proofs:

`stop_redirect_to_file - one`

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

## 1.14 dependents

category

### 1.14.1 observer

Smalltalk dependent protocol.

Availability:

logtalk\_load(dependents(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2003-02-09

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - update/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

update/1

Called when an observed object is updated.

Compilation flags:

static

Template:

update(Change)

Mode and number of proofs:

update(?nonvar) - zero\_or\_one

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

subject

category

### 1.14.2 subject

Smalltalk dependent handling predicates.

Availability:

logtalk\_load(dependents(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2003-02-09

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - changed/0
  - changed/1
  - dependents/1
  - addDependent/1
  - removeDependent/1
- Protected predicates
- Private predicates
  - dependent\_/1
- Operators

### Public predicates

changed/0

Receiver changed in some way. Notify all dependents.

Compilation flags:

static

Mode and number of proofs:

changed - one

changed/1

Receiver changed as specified in the argument. Notify all dependents.

Compilation flags:

static

Template:

changed(Change)

Mode and number of proofs:

changed(?nonvar) - one

---

dependents/1

Returns a list of all dependent objects.

Compilation flags:

static

Template:

dependents(Dependents)

Mode and number of proofs:

dependents(-list) - one

---

addDependent/1

Adds a new dependent object.

Compilation flags:

static

Template:

addDependent(Dependent)

Mode and number of proofs:

addDependent(@object) - one

---

removeDependent/1

Removes a dependent object.

Compilation flags:

static

Template:

removeDependent(Dependent)

Mode and number of proofs:

removeDependent(?object) - zero\_or\_more

---

### Protected predicates

(none)

### Private predicates

dependent\_/1

Table of dependent objects.

Compilation flags:

dynamic

Template:

dependent\_(Dependent)

Mode and number of proofs:

dependent\_(?object) - zero\_or\_more

---

### Operators

(none)

See also:

observer

---

## 1.15 diagrams

category

### 1.15.1 diagram(Format)

- Format - Graph language file format.

Common predicates for generating diagrams.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 3:5:0

Date: 2024-04-01

Compilation flags:

```
static
```

Extends:

```
public options
```

Provides:

```
logtalk::message_prefix_stream/4
```

```
logtalk::message_tokens//2
```

Uses:

```
graph_language_registry
```

```
list
```

```
logtalk
```

```
modules_diagram_support
```

```
os
```

```
pairs
```

```
type
```

```
user
```

Remarks:

```
(none)
```

Inherited public predicates:

```
check_option/1 check_options/1 default_option/1 default_options/1 option/2 option/3
```

```
valid_option/1 valid_options/1
```

- Public predicates
  - libraries/3
  - libraries/2
  - libraries/1
  - all\_libraries/1
  - all\_libraries/0
  - rlibrary/2
  - rlibrary/1
  - library/2
  - library/1
  - directories/3
  - directories/2
  - rdirectory/3
  - rdirectory/2
  - rdirectory/1
  - directory/3
  - directory/2
  - directory/1
  - files/3
  - files/2
  - files/1
  - all\_files/1
  - all\_files/0
  - format\_object/1
  - diagram\_description/1
  - diagram\_name\_suffix/1
- Protected predicates
  - diagram\_caption/3
  - output\_rlibrary/3
  - output\_library/3
  - output\_rdirectory/3
  - output externals/1
  - output\_files/2
  - output\_file/4
  - output\_sub\_diagrams/1

- reset/0
- output\_node/6
- node/6
- edge/5
- output\_edges/1
- save\_edge/5
- output\_missing externals/1
- not\_excluded\_file/4
- output\_file\_path/4
- locate\_library/2
- locate\_directory/2
- locate\_file/5
- ground\_entity\_identifier/3
- filter\_file\_extension/3
- filter\_external\_file\_extension/3
- add\_link\_options/3
- omit\_path\_prefix/3
- add\_node\_zoom\_option/4
- message\_diagram\_description/1
- Private predicates
  - node\_/6
  - edge\_/5
- Operators

## Public predicates

libraries/3

Creates a diagram for a set of libraries using the specified options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

libraries(Project,Libraries,Options)

Mode and number of proofs:

libraries(+atom,+list(atom),+list(compound)) - one

libraries/2

Creates a diagram for a set of libraries using the default options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

libraries(Project,Libraries)

Mode and number of proofs:

libraries(+atom,+list(atom)) - one

---

libraries/1

Creates a diagram for a set of libraries using the default options. The prefix libraries is used for the diagram file name.

Compilation flags:

static

Template:

libraries(Libraries)

Mode and number of proofs:

libraries(+list(atom)) - one

---

all\_libraries/1

Creates a diagram for all loaded libraries using the specified options.

Compilation flags:

static

Template:

all\_libraries(Options)

Mode and number of proofs:

all\_libraries(+list(compound)) - one

---

all\_libraries/0

Creates a diagram for all loaded libraries using default options.

Compilation flags:

static

Mode and number of proofs:

all\_libraries - one

---

rlibrary/2

Creates a diagram for a library and its sub-libraries using the specified options.

Compilation flags:

static

Template:

rlibrary(Library,Options)

Mode and number of proofs:

rlibrary(+atom,+list(compound)) - one

---

rlibrary/1

Creates a diagram for a library and its sub-libraries using default options.

Compilation flags:

static

Template:

rlibrary(Library)

Mode and number of proofs:

rlibrary(+atom) - one

---

library/2

Creates a diagram for a library using the specified options.

Compilation flags:

static

Template:

library(Library,Options)

Mode and number of proofs:

library(+atom,+list(compound)) - one

---

library/1

Creates a diagram for a library using default options.

Compilation flags:

static

Template:

library(Library)

Mode and number of proofs:

library(+atom) - one

---

`directories/3`

Creates a diagram for a set of directories using the specified options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

`static`

Template:

`directories(Project,Directories,Options)`

Mode and number of proofs:

`directories(+atom,+list(atom),+list(compound)) - one`

---

`directories/2`

Creates a diagram for a set of directories using the default options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

`static`

Template:

`directories(Project,Directories)`

Mode and number of proofs:

`directories(+atom,+list(atom)) - one`

---

`rdirectory/3`

Creates a diagram for a directory and its sub-directories using the specified options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

`static`

Template:

`rdirectory(Project,Directory,Options)`

Mode and number of proofs:

`rdirectory(+atom,+atom,+list(compound)) - one`

---

`rdirectory/2`

Creates a diagram for a directory and its sub-directories using default options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

`static`

Template:

`rdirectory(Project,Directory)`

Mode and number of proofs:

`rdirectory(+atom,+atom) - one`

---

`rdirectory/1`

Creates a diagram for a directory and its sub-directories using default options. The name of the directory is used as a prefix for the diagram file name.

Compilation flags:

`static`

Template:

`rdirectory(Directory)`

Mode and number of proofs:

`rdirectory(+atom) - one`

---

## directory/3

Creates a diagram for a directory using the specified options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

directory(Project,Directory,Options)

Mode and number of proofs:

directory(+atom,+atom,+list(compound)) - one

---

## directory/2

Creates a diagram for a directory using default options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

directory(Project,Directory)

Mode and number of proofs:

directory(+atom,+atom) - one

---

## directory/1

Creates a diagram for a directory using default options. The name of the directory is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

directory(Directory)

Mode and number of proofs:

directory(+atom) - one

---

files/3

Creates a diagram for a set of files using the specified options. The file can be specified by name, basename, full path, or using library notation. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

files(Project,Files,Options)

Mode and number of proofs:

files(+atom,+list(atom),+list(compound)) - one

---

files/2

Creates a diagram for a set of files using the default options. The file can be specified by name, basename, full path, or using library notation. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

files(Project,Files)

Mode and number of proofs:

files(+atom,+list(atom)) - one

---

files/1

Creates a diagram for a set of files using the default options. The file can be specified by name, basename, full path, or using library notation. The prefix files is used for the diagram file name.

Compilation flags:

static

Template:

files(Files)

Mode and number of proofs:

files(+list(atom)) - one

---

all\_files/1

Creates a diagram for all loaded files using the specified options.

Compilation flags:

static

Template:

all\_files(Options)

Mode and number of proofs:

all\_files(+list(compound)) - one

---

all\_files/0

Creates a diagram for all loaded files using default options.

Compilation flags:

static

Mode and number of proofs:

all\_files - one

---

format\_object/1

Returns the identifier of the object implementing the graph language currently being used. Fails if none is specified.

Compilation flags:

static

Template:

format\_object(Object)

Mode and number of proofs:

format\_object(-object\_identifier) - zero\_or\_one

---

diagram\_description/1

Returns the diagram description.

Compilation flags:

static

Template:

diagram\_description(Description)

Mode and number of proofs:

diagram\_description(-atom) - one

---

diagram\_name\_suffix/1

Returns the diagram name suffix.

Compilation flags:

static

Template:

diagram\_name\_suffix(Suffix)

Mode and number of proofs:

diagram\_name\_suffix(-atom) - one

---

### Protected predicates

diagram\_caption/3

Creates a diagram caption from the diagram description and the subject and its kind.

Compilation flags:

static

Template:

diagram\_caption(Kind,Subject,Description)

Mode and number of proofs:

diagram\_caption(+atom,+callable,-atom) - one

---

output\_rlibrary/3

Generates diagram output for a library and its sub-libraries using the specified options.

Compilation flags:

static

Template:

output\_rlibrary(Library,Path,Options)

Mode and number of proofs:

output\_rlibrary(+atom,+atom,+list(compound)) - one

---

output\_library/3

Generates diagram output for a library using the specified options.

Compilation flags:

static

Template:

`output_library(Library,Path,Options)`

Mode and number of proofs:

`output_library(+atom,+atom,+list(compound)) - one`

---

`output_rdirectory/3`

Generates diagram output for a directory and its sub-directories using the specified options.

Compilation flags:

`static`

Template:

`output_rdirectory(Project,Path,Options)`

Mode and number of proofs:

`output_rdirectory(+atom,+atom,+list(compound)) - one`

---

`output externals/1`

Output external nodes using the specified options depending on the value of the boolean option `externals/1`.

Compilation flags:

`static`

Template:

`output externals(Options)`

Mode and number of proofs:

`output externals(+list(compound)) - one`

---

---

output\_files/2

Generates diagram output for a list of files using the specified options.

Compilation flags:

static

Template:

output\_files(Files,Options)

Mode and number of proofs:

output\_files(+list,+list(compound)) - one

---

output\_file/4

Generates diagram output for a file using the specified options.

Compilation flags:

static

Template:

output\_file(Path,Basename,Directory,Options)

Mode and number of proofs:

output\_file(+atom,+atom,+atom,+list(compound)) - one

---

output\_sub\_diagrams/1

Outputs sub-diagrams using the specified options.

Compilation flags:

static

Template:

output\_sub\_diagrams(Options)

Mode and number of proofs:

output\_sub\_diagrams(+list(compound)) - one

---

reset/0

Resets all temporary information used when generating a diagram.

Compilation flags:

static

Mode and number of proofs:

reset - one

---

output\_node/6

Outputs a graph node.

Compilation flags:

static

Template:

output\_node(Identifier,Label,Caption,Contents,Kind,Options)

Mode and number of proofs:

output\_node(+nonvar,+nonvar,+nonvar,+list(nonvar),+atom,+list(compound)) - one

---

node/6

Enumerates, by backtracking, all saved nodes.

Compilation flags:

static

Template:

node(Identifier,Label,Caption,Contents,Kind,Options)

Mode and number of proofs:

node(?nonvar,?nonvar,?nonvar,?list(compound),?atom,?list(compound)) - zero\_or\_more

---

---

edge/5

Enumerates, by backtracking, all saved edges.

Compilation flags:

static

Template:

edge(From,To,Labels,Kind,Options)

Mode and number of proofs:

edge(?nonvar,?nonvar,?list(nonvar),?atom,?list(compound)) - zero\_or\_more

---

output\_edges/1

Outputs all edges.

Compilation flags:

static

Template:

output\_edges(Options)

Mode and number of proofs:

output\_edges(+list(compound)) - one

---

save\_edge/5

Saves a graph edge.

Compilation flags:

static

Template:

save\_edge(From,To,Labels,Kind,Options)

Mode and number of proofs:

save\_edge(+nonvar,+nonvar,+list(nonvar),+atom,+list(compound)) - one

---

`output_missing externals/1`

Outputs missing external nodes (usually due to unloaded resources) that are referenced from edges.

Compilation flags:

`static`

Template:

`output_missing externals(Options)`

Mode and number of proofs:

`output_missing externals(+list(compound)) - one`

---

`not_excluded_file/4`

True when the given file is not excluded from the generated output. Excluded files may be specified by full path or by basename and with or without extension. Excluded directories may be listed by full or relative path.

Compilation flags:

`static`

Template:

`not_excluded_file(Path,Basename,ExcludedDirectories,ExcludedFiles)`

Mode and number of proofs:

`not_excluded_file(+atom,+atom,+list(atom),+list(atom)) - zero_or_one`

---

`output_file_path/4`

Returns the output file path.

Compilation flags:

`static`

Template:

`output_file_path(Name,Options,Format,Path)`

Mode and number of proofs:

`output_file_path(+atom,+list(atom),+object_identifier,-atom) - one`

---

locate\_library/2

Locates a library given its name.

Compilation flags:

static

Template:

locate\_library(Library,Path)

Mode and number of proofs:

locate\_library(+atom,-atom) - one

---

locate\_directory/2

Locates a directory given its name or full path.

Compilation flags:

static

Template:

locate\_directory(Directory,Path)

Mode and number of proofs:

locate\_directory(+atom,-atom) - one

---

locate\_file/5

Locates a file given its name, basename, full path, or library notation representation.

Compilation flags:

static

Template:

locate\_file(File,Basename,Extension,Directory,Path)

Mode and number of proofs:

---

locate\_file(+atom,+atom,+atom,+atom,-atom) - one

---

ground\_entity\_identifier/3

Converts an entity identifier to a ground term.

Compilation flags:

static

Template:

ground\_entity\_identifier(Kind,Identifier,GroundIdentifier)

Mode and number of proofs:

ground\_entity\_identifier(+atom,+callable,-callable) - one

---

filter\_file\_extension/3

Filters the file name extension depending on the file\_extensions/1 option.

Compilation flags:

static

Template:

filter\_file\_extension(Basename,Options,Name)

Mode and number of proofs:

filter\_file\_extension(+atom,+list(compound),-atom) - one

---

filter\_external\_file\_extension/3

Filters the external file name extension depending on the file\_extensions/1 option.

Compilation flags:

static

Template:

---

```
filter_external_file_extension(Path,Options,Name)
```

Mode and number of proofs:

```
filter_external_file_extension(+atom,+list(compound),-atom) - one
```

---

```
add_link_options/3
```

Adds url/1, urls/2, and tooltip/1 link options (for use by the graph language) based on the specified path to the list of options.

Compilation flags:

```
static
```

Template:

```
add_link_options(Path,Options,LinkingOptions)
```

Mode and number of proofs:

```
add_link_options(+atom,+list(compound),-list(compound)) - one
```

---

```
omit_path_prefix/3
```

Removes a prefix from a path, returning the relative path, when using the option omit\_path\_prefixes/1. Used mainly for constructing directory and file node identifiers and captions.

Compilation flags:

```
static
```

Template:

```
omit_path_prefix(Path,Options,Relative)
```

Mode and number of proofs:

```
omit_path_prefix(+atom,+list(compound),-atom) - one
```

---

add\_node\_zoom\_option/4

Adds node zoom options when using the zoom option.

Compilation flags:

static

Template:

add\_node\_zoom\_option(Identifier,Suffix,Options,NodeOptions)

Mode and number of proofs:

add\_node\_zoom\_option(+atom,+atom,+list(compound),-list(compound)) - one

---

message\_diagram\_description/1

Diagram description for progress messages.

Compilation flags:

static

Template:

message\_diagram\_description(Description)

Mode and number of proofs:

message\_diagram\_description(?atom) - one

---

## Private predicates

node\_/6

Table of saved nodes.

Compilation flags:

dynamic

Template:

node\_(Identifier,Label,Caption,Contents,Kind,Options)

Mode and number of proofs:

node\_(?nonvar,?nonvar,?nonvar,?list(compound),?atom,?list(compound)) - zero\_or\_more

---

edge\_/5

Table of saved edges.

Compilation flags:

dynamic

Template:

edge\_(From,To,Labels,Kind,Options)

Mode and number of proofs:

edge\_(?nonvar,?nonvar,?list(nonvar),?atom,?list(compound)) - zero\_or\_more

---

## Operators

(none)

object

### 1.15.2 diagrams

Predicates for generating all supported diagrams for libraries, directories, and files in one step using the DOT format.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 2:1:0

Date: 2019-04-07

Compilation flags:

static, context\_switching\_calls

Extends:

public diagrams(dot)

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 directories/2 directories/3 directory/1  
directory/2 directory/3 files/1 files/2 files/3 libraries/1 libraries/2 libraries/3 library/1  
library/2 rdirectory/1 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

#### 1.15.3 diagrams(Format)

- Format - Graph language file format.

Predicates for generating all supported diagrams for libraries, directories, or files in one step using the specified format.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 2:8:0

Date: 2019-06-13

## Compilation flags:

static, context\_switching\_calls

## Uses:

list  
os

## Remarks:

- Common options: title/1, date/1, output\_directory/1, relation\_labels/1, node\_type\_captions/1, exclude\_files/1, exclude\_libraries/1, url\_prefixes/1, omit\_path\_prefix/1, entity\_url\_suffix\_target/2, and layout/1.
- Limitations: Some of the provided predicates only make sense for some types of diagrams. Also, fine tuning may require generating individual diagrams directly instead of as a batch using this utility object.

## Inherited public predicates:

(none)

- Public predicates
  - libraries/3
  - libraries/2
  - libraries/1
  - all\_libraries/1
  - all\_libraries/0
  - rlibrary/2
  - rlibrary/1
  - library/2
  - library/1
  - directories/3
  - directories/2
  - rdirectory/3
  - rdirectory/2
  - rdirectory/1
  - directory/3
  - directory/2
  - directory/1
  - files/3

- files/2
- files/1
- all\_files/1
- all\_files/0
- Protected predicates
- Private predicates
- Operators

### Public predicates

libraries/3

Creates all supported diagrams for a set of libraries using the specified options. The Project argument is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

libraries(Project,Libraries,Options)

Mode and number of proofs:

libraries(+atom,+list(atom),+list(compound)) - one

---

libraries/2

Creates all supported diagrams for a set of libraries using the default options. The Project argument is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

libraries(Project,Libraries)

Mode and number of proofs:

libraries(+atom,+list(atom)) - one

---

libraries/1

Creates all supported diagrams for a set of libraries using the default options. The prefix libraries is used for the diagram file names.

Compilation flags:

static

Template:

libraries(Libraries)

Mode and number of proofs:

libraries(+list(atom)) - one

---

all\_libraries/1

Creates all supported diagrams for all loaded libraries using the specified options.

Compilation flags:

static

Template:

all\_libraries(Options)

Mode and number of proofs:

all\_libraries(+list(compound)) - one

---

all\_libraries/0

Creates all supported diagrams for all loaded libraries using default options.

Compilation flags:

static

Mode and number of proofs:

all\_libraries - one

---

rlibrary/2

Creates all supported diagrams for a library and its sub-libraries using the specified options.

Compilation flags:

static

Template:

rlibrary(Library,Options)

Mode and number of proofs:

rlibrary(+atom,+list(compound)) - one

---

rlibrary/1

Creates all supported diagrams for a library and its sub-libraries using default options.

Compilation flags:

static

Template:

rlibrary(Library)

Mode and number of proofs:

rlibrary(+atom) - one

---

library/2

Creates all supported diagrams for a library using the specified options.

Compilation flags:

static

Template:

library(Library,Options)

Mode and number of proofs:

library(+atom,+list(compound)) - one

---

## library/1

Creates all supported diagrams for a library using default options.

Compilation flags:

static

Template:

library(Library)

Mode and number of proofs:

library(+atom) - one

---

## directories/3

Creates all supported diagrams for a set of directories using the specified options. The Project argument is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

directories(Project,Directories,Options)

Mode and number of proofs:

directories(+atom,+list(atom),+list(compound)) - one

---

## directories/2

Creates all supported diagrams for a directory using default options. The Project argument is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

directories(Project,Directories)

Mode and number of proofs:

directories(+atom,+list(atom)) - one

---

---

rdirectory/3

Creates all supported diagrams for a directory and its sub-directories using the specified options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

rdirectory(Project,Directory,Options)

Mode and number of proofs:

rdirectory(+atom,+atom,+list(compound)) - one

---

rdirectory/2

Creates all supported diagrams for a directory and its sub-directories using default options. The Project argument is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

rdirectory(Project,Directory)

Mode and number of proofs:

rdirectory(+atom,+atom) - one

---

rdirectory/1

Creates all supported diagrams for a directory and its sub-directories using default options. The name of the directory is used as a prefix for the diagram file name.

Compilation flags:

static

Template:

rdirectory(Directory)

Mode and number of proofs:

rdirectory(+atom) - one

---

directory/3

Creates all supported diagrams for a directory using the specified options. The Project argument is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

directory(Project,Directory,Options)

Mode and number of proofs:

directory(+atom,+atom,+list(compound)) - one

---

directory/2

Creates all supported diagrams for a directory using default options. The Project argument is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

directory(Project,Directory)

Mode and number of proofs:

directory(+atom,+atom) - one

---

directory/1

Creates all supported diagrams for a directory using default options. The name of the directory is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

directory(Directory)

Mode and number of proofs:

directory(+atom) - one

---

files/3

Creates all supported diagrams for a set of files using the specified options. The file can be specified by name, basename, full path, or using library notation. The Project argument is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

files(Project,Files,Options)

Mode and number of proofs:

files(+atom,+list(atom),+list(compound)) - one

---

files/2

Creates all supported diagrams for a set of files using the default options. The file can be specified by name, basename, full path, or using library notation. The Project argument is used as a prefix for the diagram file names.

Compilation flags:

static

Template:

---

files(Project,Files)

Mode and number of proofs:

files(+atom,+list(atom)) - one

---

files/1

Creates all supported diagrams for a set of files using the default options. The file can be specified by name, basename, full path, or using library notation. The prefix “files” is used for the diagram file names.

Compilation flags:

static

Template:

files(Files)

Mode and number of proofs:

files(+list(atom)) - one

---

all\_files/1

Creates all supported diagrams for all loaded files using the specified options.

Compilation flags:

static

Template:

all\_files(Options)

Mode and number of proofs:

all\_files(+list(compound)) - one

---

all\_files/0

Creates all supported diagrams for all loaded files using default options.

Compilation flags:

static

Mode and number of proofs:

all\_files - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.15.4 directory\_dependency\_diagram

Predicates for generating directory dependency diagrams in DOT format.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2019-04-07

Compilation flags:

static, context\_switching\_calls

Extends:

public directory\_dependency\_diagram(dot)

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
 default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
 directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

directory\_load\_diagram, file\_load\_diagram

object

### 1.15.5 directory\_dependency\_diagram(Format)

- Format - Graph language file format.

Predicates for generating directory dependency diagrams. A dependency exists when an entity in one directory makes a reference to an entity in another directory.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 3:0:1

Date: 2024-04-01

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public directory_diagram(Format)
```

Uses:

```
file_dependency_diagram(Format)
```

```
list
```

```
logtalk
```

```
modules_diagram_support
```

Remarks:

```
(none)
```

Inherited public predicates:

```
all_files/0 all_files/1 all_libraries/0 all_libraries/1 check_option/1 check_options/1
default_option/1 default_options/1 diagram_description/1 diagram_name_suffix/1 directories/2
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format_object/1
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid_option/1 valid_options/1
```

- Public predicates
- Protected predicates
- Private predicates
  - sub\_diagram\_/2
- Operators

## Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

sub\_diagram\_/2

Table of directory sub-diagrams to support their generation.

Compilation flags:

dynamic

Template:

sub\_diagram\_(Project,Directory)

Mode and number of proofs:

sub\_diagram\_(?atom,?atom) - zero\_or\_more

---

## Operators

(none)

See also:

directory\_load\_diagram(Format), file\_load\_diagram(Format), library\_load\_diagram(Format)

category

### 1.15.6 directory\_diagram(Format)

- Format - Graph language file format.

Common predicates for generating directory diagrams.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 1:12:1

Date: 2024-03-30

Compilation flags:

static

Extends:

public diagram(Format)

Uses:

list

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
  - remember\_included\_directory/1
  - remember\_referenced\_logtalk\_directory/1
  - remember\_referenced\_prolog\_directory/1
- Private predicates
  - included\_directory\_/1
  - referenced\_logtalk\_directory\_/1
  - referenced\_prolog\_directory\_/1
- Operators

## Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

`remember_included_directory/1`

Remember included Logtalk directory in the diagram.

Compilation flags:

`static`

Template:

`remember_included_directory(Path)`

Mode and number of proofs:

`remember_included_directory(+atom) - one`

---

`remember_referenced_logtalk_directory/1`

Remember referenced Logtalk directory in the diagram.

Compilation flags:

`static`

Template:

`remember_referenced_logtalk_directory(Path)`

Mode and number of proofs:

`remember_referenced_logtalk_directory(+atom) - one`

---

`remember_referenced_prolog_directory/1`

Remember referenced Prolog directory in the diagram.

Compilation flags:

`static`

---

Template:

remember\_referenced\_prolog\_directory(Path)

Mode and number of proofs:

remember\_referenced\_prolog\_directory(+atom) - one

---

### Private predicates

included\_directory\_/1

Table of Logtalk directories already included in the diagram.

Compilation flags:

dynamic

Template:

included\_directory\_(Path)

Mode and number of proofs:

included\_directory\_(?atom) - zero\_or\_more

---

referenced\_logtalk\_directory\_/1

Table of referenced Logtalk directories in the diagram.

Compilation flags:

dynamic

Template:

referenced\_logtalk\_directory\_(Path)

Mode and number of proofs:

referenced\_logtalk\_directory\_(?atom) - zero\_or\_more

---

---

referenced\_prolog\_directory\_/1

Table of referenced Prolog directories in the diagram.

Compilation flags:

dynamic

Template:

referenced\_prolog\_directory\_(Path)

Mode and number of proofs:

referenced\_prolog\_directory\_(?atom) - zero\_or\_more

---

## Operators

(none)

object

### 1.15.7 directory\_load\_diagram

Predicates for generating directory loading dependency diagrams in DOT format.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2019-04-07

Compilation flags:

static, context\_switching\_calls

Extends:

public directory\_load\_diagram(dot)

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

directory\_dependency\_diagram, file\_dependency\_diagram  
object

### 1.15.8 directory\_load\_diagram(Format)

- Format - Graph language file format.

Predicates for generating directory loading dependency diagrams.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 3:0:1

Date: 2024-04-01

**Compilation flags:**

static, context\_switching\_calls

**Imports:**

public directory\_diagram(Format)

**Uses:**

file\_dependency\_diagram(Format)

file\_load\_diagram(Format)

list

logtalk

modules\_diagram\_support

**Remarks:**

(none)

**Inherited public predicates:**

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
 default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
 directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
  - sub\_diagram\_/2
- Operators

**Public predicates**

(no local declarations; see entity ancestors if any)

**Protected predicates**

(no local declarations; see entity ancestors if any)

## Private predicates

sub\_diagram\_/2

Table of directory sub-diagrams to support their generation.

Compilation flags:

dynamic

Template:

sub\_diagram\_(Project,Directory)

Mode and number of proofs:

sub\_diagram\_(?atom,?atom) - zero\_or\_more

---

## Operators

(none)

See also:

directory\_dependency\_diagram(Format), file\_dependency\_diagram(Format), li-  
brary\_dependency\_diagram(Format)

object

### 1.15.9 dot\_graph\_language

Predicates for generating graph files in the DOT language (version 2.36.0 or later).

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 3:8:1

Date: 2023-08-03

Compilation flags:

static, context\_switching\_calls

Implements:

public graph\_language\_protocol

Imports:

public options

Provides:

graph\_language\_registry::language\_object/2

Uses:

list

os

term\_io

user

Remarks:

(none)

Inherited public predicates:

check\_option/1 check\_options/1 default\_option/1 default\_options/1 edge/6 file\_footer/3  
file\_header/3 graph\_footer/5 graph\_header/5 node/7 option/2 option/3 output\_file\_name/2  
valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.15.10 entity\_diagram

Predicates for generating entity diagrams in DOT format with both inheritance and cross-referencing relation edges.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 2:0:0

Date: 2014-01-01

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public entity_diagram(dot)
```

Remarks:

(none)

Inherited public predicates:

```
all_files/0 all_files/1 all_libraries/0 all_libraries/1 check_option/1 check_options/1
default_option/1 default_options/1 diagram_description/1 diagram_name_suffix/1 directories/2
directories/3 directory/1 directory/2 directory/3 file/1 file/2 files/1 files/2 files/3
format_object/1 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3
rdirectory/1 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid_option/1 valid_options/1
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

## Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`inheritance_diagram`, `uses_diagram`, `xref_diagram`  
object

### 1.15.11 `entity_diagram`(Format)

- Format - Graph language file format.

Predicates for generating entity diagrams in the specified format with both inheritance and cross-referencing relation edges.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 2:57:2

Date: 2024-04-01

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public diagram(Format)
```

Uses:

```
list
logtalk
modules_diagram_support
user
```

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
  - file/2
  - file/1
- Protected predicates
- Private predicates
  - included\_entity\_/1
  - included\_module\_/1
  - referenced\_entity\_/2
  - referenced\_module\_/2
- Operators

### Public predicates

file/2

Creates a diagram for all entities in a loaded source file using the specified options. The file can be specified by name, basename, full path, or using library notation.

Compilation flags:

static

Template:

file(File,Options)

Mode and number of proofs:

file(+atom,+list(compound)) - one

file/1

Creates a diagram for all entities in a loaded source file using default options. The file can be specified by name, basename, full path, or using library notation.

Compilation flags:

static

Template:

file(File)

Mode and number of proofs:

file(+atom) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

included\_entity\_/1

Table of Logtalk entities already included in the diagram.

Compilation flags:

dynamic

Template:

included\_entity\_(Entity)

Mode and number of proofs:

included\_entity\_(?entity\_identifier) - zero\_or\_more

---

included\_module\_/1

Table of Prolog modules already included in the diagram.

Compilation flags:

dynamic

Template:

included\_module\_(Module)

Mode and number of proofs:

included\_module\_(?module\_identifier) - zero\_or\_more

---

referenced\_entity\_/2

Table of referenced Logtalk entities in the diagram.

Compilation flags:

dynamic

Template:

referenced\_entity\_(Referencer,Entity)

Mode and number of proofs:

referenced\_entity\_(?entity\_identifier,?entity\_identifier) - zero\_or\_more

---

referenced\_module\_/2

Table of referenced Logtalk entities in the diagram.

Compilation flags:

dynamic

Template:

referenced\_module\_(Referencer,Entity)

Mode and number of proofs:

referenced\_module\_(?entity\_identifier,?module\_identifier) - zero\_or\_more

---

## Operators

(none)

See also:

`inheritance_diagram(Format)`, `uses_diagram(Format)`, `xref_diagram(Format)`, `library_diagram(Format)`  
object

### 1.15.12 `file_dependency_diagram`

Predicates for generating file contents dependency diagrams in DOT format. A dependency exists when an entity in one file makes a reference to an entity in another file.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 2:1:0

Date: 2019-06-13

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public file_dependency_diagram(dot)
```

Remarks:

(none)

Inherited public predicates:

```
all_files/0 all_files/1 all_libraries/0 all_libraries/1 check_option/1 check_options/1
default_option/1 default_options/1 diagram_description/1 diagram_name_suffix/1 directories/2
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format_object/1
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid_option/1 valid_options/1
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`file_load_diagram`, `directory_load_diagram`, `library_load_diagram`  
object

#### 1.15.13 `file_dependency_diagram`(Format)

- Format - Graph language file format.

Predicates for generating file contents dependency diagrams. A dependency exists when an entity in one file makes a reference to an entity in another file.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 2:28:3

Date: 2024-04-01

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public file_diagram(Format)
```

Uses:

```
entity_diagram(Format)  
list  
logtalk  
modules_diagram_support  
os
```

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
 default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
 directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
  - sub\_diagram\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

sub\_diagram\_/1

Table of file sub-diagrams to support their generation.

Compilation flags:

dynamic

Template:

sub\_diagram\_(File)

Mode and number of proofs:

sub\_diagram\_(?atom) - zero\_or\_more

## Operators

(none)

See also:

`file_load_diagram(Format)`, `directory_load_diagram(Format)`, `library_load_diagram(Format)`  
`category`

### 1.15.14 `file_diagram(Format)`

- Format - Graph language file format.

Common predicates for generating file diagrams.

Availability:

`logtalk_load(diagrams(loader))`

Author: Paulo Moura

Version: 2:13:2

Date: 2022-05-31

Compilation flags:

`static`

Extends:

`public diagram(Format)`

Uses:

`list`

`logtalk`

`modules_diagram_support`

Remarks:

(none)

Inherited public predicates:

`all_files/0` `all_files/1` `all_libraries/0` `all_libraries/1` `check_option/1` `check_options/1`  
`default_option/1` `default_options/1` `diagram_description/1` `diagram_name_suffix/1` `directories/2`  
`directories/3` `directory/1` `directory/2` `directory/3` `files/1` `files/2` `files/3` `format_object/1`  
`libraries/1` `libraries/2` `libraries/3` `library/1` `library/2` `option/2` `option/3` `rdirectory/1`  
`rdirectory/2` `rdirectory/3` `rlibrary/1` `rlibrary/2` `valid_option/1` `valid_options/1`

- Public predicates

- Protected predicates
  - remember\_included\_file/1
  - remember\_referenced\_logtalk\_file/1
  - remember\_referenced\_prolog\_file/1
- Private predicates
  - included\_file\_/1
  - referenced\_logtalk\_file\_/1
  - referenced\_prolog\_file\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

remember\_included\_file/1

Remember included Logtalk file in the diagram.

Compilation flags:

static

Template:

remember\_included\_file(Path)

Mode and number of proofs:

remember\_included\_file(+atom) - one

---

remember\_referenced\_logtalk\_file/1

Remember referenced Logtalk file in the diagram.

Compilation flags:

static

Template:

remember\_referenced\_logtalk\_file(Path)

Mode and number of proofs:

`remember_referenced_logtalk_file(+atom) - one`

---

`remember_referenced_prolog_file/1`

Remember referenced Prolog file in the diagram.

Compilation flags:

`static`

Template:

`remember_referenced_prolog_file(Path)`

Mode and number of proofs:

`remember_referenced_prolog_file(+atom) - one`

---

### Private predicates

`included_file_/1`

Table of Logtalk files already included in the diagram.

Compilation flags:

`dynamic`

Template:

`included_file_(Path)`

Mode and number of proofs:

`included_file_(?atom) - zero_or_more`

---

referenced\_logtalk\_file\_/1

Table of referenced Logtalk files in the diagram.

Compilation flags:

dynamic

Template:

referenced\_logtalk\_file\_(Path)

Mode and number of proofs:

referenced\_logtalk\_file\_(?atom) - zero\_or\_more

---

referenced\_prolog\_file\_/1

Table of referenced Prolog files in the diagram.

Compilation flags:

dynamic

Template:

referenced\_prolog\_file\_(Path)

Mode and number of proofs:

referenced\_prolog\_file\_(?atom) - zero\_or\_more

---

## Operators

(none)

object

### 1.15.15 file\_load\_diagram

Predicates for generating file loading dependency diagrams in DOT format. A dependency exists when a file loads or includes another file.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 2:1:0

Date: 2019-06-13

Compilation flags:

static, context\_switching\_calls

Extends:

public file\_load\_diagram(dot)

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`file_dependency_diagram`, `directory_dependency_diagram`, `library_dependency_diagram`  
object

### 1.15.16 `file_load_diagram`(Format)

- Format - Graph language file format.

Predicates for generating file loading dependency diagrams. A dependency exists when a file loads or includes another file.

Availability:

`logtalk_load(diagrams(loader))`

Author: Paulo Moura

Version: 2:30:1

Date: 2024-04-01

Compilation flags:

`static`, `context_switching_calls`

Imports:

`public file_diagram`(Format)

Uses:

`entity_diagram`(Format)

`list`

`logtalk`

`modules_diagram_support`

`os`

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
  - sub\_diagram\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

sub\_diagram\_/1

Table of file sub-diagrams to support their generation.

Compilation flags:

dynamic

Template:

sub\_diagram\_(File)

Mode and number of proofs:

sub\_diagram\_(?atom) - zero\_or\_more

## Operators

(none)

See also:

file\_dependency\_diagram(Format), directory\_dependency\_diagram(Format), li-  
 brary\_dependency\_diagram(Format)  
 protocol

### 1.15.17 graph\_language\_protocol

Predicates for generating graph files.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 2:0:0

Date: 2014-12-30

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - output\_file\_name/2
  - file\_header/3
  - file\_footer/3
  - graph\_header/5
  - graph\_footer/5
  - node/7
  - edge/6

- Protected predicates
- Private predicates
- Operators

### Public predicates

`output_file_name/2`

Constructs the diagram file basename by adding a graph language dependent extension to the given name.

Compilation flags:

`static`

Template:

`output_file_name(Name,Basename)`

Mode and number of proofs:

`output_file_name(+atom,-atom) - one`

---

`file_header/3`

Writes the output file header using the specified options.

Compilation flags:

`static`

Template:

`file_header(Stream,Identifier,Options)`

Mode and number of proofs:

`file_header(+stream_or_alias,+atom,+list(compound)) - one`

---

---

file\_footer/3

Writes the output file footer using the specified options.

Compilation flags:

static

Template:

file\_footer(Stream,Identifier,Options)

Mode and number of proofs:

file\_footer(+stream\_or\_alias,+atom,+list(compound)) - one

---

graph\_header/5

Writes a graph header using the specified options.

Compilation flags:

static

Template:

graph\_header(Stream,Identifier,Label,Kind,Options)

Mode and number of proofs:

graph\_header(+stream\_or\_alias,+atom,+atom,+atom,+list(compound)) - one

---

graph\_footer/5

Writes a graph footer using the specified options.

Compilation flags:

static

Template:

graph\_footer(Stream,Identifier,Label,Kind,Options)

Mode and number of proofs:

graph\_footer(+stream\_or\_alias,+atom,+atom,+atom,+list(compound)) - one

---

node/7

Writes a node using the specified options.

Compilation flags:

static

Template:

node(Stream,Identifier,Label,Caption,Lines,Kind,Options)

Mode and number of proofs:

node(+stream\_or\_alias,+nonvar,+nonvar,+nonvar,+list(nonvar),+atom,+list(compound)) - one

---

edge/6

Writes an edge between two nodes using the specified options.

Compilation flags:

static

Template:

edge(Stream,Start,End,Labels,Kind,Options)

Mode and number of proofs:

edge(+stream\_or\_alias,+nonvar,+nonvar,+list(nonvar),+atom,+list(compound)) - one

---

### Protected predicates

(none)

### Private predicates

(none)

## Operators

(none)

object

### 1.15.18 graph\_language\_registry

Registry of implemented graph languages.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 1:0:1

Date: 2020-03-25

Compilation flags:

```
static, context_switching_calls
```

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - language\_object/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

language\_\_object/2

Table of defined graph languages and their implementation objects.

Compilation flags:  
static, multifile

Template:  
language\_\_object(Language, Object)  
Mode and number of proofs:  
language\_\_object(?atom, ?object\_\_identifier) - zero\_\_or\_\_more

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

object

### 1.15.19 inheritance\_\_diagram

Predicates for generating entity diagrams in DOT format with inheritance relation edges but no cross-referencing relation edges.

Availability:  
logtalk\_\_load(diagrams(loader))

Author: Paulo Moura  
Version: 2:0:0  
Date: 2014-01-15

Compilation flags:

static, context\_switching\_calls

Extends:

public inheritance\_diagram(dot)

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
 default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
 directories/3 directory/1 directory/2 directory/3 file/1 file/2 files/1 files/2 files/3  
 format\_object/1 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3  
 rdirectory/1 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

entity\_diagram, uses\_diagram, xref\_diagram

object

### 1.15.20 inheritance\_diagram(Format)

- Format - Graph language file format.

Predicates for generating entity diagrams in the specified format with inheritance relation edges but no cross-referencing relation edges.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 2:20:0

Date: 2024-03-20

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public entity_diagram(Format)
```

Uses:

```
logtalk
```

Remarks:

```
(none)
```

Inherited public predicates:

```
all_files/0 all_files/1 all_libraries/0 all_libraries/1 check_option/1 check_options/1  
default_option/1 default_options/1 diagram_description/1 diagram_name_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 file/1 file/2 files/1 files/2 files/3  
format_object/1 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3  
rdirectory/1 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid_option/1 valid_options/1
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`entity_diagram(Format)`, `uses_diagram(Format)`, `xref_diagram(Format)`  
object

#### 1.15.21 `library_dependency_diagram`

Predicates for generating library dependency diagrams in DOT format.

Availability:

`logtalk_load(diagrams(loader))`

Author: Paulo Moura

Version: 2:1:0

Date: 2019-06-13

Compilation flags:

`static`, `context_switching_calls`

Extends:

`public library_dependency_diagram(dot)`

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

library\_load\_diagram, file\_load\_diagram, entity\_diagram

object

#### 1.15.22 library\_dependency\_diagram(Format)

- Format - Graph language file format.

Predicates for generating library dependency diagrams. A dependency exists when an entity in one library makes a reference to an entity in another library.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 2:33:1

Date: 2024-04-01

Compilation flags:

static, context\_switching\_calls

Imports:

public library\_diagram(Format)

Uses:

entity\_diagram(Format)

list

logtalk

modules\_diagram\_support

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
  - sub\_diagram\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

sub\_diagram\_/1

Table of library sub-diagrams to support their generation.

Compilation flags:

dynamic

Template:

sub\_diagram\_(Library)

Mode and number of proofs:

sub\_diagram\_(?atom) - zero\_or\_more

---

### Operators

(none)

See also:

library\_load\_diagram(Format), directory\_load\_diagram(Format), file\_load\_diagram(Format), entity\_diagram(Format)

category

#### 1.15.23 library\_diagram(Format)

- Format - Graph language file format.

Common predicates for generating library diagrams.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 2:16:1

Date: 2024-03-30

Compilation flags:

static

Extends:

public diagram(Format)

Uses:

list

user

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
 default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
 directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
  - add\_library\_documentation\_url/4
  - remember\_included\_library/2
  - remember\_referenced\_logtalk\_library/2
  - remember\_referenced\_prolog\_library/2
- Private predicates
  - included\_library\_/2
  - referenced\_logtalk\_library\_/2
  - referenced\_prolog\_library\_/2
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

`add_library_documentation_url/4`

Adds a documentation URL when using the option `url_prefixes/2`.

Compilation flags:

`static`

Template:

`add_library_documentation_url(Kind,Options,Library,NodeOptions)`

Mode and number of proofs:

`add_library_documentation_url(+atom,+list(compound),+atom,-list(compound)) - one`

---

`remember_included_library/2`

Remember included Logtalk library in the diagram.

Compilation flags:

`static`

Template:

`remember_included_library(Library,Path)`

Mode and number of proofs:

`remember_included_library(+atom,+atom) - one`

---

`remember_referenced_logtalk_library/2`

Remember referenced Logtalk library in the diagram.

Compilation flags:

`static`

---

Template:

remember\_referenced\_logtalk\_library(Library,Path)

Mode and number of proofs:

remember\_referenced\_logtalk\_library(+atom,+atom) - one

---

remember\_referenced\_prolog\_library/2

Remember referenced Prolog library in the diagram.

Compilation flags:

static

Template:

remember\_referenced\_prolog\_library(Library,Path)

Mode and number of proofs:

remember\_referenced\_prolog\_library(+atom,+atom) - one

---

### Private predicates

included\_library\_/2

Table of Logtalk libraries already included in the diagram.

Compilation flags:

dynamic

Template:

included\_library\_(Library,Path)

Mode and number of proofs:

included\_library\_(?atom,?atom) - zero\_or\_more

---

referenced\_logtalk\_library\_/2

Table of referenced Logtalk libraries in the diagram.

Compilation flags:

dynamic

Template:

referenced\_logtalk\_library\_(Library,Path)

Mode and number of proofs:

referenced\_logtalk\_library\_(?atom,?atom) - zero\_or\_more

---

referenced\_prolog\_library\_/2

Table of referenced Prolog libraries in the diagram.

Compilation flags:

dynamic

Template:

referenced\_prolog\_library\_(Library,Path)

Mode and number of proofs:

referenced\_prolog\_library\_(?atom,?atom) - zero\_or\_more

---

## Operators

(none)

See also:

inheritance\_diagram(Format), uses\_diagram(Format), xref\_diagram(Format), entity\_diagram(Format)  
object

### 1.15.24 library\_load\_diagram

Predicates for generating library loading dependency diagrams in DOT format.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 2:1:0

Date: 2019-06-13

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public library_load_diagram(dot)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
all_files/0 all_files/1 all_libraries/0 all_libraries/1 check_option/1 check_options/1
default_option/1 default_options/1 diagram_description/1 diagram_name_suffix/1 directories/2
directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format_object/1
libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1
rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid_option/1 valid_options/1
```

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

#### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`library_dependency_diagram`, `file_dependency_diagram`, `entity_diagram`  
object

### 1.15.25 `library_load_diagram(Format)`

- Format - Graph language file format.

Predicates for generating library loading dependency diagrams.

Availability:

`logtalk_load(diagrams(loader))`

Author: Paulo Moura

Version: 2:33:1

Date: 2024-04-01

Compilation flags:

`static`, `context_switching_calls`

Imports:

`public library_diagram(Format)`

Uses:

`entity_diagram(Format)`

`list`

`logtalk`

`modules_diagram_support`

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
 default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
 directories/3 directory/1 directory/2 directory/3 files/1 files/2 files/3 format\_object/1  
 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3 rdirectory/1  
 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
  - sub\_diagram\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

sub\_diagram\_/1

Table of library sub-diagrams to support their generation.

Compilation flags:

dynamic

Template:

sub\_diagram\_(Library)

Mode and number of proofs:

sub\_diagram\_(?atom) - zero\_or\_more

## Operators

(none)

See also:

`library_dependency_diagram(Format)`, `directory_dependency_diagram(Format)`,  
`file_dependency_diagram(Format)`, `entity_diagram(Format)`  
`object`

### 1.15.26 `modules_diagram_support`

Utility predicates for supporting Prolog modules in diagrams.

Availability:

`logtalk_load(diagrams(loader))`

Author: Paulo Moura

Version: 0:19:5

Date: 2022-07-08

Compilation flags:

`static`, `context_switching_calls`

Dependencies:

(none)

Remarks:

- Supported backend Prolog systems: ECLiPSe, SICStus Prolog, SWI-Prolog, and YAP.

Inherited public predicates:

(none)

- Public predicates
  - `module_property/2`
  - `loaded_file_property/2`
  - `source_file_extension/1`
- Protected predicates
- Private predicates
- Operators

**Public predicates**

module\_property/2

Access to module properties, at least exports/1, file/1, and file/2 but also declares/2, defines/2, calls/2, and provides/3 when possible.

Compilation flags:

static

Template:

module\_property(Module,Property)

Mode and number of proofs:

module\_property(?atom,?callable) - zero\_or\_more

---

loaded\_file\_property/2

Access to loaded source file properties, at least basename/1, directory/1 but also parent/1 when possible.

Compilation flags:

static

Template:

loaded\_file\_property(File,Property)

Mode and number of proofs:

loaded\_file\_property(?atom,?callable) - zero\_or\_file

---

source\_file\_extension/1

Valid source file extension for Prolog source files.

Compilation flags:

static

Template:

source\_file\_extension(Extension)

Mode and number of proofs:

source\_file\_extension(?atom) - one\_or\_more

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

object

### 1.15.27 uses\_diagram

Predicates for generating entity diagrams in DOT format with only uses/2 and use\_module/2 relation edges.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 2:0:1

Date: 2020-03-27

Compilation flags:

static, context\_switching\_calls

Extends:

public uses\_diagram(dot)

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
 default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
 directories/3 directory/1 directory/2 directory/3 file/1 file/2 files/1 files/2 files/3  
 format\_object/1 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3  
 rdirectory/1 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

entity\_diagram, inheritance\_diagram, xref\_diagram

object

#### 1.15.28 uses\_diagram(Format)

- Format - Graph language file format.

Predicates for generating entity diagrams with only uses/2 and use\_module/2 relation edges.

Availability:

logtalk\_load(diagrams(loader))

Author: Paulo Moura

Version: 2:21:0

Date: 2024-03-20

Compilation flags:

static, context\_switching\_calls

Extends:

public entity\_diagram(Format)

Uses:

logtalk

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
directories/3 directory/1 directory/2 directory/3 file/1 file/2 files/1 files/2 files/3  
format\_object/1 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3  
rdirectory/1 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`entity_diagram(Format)`, `inheritance_diagram(Format)`, `xref_diagram(Format)`

object

### 1.15.29 xref\_diagram

Predicates for generating predicate call cross-referencing diagrams in DOT format.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 2:0:0

Date: 2014-01-01

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public xref_diagram(dot)
```

Remarks:

(none)

Inherited public predicates:

```
all_files/0 all_files/1 all_libraries/0 all_libraries/1 check_option/1 check_options/1
default_option/1 default_options/1 diagram_description/1 diagram_name_suffix/1 directories/2
directories/3 directory/1 directory/2 directory/3 entity/1 entity/2 file/1 file/2 files/1 files/2
files/3 format_object/1 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3
rdirectory/1 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid_option/1 valid_options/1
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`entity_diagram`, `inheritance_diagram`, `uses_diagram`  
object

### 1.15.30 `xref_diagram`(Format)

- Format - Graph language file format.

Predicates for generating predicate call cross-referencing diagrams.

Availability:

```
logtalk_load(diagrams(loader))
```

Author: Paulo Moura

Version: 2:72:1

Date: 2024-04-02

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public entity_diagram(Format)
```

Uses:

```
atom  
list  
logtalk  
modules_diagram_support  
os  
user
```

Remarks:

(none)

Inherited public predicates:

all\_files/0 all\_files/1 all\_libraries/0 all\_libraries/1 check\_option/1 check\_options/1  
 default\_option/1 default\_options/1 diagram\_description/1 diagram\_name\_suffix/1 directories/2  
 directories/3 directory/1 directory/2 directory/3 file/1 file/2 files/1 files/2 files/3  
 format\_object/1 libraries/1 libraries/2 libraries/3 library/1 library/2 option/2 option/3  
 rdirectory/1 rdirectory/2 rdirectory/3 rlibrary/1 rlibrary/2 valid\_option/1 valid\_options/1

- Public predicates
  - entity/2
  - entity/1
- Protected predicates
- Private predicates
  - included\_predicate\_/1
  - referenced\_predicate\_/1
  - external\_predicate\_/1
- Operators

## Public predicates

entity/2

Creates a diagram for a single entity using the specified options.

Compilation flags:

static

Template:

entity(Entity,Options)

Mode and number of proofs:

entity(+entity\_identifier,+list(compound)) - one

entity/1

Creates a diagram for a single entity using default options.

Compilation flags:

static

Template:

entity(Entity)

Mode and number of proofs:

entity(+entity\_identifier) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

included\_predicate\_/1

Table of predicates already included in the diagram for the entity under processing.

Compilation flags:

dynamic

Template:

included\_predicate\_(Predicate)

Mode and number of proofs:

included\_predicate\_(?predicate\_indicator) - zero\_or\_more

---

referenced\_predicate\_/1

Table of referenced predicates for the entity under processing.

Compilation flags:

dynamic

---

Template:

referenced\_predicate\_(Predicate)

Mode and number of proofs:

referenced\_predicate\_(?predicate\_indicator) - zero\_or\_more

---

external\_predicate\_/1

Table of external predicate references for all the entities under processing.

Compilation flags:

dynamic

Template:

external\_predicate\_(Reference)

Mode and number of proofs:

external\_predicate\_(?compound) - zero\_or\_more

---

## Operators

(none)

See also:

entity\_diagram(Format), inheritance\_diagram(Format), uses\_diagram(Format)

## 1.16 dictionaries

object

### 1.16.1 avltree

AVL tree implementation of the dictionary protocol. Uses standard order to compare keys.

Availability:

logtalk\_load(dictionaries(loader))

Author: R.A.O'Keefe, L.Damas, V.S.Costa, Glenn Burgess, Jiri Spitz, and Jan Wielemaker; Logtalk port and additional predicates by Paulo Moura

Version: 1:4:0

Date: 2021-04-12

Compilation flags:

static, context\_switching\_calls

Implements:

public dictionaryp

Extends:

public term

Uses:

list

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 apply/4 as\_curly\_bracketed/2  
as\_dictionary/2 as\_list/2 check/1 clone/3 clone/4 delete/4 delete\_max/4 delete\_min/4  
depth/2 empty/1 ground/1 insert/4 intersection/2 intersection/3 keys/2 lookup/2 lookup/3  
map/2 map/3 max/3 min/3 new/1 next/4 numbervars/1 numbervars/3 occurs/2 previous/4  
singletons/2 size/2 subsumes/2 subterm/2 update/3 update/4 update/5 valid/1 values/2  
variables/2 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

bintree, rbtree

object

### 1.16.2 bintree

Simple binary tree implementation of the dictionary protocol. Uses standard order to compare keys.

Availability:

```
logtalk_load(dictionaries(loader))
```

Author: Paulo Moura and Paul Fodor

Version: 2:11:1

Date: 2022-05-05

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public dictionaryp
```

Extends:

```
public term
```

Uses:

```
list
```

Remarks:

(none)

Inherited public predicates:

```
(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 apply/4 as_curly_bracketed/2
as_dictionary/2 as_list/2 check/1 clone/3 clone/4 delete/4 delete_max/4 delete_min/4
depth/2 empty/1 ground/1 insert/4 intersection/2 intersection/3 keys/2 lookup/2 lookup/3
map/2 map/3 max/3 min/3 new/1 next/4 numbervars/1 numbervars/3 occurs/2 previous/4
singletons/2 size/2 subsumes/2 subterm/2 update/3 update/4 update/5 valid/1 values/2
variables/2 variant/2 varnumbers/2 varnumbers/3
```

- Public predicates
  - preorder/2
  - inorder/2
  - postorder/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

preorder/2

Preorder tree traversal.

Compilation flags:

static

Template:

preorder(Tree,List)

Mode and number of proofs:

preorder(@tree,-list) - one

---

inorder/2

Inorder tree traversal.

Compilation flags:

static

Template:

inorder(Tree,List)

Mode and number of proofs:

inorder(@tree,-list) - one

---

postorder/2

Postorder tree traversal.

Compilation flags:

static

Template:

postorder(Tree,List)

Mode and number of proofs:

postorder(@tree,-list) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

avltree, rbtree

protocol

### 1.16.3 dictionaryp

Dictionary protocol.

Availability:

logtalk\_load(dictionaries(loader))

Author: Paulo Moura

Version: 2:4:0

Date: 2024-10-02

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - as\_dictionary/2
  - as\_list/2
  - as\_curly\_bracketed/2
  - clone/3
  - clone/4
  - insert/4
  - delete/4
  - update/4
  - update/5
  - update/3
  - empty/1
  - lookup/3
  - lookup/2
  - intersection/2
  - intersection/3
  - previous/4
  - next/4
  - min/3
  - max/3
  - delete\_min/4
  - delete\_max/4
  - keys/2
  - values/2
  - map/2

- map/3
- apply/4
- size/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

`as_dictionary/2`

Converts a list of key-value pairs to a dictionary.

Compilation flags:

`static`

Template:

`as_dictionary(Pairs,Dictionary)`

Mode and number of proofs:

`as_dictionary(@list(pairs),-dictionary) - one`

---

`as_list/2`

Converts a dictionary to an ordered list (as per standard order) of key-value pairs.

Compilation flags:

`static`

Template:

`as_list(Dictionary,Pairs)`

Mode and number of proofs:

`as_list(@dictionary,-list(pairs)) - one`

---

as\_curly\_bracketed/2

Creates a curly-bracketed term representation of a dictionary.

Compilation flags:

static

Template:

as\_curly\_bracketed(Dictionary,Term)

Mode and number of proofs:

as\_curly\_bracketed(+dictionary,--term) - one

---

clone/3

Clones a dictionary using the same keys but with all values unbound and returning a list of all the pairs in the new clone.

Compilation flags:

static

Template:

clone(Dictionary,Clone,ClonePairs)

Mode and number of proofs:

clone(+dictionary,-dictionary,-list(pairs)) - one

---

clone/4

Clones a dictionary using the same keys but with all values unbound and returning the list of all pairs in the dictionary and in the clone.

Compilation flags:

static

Template:

clone(Dictionary,Pairs,Clone,ClonePairs)

Mode and number of proofs:

clone(+dictionary,-list(pairs),-dictionary,-list(pairs)) - one

---

insert/4

Inserts a key-value pair into a dictionary, returning the updated dictionary. When the key already exists, the associated value is updated.

Compilation flags:

static

Template:

insert(OldDictionary,Key,Value,NewDictionary)

Mode and number of proofs:

insert(+dictionary,+ground,@term,-dictionary) - one

---

delete/4

Deletes a matching key-value pair from a dictionary, returning the updated dictionary. Fails if it cannot find the key or if the key exists but the value does not unify.

Compilation flags:

static

Template:

delete(OldDictionary,Key,Value,NewDictionary)

Mode and number of proofs:

delete(+dictionary,@ground,?term,-dictionary) - zero\_or\_one

---

update/4

Updates the value associated with Key in a dictionary, returning the updated dictionary. Fails if it cannot find the key.

Compilation flags:

static

Template:

update(OldDictionary,Key,NewValue,NewDictionary)

Mode and number of proofs:

update(+dictionary,@ground,+term,-dictionary) - zero\_or\_one

---

update/5

Updates the value associated with a key in a dictionary, returning the updated dictionary. Fails if it cannot find the key or if the existing value does not unify.

Compilation flags:

static

Template:

update(OldDictionary,Key,OldValue,NewValue,NewDictionary)

Mode and number of proofs:

update(+dictionary,@ground,?term,+term,-dictionary) - zero\_or\_one

---

update/3

Updates the key-value pairs in a dictionary, returning the updated dictionary. Fails if it cannot find one of the keys.

Compilation flags:

static

Template:

update(OldDictionary,Pairs,NewDictionary)

Mode and number of proofs:

update(+dictionary,@list(pair),-dictionary) - zero\_or\_one

---

---

empty/1

True iff the dictionary is empty.

Compilation flags:

static

Template:

empty(Dictionary)

Mode and number of proofs:

empty(@dictionary) - zero\_or\_one

---

lookup/3

Lookups a matching key-value pair from a dictionary. Fails if no match is found.

Compilation flags:

static

Template:

lookup(Key,Value,Dictionary)

Mode and number of proofs:

lookup(+ground,?term,@dictionary) - zero\_or\_one

lookup(-ground,?term,@dictionary) - zero\_or\_more

---

lookup/2

Lookups all matching key-value pairs from a dictionary. Fails if it cannot find one of the keys or if a value for a key does not unify.

Compilation flags:

static

Template:

lookup(Pairs,Dictionary)

Mode and number of proofs:

lookup(+list(pair),@dictionary) - zero\_or\_one

---

intersection/2

True iff the values of the dictionaries common keys unify. Trivially true when there are no common keys.

Compilation flags:  
static

Template:  
intersection(Dictionary1,Dictionary2)

Mode and number of proofs:  
intersection(+dictionary,+dictionary) - zero\_or\_one

---

intersection/3

Returns the (possibly empty) intersection between two dictionaries when the values of their common keys unify.

Compilation flags:  
static

Template:  
intersection(Dictionary1,Dictionary2,Intersection)

Mode and number of proofs:  
intersection(+dictionary,+dictionary,-dictionary) - zero\_or\_one

---

previous/4

Returns the previous pair in a dictionary given a key. Fails if there is no previous pair.

Compilation flags:  
static

Template:  
previous(Dictionary,Key,Previous,Value)

---

Mode and number of proofs:

previous(+dictionary,+key,-key,-value) - zero\_or\_one

---

next/4

Returns the next pair in a dictionary given a key. Fails if there is no next pair.

Compilation flags:

static

Template:

next(Dictionary,Key,Next,Value)

Mode and number of proofs:

next(+dictionary,+key,-key,-value) - zero\_or\_one

---

min/3

Returns the pair with the minimum key (as per standard order) in a dictionary. Fails if the dictionary is empty.

Compilation flags:

static

Template:

min(Dictionary,Key,Value)

Mode and number of proofs:

min(+dictionary,-key,-value) - zero\_or\_one

---

max/3

Returns the pair with the maximum key (as per standard order) in a dictionary. Fails if the dictionary is empty.

Compilation flags:

static

Template:

max(Dictionary,Key,Value)

Mode and number of proofs:

max(+dictionary,-key,-value) - zero\_or\_one

---

delete\_min/4

Deletes the pair with the minimum key (as per standard order) from a dictionary, returning the deleted pair and the updated dictionary. Fails if the dictionary is empty.

Compilation flags:

static

Template:

delete\_min(OldDictionary,Key,Value,NewDictionary)

Mode and number of proofs:

delete\_min(+dictionary,-key,-value,-dictionary) - zero\_or\_one

---

delete\_max/4

Deletes the pair with the maximum key (as per standard order) from a dictionary, returning the deleted pair and the updated dictionary. Fails if the dictionary is empty.

Compilation flags:

static

Template:

delete\_max(OldDictionary,Key,Value,NewDictionary)

Mode and number of proofs:

`delete_max(+dictionary,-key,-value,-dictionary) - zero_or_one`

---

`keys/2`

Returns a list with all the dictionary keys in ascending order (as per standard order).

Compilation flags:

`static`

Template:

`keys(Dictionary,Keys)`

Mode and number of proofs:

`keys(@dictionary,-list) - one`

---

`values/2`

Returns a list with all the dictionary values in ascending order of the keys (as per standard order).

Compilation flags:

`static`

Template:

`values(Dictionary,Values)`

Mode and number of proofs:

`values(@dictionary,-list) - one`

---

`map/2`

Maps a closure over each dictionary key-value pair. Fails if the mapped closure attempts to modify the keys.

Compilation flags:

`static`

Template:

map(Closure,Dictionary)

Meta-predicate template:

map(1,\*)

Mode and number of proofs:

map(@callable,+dictionary) - zero\_or\_more

---

map/3

Maps a closure over each dictionary key-value pair, returning the new dictionary. Fails if the mapped closure attempts to modify the keys.

Compilation flags:

static

Template:

map(Closure,OldDictionary,NewDictionary)

Meta-predicate template:

map(2,\*,\*)

Mode and number of proofs:

map(@callable,+dictionary,-dictionary) - zero\_or\_more

---

apply/4

Applies a closure to a specific key-value pair, returning the new dictionary. Fails if the key cannot be found or if the mapped closure attempts to modify the key.

Compilation flags:

static

Template:

apply(Closure,OldDictionary,Key,NewDictionary)

Meta-predicate template:

apply(2,\*,\*,\*)

Mode and number of proofs:

apply(+callable,+dictionary,+key,-dictionary) - zero\_or\_one

---

size/2

Number of dictionary entries.

Compilation flags:

static

Template:

size(Dictionary,Size)

Mode and number of proofs:

size(@dictionary,?integer) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

avltree, bintree, rbtree

object

### 1.16.4 rbtree

Red-Black tree implementation of the dictionary protocol. Uses standard order to compare keys.

Availability:

logtalk\_load(dictionaries(loader))

Author: Vitor Santos Costa; Logtalk port and additional predicates by Paulo Moura.

Version: 1:9:0

Date: 2021-04-12

Compilation flags:

static, context\_switching\_calls

Implements:

public dictionaryp

Extends:

public term

Remarks:

(none)

Inherited public predicates:

(<)/2 (:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 apply/4 as\_curly\_bracketed/2  
as\_dictionary/2 as\_list/2 check/1 clone/3 clone/4 delete/4 delete\_max/4 delete\_min/4  
depth/2 empty/1 ground/1 insert/4 intersection/2 intersection/3 keys/2 lookup/2 lookup/3  
map/2 map/3 max/3 min/3 new/1 next/4 numbervars/1 numbervars/3 occurs/2 previous/4  
singletons/2 size/2 subsumes/2 subterm/2 update/3 update/4 update/5 valid/1 values/2  
variables/2 variant/2 varnumbers/2 varnumbers/3

- Public predicates
  - partial\_map/4
- Protected predicates
- Private predicates
- Operators

## Public predicates

partial\_map/4

Applies a closure to the tree pairs identified by a set of keys.

Compilation flags:

static

Template:

partial\_map(Tree,Keys,Closure,NewTree)

Meta-predicate template:

partial\_map(\*,\*,2,\*)

Mode and number of proofs:

partial\_map(+tree,+list,@closure,-tree) - zero\_or\_one

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

avltree, bintree

## 1.17 dif

object

### 1.17.1 dif

Provides dif/2 and derived predicates.

Availability:

`logtalk_load(dif(loader))`

Author: Paulo Moura

Version: 1:3:0

Date: 2023-10-02

Compilation flags:

`static, context_switching_calls`

Dependencies:

(none)

Remarks:

- Supported backend Prolog systems: B-Prolog, ECLiPSe, SICStus Prolog, SWI-Prolog, Trealla Prolog, and YAP.

Inherited public predicates:

(none)

- Public predicates
  - dif/2
  - dif/1
- Protected predicates
- Private predicates
- Operators

### Public predicates

dif/2

Sets a constraint that is true iff the two terms are different.

Compilation flags:

static

Template:

dif(Term1,Term2)

Mode and number of proofs:

dif(+term,+term) - zero\_or\_one

---

dif/1

Sets a set of constraints that are true iff all terms in a list are different.

Compilation flags:

static

Template:

dif(Terms)

Mode and number of proofs:

dif(+list(term)) - zero\_or\_one

---

**Protected predicates**

(none)

**Private predicates**

(none)

**Operators**

(none)

**1.18 doclet**

object

**1.18.1 doclet**

Utility object to help automate (re)generating documentation for a project.

Availability:

`logtalk_load(doclet(loader))`

Author: Paulo Moura

Version: 0:5:0

Date: 2017-01-05

Compilation flags:

`static, context_switching_calls`

Provides:

`logtalk::message_tokens//2`

Uses:

`logtalk`

`os`

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - update/0
  - doc\_goal/1
  - shell\_command/1
- Protected predicates
- Private predicates
- Operators

### Public predicates

update/0

Updates the project documentation, first by calling a sequence of goals and second by executing a sequence of shell commands. Fails if any goal or shell command fails.

Compilation flags:

static

Mode and number of proofs:

update - zero\_or\_one

---

doc\_goal/1

Table of goals, typically using the diagrams and the lgt doc tools, used to generate the documentation. Goals are called in the order they are defined and in the context of the user pseudo-object.

Compilation flags:

static

Template:

doc\_goal(Goal)

Mode and number of proofs:

doc\_goal(?callable) - one\_or\_more

---

shell\_command/1

Table of shell commands to convert intermediate documentation files into user-friendly documentation. Commands are executed in the order they are defined.

Compilation flags:

static

Template:

shell\_command(Command)

Mode and number of proofs:

shell\_command(?atom) - one\_or\_more

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

lgtdocp, diagram(Format)

## 1.19 edcg

object

### 1.19.1 edcg

Multiple hidden parameters: an extension to Prolog's DCG notation. Ported to Logtalk as a hook object.

Availability:

logtalk\_load(edcg(loader))

Author: Peter Van Roy; adapted to Logtalk by Paulo Moura.

Version: 1:4:2  
Date: 2020-04-08

Copyright: Copyright (C) 1992 Peter Van Roy  
License: MIT

Compilation flags:  
static, context\_switching\_calls

Implements:  
public expanding  
Provides:  
logtalk::message\_tokens//2  
Uses:  
list  
logtalk

Remarks:

- Usage: Compile source files with objects (or categories) defining EDCGs using the compiler option `hook(edcg)`.

Inherited public predicates:  
goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
  - pred\_info/3
  - acc\_info/7
  - acc\_info/5
  - pass\_info/2
  - pass\_info/1
- Operators
  - op(1200,xfx,-->>)

**Public predicates**

(no local declarations; see entity ancestors if any)

**Protected predicates**

(no local declarations; see entity ancestors if any)

**Private predicates**

pred\_info/3

Declares predicates that have the listed hidden parameters.

Compilation flags:

dynamic

Template:

pred\_info(Name,Arity,HiddenParameters)

Mode and number of proofs:

pred\_info(?atom,?integer,?list(atom)) - zero\_or\_more

---

acc\_info/7

Long form for declaring accumulators.

Compilation flags:

dynamic

Template:

acc\_info(Accumulator,Term,Left,Right,Joiner,LStart,RStart)

Mode and number of proofs:

acc\_info(?atom,?term,?term,?term,?callable,?term,?term) - zero\_or\_more

---

acc\_info/5

Short form for declaring accumulators.

Compilation flags:

dynamic

Template:

acc\_info(Accumulator,Term,Left,Right,Joiner)

Mode and number of proofs:

acc\_info(?atom,?term,?term,?term,?callable) - zero\_or\_more

---

pass\_info/2

Long form for declaring passed arguments. Passed arguments are conceptually the same as accumulators with =/2 as the joiner function.

Compilation flags:

dynamic

Template:

pass\_info(Argument,PStart)

Mode and number of proofs:

pass\_info(?atom,?term) - zero\_or\_more

---

pass\_info/1

Short form for declaring passed arguments. Passed arguments are conceptually the same as accumulators with =/2 as the joiner function.

Compilation flags:

dynamic

Template:

pass\_info(Argument)

Mode and number of proofs:

pass\_info(?atom) - zero\_or\_more

---

---

## Operators

op(1200,xfx,-->>)

Scope:

public

## 1.20 events

object

### 1.20.1 after\_event\_registry

After events registry predicates.

Availability:

logtalk\_load(events(loader))

Author: Paulo Moura

Version: 1:1:0

Date: 2009-10-08

Compilation flags:

static, context\_switching\_calls, events

Implements:

public event\_registryp

Remarks:

(none)

Inherited public predicates:

del\_monitors/0 del\_monitors/4 monitor/1 monitor/4 monitored/1 monitors/1 set\_monitor/4

- [Public predicates](#)
  - [Protected predicates](#)
  - [Private predicates](#)

- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`before_event_registry`, `monitorp`  
object

### 1.20.2 `before_event_registry`

Before events registry predicates.

Availability:

`logtalk_load(events(loader))`

Author: Paulo Moura

Version: 1:1:0

Date: 2009-10-08

Compilation flags:

`static`, `context_switching_calls`, `events`

Implements:

`public event_registryp`

Remarks:

(none)

Inherited public predicates:

`del_monitors/0` `del_monitors/4` `monitor/1` `monitor/4` `monitored/1` `monitors/1` `set_monitor/4`

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`after_event_registry`, `monitorp`

object

### 1.20.3 event\_registry

Before and after events registry predicates.

Availability:

`logtalk_load(events(loader))`

Author: Paulo Moura

Version: 1:1:0

Date: 2009-10-08

Compilation flags:

`static`, `context_switching_calls`, `events`

Implements:

public event\_registryp

Remarks:

(none)

Inherited public predicates:

del\_monitors/0 del\_monitors/4 monitor/1 monitor/4 monitored/1 monitors/1 set\_monitor/4

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.20.4 event\_registryp

Event registry protocol.

Availability:

logtalk\_load(events(loader))

Author: Paulo Moura

Version: 1:1:0

Date: 2009-10-08

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - monitors/1
  - monitor/1
  - monitored/1
  - monitor/4
  - set\_monitor/4
  - del\_monitors/4
  - del\_monitors/0
- Protected predicates
- Private predicates
- Operators

## Public predicates

monitors/1

Returns a list of all current monitors.

Compilation flags:

static

Template:

monitors(Monitors)

Mode and number of proofs:

monitors(-list(object\_identifier)) - one

monitor/1

Monitor is an object playing the role of a monitor.

Compilation flags:

static

Template:

monitor(Monitor)

Mode and number of proofs:

monitor(-object\_identifier) - zero\_or\_more

monitor(+object\_identifier) - zero\_or\_one

---

monitored/1

Returns a list of all currently monitored objects.

Compilation flags:

static

Template:

monitored(Objects)

Mode and number of proofs:

monitored(-list(object\_identifier)) - one

---

monitor/4

True if the arguments describe a currently defined monitored event.

Compilation flags:

static

Template:

monitor(Object,Message,Sender,Monitor)

Mode and number of proofs:

monitor(?object\_identifier,?nonvar,?object\_identifier,?object\_identifier) - zero\_or\_more

---

set\_monitor/4

Sets a monitor for the set of matching events.

Compilation flags:

static

Template:

set\_monitor(Object,Message,Sender,Monitor)

Mode and number of proofs:

set\_monitor(?object\_identifier,?nonvar,?object\_identifier,+object\_identifier) - zero\_or\_one

---

del\_monitors/4

Deletes all matching monitored events.

Compilation flags:

static

Template:

del\_monitors(Object,Message,Sender,Monitor)

Mode and number of proofs:

del\_monitors(?object\_identifier,?nonvar,?object\_identifier,?object\_identifier) - one

---

del\_monitors/0

Deletes all monitored events.

Compilation flags:

static

Mode and number of proofs:

del\_monitors - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

event\_registry, monitorp  
category

### 1.20.5 monitor

Monitor predicates.

Availability:

logtalk\_load(events(loader))

Author: Paulo Moura

Version: 1:3:0

Date: 2019-03-08

Compilation flags:

static, events

Implements:

public monitorp

Remarks:

(none)

Inherited public predicates:

activate\_monitor/0 del\_spy\_points/4 monitor\_activated/0 reset\_monitor/0 set\_spy\_point/4  
spy\_point/4 suspend\_monitor/0

- Public predicates
- Protected predicates
- Private predicates
  - spy\_point\_/4
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

spy\_point\_/4

Stores current spy points.

Compilation flags:

dynamic

Template:

spy\_point\_(Event, Object, Message, Sender)

Mode and number of proofs:

spy\_point\_(?event, ?object, ?callable, ?object) - zero\_or\_more

---

### Operators

(none)

protocol

## 1.20.6 monitorp

Monitor protocol.

Availability:

logtalk\_load(events(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2000-07-24

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - monitor\_activated/0
  - activate\_monitor/0
  - suspend\_monitor/0
  - reset\_monitor/0
  - spy\_point/4
  - set\_spy\_point/4
  - del\_spy\_points/4
- Protected predicates
- Private predicates
- Operators

**Public predicates**

monitor\_activated/0

True if monitor is currently active.

Compilation flags:

static

Mode and number of proofs:

monitor\_activated - zero\_or\_one

---

activate\_monitor/0

Activates all spy points and start monitoring.

Compilation flags:

static

Mode and number of proofs:

activate\_monitor - one

---

suspend\_monitor/0

Suspends monitoring, deactivating all spy points.

Compilation flags:

static

Mode and number of proofs:

suspend\_monitor - one

---

reset\_monitor/0

Resets monitor, deactivating and deleting all spy points.

Compilation flags:

static

Mode and number of proofs:

reset\_monitor - one

---

spy\_point/4

Current spy point.

Compilation flags:

static

Template:

spy\_point(Event, Object, Message, Sender)

Mode and number of proofs:

spy\_point(?event, ?object, ?callable, ?object) - zero\_or\_more

---

set\_spy\_point/4

Sets a spy point.

Compilation flags:

static

Template:

set\_spy\_point(Event, Object, Message, Sender)

Mode and number of proofs:

set\_spy\_point(?event, ?object, ?callable, ?object) - one

---

`del_spy_points/4`

Deletes all matching spy points.

Compilation flags:

`static`

Template:

`del_spy_points(Event, Object, Message, Sender)`

Mode and number of proofs:

`del_spy_points(@event, @object, @callable, @object) - one`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

`monitor`, `event_registry`

## 1.21 expand\_library\_alias\_paths

object

### 1.21.1 expand\_library\_alias\_paths

Hook object for expanding library alias paths in `logtalk_library_path/2` facts when compiling a source file.

Availability:

`logtalk_load(expand_library_alias_paths(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2018-04-12

Compilation flags:

static, context\_switching\_calls

Implements:

public expanding

Uses:

logtalk

os

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

## 1.22 expecteds

object

### 1.22.1 either

Types and predicates for extended type-checking and handling of expected terms.

Availability:

```
logtalk_load(expecteds(loader))
```

Author: Paulo Moura

Version: 0:7:0

Date: 2021-01-03

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
type::type/1
```

```
type::check/2
```

```
arbitrary::arbitrary/1
```

```
arbitrary::arbitrary/2
```

Uses:

```
expected
```

```
expected(Expected)
```

```
random
```

```
type
```

Remarks:

- Type-checking support: Defines a `either(ValueType, ErrorType)` type for checking expected terms where the value and error terms must be of the given types.
- QuickCheck support: Defines clauses for the `type::arbitrary/1-2` predicates to allow generating random values for the `either(ValueType, ErrorType)` type.

Inherited public predicates:

(none)

- Public predicates
  - expecteds/2
  - unexpecteds/2
  - partition/3
- Protected predicates
- Private predicates
- Operators

### Public predicates

expecteds/2

Returns the values stored in the expected terms that hold a value.

Compilation flags:

static

Template:

expecteds(Expecteds,Values)

Mode and number of proofs:

expecteds(+list(expected),-list) - one

---

unexpecteds/2

Returns the errors stored in the expected terms that hold an error.

Compilation flags:

static

Template:

unexpecteds(Expecteds,Errors)

Mode and number of proofs:

unexpecteds(+list(expected),-list) - one

---

---

partition/3

Retrieves and partitions the values and errors hold by the expected terms.

Compilation flags:

static

Template:

partition(Expecteds,Values,Errors)

Mode and number of proofs:

partition(+list(expected),-list,-list) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

expected, expected(Expected), type, arbitrary

object

### 1.22.2 expected

Constructors for expected terms. An expected term contains either a value or an error. Expected terms should be regarded as opaque terms and always used with the expected/1 object by passing the expected term as a parameter.

Availability:

logtalk\_load(expecteds(loader))

Author: Paulo Moura

Version: 2:1:0

Date: 2021-01-03

Compilation flags:

static, context\_switching\_calls

Provides:

type::type/1  
type::check/2

Remarks:

- Type-checking support: This object also defines a type expected for use with the type library object.

Inherited public predicates:

(none)

- Public predicates
  - of\_unexpected/2
  - of\_expected/2
  - from\_goal/4
  - from\_goal/3
  - from\_goal/2
  - from\_generator/4
  - from\_generator/3
  - from\_generator/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

of\_unexpected/2

Constructs an expected term from an error that represent that the expected value is missing.

Compilation flags:

static

Template:

of\_unexpected(Error,Expected)

---

Mode and number of proofs:

of\_unexpected(@term,--nonvar) - one

---

of\_expected/2

Constructs an expected term from an expected value.

Compilation flags:

static

Template:

of\_expected(Value,Expected)

Mode and number of proofs:

of\_expected(@term,--nonvar) - one

---

from\_goal/4

Constructs an expected term holding a value bound by calling the given goal. Otherwise returns an expected term with the unexpected goal error or failure represented by the Error argument.

Compilation flags:

static

Template:

from\_goal(Goal,Value,Error,Expected)

Meta-predicate template:

from\_goal(0,\*,\*,\*)

Mode and number of proofs:

from\_goal(+callable,--term,@term,--nonvar) - one

---

from\_goal/3

Constructs an expected term holding a value bound by calling the given goal. Otherwise returns an expected term with the unexpected goal error or the atom fail representing the unexpected failure.

Compilation flags:

static

Template:

from\_goal(Goal,Value,Expected)

Meta-predicate template:

from\_goal(0,\*,\*)

Mode and number of proofs:

from\_goal(+callable,--term,--nonvar) - one

---

from\_goal/2

Constructs an expected term holding a value bound by calling the given closure. Otherwise returns an expected term holding the unexpected closure error or the atom fail representing the unexpected failure.

Compilation flags:

static

Template:

from\_goal(Closure,Expected)

Meta-predicate template:

from\_goal(1,\*)

Mode and number of proofs:

from\_goal(+callable,--nonvar) - one

---

from\_generator/4

Constructs expected terms with the values generated by calling the given goal. On goal error or failure, returns an expected term with the unexpected goal error or failure represented by the Error argument.

Compilation flags:

static

---

Template:

```
from_generator(Goal,Value,Error,Expected)
```

Meta-predicate template:

```
from_generator(0,*,*,*)
```

Mode and number of proofs:

```
from_generator(+callable,--term,@term,--nonvar) - one_or_more
```

---

`from_generator/3`

Constructs expected terms with the values generated by calling the given goal. On goal error or failure, returns an expected term with, respectively, the unexpected goal error or the atom fail representing the unexpected goal failure.

Compilation flags:

```
static
```

Template:

```
from_generator(Goal,Value,Expected)
```

Meta-predicate template:

```
from_generator(0,*,*)
```

Mode and number of proofs:

```
from_generator(+callable,--term,--nonvar) - one_or_more
```

---

`from_generator/2`

Constructs expected terms with the values generated by calling the given closure. On closure error or failure, returns an expected term with, respectively, the unexpected closure error or the atom fail representing the unexpected closure failure.

Compilation flags:

```
static
```

Template:

```
from_generator(Closure,Expected)
```

Meta-predicate template:

```
from_generator(1,*)
```

Mode and number of proofs:

```
from_generator(+callable,--nonvar) - one_or_more
```

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`expected(Expected)`, type

object

#### 1.22.3 `expected(Expected)`

Expected term predicates. Requires passing an expected term (constructed using the expected object predicates) as a parameter.

Availability:

`logtalk_load(expecteds(loader))`

Author: Paulo Moura

Version: 1:5:0

Date: 2020-01-06

Compilation flags:

`static, context_switching_calls`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - is\_expected/0
  - is\_unexpected/0
  - if\_expected/1
  - if\_unexpected/1
  - if\_expected\_or\_else/2
  - unexpected/1
  - expected/1
  - map/2
  - flat\_map/2
  - either/3
  - or\_else/2
  - or\_else\_get/2
  - or\_else\_call/2
  - or\_else\_throw/1
  - or\_else\_fail/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

is\_expected/0

True if the expected term holds a value. See also the if\_expected/1 predicate.

Compilation flags:

static

Mode and number of proofs:

is\_expected - zero\_or\_one

is\_unexpected/0

True if the expected term holds an error. See also the if\_unexpected/1 predicate.

Compilation flags:

static

Mode and number of proofs:

is\_unexpected - zero\_or\_one

---

if\_expected/1

Applies a closure when the expected term holds a value using the value as argument. Succeeds otherwise.

Compilation flags:

static

Template:

if\_expected(Closure)

Meta-predicate template:

if\_expected(1)

Mode and number of proofs:

if\_expected(+callable) - zero\_or\_more

---

if\_unexpected/1

Applies a closure when the expected term holds an error using the error as argument. Succeeds otherwise. Can be used to throw the exception hold by the expected term by calling it the atom throw.

Compilation flags:

static

Template:

if\_unexpected(Closure)

Meta-predicate template:

if\_unexpected(1)

Mode and number of proofs:

---

`if_unexpected(+callable) - zero_or_more`

---

`if_expected_or_else/2`

Applies either `ExpectedClosure` or `UnexpectedClosure` depending on the expected term holding a value or an error.

Compilation flags:

`static`

Template:

`if_expected_or_else(ExpectedClosure,UnexpectedClosure)`

Meta-predicate template:

`if_expected_or_else(1,1)`

Mode and number of proofs:

`if_expected_or_else(+callable,+callable) - zero_or_more`

---

`unexpected/1`

Returns the error hold by the expected term. Throws an error otherwise.

Compilation flags:

`static`

Template:

`unexpected(Error)`

Mode and number of proofs:

`unexpected(--term) - one_or_error`

Exceptions:

Expected term holds a value:

`existence_error(unexpected_error,Expected)`

---

expected/1

Returns the value hold by the expected term. Throws an error otherwise.

Compilation flags:

static

Template:

expected(Value)

Mode and number of proofs:

expected(--term) - one\_or\_error

Exceptions:

Expected term holds an error:

existence\_error(expected\_value,Expected)

---

map/2

When the expected term does not hold an error and mapping a closure with the expected value and the new value as additional arguments is successful, returns an expected term with the new value. Otherwise returns the same expected term.

Compilation flags:

static

Template:

map(Closure,NewExpected)

Meta-predicate template:

map(2,\*)

Mode and number of proofs:

map(+callable,--nonvar) - one

---

---

`flat_map/2`

When the expected term does not hold an error and mapping a closure with the expected value and the new expected term as additional arguments is successful, returns the new expected term. Otherwise returns the same expected term.

Compilation flags:

`static`

Template:

`flat_map(Closure,NewExpected)`

Meta-predicate template:

`flat_map(2,*)`

Mode and number of proofs:

`flat_map(+callable,--nonvar) - one`

---

`either/3`

Applies either `ExpectedClosure` if the expected term holds a value or `UnexpectedClosure` if the expected term holds an error. Returns a new expected term if the applied closure is successful. Otherwise returns the same expected term.

Compilation flags:

`static`

Template:

`either(ExpectedClosure,UnexpectedClosure,NewExpected)`

Meta-predicate template:

`either(2,2,*)`

Mode and number of proofs:

`either(+callable,+callable,--nonvar) - one`

---

`or_else/2`

Returns the value hold by the expected term if it does not hold an error or the given default term if the expected term holds an error.

Compilation flags:

`static`

Template:

`or_else(Value,Default)`

Mode and number of proofs:

`or_else(--term,@term) - one`

---

`or_else_get/2`

Returns the value hold by the expected term if it does not hold an error. Otherwise applies a closure to compute the expected value. Throws an error when the expected term holds an error and a value cannot be computed.

Compilation flags:

`static`

Template:

`or_else_get(Value,Closure)`

Meta-predicate template:

`or_else_get(*,1)`

Mode and number of proofs:

`or_else_get(--term,+callable) - one_or_error`

Exceptions:

Expected term holds an unexpected error and an expected value cannot be computed:

`existence_error(expected_value,Expected)`

---

---

`or_else_call/2`

Returns the value hold by the expected term if it does not hold an error. Calls a goal deterministically otherwise.

Compilation flags:

`static`

Template:

`or_else_call(Value,Goal)`

Meta-predicate template:

`or_else_call(*,0)`

Mode and number of proofs:

`or_else_call(--term,+callable) - zero_or_one`

---

`or_else_throw/1`

Returns the value hold by the expected term if present. Throws the error hold by the expected term as an exception otherwise.

Compilation flags:

`static`

Template:

`or_else_throw(Value)`

Mode and number of proofs:

`or_else_throw(--term) - one_or_error`

---

`or_else_fail/1`

Returns the value hold by the expected term if it does not hold an error. Fails otherwise. Usually called to skip over expected terms holding errors.

Compilation flags:

`static`

Template:

`or_else_fail(Value)`

Mode and number of proofs:

`or_else_fail(--term) - zero_or_one`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

`expected`

## 1.23 fcube

object

### 1.23.1 fcube

FCube: An Efficient Prover for Intuitionistic Propositional Logic.

Availability:

`logtalk_load(fcube(loader))`

Author: Mauro Ferrari, Camillo Fiorentini, Guido Fiorino; ported to Logtalk by Paulo Moura.

Version: 5:0:1

Date: 2024-03-14

Copyright: Copyright 2012 Mauro Ferrari, Camillo Fiorentini, Guido Fiorino; Copyright 2020-2024 Paulo Moura

License: GPL-2.0-or-later

Compilation flags:

`static, context_switching_calls`

Uses:

integer  
list  
os  
set  
user

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - gnu/0
  - fcube/0
  - decide/1
  - decide/2
- Protected predicates
- Private predicates
- Operators
  - op(1200,xfy,<=>)
  - op(1110,xfy,=>)
  - op(1000,xfy,&&&)
  - op(500,fy,~)
  - op(1100,xfy,v)

### Public predicates

gnu/0

Prints banner with copyright and license information.

Compilation flags:

static

Mode and number of proofs:

gnu - one

fcube/0

Reads a formula and applies the prover to it, printing its counter-model.

Compilation flags:

static

Mode and number of proofs:

fcube - one

---

decide/1

Applies the prover to the given formula and prints its counter-model.

Compilation flags:

static

Template:

decide(Formula)

Mode and number of proofs:

decide(++compound) - one

---

decide/2

Applies the prover to the given formula and returns its counter-model.

Compilation flags:

static

Template:

decide(Formula,CounterModel)

Mode and number of proofs:

decide(++compound,--compound) - one

---

**Protected predicates**

(no local declarations; see entity ancestors if any)

**Private predicates**

(no local declarations; see entity ancestors if any)

**Operators**

op(1200,xfy,<=>)

Scope:

public

op(1110,xfy,=>)

Scope:

public

op(1000,xfy,&&)

Scope:

public

op(500,fy,~)

Scope:

public

op(1100,xfy,v)

Scope:

public

## 1.24 flags

category

### 1.24.1 flags

Implementation of persistent object flags.

Availability:

logtalk\_load(flags(loader))

Author: Theofrastos Mantadelis

Version: 1:0:0

Date: 2010-11-27

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - get\_flag\_value/2
  - set\_flag\_value/2
  - set\_flag\_value/3
  - reset\_flags/0
  - reset\_flags/1
  - flag\_groups/1
  - flag\_group\_chk/1
  - print\_flags/0
  - print\_flags/1
  - defined\_flag/6

- built\_in\_flag/2
- Protected predicates
  - unsafe\_set\_flag\_value/2
  - define\_flag/1
  - define\_flag/2
- Private predicates
  - defined\_flag\_/6
  - flag\_value\_/2
  - validate/3
  - validate\_type/1
  - is\_validator/1
- Operators

### Public predicates

get\_flag\_value/2

Gets or tests the value of a flag.

Compilation flags:

static

Template:

get\_flag\_value(Flag,Value)

Mode and number of proofs:

get\_flag\_value(+atom,?nonvar) - zero\_or\_one

set\_flag\_value/2

Sets the value of a flag.

Compilation flags:

static

Template:

set\_flag\_value(Flag,NewValue)

Mode and number of proofs:

`set_flag_value(+atom,@nonvar) - one`

---

`set_flag_value/3`

Sets the value of a flag, returning the old value.

Compilation flags:

`static`

Template:

`set_flag_value(Flag,OldValue,NewValue)`

Mode and number of proofs:

`set_flag_value(+atom,?nonvar,@nonvar) - one`

---

`reset_flags/0`

Resets all flags to their default values.

Compilation flags:

`static`

Mode and number of proofs:

`reset_flags - one`

---

`reset_flags/1`

Resets all flags in a group to their default values.

Compilation flags:

`static`

Template:

`reset_flags(Group)`

---

Mode and number of proofs:

reset\_flags(+atom) - one

---

flag\_groups/1

Returns a list of all flag groups.

Compilation flags:

static

Template:

flag\_groups(Groups)

Mode and number of proofs:

flag\_groups(-list(atom)) - one

---

flag\_group\_chk/1

Checks if a given atom is a flag group.

Compilation flags:

static

Template:

flag\_group\_chk(Group)

Mode and number of proofs:

flag\_group\_chk(+atom) - zero\_or\_one

---

print\_flags/0

Prints a listing of all flags.

Compilation flags:

static

---

Mode and number of proofs:

`print_flags` - one

---

`print_flags/1`

Prints a listing of all flags in a group.

Compilation flags:

`static`

Template:

`print_flags(Group)`

Mode and number of proofs:

`print_flags(+atom)` - one

---

`defined_flag/6`

Gets or test the existing (visible) flag definitions.

Compilation flags:

`static`

Template:

`defined_flag(Flag,Group,Type,DefaultValue,Description,Access)`

Mode and number of proofs:

`defined_flag(?atom,?atom,?nonvar,?nonvar,?atom,?atom)` - `zero_or_more`

---

`built_in_flag/2`

True if the argument is a built-in flag type with the specified default value.

Compilation flags:

`static`

---

Template:

```
built_in_flag(Type,DefaultValue)
```

Mode and number of proofs:

```
built_in_flag(?atom,?nonvar) - zero_or_more
```

---

### Protected predicates

`unsafe_set_flag_value/2`

Sets the value of a flag without performing any validation checks.

Compilation flags:

```
static
```

Template:

```
unsafe_set_flag_value(Flag,NewValue)
```

Mode and number of proofs:

```
unsafe_set_flag_value(+atom,@nonvar) - one
```

---

`define_flag/1`

Defines a new flag using default options.

Compilation flags:

```
static
```

Template:

```
define_flag(Flag)
```

Mode and number of proofs:

```
define_flag(+atom) - one
```

---

`define_flag/2`

Defines a new flag using a given set of options (for example, `[group(general), type(nonvar), default(true), description(Flag), access(read_write)]`).

Compilation flags:

`static`

Template:

`define_flag(Flag,Options)`

Mode and number of proofs:

`define_flag(+atom,@list) - one`

---

### Private predicates

`defined_flag_/6`

Gets or test the existing flag definitions.

Compilation flags:

`dynamic`

Template:

`defined_flag_(Flag,Group,Type,DefaultValue,Description,Access)`

Mode and number of proofs:

`defined_flag_(?atom,?atom,?nonvar,?nonvar,?atom,?atom) - zero_or_more`

---

`flag_value_/2`

Table of flag values.

Compilation flags:

`dynamic`

Template:

`flag_value_(Flag,Value)`

Mode and number of proofs:

flag\_value\_(?atom,?nonvar) - zero\_or\_more

---

validate/3

Compilation flags:

static

---

validate\_type/1

Compilation flags:

static

---

is\_validator/1

Compilation flags:

static

---

## Operators

(none)

protocol

### 1.24.2 flags\_validator

Flag validation protocol. Must be implemented by validator objects.

Availability:

logtalk\_load(flags(loader))

Author: Theofrastos Mantadelis

Version: 1:0:0

Date: 2010-11-27

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - print\_flags/0
  - validate/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

print\_flags/0

Validates the validator object itself.

Compilation flags:

static

Mode and number of proofs:

print\_flags - zero\_or\_one

validate/1

Validates a flag value.

Compilation flags:

static

Template:

validate(Value)

Mode and number of proofs:

validate(@term) - zero\_or\_one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.25 format

object

### 1.25.1 format

Formatted output predicates.

Availability:

logtalk\_load(format(loader))

Author: Paulo Moura

Version: 1:2:0

Date: 2023-10-02

Compilation flags:

static, context\_switching\_calls

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - format/3
  - format/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

format/3

Writes a list of arguments after a format specification to the specified output stream.

Compilation flags:

static

Template:

format(Stream,Format,Arguments)

Mode and number of proofs:

format(@stream\_or\_alias,+atom,@list) - zero\_or\_one

format(@stream\_or\_alias,+list(character\_code),@list) - zero\_or\_one

format(@stream\_or\_alias,+list(character),@list) - zero\_or\_one

format/2

Writes a list of arguments after a format specification to the current output stream.

Compilation flags:

static

Template:

format(Format,Arguments)

Mode and number of proofs:

format(+atom,@list) - zero\_or\_one

format(+list(character\_code),@list) - zero\_or\_one

format(+list(character),@list) - zero\_or\_one

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

## 1.26 genint

object

### 1.26.1 genint

Global object for generating increasing non-negative integers for named counters. The predicates are declared as synchronized when the library is compiled using a backend supporting threads.

Availability:

logtalk\_load(genint(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2022-07-21

Compilation flags:

static, context\_switching\_calls

Imports:

public genint\_core

Remarks:

(none)

Inherited public predicates:

genint/2 reset\_genint/0 reset\_genint/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

category

## 1.26.2 genint\_core

Predicates for generating increasing non-negative integers. The predicates are declared as synchronized when the library is compiled using a backend supporting threads.

Availability:

```
logtalk_load(genint(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2022-07-26

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - reset\_genint/0
  - reset\_genint/1
  - genint/2
- Protected predicates
- Private predicates
  - counter\_/2
- Operators

### Public predicates

reset\_genint/0

Resets all counters.

Compilation flags:

static, synchronized

Mode and number of proofs:

reset\_genint - one

---

reset\_genint/1

Resets the given counter.

Compilation flags:

static, synchronized

Template:

reset\_genint(Counter)

Mode and number of proofs:

reset\_genint(+atom) - one

---

genint/2

Returns the next integer for a given counter.

Compilation flags:

static, synchronized

Template:

genint(Counter,Integer)

Mode and number of proofs:

genint(+atom,-non\_negative\_integer) - one

---

### Protected predicates

(none)

### Private predicates

counter\_/2

Table of current state of counters.

Compilation flags:

dynamic

Template:

counter\_(Counter,Latest)

Mode and number of proofs:

counter\_(?atom,?non\_negative\_integer) - zero\_or\_more

---

### Operators

(none)

## 1.27 gensym

object

### 1.27.1 gensym

Global object for generating unique atoms. The predicates are declared as synchronized when the library is compiled using a backend supporting threads.

Availability:

logtalk\_load(gensym(loader))

Author: Paulo Moura

Version: 2:0:0

Date: 2022-07-21

Compilation flags:

static, context\_switching\_calls

---

Imports:

public gensym\_core

Remarks:

(none)

Inherited public predicates:

gensym/2 reset\_gensym/0 reset\_gensym/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

category

## 1.27.2 gensym\_core

Predicates for generating unique atoms. Protocol based on the gensym module of SWI-Prolog. The predicates are declared as synchronized when the library is compiled using a backend supporting threads.

Availability:

logtalk\_load(gensym(loader))

Author: Paulo Moura

Version: 2:1:0

Date: 2022-07-26

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - reset\_gensym/0
  - reset\_gensym/1
  - gensym/2
- Protected predicates
- Private predicates
  - base\_/2
- Operators

### Public predicates

reset\_gensym/0

Resets the generator counter for all bases.

Compilation flags:

static, synchronized

Mode and number of proofs:

reset\_gensym - one

reset\_gensym/1

Resets the generator counter for a given base.

Compilation flags:

static, synchronized

Template:

reset\_gensym(Base)

Mode and number of proofs:

reset\_gensym(+atom) - one

---

gensym/2

Returns a new unique atom with a given base (prefix).

Compilation flags:

static, synchronized

Template:

gensym(Base,Unique)

Mode and number of proofs:

gensym(+atom,-atom) - one

---

## Protected predicates

(none)

## Private predicates

base\_/2

Table of generator bases and respective counters.

Compilation flags:

dynamic

---

Template:

base\_(Base,Counter)

Mode and number of proofs:

base\_(?atom,?integer) - zero\_or\_more

---

## Operators

(none)

## 1.28 git

object

### 1.28.1 git

Predicates for accessing a git project current branch and latest commit data.

Availability:

logtalk\_load([git\(loader\)](#))

Author: Paulo Moura

Version: 2:1:2

Date: 2024-03-11

Compilation flags:

static, context\_switching\_calls

Implements:

public [git\\_protocol](#)

Uses:

[os](#)

[user](#)

Remarks:

(none)

Inherited public predicates:

[branch/2](#) [commit\\_author/2](#) [commit\\_date/2](#) [commit\\_hash/2](#) [commit\\_hash\\_abbreviated/2](#)  
[commit\\_log/3](#) [commit\\_message/2](#)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.28.2 git\_protocol

Predicates for accessing a git project current branch and latest commit data.

Availability:

logtalk\_load(git(loader))

Author: Paulo Moura

Version: 1:1:0

Date: 2022-01-21

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - branch/2
  - commit\_author/2
  - commit\_date/2
  - commit\_hash/2
  - commit\_hash\_abbreviated/2
  - commit\_message/2
  - commit\_log/3
- Protected predicates
- Private predicates
- Operators

## Public predicates

branch/2

Returns the name of the current git branch. Fails if the directory is not a git repo or a sub-directory of a git repo directory.

Compilation flags:

static

Template:

branch(Directory,Branch)

Mode and number of proofs:

branch(+atom,?atom) - zero\_or\_one

commit\_author/2

Returns the latest commit author. Fails if the directory is not a git repo or a sub-directory of a git repo directory.

Compilation flags:

static

Template:

commit\_author(Directory,Author)

Mode and number of proofs:

commit\_author(+atom,-atom) - zero\_or\_one

---

commit\_date/2

Returns the latest commit date (strict ISO 8601 format). Fails if the directory is not a git repo or a sub-directory of a git repo directory.

Compilation flags:

static

Template:

commit\_date(Directory,Date)

Mode and number of proofs:

commit\_date(+atom,-atom) - zero\_or\_one

---

commit\_hash/2

Returns the latest commit hash. Fails if the directory is not a git repo or a sub-directory of a git repo directory.

Compilation flags:

static

Template:

commit\_hash(Directory,Hash)

Mode and number of proofs:

`commit_hash(+atom,-atom) - zero_or_one`

---

`commit_hash_abbreviated/2`

Returns the latest commit abbreviated hash. Fails if the directory is not a git repo or a sub-directory of a git repo directory.

Compilation flags:

`static`

Template:

`commit_hash_abbreviated(Directory,Hash)`

Mode and number of proofs:

`commit_hash_abbreviated(+atom,-atom) - zero_or_one`

---

`commit_message/2`

Returns the latest commit message. Fails if the directory is not a git repo or a sub-directory of a git repo directory.

Compilation flags:

`static`

Template:

`commit_message(Directory,Message)`

Mode and number of proofs:

`commit_message(+atom,-atom) - zero_or_one`

---

`commit_log/3`

Returns the git latest commit log output for the given format (see e.g. <https://git-scm.com/docs/pretty-formats>). Fails if the directory is not a git repo or a sub-directory of a git repo directory.

Compilation flags:

`static`

Template:

`commit_log(Directory,Format,Output)`

Mode and number of proofs:

`commit_log(+atom,+atom,-atom) - zero_or_one`

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

## 1.29 grammars

object

### 1.29.1 `blank_grammars(Format)`

Blank grammars.

Availability:

`logtalk_load(grammars(loader))`

Author: Paulo Moura

Version: 0:3:1

Date: 2022-10-08

## Compilation flags:

static, context\_switching\_calls

## Dependencies:

(none)

## Remarks:

(none)

## Inherited public predicates:

(none)

- Public predicates
  - white\_space//0
  - white\_spaces//0
  - space//0
  - spaces//0
  - tab//0
  - tabs//0
  - new\_line//0
  - new\_lines//0
  - blank//0
  - blanks//0
  - non\_blank//1
  - non\_blanks//1
  - control//0
  - controls//0
- Protected predicates
- Private predicates
- Operators

### Public predicates

`white_space//0`

Consumes a single space or tab.

Compilation flags:

`static`

Mode and number of proofs:

`white_space - zero_or_one`

---

`white_spaces//0`

Consumes zero or more spaces and tabs.

Compilation flags:

`static`

Mode and number of proofs:

`white_spaces - one`

---

`space//0`

Consumes a single space.

Compilation flags:

`static`

Mode and number of proofs:

`space - zero_or_one`

---

spaces//0

Consumes zero or more spaces.

Compilation flags:

static

Mode and number of proofs:

spaces - one

---

tab//0

Consumes a single tab.

Compilation flags:

static

Mode and number of proofs:

tab - zero\_or\_one

---

tabs//0

Consumes zero or more tabs.

Compilation flags:

static

Mode and number of proofs:

tabs - one

---

`new_line//0`

Consumes a single new line.

Compilation flags:

`static`

Mode and number of proofs:

`new_line - zero_or_one`

---

`new_lines//0`

Consumes zero or more new lines.

Compilation flags:

`static`

Mode and number of proofs:

`new_lines - one`

---

`blank//0`

Consumes a single space, tab, vertical tab, line feed, or new line.

Compilation flags:

`static`

Mode and number of proofs:

`blank - zero_or_one`

---

blanks//0

Consumes zero or more spaces, tabs, vertical tabs, line feeds, or new lines.

Compilation flags:

static

Mode and number of proofs:

blanks - one

---

non\_blank//1

Returns a single non-blank character or character code.

Compilation flags:

static

Template:

non\_blank(NonBlank)

Mode and number of proofs:

non\_blank(-atomic) - zero\_or\_one

---

non\_blanks//1

Returns a (possibly empty) list of non-blank characters or character codes.

Compilation flags:

static

Template:

non\_blanks(NonBlanks)

Mode and number of proofs:

non\_blanks(-list(atomic)) - one

---

control//0

Consumes a single control character or character code. Support for the null control character depends on the Prolog backend.

Compilation flags:

static

Mode and number of proofs:

control - zero\_or\_one

---

controls//0

Consumes zero or more control characters or character codes. Support for the null control character depends on the Prolog backend.

Compilation flags:

static

Mode and number of proofs:

controls - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

object

## 1.29.2 ip\_grammars(Format)

IP address grammars.

Availability:

```
logtalk_load(grammars(loader))
```

Author: Paulo Moura

Version: 0:1:1

Date: 2022-10-08

Compilation flags:

```
static, context_switching_calls
```

Uses:

```
number_grammars(Format)
```

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - ipv4//1
  - ipv6//1
- Protected predicates
- Private predicates
- Operators

### Public predicates

ipv4//1

Parses an IPv4 network address in the format XXX.XXX.XXX.XXX where each XXX is an octet (i.e. an integer between 0 and 255).

Compilation flags:

```
static
```

Template:

ipv4(Octets)

Mode and number of proofs:

ipv4(?list(integer)) - zero\_or\_one

---

ipv6//1

Parses an IPv6 network address in the format XXXX.XXXX.XXXX.XXXX.XXXX.XXXX.XXXX.XXXX where each X is a hexadecimal digit.

Compilation flags:

static

Template:

ipv6(HexDigits)

Mode and number of proofs:

ipv6(?list(integer)) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.29.3 number\_grammars(Format)

Number grammars.

Availability:

logtalk\_load(grammars(loader))

Author: Paulo Moura

Version: 0:2:2

Date: 2024-03-14

Compilation flags:

static, context\_switching\_calls

Uses:

list

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - bit//1
  - bits//1
  - digit//1
  - digits//1
  - hex\_digit//1
  - hex\_digits//1
  - natural//1
  - integer//1
  - float//1
  - number//1
  - sign//1
  - dot//1
- Protected predicates
- Private predicates
- Operators

### Public predicates

bit//1

Parses a single bit.

Compilation flags:  
static

Template:  
bit(Bit)

Mode and number of proofs:  
bit(?integer) - zero\_or\_one

---

bits//1

Parses a sequence of one or more bits.

Compilation flags:  
static

Template:  
bits(Bits)

Mode and number of proofs:  
bits(?list(integer)) - zero\_or\_one

---

digit//1

Parses a single decimal digit.

Compilation flags:  
static

Template:  
digit(Digit)

Mode and number of proofs:  
digit(?atomic) - zero\_or\_one

---

digits//1

Parses a sequence of zero or more digits.

Compilation flags:  
static

Template:  
digits(Digits)

Mode and number of proofs:  
digits(?list(atomic)) - one

---

hex\_digit//1

Parses a single hexa-decimal digit.

Compilation flags:  
static

Template:  
hex\_digit(HexDigit)

Mode and number of proofs:  
hex\_digit(?atomic) - zero\_or\_one

---

hex\_digits//1

Parses a sequence of zero or more hexa-decimal digits.

Compilation flags:  
static

Template:  
hex\_digits(HexDigits)

Mode and number of proofs:

`hex_digits(?list(atomic)) - one`

---

`natural//1`

Parses a natural number (a non signed integer).

Compilation flags:

`static`

Template:

`natural(Natural)`

Mode and number of proofs:

`natural(?non_negative_integer) - zero_or_one`

---

`integer//1`

Parses an integer.

Compilation flags:

`static`

Template:

`integer(Integer)`

Mode and number of proofs:

`integer(?integer) - zero_or_one`

---

`float//1`

Parses a float.

Compilation flags:

`static`

Template:

float(Float)

Mode and number of proofs:

float(?float) - zero\_or\_one

---

number//1

Parses a number (an integer or a float).

Compilation flags:

static

Template:

number(Number)

Mode and number of proofs:

number(?number) - zero\_or\_one

---

sign//1

Parses a number sign (plus or minus).

Compilation flags:

static

Template:

sign(Sign)

Mode and number of proofs:

sign(?atomic) - zero\_or\_one

---

dot//1

Parses a decimal dot.

Compilation flags:

static

Template:

dot(Dot)

Mode and number of proofs:

dot(?atomic) - zero\_or\_one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.29.4 sequence\_grammars

Sequence grammars.

Availability:

logtalk\_load(grammars(loader))

Author: Paulo Moura

Version: 0:3:0

Date: 2023-12-09

Compilation flags:

static, context\_switching\_calls

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - zero\_or\_more//2
  - one\_or\_more//2
  - zero\_or\_more//1
  - one\_or\_more//1
  - zero\_or\_more//0
  - one\_or\_more//0
  - without//2
- Protected predicates
- Private predicates
- Operators

## Public predicates

zero\_or\_more//2

Eagerly collect zero or more terminals that satisfy the given closure.

Compilation flags:

static

Template:

zero\_or\_more(Closure,Terminals)

Meta-predicate template:

zero\_or\_more(1,\*)

Mode and number of proofs:

zero\_or\_more(+callable,-list(atomic)) - one

`one_or_more//2`

Eagerly collect one or more terminals that satisfy the given closure.

Compilation flags:

`static`

Template:

`one_or_more(Closure,Terminals)`

Meta-predicate template:

`one_or_more(1,*)`

Mode and number of proofs:

`one_or_more(+callable,-list(atomic)) - zero_or_one`

---

`zero_or_more//1`

Eagerly collect zero or more terminals.

Compilation flags:

`static`

Template:

`zero_or_more(Terminals)`

Mode and number of proofs:

`zero_or_more(-list(atomic)) - one`

---

`one_or_more//1`

Eagerly collect one or more terminals.

Compilation flags:

`static`

Template:

`one_or_more(Terminals)`

Mode and number of proofs:

`one_or_more(-list(atomic)) - zero_or_one`

---

zero\_or\_more//0

Eagerly parse zero or more terminals.

Compilation flags:

static

Mode and number of proofs:

zero\_or\_more - one

---

one\_or\_more//0

Eagerly parse one or more terminals.

Compilation flags:

static

Mode and number of proofs:

one\_or\_more - zero\_or\_one

---

without//2

Collects input terminals until one of the stop terminals is found. The stop terminals are excluded from the collected terminals.

Compilation flags:

static

Template:

without(StopTerminals,Terminals)

Mode and number of proofs:

without(+list(atomic),-list(atomic)) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.30 heaps

object

### 1.30.1 heap(Order)

Heap implementation, parameterized by the order to be used to compare keys (< or >).

Availability:

```
logtalk_load(heaps(loader))
```

Author: Richard O’Keefe; adapted to Logtalk by Paulo Moura and Victor Lagerkvist.

Version: 1:1:0

Date: 2019-05-18

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public heapp
```

Extends:

```
public compound
```

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 as\_heap/2 as\_list/2 check/1 delete/4  
 depth/2 empty/1 ground/1 insert/4 insert\_all/3 merge/3 new/1 numbervars/1 numbervars/3  
 occurs/2 singletons/2 size/2 subsumes/2 subterm/2 top/3 top\_next/5 valid/1 variables/2  
 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

minheap, maxheap

protocol

## 1.30.2 heapp

Heap protocol. Key-value pairs are represented as Key-Value.

Availability:

logtalk\_load(heaps(loader))

Author: Richard O'Keefe; adapted to Logtalk by Paulo Moura and Victor Lagerkvist.

Version: 1:0:1

Date: 2010-11-13

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - insert/4
  - insert\_all/3
  - delete/4
  - merge/3
  - empty/1
  - size/2
  - as\_list/2
  - as\_heap/2
  - top/3
  - top\_next/5
- Protected predicates
- Private predicates
- Operators

## Public predicates

insert/4

Inserts the new pair into a heap, returning the updated heap.

Compilation flags:

static

Template:

insert(Key,Value,Heap,NewHeap)

Mode and number of proofs:

`insert(+key,+value,+heap,-heap) - one`

---

`insert_all/3`

Inserts a list of pairs into a heap, returning the updated heap.

Compilation flags:

`static`

Template:

`insert_all(List,Heap,NewHeap)`

Mode and number of proofs:

`insert_all(@list(pairs),+heap,-heap) - one`

---

`delete/4`

Deletes and returns the top pair in a heap returning the updated heap.

Compilation flags:

`static`

Template:

`delete(Heap,TopKey,TopValue,NewHeap)`

Mode and number of proofs:

`delete(+heap,?key,?value,-heap) - zero_or_one`

---

`merge/3`

Merges two heaps.

Compilation flags:

`static`

Template:

`merge(Heap1,Heap2,NewHeap)`

Mode and number of proofs:

`merge(+heap,+heap,-heap) - one`

---

`empty/1`

True if the heap is empty.

Compilation flags:

`static`

Template:

`empty(Heap)`

Mode and number of proofs:

`empty(@heap) - zero_or_one`

---

`size/2`

Returns the number of heap elements.

Compilation flags:

`static`

Template:

`size(Heap,Size)`

Mode and number of proofs:

`size(+heap,?integer) - zero_or_one`

---

---

`as_list/2`

Returns the current set of pairs in the heap as a list, sorted into ascending order of the keys.

Compilation flags:

`static`

Template:

`as_list(Heap,List)`

Mode and number of proofs:

`as_list(+heap,-list) - one`

---

`as_heap/2`

Constructs a heap from a list of pairs.

Compilation flags:

`static`

Template:

`as_heap(List,Heap)`

Mode and number of proofs:

`as_heap(+list,-heap) - one`

---

`top/3`

Returns the top pair in the heap. Fails if the heap is empty.

Compilation flags:

`static`

Template:

`top(Heap,TopKey,TopValue)`

Mode and number of proofs:

`top(+heap,?key,?value) - zero_or_one`

---

`top_next/5`

Returns the top pair and the next pair in the heap. Fails if the heap does not have at least two elements.

Compilation flags:

`static`

Template:

`top_next(Heap,TopKey,TopValue,NextKey,NextValue)`

Mode and number of proofs:

`top_next(+heap,?key,?value,?key,?value) - zero_or_one`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

`heap(Order)`

object

### 1.30.3 maxheap

Max-heap implementation. Uses standard order to compare keys.

Availability:

`logtalk_load(heaps(loader))`

Author: Paulo Moura.

Version: 1:0:0

Date: 2010-02-19

Compilation flags:

static, context\_switching\_calls

Extends:

public heap(>)

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 as\_heap/2 as\_list/2 check/1 delete/4  
 depth/2 empty/1 ground/1 insert/4 insert\_all/3 merge/3 new/1 numbervars/1 numbervars/3  
 occurs/2 singletons/2 size/2 subsumes/2 subterm/2 top/3 top\_next/5 valid/1 variables/2  
 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.30.4 minheap

Min-heap implementation. Uses standard order to compare keys.

Availability:

`logtalk_load(heaps(loader))`

Author: Paulo Moura.

Version: 1:0:0

Date: 2010-02-19

Compilation flags:

`static, context_switching_calls`

Extends:

`public heap(<)`

Remarks:

(none)

Inherited public predicates:

`(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 as_heap/2 as_list/2 check/1 delete/4  
depth/2 empty/1 ground/1 insert/4 insert_all/3 merge/3 new/1 numbervars/1 numbervars/3  
occurs/2 singletons/2 size/2 subsumes/2 subterm/2 top/3 top_next/5 valid/1 variables/2  
variant/2 varnumbers/2 varnumbers/3`

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

# 1.31 help

object

## 1.31.1 help

Command-line help for Logtalk libraries, entities, plus built-in control constructs, predicates, non-terminals, and methods.

Availability:

```
logtalk_load(help(loader))
```

Author: Paulo Moura

Version: 0:34:0

Date: 2024-09-16

Compilation flags:

```
static, context_switching_calls, complements(allow)
```

Implements:

```
public forwarding
```

Uses:

```
atom
```

```
os
```

```
user
```

Remarks:

(none)

Inherited public predicates:

apis/0 apis/1 forward/1 handbook/0 handbook/1 man/1

- Public predicates
  - help/0
  - (/)/2
  - (//)/2
  - completion/2
  - completions/2
  - built\_in\_directive/4
  - built\_in\_predicate/4
  - built\_in\_method/4
  - control\_construct/4
  - built\_in\_non\_terminal/4
  - library/0
  - library/1
  - entity/1
  - manuals/0
- Protected predicates
- Private predicates
- Operators

## Public predicates

help/0

Prints instructions on how to use the help tool.

Compilation flags:

static

Mode and number of proofs:

help - one

---

(/)/2

Provides help on the Functor/Arity built-in control construct, directive, predicate, or method.

Compilation flags:

static

Template:

Functor/Arity

Mode and number of proofs:

+atom/ +integer - zero\_or\_one

---

(//)/2

Provides help on the Functor//Arity built-in non-terminal.

Compilation flags:

static

Template:

Functor//Arity

Mode and number of proofs:

+atom// +integer - zero\_or\_one

---

completion/2

Provides a completion pair, Completion-Page, for a given prefix.

Compilation flags:

static

Template:

completion(Prefix,Completion)

Mode and number of proofs:

completion(+atom,-pair) - zero\_or\_more

---

completions/2

Provides a list of completions pairs, Completion-Page, for a given prefix.

Compilation flags:

static

Template:

completions(Prefix,Completions)

Mode and number of proofs:

completions(+atom,-lists(pair)) - zero\_or\_more

---

built\_in\_directive/4

Provides access to the HTML documenting files describing built-in directives.

Compilation flags:

static

Template:

built\_in\_directive(Functor,Arity,Directory,Basename)

Mode and number of proofs:

built\_in\_directive(?atom,?integer,-atom,-atom) - zero\_or\_more

---

built\_in\_predicate/4

Provides access to the HTML documenting files describing built-in predicates.

Compilation flags:

static

Template:

built\_in\_predicate(Functor,Arity,Directory,Basename)

Mode and number of proofs:

built\_in\_predicate(?atom,?integer,-atom,-atom) - zero\_or\_more

---

---

built\_in\_method/4

Provides access to the HTML documenting files describing built-in methods.

Compilation flags:

static

Template:

built\_in\_method(Functor,Arity,Directory,Basename)

Mode and number of proofs:

built\_in\_method(?atom,?integer,-atom,-atom) - zero\_or\_more

---

control\_construct/4

Provides access to the HTML documenting files describing built-in control constructs.

Compilation flags:

static

Template:

control\_construct(Functor,Arity,Directory,Basename)

Mode and number of proofs:

control\_construct(?atom,?integer,-atom,-atom) - zero\_or\_more

---

built\_in\_non\_terminal/4

Provides access to the HTML documenting files describing built-in DCG non-terminals.

Compilation flags:

static

Template:

built\_in\_non\_terminal(Functor,Arity,Directory,Basename)

Mode and number of proofs:

built\_in\_non\_terminal(?atom,?integer,-atom,-atom) - zero\_or\_more

---

library/0

Provides help on the standard Logtalk library.

Compilation flags:

static

Mode and number of proofs:

library - one

---

library/1

Provides help on the standard Logtalk libraries, library predicates, and library non-terminals.

Compilation flags:

static

Template:

library(Topic)

Mode and number of proofs:

library(+atom) - zero\_or\_one

library(+predicate\_indicator) - zero\_or\_one

library(+non\_terminal\_indicator) - zero\_or\_one

---

entity/1

Provides help on Logtalk entities (objects, protocols, or categories).

Compilation flags:

static

Template:

entity(Entity)

Mode and number of proofs:

entity(+entity\_identifier) - zero\_or\_one

---

manuals/0

Provides access to the Logtalk User and Reference manuals.

Compilation flags:

static

Mode and number of proofs:

manuals - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

category

## 1.31.2 help\_info\_support

Experimental help predicates for inline browsing of the Texinfo versions of the Handbook and APIs documentation. Currently requires Ciao Prolog, ECLiPSe, GNU Prolog, XVM, SICStus Prolog, SWI-Prolog, Trealla Prolog, XSB, or YAP as the backend running on a POSIX system.

Availability:

logtalk\_load(help(loader))

Author: Paulo Moura

Version: 0:8:1

Date: 2024-04-08

Compilation flags:

static

Complements:

help

Uses:

os

user

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - handbook/0
  - handbook/1
  - apis/0
  - apis/1
  - man/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

handbook/0

Opens inline the Texinfo version of the Handbook.

Compilation flags:

static

Mode and number of proofs:

handbook - one

handbook/1

Opens inline the Texinfo version of the Handbook at the given topic.

Compilation flags:

static

Template:

handbook(Topic)

Mode and number of proofs:

handbook(+atom) - one

handbook(+predicate\_indicator) - one

handbook(+non\_terminal\_indicator) - one

---

apis/0

Opens inline the Texinfo version of the APIs documentation.

Compilation flags:

static

Mode and number of proofs:

apis - one

---

apis/1

Opens inline the Texinfo version of the APIs documentation at the given topic.

Compilation flags:

static

Template:

apis(Topic)

Mode and number of proofs:

apis(+atom) - one

apis(+predicate\_indicator) - one

apis(+non\_terminal\_indicator) - one

---

man/1

Opens inline the man page of the given script.

Compilation flags:

static

Template:

man(*Script*)

Mode and number of proofs:

man(+atom) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.32 hierarchies

category

### 1.32.1 class\_hierarchy

Class hierarchy predicates.

Availability:

logtalk\_load(hierarchies(loader))

Author: Paulo Moura

Version: 1:1:0

Date: 2006-02-20

Compilation flags:

static

Implements:

public class\_hierarchy

Remarks:

(none)

Inherited public predicates:

ancestor/1 ancestors/1 class/1 classes/1 descendant/1 descendant\_class/1 descendant\_classes/1  
descendant\_instance/1 descendant\_instances/1 descendants/1 instance/1 instances/1 leaf/1  
leaf\_class/1 leaf\_classes/1 leaf\_instance/1 leaf\_instances/1 leaves/1 subclass/1 subclasses/1  
superclass/1 superclasses/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

protocol

### 1.32.2 class\_hierarchy

Class hierarchy protocol.

Availability:

```
logtalk_load(hierarchies(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2000-07-24

Compilation flags:

```
static
```

Extends:

```
public hierarchy
```

Remarks:

(none)

Inherited public predicates:

```
ancestor/1 ancestors/1 descendant/1 descendants/1 leaf/1 leaves/1
```

- Public predicates
  - class/1
  - classes/1
  - instance/1
  - instances/1
  - subclass/1
  - subclasses/1
  - superclass/1
  - superclasses/1
  - leaf\_instance/1

- leaf\_instances/1
- leaf\_class/1
- leaf\_classes/1
- descendant\_instance/1
- descendant\_instances/1
- descendant\_class/1
- descendant\_classes/1
- Protected predicates
- Private predicates
- Operators

### Public predicates

class/1

Returns, by backtracking, all object classes.

Compilation flags:

static

Template:

class(Class)

Mode and number of proofs:

class(?object) - zero\_or\_more

classes/1

List of all object classes.

Compilation flags:

static

Template:

classes(Classes)

Mode and number of proofs:

classes(-list) - one

instance/1

Returns, by backtracking, all class instances.

Compilation flags:

static

Template:

instance(Instance)

Mode and number of proofs:

instance(?object) - zero\_or\_more

---

instances/1

List of all class instances.

Compilation flags:

static

Template:

instances(Instances)

Mode and number of proofs:

instances(-list) - one

---

subclass/1

Returns, by backtracking, all class subclasses.

Compilation flags:

static

Template:

subclass(Subclass)

Mode and number of proofs:

---

`subclass(?object) - zero_or_more`

---

`subclasses/1`

List of all class subclasses.

Compilation flags:

`static`

Template:

`subclasses(Subclasses)`

Mode and number of proofs:

`subclasses(-list) - one`

---

`superclass/1`

Returns, by backtracking, all class superclasses.

Compilation flags:

`static`

Template:

`superclass(Superclass)`

Mode and number of proofs:

`superclass(?object) - zero_or_more`

---

`superclasses/1`

List of all class superclasses.

Compilation flags:

`static`

Template:

superclasses(Superclasses)

Mode and number of proofs:

superclasses(-list) - one

---

leaf\_instance/1

Returns, by backtracking, all class leaf instances.

Compilation flags:

static

Template:

leaf\_instance(Leaf)

Mode and number of proofs:

leaf\_instance(?object) - zero\_or\_more

---

leaf\_instances/1

List of all class leaf instances.

Compilation flags:

static

Template:

leaf\_instances(Leaves)

Mode and number of proofs:

leaf\_instances(-list) - one

---

leaf\_class/1

Returns, by backtracking, all class leaf subclasses.

Compilation flags:

static

Template:

leaf\_class(Leaf)

Mode and number of proofs:

leaf\_class(?object) - zero\_or\_more

---

leaf\_classes/1

List of all class leaf leaf subclasses.

Compilation flags:

static

Template:

leaf\_classes(Leaves)

Mode and number of proofs:

leaf\_classes(-list) - one

---

descendant\_instance/1

Returns, by backtracking, all class descendant instances.

Compilation flags:

static

Template:

descendant\_instance(Descendant)

Mode and number of proofs:

descendant\_instance(?object) - zero\_or\_more

---

descendant\_instances/1

List of all class descendant instances.

Compilation flags:

static

Template:

descendant\_instances(Descendants)

Mode and number of proofs:

descendant\_instances(-list) - one

---

descendant\_class/1

Returns, by backtracking, all class descendant subclasses.

Compilation flags:

static

Template:

descendant\_class(Descendant)

Mode and number of proofs:

descendant\_class(?object) - zero\_or\_more

---

descendant\_classes/1

List of all class descendant subclasses.

Compilation flags:

static

Template:

descendant\_classes(Descendants)

Mode and number of proofs:

descendant\_classes(-list) - one

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

[class\\_hierarchy](#)

[protocol](#)

### 1.32.3 hierarchy

Common hierarchy protocol for prototype and class hierarchies.

Availability:

```
logtalk_load(hierarchies(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2000-07-24

Compilation flags:

```
static
```

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- [Public predicates](#)
  - [ancestor/1](#)

- ancestors/1
- leaf/1
- leaves/1
- descendant/1
- descendants/1
- Protected predicates
- Private predicates
- Operators

### Public predicates

ancestor/1

Returns, by backtracking, all object ancestors.

Compilation flags:

static

Template:

ancestor(Ancestor)

Mode and number of proofs:

ancestor(?object) - zero\_or\_more

---

ancestors/1

List of all object ancestors.

Compilation flags:

static

Template:

ancestors(Ancestors)

Mode and number of proofs:

ancestors(-list) - one

leaf/1

Returns, by backtracking, all object leaves.

Compilation flags:

static

Template:

leaf(Leaf)

Mode and number of proofs:

leaf(?object) - zero\_or\_more

---

leaves/1

List of all object leaves.

Compilation flags:

static

Template:

leaves(Leaves)

Mode and number of proofs:

leaves(-list) - one

---

descendant/1

Returns, by backtracking, all object descendants.

Compilation flags:

static

Template:

descendant(Descendant)

Mode and number of proofs:

descendant(?object) - zero\_or\_more

---

descendants/1

List of all object descendants.

Compilation flags:

static

Template:

descendants(Descendants)

Mode and number of proofs:

descendants(-list) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

category

### 1.32.4 proto\_hierarchy

Prototype hierarchy predicates.

Availability:

logtalk\_load(hierarchies(loader))

Author: Paulo Moura

Version: 1:1:0

Date: 2006-02-20

Compilation flags:

static

Implements:

public proto\_hierarchyp

Remarks:

(none)

Inherited public predicates:

ancestor/1 ancestors/1 descendant/1 descendants/1 extension/1 extensions/1 leaf/1 leaves/1  
parent/1 parents/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.32.5 proto\_hierarchyp

Prototype hierarchy protocol.

Availability:

logtalk\_load(hierarchies(loader))

Author: Paulo Moura

Version: 1:1:0

Date: 2006-02-20

Compilation flags:

static

Extends:

public [hierarchyp](#)

Remarks:

(none)

Inherited public predicates:

[ancestor/1](#) [ancestors/1](#) [descendant/1](#) [descendants/1](#) [leaf/1](#) [leaves/1](#)

- Public predicates
  - [parent/1](#)
  - [parents/1](#)
  - [extension/1](#)
  - [extensions/1](#)
- Protected predicates
- Private predicates
- Operators

## Public predicates

[parent/1](#)

Returns, by backtracking, all object parents.

Compilation flags:

static

Template:

[parent](#)(Parent)

Mode and number of proofs:

[parent](#)(?object) - zero\_or\_more

parents/1

List of all object parents.

Compilation flags:

static

Template:

parents(Parents)

Mode and number of proofs:

parents(-list) - one

---

extension/1

Returns, by backtracking, all object direct descendants.

Compilation flags:

static

Template:

extension(Extension)

Mode and number of proofs:

extension(?object) - zero\_or\_more

---

extensions/1

List of all object direct descendants.

Compilation flags:

static

Template:

extensions(Extensions)

Mode and number of proofs:

extensions(-list) - one

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`proto_hierarchy`

## 1.33 hook\_flows

object

### 1.33.1 hook\_pipeline(Pipeline)

- Pipeline - List of hook objects.

Use a pipeline (represented using a list) of hook objects to expand terms and goals. The expansion results from a hook object are passed to the next hook object in the pipeline.

Availability:

`logtalk_load(hook_flows(loader))`

Author: Paulo Moura

Version: 2:0:0

Date: 2024-09-27

Compilation flags:

`static, context_switching_calls`

Implements:

public `expanding`

Remarks:

- Usage: Compile source files that should be expanded using the pipeline of hook objects using the compiler option `hook(hook_pipeline(Pipeline))`.

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

hook\_set(Set)

object

#### 1.33.2 hook\_set(Set)

- Set - Set (list) of hook objects.

Use a set (represented using a list) of hook objects to expand terms and goals. The hook objects are tried in sequence until one of them succeeds in expanding the current term (goal) into a different term (goal).

Availability:

logtalk\_load(hook\_flows(loader))

Author: Paulo Moura

Version: 2:0:0

Date: 2024-09-27

Compilation flags:

static, context\_switching\_calls

Implements:

public expanding

Remarks:

- Usage: Compile source files that should be expanded using the set of hook objects using the compiler option `hook(hook_set(Set))`.

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`hook_pipeline(Pipeline)`

## 1.34 hook\_objects

object

### 1.34.1 backend\_adapter\_hook

This hook object applies the expansion rules defined in the Prolog backend adapter file.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2020-02-17

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Remarks:

```
(none)
```

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`default_workflow_hook`, `identity_hook`, `grammar_rules_hook`, `prolog_module_hook(Module)`, `object_wrapper_hook`, `write_to_stream_hook(Stream,Options)`, `write_to_stream_hook(Stream)`, `print_goal_hook`, `suppress_goal_hook`

object

### 1.34.2 `default_workflow_hook`

Use this object as the default hook object to restore the default expansion pipeline semantics used by the compiler.

Availability:

`logtalk_load(hook_objects(loader))`

Author: Paulo Moura

Version: 1:0:1

Date: 2020-03-24

Compilation flags:

`static`, `context_switching_calls`

Implements:

public `expanding`

Remarks:

(none)

Inherited public predicates:

`goal_expansion/2` `term_expansion/2`

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`backend_adapter_hook`, `identity_hook`, `grammar_rules_hook`, `prolog_module_hook(Module)`, `object_wrapper_hook`, `write_to_stream_hook(Stream,Options)`, `write_to_stream_hook(Stream)`, `print_goal_hook`, `suppress_goal_hook`

object

### 1.34.3 `grammar_rules_hook`

This hook object expands grammar rules into clauses.

Availability:

`logtalk_load(hook_objects(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2020-02-14

Compilation flags:

static, context\_switching\_calls

Implements:

public expanding

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

backend\_adapter\_hook, default\_workflow\_hook, identity\_hook, prolog\_module\_hook(Module),  
object\_wrapper\_hook, write\_to\_stream\_hook(Stream,Options), write\_to\_stream\_hook(Stream),  
print\_goal\_hook, suppress\_goal\_hook

object

### 1.34.4 identity\_hook

Use this object as a file specific hook object to prevent any (other) user-defined expansion rules to be applied when compiling the file.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2020-02-15

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Remarks:

```
(none)
```

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`backend_adapter_hook`, `default_workflow_hook`, `grammar_rules_hook`, `prolog_module_hook(Module)`,  
`object_wrapper_hook`, `write_to_stream_hook(Stream,Options)`, `write_to_stream_hook(Stream)`,  
`print_goal_hook`, `suppress_goal_hook`

object

### 1.34.5 `object_wrapper_hook`

Use this object to wrap the contents of a plain Prolog file in an object named after the file. The wrapper sets the `context_switching_calls` flag to allow, enabling calling of the wrapped predicates using the `<</2` control construct.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:1:0

Date: 2020-10-30

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Uses:

```
os
```

Remarks:

```
(none)
```

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`object_wrapper_hook(Protocol)`, `object_wrapper_hook(Name,Relations)`, `back-end_adapter_hook`, `default_workflow_hook`, `grammar_rules_hook`, `prolog_module_hook(Module)`, `write_to_stream_hook(Stream,Options)`, `write_to_stream_hook(Stream)`, `print_goal_hook`, `suppress_goal_hook`

`object`

#### 1.34.6 `object_wrapper_hook(Protocol)`

Use this object to wrap the contents of a plain Prolog file in an object named after the file that implements the given protocol.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2021-11-24

Compilation flags:

```
static, context_switching_calls
```

Implements:

public expanding

Uses:

os

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

object\_wrapper\_hook, object\_wrapper\_hook(Name,Relations), backend\_adapter\_hook,  
default\_workflow\_hook, grammar\_rules\_hook, prolog\_module\_hook(Module),  
write\_to\_stream\_hook(Stream,Options), write\_to\_stream\_hook(Stream), print\_goal\_hook, sup-  
press\_goal\_hook

object

### 1.34.7 object\_wrapper\_hook(Name,Relations)

Use this object to wrap the contents of a plain Prolog file in an object with the given name and object entity relations (a list).

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2022-02-03

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Remarks:

```
(none)
```

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`object_wrapper_hook`, `object_wrapper_hook(Protocol)`, `backend_adapter_hook`,  
`default_workflow_hook`, `grammar_rules_hook`, `prolog_module_hook(Module)`,  
`write_to_stream_hook(Stream,Options)`, `write_to_stream_hook(Stream)`, `print_goal_hook`, `sup-`  
`press_goal_hook`

object

### 1.34.8 `print_goal_hook`

Use this object to easily print entity predicate goals before, after, or before and after calling them.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2020-03-14

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Remarks:

- Usage: Mark a goal to be printed by prefixing it with an operator. Printing uses a comment message.
- To print goal before calling it: - Goal.
- To print goal after calling it: + Goal.
- To print goal before and after calling it: \* Goal.

- Operators: This hook object uses the standard - and + prefix operators and also defines a global \* prefix operator with the same type and priority.

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

backend\_adapter\_hook, default\_workflow\_hook, grammar\_rules\_hook, identity\_hook, prolog\_module\_hook(Module), object\_wrapper\_hook, write\_to\_stream\_hook(Stream,Options), write\_to\_stream\_hook(Stream), suppress\_goal\_hook

object

### 1.34.9 prolog\_module\_hook(Module)

This hook object applies the expansion rules defined in a Prolog module (e.g. user).

Availability:

logtalk\_load(hook\_objects(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2020-02-17

Compilation flags:

static, context\_switching\_calls

Implements:

public expanding

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

backend\_adapter\_hook, default\_workflow\_hook, identity\_hook, grammar\_rules\_hook, object\_wrapper\_hook, write\_to\_stream\_hook(Stream,Options), write\_to\_stream\_hook(Stream), print\_goal\_hook, suppress\_goal\_hook

object

### 1.34.10 suppress\_goal\_hook

Use this object to easily suppress a goal in a clause body.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2020-05-04

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Remarks:

- Usage: Mark a goal to be suppressed by prefixing it with the -- operator.
- Operators: This hook object uses the -- prefix operator declared by Logtalk for use in mode/2 directives.

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`backend_adapter_hook`, `default_workflow_hook`, `grammar_rules_hook`, `identity_hook`, `prolog_module_hook(Module)`, `object_wrapper_hook`, `write_to_stream_hook(Stream,Options)`, `write_to_stream_hook(Stream)`, `print_goal_hook`

object

### 1.34.11 `write_to_file_hook(File)`

This hook object writes term-expansion results to a file in canonical format. The terms are terminated by a period and a new line.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2022-07-06

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public write_to_file_hook(File,[quoted(true),ignore_ops(true)])
```

Remarks:

(none)

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

backend\_adapter\_hook, default\_workflow\_hook, identity\_hook, grammar\_rules\_hook,  
 prolog\_module\_hook(Module), object\_wrapper\_hook, write\_to\_file\_hook(File,Options),  
 write\_to\_stream\_hook(Stream,Options), write\_to\_stream\_hook(Stream), print\_goal\_hook, sup-  
 press\_goal\_hook

object

#### 1.34.12 write\_to\_file\_hook(File,Options)

This hook object writes term-expansion results to a file using a list of write\_term/3 options. The terms are terminated by a period and a new line.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2022-07-06

Compilation flags:

```
static, context_switching_calls
```

Implements:

public expanding

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

backend\_adapter\_hook, default\_workflow\_hook, identity\_hook, grammar\_rules\_hook,  
prolog\_module\_hook(Module), object\_wrapper\_hook, write\_to\_file\_hook(File),  
write\_to\_stream\_hook(Stream,Options), write\_to\_stream\_hook(Stream), print\_goal\_hook, sup-  
press\_goal\_hook

object

### 1.34.13 write\_to\_stream\_hook(Stream)

This hook object writes term-expansion results to a stream in canonical format. The terms are terminated by a period and a new line.

Availability:

```
logtalk_load(hook_objects(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2020-02-16

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public write_to_stream_hook(Stream,[quoted(true),ignore_ops(true)])
```

Remarks:

```
(none)
```

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`backend_adapter_hook`, `default_workflow_hook`, `identity_hook`, `grammar_rules_hook`, `prolog_module_hook(Module)`, `object_wrapper_hook`, `write_to_stream_hook(Stream,Options)`, `write_to_file_hook(File,Options)`, `write_to_file_hook(File)`, `print_goal_hook`, `suppress_goal_hook`  
object

### 1.34.14 `write_to_stream_hook(Stream,Options)`

This hook object writes term-expansion results to a stream using a list of `write_term/3` options. The terms are terminated by a period and a new line.

Availability:

`logtalk_load(hook_objects(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2020-02-16

Compilation flags:

`static`, `context_switching_calls`

Implements:

`public expanding`

Remarks:

(none)

Inherited public predicates:

`goal_expansion/2` `term_expansion/2`

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`backend_adapter_hook`, `default_workflow_hook`, `identity_hook`, `grammar_rules_hook`,  
`prolog_module_hook(Module)`, `object_wrapper_hook`, `write_to_stream_hook(Stream)`,  
`write_to_file_hook(File,Options)`, `write_to_file_hook(File)`, `print_goal_hook`, `suppress_goal_hook`

## 1.35 html

category

### 1.35.1 html

HTML generation.

Availability:

`logtalk_load(html(loader))`

Author: Paul Brown and Paulo Moura

Version: 0:3:0

Date: 2021-03-30

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - generate/2
  - void\_element/1
  - normal\_element/2
- Protected predicates
- Private predicates
  - doctype/1
- Operators

### Public predicates

generate/2

Generates HTML content using the representation specified in the first argument (stream(Stream) or file(Path)) for the term in the second argument.

Compilation flags:

static

Template:

generate(Sink,Term)

Mode and number of proofs:

generate(+compound,++term) - one\_or\_error

void\_element/1

Enumerates, by backtracking, all void elements.

Compilation flags:

static

Template:

void\_element(Element)

Mode and number of proofs:

void\_element(?atom) - zero\_or\_more

---

normal\_element/2

Enumerates, by backtracking, all normal elements. The value of the Display argument is either inline or block.

Compilation flags:

static

Template:

normal\_element(Element,Display)

Mode and number of proofs:

normal\_element(?atom,?atom) - zero\_or\_more

---

## Protected predicates

(none)

## Private predicates

doctype/1

Doctype text.

Compilation flags:

static

---

Template:

doctype(DocType)

Mode and number of proofs:

doctype(?atom) - one

---

## Operators

(none)

object

### 1.35.2 html5

HTML content generation using the HTML 5 doctype.

Availability:

logtalk\_load(html(loader))

Author: Paul Brown and Paulo Moura

Version: 1:0:0

Date: 2021-03-29

Compilation flags:

static, context\_switching\_calls

Imports:

public [html](#)

Remarks:

(none)

Inherited public predicates:

[generate/2](#) [normal\\_element/2](#) [void\\_element/1](#)

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.35.3 xhtml11

XHTML content generation using the XHTML 1.1 doctype.

Availability:

`logtalk_load(html(loader))`

Author: Paul Brown and Paulo Moura

Version: 1:0:0

Date: 2021-03-29

Compilation flags:

`static, context_switching_calls`

Imports:

`public html`

Remarks:

(none)

Inherited public predicates:

`generate/2 normal_element/2 void_element/1`

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.36 ids

object

### 1.36.1 ids

Generator of random identifiers with 160 bits (20 bytes) of randomness.

Availability:

```
logtalk_load(ids(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2022-11-23

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public ids(atom,20)
```

Remarks:

(none)

Inherited public predicates:

generate/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

ids(Representation,Bytes), uuid, ulid

object

#### 1.36.2 ids(Representation,Bytes)

- Representation - Text representation for the identifier. Possible values are atom, chars, and codes.
- Bytes - Number of bytes of randomness.

Generator of random identifiers.

Availability:

logtalk\_load(ids(loader))

Author: Paulo Moura

Version: 1:0:0  
Date: 2022-11-23

Compilation flags:  
static, context\_switching\_calls

Uses:  
base64  
fast\_random  
list  
os

Remarks:  
(none)

Inherited public predicates:  
(none)

- Public predicates
  - generate/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

generate/1

Generate a random identifier.

Compilation flags:  
static

Template:  
generate(Identifier)  
Mode and number of proofs:  
generate(--textids) - one

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

ids, uuid, ulid

## 1.37 intervals

object

### 1.37.1 interval

Basic temporal interval relations. An interval is represented by a compound term, `i/2`, with two ground arguments, the start and end points.

Availability:

```
logtalk_load(intervals(loader))
```

Author: Paulo Moura

Version: 1:2:1

Date: 2022-01-15

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public intervalp
```

Aliases:

```
intervalp before/2 as b/2
```

```
intervalp after/2 as bi/2
```

```
intervalp meets/2 as m/2
```

```
intervalp met_by/2 as mi/2
```

```
intervalp overlaps/2 as o/2
```

```
intervalp overlapped_by/2 as oi/2
```

```
intervalp starts/2 as s/2
```

intervalp started\_by/2 as si/2  
intervalp during/2 as d/2  
intervalp contains/2 as di/2  
intervalp finishes/2 as f/2  
intervalp finished\_by/2 as fi/2  
intervalp equal/2 as eq/2

Remarks:

(none)

Inherited public predicates:

after/2 before/2 contains/2 during/2 equal/2 finished\_by/2 finishes/2 meets/2 met\_by/2  
new/3 overlapped\_by/2 overlaps/2 started\_by/2 starts/2 valid/1

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

### 1.37.2 intervalp

Basic temporal interval relations protocol (based on James F. Allen Interval Algebra work).

Availability:

```
logtalk_load(intervals(loader))
```

Author: Paulo Moura

Version: 1:1:0

Date: 2014-04-26

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - new/3
  - valid/1
  - before/2
  - after/2
  - meets/2
  - met\_by/2
  - overlaps/2
  - overlapped\_by/2
  - starts/2
  - started\_by/2
  - during/2
  - contains/2
  - finishes/2

- finished\_by/2
- equal/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

new/3

Constructs a new interval given start and end points. The start point must strictly precede the end point.

Compilation flags:

static

Template:

new(Start,End,Interval)

Mode and number of proofs:

new(@ground,@ground,-interval) - zero\_or\_one

---

valid/1

True if Interval is a valid interval.

Compilation flags:

static

Template:

valid(Interval)

Mode and number of proofs:

valid(@interval) - zero\_or\_one

---

before/2

True if Interval1 takes place before Interval2.

Compilation flags:

static

Template:

before(Interval1,Interval2)

Mode and number of proofs:

before(@interval,@interval) - zero\_or\_one

---

after/2

True if Interval1 takes place after Interval2.

Compilation flags:

static

Template:

after(Interval1,Interval2)

Mode and number of proofs:

after(@interval,@interval) - zero\_or\_one

---

meets/2

True if Interval1 meets Interval2.

Compilation flags:

static

Template:

meets(Interval1,Interval2)

Mode and number of proofs:

meets(@interval,@interval) - zero\_or\_one

---

met\_by/2

True if Interval1 is met by Interval2.

Compilation flags:

static

Template:

met\_by(Interval1,Interval2)

Mode and number of proofs:

met\_by(@interval,@interval) - zero\_or\_one

---

overlaps/2

True if Interval1 overlaps with Interval2.

Compilation flags:

static

Template:

overlaps(Interval1,Interval2)

Mode and number of proofs:

overlaps(@interval,@interval) - zero\_or\_one

---

overlapped\_by/2

True if Interval1 is overlapped by Interval2.

Compilation flags:

static

Template:

overlapped\_by(Interval1,Interval2)

Mode and number of proofs:

overlapped\_by(@interval,@interval) - zero\_or\_one

---

starts/2

True if Interval1 starts Interval2.

Compilation flags:

static

Template:

starts(Interval1,Interval2)

Mode and number of proofs:

starts(@interval,@interval) - zero\_or\_one

---

started\_by/2

True if Interval1 is started by Interval2.

Compilation flags:

static

Template:

started\_by(Interval1,Interval2)

Mode and number of proofs:

started\_by(@interval,@interval) - zero\_or\_one

---

during/2

True if Interval1 occurs during Interval2.

Compilation flags:

static

Template:

during(Interval1,Interval2)

Mode and number of proofs:

during(@interval,@interval) - zero\_or\_one

---

contains/2

True if Interval1 contains Interval2.

Compilation flags:

static

Template:

contains(Interval1,Interval2)

Mode and number of proofs:

contains(@interval,@interval) - zero\_or\_one

---

finishes/2

True if Interval1 finishes Interval2.

Compilation flags:

static

Template:

finishes(Interval1,Interval2)

Mode and number of proofs:

finishes(@interval,@interval) - zero\_or\_one

---

finished\_by/2

True if Interval1 is finished by Interval2.

Compilation flags:

static

Template:

finished\_by(Interval1,Interval2)

Mode and number of proofs:

finished\_by(@interval,@interval) - zero\_or\_one

---

equal/2

True if Interval1 is equal to Interval2.

Compilation flags:

static

Template:

equal(Interval1,Interval2)

Mode and number of proofs:

equal(@interval,@interval) - zero\_or\_one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

interval

## 1.38 iso8601

object

### 1.38.1 iso8601

ISO 8601 (and European civil calendar) compliant library of date predicates.

Availability:

logtalk\_load(iso8601(loader))

Author: Daniel L. Dudley

Version: 1:0:3

Date: 2019-10-09

Compilation flags:

static, context\_switching\_calls

Uses:

os

Remarks:

- Scope: This object currently provides a powerful, versatile and efficient set of date-handling predicates, which—thanks to Logtalk—may be used as is on a wide range of Prolog compilers. Besides taking time to familiarize oneself with each predicate, the user should take note of the following information.
- Validation of dates: Date parts are not validated—that is the caller’s responsibility! However, not being quite heartless yet, we do provide a predicate for this purpose.
- Date arithmetic: Many of the examples illustrate a simplified method of doing date arithmetic. Note, however, that we do not generally recommend this practice—it is all too easy to make mistakes. The safest way of finding the day difference between two dates is to first convert the dates to their Julian day numbers and then subtract one from the other. Similarly, the safe way to add or subtract a day offset to a particular date is to first convert the date to its Julian day number, add or subtract the day offset, and then convert the result to its corresponding date.
- BC years: ISO 8601 specifies that the Gregorian calendar be used, yet requires that years prior to 1 AD be handled arithmetically, i.e., the year we know as 1 BC is year 0, 2 BC is year -1, 3 BC is year -2 and so on. We do not follow ISO 8601 with regard to the handling of BC years. Our date predicates will accept and interpret an input year 0 as 1 BC; however, a negative year, Year, should always be interpreted as  $\text{abs}(\text{Year}) ::= \text{Year BC}$ . We believe that the average person will find our handling of BC years more user-friendly than the ISO 8601 one, but we encourage feedback from users with a view to a possible change in future versions.
- Week numbers: It is possible for a day (date) to have a week number that belongs to another year. Up to three of the first days of a calendar year may belong to the last week (number) of the prior calendar year, and up to three days of the last days of a calendar year may belong to the first week (number) of the next calendar year. It for this reason that the Week parameter in date/6-7 is a compound term, namely week(WeekNo,ActualYear).
- Computation of Gregorian Easter Sunday: The algorithm is based upon the “Gaussian rule”. Proleptic use is limited to years  $> 1582$  AD, that is, after the introduction of the Gregorian calendar.
- Some Christian feast day offsets from Easter Sunday: Carnival Monday: -48 days, Mardi Gras (Shrove Tuesday): -47 days, Ash Wednesday: -46 days, Palm Sunday: -7 days, Easter Friday: -2 days, Easter Saturday: -1 day, Easter Monday: +1 day, Ascension of Christ: +39 days, Whitsunday: +49 days, Whitmonday: +50 days, Feast of Corpus Christi: +60 days.

Inherited public predicates:

(none)

- Public predicates
  - date/4
  - date/5
  - date/6
  - date/7
  - date\_string/3
  - valid\_date/3
  - leap\_year/1
  - calendar\_month/3
  - easter\_day/3
- Protected predicates
- Private predicates
- Operators

## Public predicates

date/4

Get the system date and/or its Julian Day # or convert a Julian Day # to/from given date parts.

Compilation flags:

static

Template:

date(JD,Year,Month,Day)

JD - Julian day serial number.

Year - 0 or negative if converted BC year, positive otherwise.

Month - Normally an integer between 1 and 12 inclusive.

Day - Normally an integer between 1 and 31 inclusive depending upon month.

Mode and number of proofs:

date(?integer,?integer,?integer,?integer) - zero\_or\_one

Examples:

Current date (i.e., today)

date(JD,Year,Month,Day)

JD=2453471,Year=2005,Month=4,Day=10

Convert a date to its Julian day number

date(JD,2000,2,29)

JD=2451604

Convert a Julian day number to its date

```
date(2451604,Year,Month,Day)
Year=2000,Month=2,Day=29
What is the date of day # 60 in year 2000?
date(JD,2000,1,60)
JD=2451604
What is the Julian of the 1st day prior to 2000-1-1?
date(JD,2000,1,0)
JD=2451544
What is the Julian of the 60th day prior to 2000-1-1?
date(JD,2000,1,-59)
JD=2451485
Illegal date is auto-adjusted (see also next query)
date(JD,1900,2,29)
JD=2415080
This is the correct date!
date(2415080,Year,Month,Day)
Year=1900,Month=3,Day=1
```

---

date/5

Ditto date/4 + get/check its day-of-week #.

Compilation flags:

static

Template:

```
date(JD,Year,Month,Day,DoW)
JD - Julian day serial number.
Year - 0 or negative if converted BC year, positive otherwise.
Month - Normally an integer between 1 and 12 inclusive.
Day - Normally an integer between 1 and 31 inclusive depending upon month.
DoW - Day of week, where Monday=1, Tuesday=2, ..., Sunday=7.
```

Mode and number of proofs:

```
date(?integer,?integer,?integer,?integer,?integer) - zero_or_one
```

Examples:

```
Get the Julian and the day-of-week # of a date
date(JD,2000,2,29,DoW)
JD=2451604,DoW=2
Check the validity of a given date (day-of-week is 2, not 4)
date(_,2002,3,5,4)
no
```

Get the Julian day of a given date if it is a Sunday

```
date(JD,2004,2,29,7)
```

```
JD=2453065
```

Get the date and day-of-week # of a Julian

```
date(2451545,Year,Month,Day,DoW)
```

```
Year=2000,Month=1,Day=1,DoW=6
```

date/6

Ditto date/5 + get/check its week #.

Compilation flags:

```
static
```

Template:

```
date(JD,Year,Month,Day,DoW,Week)
```

JD - Julian day serial number.

Year - 0 or negative if converted BC year, positive otherwise.

Month - Normally an integer between 1 and 12 inclusive.

Day - Normally an integer between 1 and 31 inclusive depending upon month.

DoW - Day of week, where Monday=1, Tuesday=2, ..., Sunday=7.

Week - Compound term, week(WeekNo,ActualYear), of a day.

Mode and number of proofs:

```
date(?integer,?integer,?integer,?integer,?integer,?compound) - zero_or_one
```

Examples:

Get the day-of-week and week number of a date

```
date(_,2000,1,1,DoW,Week)
```

```
DoW=6,Week=week(52,1999)
```

Get the week number and year of this week

```
date(_,_,_,_,Week)
```

```
Week=week(7,2004)
```

Get the Julian number and the week of a date if it is a Sunday

```
date(JD,2004,2,29,7,Week)
```

```
JD=2453065,Week=week(9,2004)
```

Get the day-of-week and week of a Julian day number

```
date(2453066,_,_,_,DoW,Week)
```

```
DoW=1,Week=week(10,2004)
```

Check that given date data matches

```
date(_,2004,3,1,1,week(10,2004))
```

```
yes
```

What is the date of a day of week (default is 1) in given week # and year?

```
date(__,Year,Month,Day,DoW,week(26,2004))
Year=2004,Month=6,Day=21,DoW=1
Ditto for Sunday
date(__,Year,Month,Day,7,week(1,2005))
Year=2005,Month=1,Day=9
Ditto for Tuesday in following week
date(__,Year,Month,Day,9,week(1,2005))
Year=2005,Month=1,Day=11
Ditto for Thursday in the prior week
date(__,Year,Month,Day,4,week(0,2005))
Year=2004,Month=12,Day=30
Ditto for Tuesday two weeks prior
date(__,Year,Month,Day,2,week(-1,2005))
Year=2004,Month=12,Day=21
Ditto for Saturday
date(__,Year,Month,Day,6,week(53,2004))
Year=2005,Month=1,Day=1
Ditto for Monday (note automatic compensation of nonexistent week number)
date(__,Year,Month,Day,1,week(60,2004))
Year=2005,Month=2,Day=14
```

---

date/7

Ditto date/6 + get/check its day-of-year #.

Compilation flags:

static

Template:

```
date(JD,Year,Month,Day,DoW,Week,DoY)
JD - Julian day serial number.
Year - 0 or negative if converted BC year, positive otherwise.
Month - Normally an integer between 1 and 12 inclusive.
Day - Normally an integer between 1 and 31 inclusive depending upon month.
DoW - Day of week, where Monday=1, Tuesday=2, ..., Sunday=7.
Week - Compound term, week(WeekNo,ActualYear), of a day.
DoY - Day of year (NB! calendar year, not week # year).
```

Mode and number of proofs:

```
date(?integer,?integer,?integer,?integer,?integer,?compound,?integer) - zero_or_one
```

Examples:

Get the date and day-of-year of a Julian number

```

date(2451649,Year,Month,Day,_,_,DoY)
Year=2000,Month=4,Day=14,DoY=105
Get the Julian number, week number and day-of-year of a date, confirming that it is a Sunday
date(JD,2004,2,29,7,Week,DoY)
JD=2453065,Week=week(9,2004),DoY=60
Confirm that a date is, in fact, a specific day-of-year
date(_,2004,3,1,_,_,61)
yes
Get the Julian number, week day and day-of-year of a date
date(JD,2004,10,18,DoW,_,DoY)
JD=2453297,DoW=1,DoY=292
Get today's day-of-year
date(_,_,_,_,_,DoY)
DoY=54
Get all missing date data (excl. Julian number) for the 60th calendar day of 2004
date(_,2004,Month,Day,DoW,Week,60)
Month=2,Day=29,DoW=7,Week=week(9,2004)
Match given date data and, if true, return the missing data (excl. Julian number)
date(_,2004,3,Day,DoW,Week,61)
Day=1,DoW=1,Week=week(10,2004)
Ditto (the 61st day-of-year cannot be both day 1 and 2 of the month)
date(_,2004,_,2,_,_,61)
no

```

---

### date\_string/3

Conversion between an ISO 8601 compliant date string and its components (truncated and expanded date representations are currently unsupported). Note that date components are not validated; that is the caller's responsibility!

Compilation flags:

```
static
```

Template:

```
date_string(Format,Components,String)
```

Format - ISO 8601 format.

Components - When bound and String is free, either a Julian number or a [Year,Month,Day] term; it binds to the system day/date if free When free and String is bound, it binds to an integer list representing the numeric elements of String.

String - ISO 8601 formatted string correspondent to Components.

Mode and number of proofs:

```
date_string(+atom,+integer,?atom) - zero_or_one
```

```
date_string(+atom,?list,?atom) - zero_or_one
```

Examples:

```
Date, complete, basic (section 5.2.1.1)
  date_string('YYYYMMDD',[2004,2,29],String)
  String='20040229'
Date, complete, basic (section 5.2.1.1)
  date_string('YYYYMMDD',Components,'20040229')
  Components=[2004,2,29]
Date, complete, extended (section 5.2.1.1)
  date_string('YYYY-MM-DD',[2003,12,16],String)
  String='2003-12-16'
Date, complete, extended (section 5.2.1.1)
  date_string('YYYY-MM-DD',Components,'2003-12-16')
  Components=[2003,12,16]
Date, complete, extended (section 5.2.1.1)
  date_string('YYYY-MM-DD',_,String)
  String='2004-02-17'
Date, complete, extended (section 5.2.1.1)
  date_string('YYYY-MM-DD',Components,'2004-02-17')
  Components=[2004,2,17]
Date, reduced, month (section 5.2.1.2 a)
  date_string('YYYY-MM',[2004,9,18],String)
  String='2004-09'
Date, reduced, month (section 5.2.1.2 a)
  date_string('YYYY-MM',Components,'2004-09')
  Components=[2004,9]
Date, reduced, year (section 5.2.1.2 b)
  date_string('YYYY',[1900,7,24],String)
  String='1900'
Date, reduced, year (section 5.2.1.2 b)
  date_string('YYYY',Components,'1900')
  Components=[1900]
Date, reduced, century (section 5.2.1.2 c)
  date_string('YY',2456557,String)
  String='20'
Date, reduced, century (section 5.2.1.2 c)
  date_string('YY',Components,'20')
  Components=[20]
Date, ordinal, complete (section 5.2.2.1)
  date_string('YYYYDDD',[2005,3,25],String)
  String='2005084'
Date, ordinal, complete (section 5.2.2.1)
  date_string('YYYYDDD',Components,'2005084')
  Components=[2005,84]
Date, ordinal, extended (section 5.2.2.1)
  date_string('YYYY-DDD',[1854,12,4],String)
  String='1854-338'
Date, ordinal, extended (section 5.2.2.1)
```

```

    date_string('YYYY-DDD',Components,'1854-338')
    Components=[1854,338]
Week, complete, basic (section 5.2.3.1)
    date_string('YYYYWwwD',[2000,1,2],String)
    String='1999W527'
Week, complete, basic (section 5.2.3.1)
    date_string('YYYYWwwD',Components,'1999W527')
    Components=[1999,52,7]
Week, complete, extended (section 5.2.3.1)
    date_string('YYYY-Www-D',[2003,12,29],String)
    String='2004-W01-1'
Week, complete, extended (section 5.2.3.1)
    date_string('YYYY-Www-D',Components,'2004-W01-1')
    Components=[2004,1,1]
Week, complete, extended (section 5.2.3.1)
    date_string('YYYY-Www-D',2453167,String)
    String='2004-W24-4'
Week, complete, extended (section 5.2.3.1)
    date_string('YYYY-Www-D',Components,'2004-W24-4')
    Components=[2004,24,4]
Week, reduced, basic (section 5.2.3.2)
    date_string('YYYYWww',[2004,2,29],String)
    String='2004W09'
Week, reduced, basic (section 5.2.3.2)
    date_string('YYYYWww',Components,'2004W09')
    Components=[2004,9]
Week, reduced, extended (section 5.2.3.2)
    date_string('YYYY-Www',[2004,2,29],String)
    String='2004-W09'
Week, reduced, extended (section 5.2.3.2)
    date_string('YYYY-Www',Components,'2004-W09')
    Components=[2004,9]

```

---

`valid_date/3`

Validate a given date in the Gregorian calendar.

Compilation flags:

```
static
```

Template:

```
valid_date(Year,Month,Day)
```

Mode and number of proofs:

`valid_date(+integer,+integer,+integer) - zero_or_one`

Examples:

Yes, the recent millennium was a leap year

```
valid_date(2000,2,29)
```

yes

2004 was also a leap year

```
valid_date(2004,2,29)
```

yes

Only 30 days in April

```
valid_date(2004,4,31)
```

no

1 BC was a leap year

```
valid_date(-1,2,29)
```

yes

---

`leap_year/1`

Succeed if given year is a leap year in the Gregorian calendar.

Compilation flags:

static

Template:

```
leap_year(Year)
```

Year - The Gregorian calendar year to investigate. If free, it binds to the system year.

Mode and number of proofs:

```
leap_year(?integer) - zero_or_one
```

Examples:

No, the prior centenary was not a leap year

```
leap_year(1900)
```

no

The recent millennium

```
leap_year(2000)
```

yes

This year

```
leap_year(Year)
```

Year=2004

This year (equivalent to prior query)

```
leap_year(_)
```

```

    yes
Next centennial
    leap_year(2100)
    no
Year 0, equivalent to 1 BC
    leap_year(0)
    yes
1 BC
    leap_year(-1)
    yes
4 BC
    leap_year(-4)
    no
5 BC
    leap_year(-5)
    yes

```

---

calendar\_month/3

Compute a calendar month.

Compilation flags:

```
static
```

Template:

```
calendar_month(Year,Month,Calendar)
```

Year - The calendar year.

Month - The calendar month.

Calendar - A compound term, m/3, composed of three main arguments specifying year, month, and a list of week and week day numbers (calendar body).

Mode and number of proofs:

```
calendar_month(?integer,?integer,-compound) - zero_or_one
```

Examples:

Compute the calendar of March, 2005

```
calendar_month(2005,3,Calendar)
```

```
Calendar=m(2005,3,[w(9,[0,1,2,3,4,5,6]),w(10,[7,8,9,10,11,12,13]),w(11,[14,15,16,17,18,19,20]),
w(12,[21,22,23,24,25,26,27]),w(13,[28,29,30,31,0,0,0]),w(0,[0,0,0,0,0,0])])
```

easter\_day/3

Compute a Gregorian Easter Sunday.

Compilation flags:

static

Template:

easter\_day(Year,Month,Day)

Year - Integer specifying the year to be investigated.

Month - Month in which Easter Sunday falls for given year.

Day - Day of month in which Easter Sunday falls for given year.

Mode and number of proofs:

easter\_day(?integer,-integer,-integer) - zero\_or\_one

Examples:

Compute Easter Sunday for a particular year

easter\_day(2006,Month,Day)

Month=4,Day=16

Compute Easter Sunday for the current year

easter\_day(Year,Month,Day)

Year=2005,Month=3,Day=27

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.39 issue\_creator

object

### 1.39.1 issue\_creator

Support for automatically creating bug report issues for failed tests in GitHub or GitLab servers.

Availability:

```
logtalk_load(issue_creator(loader))
```

Author: Paulo Moura

Version: 0:12:0

Date: 2022-01-20

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
logtalk::message_hook/4
```

Uses:

```
git
```

```
os
```

```
term_io
```

```
user
```

Remarks:

- Usage: This tool is automatically loaded and used from the `logtalk_tester` automation script when using its `-b` option. See the script man page for details.

Inherited public predicates:

```
(none)
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.40 java

object

### 1.40.1 java

Abstract interface to JPL API utility predicates.

Availability:

`logtalk_load(java(loader))`

Author: Paulo Moura

Version: 1:8:0

Date: 2023-03-15

Compilation flags:

`static, context_switching_calls`

Implements:

`public java_utils_protocol`

Uses:

`user`

Remarks:

(none)

Inherited public predicates:

array\_list/2 array\_to\_list/2 array\_to\_terms/2 array\_to\_terms/3 decode\_exception/2  
 decode\_exception/3 false/1 is\_false/1 is\_null/1 is\_object/1 is\_true/1 is\_void/1  
 iterator\_element/2 list\_to\_array/2 map\_element/2 null/1 set\_element/2 terms\_to\_array/2  
 true/1 value\_reference/2 void/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

java(Reference,ReturnValue), java(Reference), java\_hook  
 object

## 1.40.2 java(Reference)

- Reference - Either a class name or a Java reference to an object.

Minimal abstraction of the JPL API for calling Java from Logtalk using familiar message sending syntax and a forward/1 handler to resolve methods.

Availability:

logtalk\_load(java(loader))

Author: Paulo Moura and Sergio Castro

Version: 1:0:1

Date: 2019-06-13

Compilation flags:

static, context\_switching\_calls

Extends:

public java(Reference,\_)

Remarks:

- Usage: Send to this object any valid message as listed in the JavaDocs for the given reference.

Inherited public predicates:

forward/1 get\_field/2 invoke/1 invoke/2 new/1 new/2 set\_field/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

java(Reference,ReturnValue), java, java\_hook

object

### 1.40.3 java(Reference,ReturnValue)

- Reference - Either a class name or a Java reference to an object.
- ReturnValue - Value returned by a method call (possibly the Java value void).

Minimal abstraction of the JPL API for calling Java from Logtalk using familiar message sending syntax and a forward/1 handler to resolve methods.

Availability:

```
logtalk_load(java(loader))
```

Author: Paulo Moura and Sergio Castro

Version: 1:4:0

Date: 2023-03-13

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public forwarding
public java_access_protocol
```

Remarks:

- Usage: Send to this object any valid message as listed in the JavaDocs for the given reference.

Inherited public predicates:

```
forward/1 get_field/2 invoke/1 invoke/2 new/1 new/2 set_field/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

[java\(Reference\)](#), [java](#), [java\\_hook](#)  
protocol

## 1.40.4 java\_access\_protocol

Protocol for a minimal abstraction for calling Java from Logtalk using familiar message sending syntax.

Availability:

```
logtalk_load(java(loader))
```

Author: Paulo Moura and Sergio Castro

Version: 1:2:1

Date: 2023-03-16

Compilation flags:

```
static
```

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - get\_field/2
  - set\_field/2
  - new/2
  - new/1
  - invoke/1
  - invoke/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

get\_field/2

Gets the value of a class or object field.

Compilation flags:

static

Template:

get\_field(Field,Value)

Mode and number of proofs:

get\_field(+atom,?nonvar) - zero\_or\_one

---

set\_field/2

Sets the value of a class or object field.

Compilation flags:

static

Template:

set\_field(Field,Value)

Mode and number of proofs:

set\_field(+atom,+nonvar) - one

`new/2`

Creates a new instance using the specified parameter values.

Compilation flags:

`static`

Template:

`new(Parameters,Instance)`

Mode and number of proofs:

`new(+list(nonvar),-reference) - one`

---

`new/1`

Creates a new instance using default parameter values.

Compilation flags:

`static`

Template:

`new(Instance)`

Mode and number of proofs:

`new(-reference) - one`

---

`invoke/1`

Invokes a method. This is a more efficient compared with relying on the `forward/1` handler to resolve methods.

Compilation flags:

`static`

Template:

`invoke(Method)`

---

Mode and number of proofs:

invoke(@nonvar) - one

---

invoke/2

Invokes a method. This is a more efficient compared with relying on the forward/1 handler to resolve methods.

Compilation flags:

static

Template:

invoke(Functor,Arguments)

Mode and number of proofs:

invoke(@nonvar,@list) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

object

### 1.40.5 java\_hook

Hook object to optimize messages to the java/1-2 objects that otherwise would trigger the forward/1 handler.

Availability:

logtalk\_load(java(loader))

Author: Paulo Moura

Version: 1:0:1

Date: 2019-06-13

Compilation flags:

static, context\_switching\_calls

Implements:

public `expanding`

Remarks:

- Usage: Compile source files with messages to the java/1-2 objects using the compiler option `hook(java_hook)`.

Inherited public predicates:

`goal_expansion/2` `term_expansion/2`

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

java(Reference,ReturnValue), java(Reference)

protocol

### 1.40.6 java\_utils\_protocol

Abstract interface to Java utility predicates.

Availability:

logtalk\_load(java(loader))

Author: Paulo Moura

Version: 1:6:0

Date: 2023-03-13

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - value\_reference/2
  - true/1
  - false/1
  - void/1
  - null/1
  - is\_true/1
  - is\_false/1

- is\_void/1
- is\_null/1
- is\_object/1
- terms\_to\_array/2
- array\_to\_terms/3
- array\_to\_terms/2
- array\_to\_list/2
- list\_to\_array/2
- array\_list/2
- iterator\_element/2
- map\_element/2
- set\_element/2
- decode\_exception/2
- decode\_exception/3
- Protected predicates
- Private predicates
- Operators

### Public predicates

value\_reference/2

Returns an opaque term that represents the Java value with the given name.

Compilation flags:

static

Template:

value\_reference(Value,Reference)

Mode and number of proofs:

value\_reference(?atom,--ground) - one\_or\_more

true/1

Returns an opaque term that represents the Java value true.

Compilation flags:

static

Template:

true(Reference)

Mode and number of proofs:

true(--ground) - one

---

false/1

Returns an opaque term that represents the Java value false.

Compilation flags:

static

Template:

false(Reference)

Mode and number of proofs:

false(--ground) - one

---

void/1

Returns an opaque term that represents the Java value void.

Compilation flags:

static

Template:

void(Reference)

Mode and number of proofs:

void(--ground) - one

---

null/1

Returns an opaque term that represents the Java value null.

Compilation flags:

static

Template:

null(Reference)

Mode and number of proofs:

null(--ground) - one

---

is\_true/1

True when the argument is the Java value true. Fails if the argument is not instantiated.

Compilation flags:

static

Template:

is\_true(Reference)

Mode and number of proofs:

is\_true(@term) - zero\_or\_one

---

is\_false/1

True when the argument is the Java value false. Fails if the argument is not instantiated.

Compilation flags:

static

Template:

is\_false(Reference)

Mode and number of proofs:

is\_false(@term) - zero\_or\_one

---

is\_void/1

True when the argument is the Java value void. Fails if the argument is not instantiated.

Compilation flags:

static

Template:

is\_void(Reference)

Mode and number of proofs:

is\_void(@term) - zero\_or\_one

---

is\_null/1

True when the argument is the Java value null. Fails if the argument is not instantiated.

Compilation flags:

static

Template:

is\_null(Reference)

Mode and number of proofs:

is\_null(@term) - zero\_or\_one

---

is\_object/1

True when the argument is a reference to a Java object. Fails if the argument is not instantiated.

Compilation flags:

static

Template:

is\_object(Reference)

Mode and number of proofs:

is\_object(@term) - zero\_or\_one

---

terms\_to\_array/2

Converts a list of ground Prolog terms to an array (a Java reference).

Compilation flags:

static

Template:

terms\_to\_array(Terms,Array)

Mode and number of proofs:

terms\_to\_array(++list(ground),-array) - one

---

array\_to\_terms/3

Converts an array (a Java reference) to a list of ground Prolog terms returning also its length. The array elements must be atoms, integers, floats, or compound terms. Fails otherwise.

Compilation flags:

static

Template:

array\_to\_terms(Array,Terms,Length)

Mode and number of proofs:

array\_to\_terms(+array,-list(ground),-integer) - one

---

array\_to\_terms/2

Converts an array (a Java reference) to a list of ground Prolog terms. The array elements must be atoms, integers, floats, or ground compound terms. Fails otherwise.

Compilation flags:

static

Template:

array\_to\_terms(Array,Terms)

Mode and number of proofs:

array\_to\_terms(+array,-list(term)) - one

---

`array_to_list/2`

Converts an array (a Java reference) to a list of Java references or their values.

Compilation flags:

`static`

Template:

`array_to_list(Array,List)`

Mode and number of proofs:

`array_to_list(+array,-list) - one`

---

`list_to_array/2`

Converts a list of Java references or values to an array (a Java reference).

Compilation flags:

`static`

Template:

`list_to_array(List,Array)`

Mode and number of proofs:

`list_to_array(+list,-array) - one`

---

`array_list/2`

Converts between an array (a Java reference) and a list of Java references or their values. Deprecated. Use the `array_to_list/2` and `list_to_array/2` predicates instead.

Compilation flags:

`static`

Template:

`array_list(Array,List)`

---

Mode and number of proofs:

`array_list(+array,-list)` - one

`array_list(-array,+list)` - one

---

`iterator_element/2`

Enumerates, by backtracking, all iterator elements.

Compilation flags:

`static`

Template:

`iterator_element(Iterator,Element)`

Mode and number of proofs:

`iterator_element(+iterator,-element)` - zero\_or\_more

---

`map_element/2`

Enumerates, by backtracking, all map elements.

Compilation flags:

`static`

Template:

`map_element(Map,Element)`

Mode and number of proofs:

`map_element(+iterator,-element)` - zero\_or\_more

---

set\_element/2

Enumerates, by backtracking, all set elements.

Compilation flags:

static

Template:

set\_element(Set,Element)

Mode and number of proofs:

set\_element(+iterator,-element) - zero\_or\_more

---

decode\_exception/2

Decodes an exception into its corresponding cause. Fails if the exception is not a Java exception.

Compilation flags:

static

Template:

decode\_exception(Exception,Cause)

Mode and number of proofs:

decode\_exception(+callable,-atom) - zero\_or\_one

---

decode\_exception/3

Decodes an exception into its corresponding cause and a stack trace. Fails if the exception is not a Java exception.

Compilation flags:

static

Template:

decode\_exception(Exception,Cause,StackTrace)

Mode and number of proofs:

decode\_exception(+callable,-atom,-list(atom)) - zero\_or\_one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.41 json

object

### 1.41.1 json

JSON parser and generator. Uses curly terms for parsed JSON objects, dashes for parsed JSON pairs, and atoms for parsed JSON strings.

Availability:

```
logtalk_load(json(loader))
```

Author: Paulo Moura and Jacinto Dávila

Version: 1:1:0

Date: 2022-11-14

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public json(curly,dash,atom)
```

Remarks:

(none)

Inherited public predicates:

```
generate/2 parse/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

#### 1.41.2 json(StringRepresentation)

- StringRepresentation - Text representation to be used when decoding JSON strings. Possible values are atom (default), chars, and codes.

JSON parser and generator. Uses curly terms for parsed JSON objects and dashes for parsed JSON pairs.

Availability:

```
logtalk_load(json(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2022-11-14

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public json(curly,dash,StringRepresentation)
```

Remarks:

(none)

Inherited public predicates:

generate/2 parse/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.41.3 json(ObjectRepresentation,PairRepresentation,StringRepresentation)

- ObjectRepresentation - Object representation to be used when decoding JSON objects. Possible values are curly (default) and list.
- PairRepresentation - Pair representation to be used when decoding JSON objects. Possible values are dash (default), equal, and colon.
- StringRepresentation - Text representation to be used when decoding JSON strings. Possible values are atom (default), chars, and codes.

JSON parser and generator.

Availability:

logtalk\_load(json(loader))

Author: Paulo Moura and Jacinto Dávila  
Version: 0:13:0  
Date: 2024-07-16

Compilation flags:  
static, context\_switching\_calls

Implements:  
public json\_protocol

Uses:  
reader

Remarks:  
(none)

Inherited public predicates:  
generate/2 parse/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

protocol

### 1.41.4 json\_protocol

JSON parser and generator protocol.

Availability:

logtalk\_load(json(loader))

Author: Paulo Moura and Jacinto Dávila

Version: 0:11:0

Date: 2022-11-09

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - parse/2
  - generate/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

parse/2

Parses the JSON contents read from the given source (codes(List), stream(Stream), line(Stream), file(Path), chars(List), or atom(Atom)) into a term. Fails if the JSON contents cannot be parsed.

Compilation flags:

static

Template:

parse(Source,Term)

Mode and number of proofs:

parse(++compound,--term) - one\_or\_error

---

generate/2

Generates the content using the representation specified in the first argument (codes(List), stream(Stream), file(Path), chars(List), or atom(Atom)) for the term in the second argument. Fails if this term cannot be processed.

Compilation flags:

static

Template:

generate(Sink,Term)

Mode and number of proofs:

generate(+compound,++term) - one\_or\_error

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

## 1.42 lgtdoc

object

### 1.42.1 lgtdoc

Documenting tool. Generates XML documenting files for loaded entities and for library, directory, entity, and predicate indexes.

Availability:

```
logtalk_load(lgtdoc(loader))
```

Author: Paulo Moura

Version: 11:1:1

Date: 2024-10-01

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public lgtdocp
```

Imports:

```
public options
```

Uses:

```
date
```

```
list
```

```
logtalk
```

```
os
```

```
type
```

```
user
```

```
varlist
```

Remarks:

(none)

Inherited public predicates:

all/0 all/1 check\_option/1 check\_options/1 default\_option/1 default\_options/1 directories/1  
 directories/2 directory/1 directory/2 file/1 file/2 files/1 files/2 fix\_option/2 fix\_options/2  
 libraries/1 libraries/2 library/1 library/2 merge\_options/2 option/2 option/3 rdirectories/1  
 rdirectories/2 rdirectory/1 rdirectory/2 rlibraries/1 rlibraries/2 rlibrary/1 rlibrary/2  
 valid\_option/1 valid\_options/1

- Public predicates
- Protected predicates
- Private predicates
  - library\_entity\_/4
  - directory\_entity\_/4
  - type\_entity\_/4
  - predicate\_entity\_/4
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

library\_entity\_/4

Table of documented entities per library.

Compilation flags:

dynamic

Template:

library\_entity\_(Library,PrimarySortKey,SecondarySortKey,Entity)

Mode and number of proofs:

library\_entity\_(?atom,?nonvar,?nonvar,?atom) - zero\_or\_more

directory\_entity\_/4

Table of documented entities per directory.

Compilation flags:

dynamic

Template:

directory\_entity\_\_(Directory,PrimarySortKey,SecondarySortKey,Entity)

Mode and number of proofs:

directory\_entity\_\_(?atom,?nonvar,?nonvar,?atom) - zero\_or\_more

---

type\_entity\_/4

Table of documented entities per type.

Compilation flags:

dynamic

Template:

type\_entity\_\_(Type,PrimarySortKey,SecondarySortKey,Entity)

Mode and number of proofs:

type\_entity\_\_(?atom,?nonvar,?nonvar,?atom) - zero\_or\_more

---

predicate\_entity\_/4

Table of public predicates for all documented entities.

Compilation flags:

dynamic

Template:

predicate\_entity\_\_(Predicate,PrimarySortKey,SecondarySortKey,Entity)

Mode and number of proofs:

predicate\_entity\_\_(?predicate\_indicator,?nonvar,?nonvar,?entity\_identifier) - zero\_or\_more

---

## Operators

(none)

category

### 1.42.2 lgtdoc\_messages

Logtalk documentation tool default message translations.

Availability:

```
logtalk_load(lgtdoc(loader))
```

Author: Paulo Moura

Version: 4:0:0

Date: 2024-05-07

Compilation flags:

```
static
```

Provides:

```
logtalk::message_prefix_stream/4
```

```
logtalk::message_tokens//2
```

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.42.3 lgtdocp

Documenting tool protocol.

Availability:

`logtalk_load(lgtdoc(loader))`

Author: Paulo Moura

Version: 6:0:0

Date: 2024-03-08

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

- Compiling files for generating XML documentation: All source files must be compiled with the `source_data` flag turned on.
- `xml_spec(Specification)` option: XML documenting files specification format. Possible option values are `dtd` (DTD specification; default) and `xsd` (XML Schema specification).
- `xml_spec_reference(Reference)` option: Reference to the XML specification file in XML documenting files. Possible values are `local` (default; DTD/XSD file in same folder as XML files), `web` (logtalk.org website DTD/XSD file), and `standalone` (no reference to specification files).

- `entity_xsl_file`(File) option: XSLT file to use with generated XML documenting files. Default is `logtalk_entity_to_xml.xsl`, allowing the XML files to be viewed by opening them with a browser supporting XSLT (after running the `lgt2xml.sh` script on the output directory).
- `index_xsl_file`(File) option: XSLT file to use with generated XML documenting files. Default is `logtalk_index_to_xml.xsl`, allowing the XML files to be viewed by opening them with a browser supporting XSLT (after running the `lgt2xml.sh` script on the output directory).
- `xml_docs_directory`(Directory) option: Directory where the XML documenting files will be generated. The default value is `./xml_docs`, a sub-directory of the source files directory.
- `bom`(Boolean) option: Defines if a BOM should be added to the generated XML documenting files.
- `encoding`(Encoding) option: Encoding to be used for the generated XML documenting files.
- `omit_path_prefixes`(Prefixes) option: List of path prefixes (atoms) to omit when writing directory paths. The default value is to omit the home directory.
- `exclude_files`(List) option: List of files to exclude when generating the XML documenting files.
- `exclude_paths`(List) option: List of relative library paths to exclude when generating the XML documenting files (default is []). All sub-directories of the excluded directories are also excluded.
- `exclude_prefixes`(List) option: List of path prefixes to exclude when generating the XML documenting files (default is []).
- `exclude_entities`(List) option: List of entities to exclude when generating the XML documenting files (default is []).
- `sort_predicates`(Boolean) option: Sort entity predicates (default is false).
- Known issues: Some options may depend on the used XSL processor. Most XSL processors support DTDs but only some of them support XML Schemas. Some processors (e.g. `fop2`) reject reference to a DTD.

Inherited public predicates:

(none)

- Public predicates
  - `rlibraries/2`
  - `rlibraries/1`
  - `rlibrary/2`
  - `rlibrary/1`
  - `libraries/2`
  - `libraries/1`
  - `library/2`
  - `library/1`
  - `rdirectories/2`
  - `rdirectories/1`
  - `rdirectory/2`

- rdirectory/1
- directories/2
- directories/1
- directory/2
- directory/1
- files/2
- files/1
- file/2
- file/1
- all/1
- all/0
- Protected predicates
- Private predicates
- Operators

## Public predicates

rlibraries/2

Creates XML documenting files for all entities in all given libraries and their sub-libraries using the specified options.

Compilation flags:

static

Template:

rlibraries(Libraries,Options)

Mode and number of proofs:

rlibraries(+list(atom),+list) - one

### rlibraries/1

Creates XML documenting files for all entities in all given libraries and their sub-libraries using default options.

Compilation flags:

static

Template:

rlibraries(Libraries)

Mode and number of proofs:

rlibraries(+list(atom)) - one

---

### rlibrary/2

Creates XML documenting files for all entities in a library and its sub-libraries using the specified options.

Compilation flags:

static

Template:

rlibrary(Library,Options)

Mode and number of proofs:

rlibrary(+atom,+list) - one

Examples:

Generate XML documenting files for all tool entities for later conversion to Markdown files

```
rlibrary(tools,[xslfile('lgtmd.xml')])
```

```
yes
```

---

rlibrary/1

Creates XML documenting files for all entities in a library and its sub-libraries using default options.

Compilation flags:

static

Template:

rlibrary(Library)

Mode and number of proofs:

rlibrary(+atom) - one

Examples:

Generate XML documenting files for all tool entities for direct viewing in a browser (after indexing using the lgt2xml script)

rlibrary(tools)

yes

---

libraries/2

Creates XML documenting files for all entities in all given libraries using the specified options.

Compilation flags:

static

Template:

libraries(Libraries,Options)

Mode and number of proofs:

libraries(+list(atom),+list) - one

---

libraries/1

Creates XML documenting files for all entities in all given libraries using default options.

Compilation flags:

static

Template:

libraries(Libraries)

Mode and number of proofs:

libraries(+list(atom)) - one

---

library/2

Creates XML documenting files for all entities in a library using the specified options.

Compilation flags:

static

Template:

library(Library,Options)

Mode and number of proofs:

library(+atom,+list) - one

Examples:

Generate XML documenting files for all library entities for later conversion to PDF A4 files

```
library(library,[xslfile('logtalk_entity_to_pdf_a4.xsl')])
```

```
yes
```

---

library/1

Creates XML documenting files for all entities in a library using default options.

Compilation flags:

static

Template:

library(Library)

Mode and number of proofs:

library(+atom) - one

---

rdirectories/2

Creates XML documenting files for all entities in all given directories and their sub-directories using the specified options.

Compilation flags:

static

Template:

rdirectories(Directories,Options)

Mode and number of proofs:

rdirectories(+list(atom),+list) - one

---

rdirectories/1

Creates XML documenting files for all entities in all given directories and their sub-directories using default options.

Compilation flags:

static

Template:

rdirectories(Directories)

Mode and number of proofs:

rdirectories(+list(atom)) - one

---

### rdirectory/2

Creates XML documenting files for all entities in a directory and its sub-directories using the specified options.

Compilation flags:

static

Template:

rdirectory(Directory,Options)

Mode and number of proofs:

rdirectory(+atom,+list) - one

Examples:

Generate XML documenting files for all entities in the tools directory for later conversion to Markdown files

```
rdirectory('./tools',[xslfile('lgtmd.xml')])
```

```
yes
```

---

### rdirectory/1

Creates XML documenting files for all entities in a directory and its sub-directories using default options.

Compilation flags:

static

Template:

rdirectory(Directory)

Mode and number of proofs:

rdirectory(+atom) - one

Examples:

Generate XML documenting files for all entities in the tools directory for direct viewing in a browser (after indexing using the lgt2xml script)

```
rdirectory('./tools')
```

```
yes
```

---

directories/2

Creates XML documenting files for all entities in all given directories using the specified options.

Compilation flags:

static

Template:

directories(Directories,Options)

Mode and number of proofs:

directories(+list(atom),+list) - one

---

directories/1

Creates XML documenting files for all entities in all given directories using default options.

Compilation flags:

static

Template:

directories(Directories)

Mode and number of proofs:

directories(+list(atom)) - one

---

directory/2

Creates XML documenting files for all entities in a directory using the specified options.

Compilation flags:

static

Template:

directory(Directory,Options)

Mode and number of proofs:

directory(+atom,+list) - one

---

## Examples:

Generate XML documenting files for all the entities in the current directory for later conversion to PDF A4 files

```
directory('.',[xslfile('logtalk_entity_to_pdf_a4.xsl')])
yes
```

---

## directory/1

Creates XML documenting files for all entities in a directory using default options.

## Compilation flags:

static

## Template:

directory(Directory)

## Mode and number of proofs:

directory(+atom) - one

---

## files/2

Creates XML documenting files for all entities in loaded source files using the specified options. The files can be given by name, basename, full path, or using library notation.

## Compilation flags:

static

## Template:

files(Files,Options)

## Mode and number of proofs:

files(+list(atom),+list) - one

---

files/1

Creates XML documenting files for all entities in loaded source files using default options. The files can be given by name, basename, full path, or using library notation.

Compilation flags:

static

Template:

files(Files)

Mode and number of proofs:

files(+list(atom)) - one

---

file/2

Creates XML documenting files for all entities in a loaded source file using the specified options. The file can be given by name, basename, full path, or using library notation.

Compilation flags:

static

Template:

file(File,Options)

Mode and number of proofs:

file(+atom,+list) - one

---

file/1

Creates XML documenting files for all entities in a loaded source file using default options. The file can be given by name, basename, full path, or using library notation.

Compilation flags:

static

Template:

file(File)

Mode and number of proofs:

file(+atom) - one

---

all/1

Creates XML documenting files for all loaded entities using the specified options.

Compilation flags:

static

Template:

all(Options)

Mode and number of proofs:

all(+list) - one

---

all/0

Creates XML documenting files for all loaded entities using default options.

Compilation flags:

static

Mode and number of proofs:

all - one

---

### **Protected predicates**

(none)

## Private predicates

(none)

## Operators

(none)

See also:

lgtdoc

## 1.43 lgtunit

object

### 1.43.1 automation\_report

Intercepts unit test execution messages and generates a \*.totals files for parsing by the logtalk\_tester.sh automation shell script.

Availability:

logtalk\_load(lgtunit(loader))

Author: Paulo Moura

Version: 5:0:0

Date: 2024-02-20

Compilation flags:

static, context\_switching\_calls

Provides:

logtalk::message\_hook/4

Uses:

user

Remarks:

- Usage: Automatically loaded by the logtalk\_tester.sh shell script.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.43.2 coverage\_report

Intercepts unit test execution messages and generates a `coverage_report.xml` file with a test suite code coverage results.

Availability:

```
logtalk_load(lgtunit(loader))
```

Author: Paulo Moura

Version: 3:2:0

Date: 2023-04-11

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
logtalk::message_hook/4
```

Uses:

```
logtalk
```

user

Remarks:

- Usage: Simply load this object before running your tests using the goal `logtalk_load(lgtunit(coverage_report))`.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
  - `timestamp_/6`
  - `object_file_/2`
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

`timestamp_/6`

Cache of the starting tests timestamp.

Compilation flags:

dynamic

Template:

`timestamp_(Year,Month,Day,Hours,Minutes,Seconds)`

Mode and number of proofs:

`timestamp_(-integer,-integer,-integer,-integer,-integer,-integer) - one`

object\_file\_/2

Cache of test object - file pairs.

Compilation flags:

dynamic

Template:

object\_file\_\_(Object,File)

Mode and number of proofs:

object\_file\_\_(?object\_identifier,?atom) - zero\_or\_more

---

## Operators

(none)

object

### 1.43.3 lgtunit

A unit test framework supporting predicate clause coverage, determinism testing, input/output testing, property-based testing, and multiple test dialects.

Availability:

logtalk\_load(lgtunit(loader))

Author: Paulo Moura

Version: 19:2:0

Date: 2024-10-16

Compilation flags:

static, context\_switching\_calls

Implements:

public expanding

Provides:

logtalk::trace\_event/2

Uses:

fast\_random

list

logtalk

os  
type  
user

Remarks:

- Usage: Define test objects as extensions of the lgtunit object and compile their source files using the compiler option hook(lgtunit).
- Portability: Deterministic unit tests are currently not available when using Quintus Prolog as the backend compiler.
- Known issues: Parameter variables cannot currently be used in the definition of test options.

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
  - cover/1
  - run/0
  - run/1
  - run/2
  - run\_test\_sets/1
  - test/1
  - number\_of\_tests/1
  - deterministic/1
  - deterministic/2
  - assertion/1
  - assertion/2
  - quick\_check/3
  - quick\_check/2
  - quick\_check/1
  - benchmark/2
  - benchmark\_reified/3
  - benchmark/3
  - benchmark/4
  - variant/2
  - approximately\_equal/2
  - approximately\_equal/3

- essentially\_equal/3
- tolerance\_equal/4
- ==~ / 2
- epsilon/1
- Protected predicates
  - run\_tests/0
  - run\_tests/1
  - run\_test\_set/0
  - run\_quick\_check\_tests/5
  - condition/0
  - setup/0
  - cleanup/0
  - make/1
  - note/1
  - file\_path/2
  - suppress\_text\_output/0
  - suppress\_binary\_output/0
  - set\_text\_input/3
  - set\_text\_input/2
  - set\_text\_input/1
  - check\_text\_input/2
  - check\_text\_input/1
  - text\_input\_assertion/3
  - text\_input\_assertion/2
  - clean\_text\_input/0
  - set\_binary\_input/3
  - set\_binary\_input/2
  - set\_binary\_input/1
  - check\_binary\_input/2
  - check\_binary\_input/1
  - binary\_input\_assertion/3
  - binary\_input\_assertion/2
  - clean\_binary\_input/0
  - set\_text\_output/3
  - set\_text\_output/2

- set\_text\_output/1
- check\_text\_output/3
- check\_text\_output/2
- check\_text\_output/1
- text\_output\_assertion/4
- text\_output\_assertion/3
- text\_output\_assertion/2
- text\_output\_contents/3
- text\_output\_contents/2
- text\_output\_contents/1
- clean\_text\_output/0
- set\_binary\_output/3
- set\_binary\_output/2
- set\_binary\_output/1
- check\_binary\_output/2
- check\_binary\_output/1
- binary\_output\_assertion/3
- binary\_output\_assertion/2
- binary\_output\_contents/2
- binary\_output\_contents/1
- clean\_binary\_output/0
- create\_text\_file/3
- create\_text\_file/2
- create\_binary\_file/2
- check\_text\_file/3
- check\_text\_file/2
- text\_file\_assertion/4
- text\_file\_assertion/3
- check\_binary\_file/2
- binary\_file\_assertion/3
- clean\_file/1
- clean\_directory/1
- closed\_input\_stream/2
- closed\_output\_stream/2
- stream\_position/1

- test/2
- Private predicates
  - running\_test\_sets\_/0
  - test/3
  - auxiliary\_predicate\_counter\_/1
  - test\_/2
  - selected\_test\_/1
  - skipped\_/1
  - passed\_/3
  - failed\_/3
  - flaky\_/1
  - fired\_/3
  - covered\_/4
- Operators
  - op(700,xfx,==)

### Public predicates

cover/1

Declares entities being tested for which code coverage information should be collected.

Compilation flags:

static

Template:

cover(Entity)

Mode and number of proofs:

cover(?entity\_identifier) - zero\_or\_more

run/0

Runs the unit tests, writing the results to the current output stream.

Compilation flags:

static

Mode and number of proofs:

run - one

---

run/1

Runs a unit test or a list of unit tests, writing the results to the current output stream. Runs the global setup and cleanup steps when defined. Fails when given a partial list of tests or when one of the test identifiers is not valid.

Compilation flags:

static

Template:

run(Tests)

Mode and number of proofs:

run(++callable) - zero\_or\_one

run(++list(callable)) - zero\_or\_one

---

run/2

Runs the unit tests, writing the results to the specified file. Mode can be either write (to create a new file) or append (to add results to an existing file).

Compilation flags:

static

Template:

run(File,Mode)

Mode and number of proofs:

run(+atom,+atom) - one

---

`run_test_sets/1`

Runs two or more test sets as a unified set generating a single code coverage report if one is requested. When there is a single test set, it is equivalent to sending the message `run/0` to the test set. Trivially succeeds when the argument is an empty list.

Compilation flags:

`static`

Template:

`run_test_sets(TestObjects)`

Mode and number of proofs:

`run_test_sets(+list(object)) - one`

Exceptions:

TestObjects is a partial list or a list with an element which is a variable:

`instantiation_error`

TestObjects is neither a partial list nor a list:

`type_error(list(object),TestObjects)`

An element TestObject of the TestObjects list is not an existing object:

`existence_error(object,TestObject)`

---

`test/1`

Enumerates, by backtracking, the identifiers of all defined unit tests.

Compilation flags:

`static`

Template:

`test(Identifier)`

Mode and number of proofs:

`test(?callable) - zero_or_more`

---

number\_of\_tests/1

Number of defined unit tests.

Compilation flags:

static

Template:

number\_of\_tests(NumerOfTests)

Mode and number of proofs:

number\_of\_tests(?integer) - zero\_or\_one

---

deterministic/1

True if the goal succeeds once without leaving choice-points.

Compilation flags:

static

Template:

deterministic(Goal)

Meta-predicate template:

deterministic(0)

Mode and number of proofs:

deterministic(+callable) - zero\_or\_one

---

deterministic/2

Reified version of the deterministic/1 predicate. True if the goal succeeds. Returns a boolean value (true or false) indicating if the goal succeeded without leaving choice-points.

Compilation flags:

static

Template:

deterministic(Goal,Deterministic)

Meta-predicate template:

---

---

deterministic(0,\*)

Mode and number of proofs:

deterministic(+callable,--atom) - zero\_or\_one

---

assertion/1

True if the assertion goal succeeds. Throws an error using the assertion goal as argument if the assertion goal throws an error or fails.

Compilation flags:

static

Template:

assertion(Assertion)

Meta-predicate template:

assertion(::)

Mode and number of proofs:

assertion(@callable) - one

Exceptions:

Assertion goal fails:

assertion\_failure(Assertion)

Assertion goal throws Error:

assertion\_error(Assertion,Error)

---

assertion/2

True if the assertion goal succeeds. Throws an error using the description as argument if the assertion goal throws an error or fails. The description argument helps to distinguish between different assertions in the same test body.

Compilation flags:

static

Template:

assertion(Description,Assertion)

Meta-predicate template:

assertion(\*,0)

---

Mode and number of proofs:

assertion(+nonvar,@callable) - one

Exceptions:

Assertion goal fails:

assertion\_failure(Description)

Assertion goal throws Error:

assertion\_error(Description,Error)

---

quick\_check/3

Reified version of the quick\_check/2 predicate. Reports passed(SequenceSeed,Discarded,Labels), failed(Goal,SequenceSeed,TestSeed), error(Error,Goal,SequenceSeed,TestSeed), or broken(Why,Culprit). Goal is the failed test.

Compilation flags:

static

Template:

quick\_check(Template,Result,Options)

Meta-predicate template:

quick\_check(:,\*,::)

Mode and number of proofs:

quick\_check(@callable,-callable,++list(compound)) - one

Remarks:

- SequenceSeed argument: Can be used to re-run the same exact sequence of pseudo-random tests by using the rs/1 option after changes to the code being tested.
  - TestSeed argument: Can be used to re-run the test that failed by using the rs/1 option after changes to the code being tested.
  - Discarded argument: Number of generated tests that were discarded for failing to comply a pre-condition specified using the pc/1 option.
  - Labels argument: List of pairs Label-N where N is the number of generated tests that are classified as Label by a closure specified using the l/1 option.
  - broken(Why,Culprit) result: This result signals a broken setup. For example, an invalid template, a broken pre-condition or label goal, or broken test generation.
-

`quick_check/2`

Generates and runs random tests for a predicate given its mode template and a set of options. Fails when a generated test fails printing the test. Also fails on an invalid option, printing the option.

Compilation flags:

`static`

Template:

`quick_check(Template,Options)`

Meta-predicate template:

`quick_check(:,::,::)`

Mode and number of proofs:

`quick_check(@callable,++list(compound)) - zero_or_one`

Remarks:

- Number of tests: Use the `n(NumberOfTests)` option to specify the number of random tests. Default is 100.
- Maximum number of shrink operations: Use the `s(MaxShrinks)` option to specify the number of shrink operations when a counter example is found. Default is 64.
- Type edge cases: Use the `ec(Boolean)` option to specify if type edge cases are tested (before generating random tests). Default is `true`.
- Starting seed: Use the `rs(Seed)` option to specify the random generator starting seed to be used when generating tests. No default. Seeds should be regarded as opaque terms.
- Test generation filtering: Use the `pc/1` option to specify a pre-condition closure for filtering generated tests (extended with the test arguments; no default).
- Generated tests classification: Use the `l/1` option to specify a label closure for classifying the generated tests (extended with the test arguments plus the labels argument; no default). The labelling predicate can return a single test label or a list of test labels.
- Verbose test generation: Use the `v(Boolean)` option to specify verbose reporting of generated random tests. Default is `false`.
- Progress bar: Use the `pb(Boolean,Tick)` option to print a progress bar for the executed tests, advancing at every `Tick` tests. Default is `false`. Only applies when the verbose option is `false`.

quick\_check/1

Generates and runs random tests using default options for a predicate given its mode template. Fails when a generated test fails printing the test.

Compilation flags:

static

Template:

quick\_check(Template)

Mode and number of proofs:

quick\_check(@callable) - zero\_or\_one

---

benchmark/2

Benchmarks a goal and returns the total execution time in seconds. Uses CPU clock. Goals that may throw an exception should be wrapped by the catch/3 control construct.

Compilation flags:

static

Template:

benchmark(Goal,Time)

Meta-predicate template:

benchmark(0,\*)

Mode and number of proofs:

benchmark(+callable,-float) - one

---

benchmark\_reified/3

Benchmarks a goal and returns the total execution time in seconds plus its result (success, failure, or error(Error)). Uses CPU clock.

Compilation flags:

static

Template:

---

```
benchmark_reified(Goal,Time,Result)
```

Meta-predicate template:

```
benchmark_reified(0,*,*)
```

Mode and number of proofs:

```
benchmark_reified(+callable,-float,-callable) - one
```

---

benchmark/3

Benchmarks a goal by repeating it the specified number of times and returning the total execution time in seconds. Uses CPU clock. Goals that may throw an exception should be wrapped by the catch/3 control construct.

Compilation flags:

```
static
```

Template:

```
benchmark(Goal,Repetitions,Time)
```

Meta-predicate template:

```
benchmark(0,*,*)
```

Mode and number of proofs:

```
benchmark(@callable,+positive_integer,-float) - one
```

---

benchmark/4

Benchmarks a goal by repeating it the specified number of times and returning the total execution time in seconds using the given clock (cpu or wall). Goals that may throw an exception should be wrapped by the catch/3 control construct.

Compilation flags:

```
static
```

Template:

```
benchmark(Goal,Repetitions,Clock,Time)
```

Meta-predicate template:

```
benchmark(0,*,*,*)
```

Mode and number of proofs:

```
benchmark(@callable,+positive_integer,+atom,-float) - one
```

---

variant/2

True when the two arguments are a variant of each other. I.e. if is possible to rename the term variables to make them identical. Useful for checking expected test results that contain variables.

Compilation flags:

static

Template:

variant(Term1,Term2)

Mode and number of proofs:

variant(@term,@term) - zero\_or\_one

---

approximately\_equal/2

Compares two numbers for approximate equality given the epsilon arithmetic constant value using the de facto standard formula  $\text{abs}(\text{Number1} - \text{Number2}) = < \max(\text{abs}(\text{Number1}), \text{abs}(\text{Number2})) * \text{epsilon}$ . Type-checked.

Compilation flags:

static

Template:

approximately\_equal(Number1,Number2)

Mode and number of proofs:

approximately\_equal(+number,+number) - zero\_or\_one

---

approximately\_equal/3

Compares two numbers for approximate equality given a user-defined epsilon value using the de facto standard formula  $\text{abs}(\text{Number1} - \text{Number2}) = < \max(\text{abs}(\text{Number1}), \text{abs}(\text{Number2})) * \text{Epsilon}$ . Type-checked.

Compilation flags:

static

Template:

approximately\_equal(Number1,Number2,Epsilon)

---

Mode and number of proofs:

approximately\_equal(+number,+number,+number) - zero\_or\_one

Remarks:

- Epsilon range: Epsilon should be the epsilon arithmetic constant value or a small multiple of it. Only use a larger value if a greater error is expected.
- Comparison with essential equality: For the same epsilon value, approximate equality is weaker requirement than essential equality.

---

essentially\_equal/3

Compares two numbers for essential equality given an epsilon value using the de facto standard formula  $\text{abs}(\text{Number1} - \text{Number2}) \leq \min(\text{abs}(\text{Number1}), \text{abs}(\text{Number2})) * \text{Epsilon}$ . Type-checked.

Compilation flags:

static

Template:

essentially\_equal(Number1,Number2,Epsilon)

Mode and number of proofs:

essentially\_equal(+number,+number,+number) - zero\_or\_one

Remarks:

- Comparison with approximate equality: For the same epsilon value, essential equality is a stronger requirement than approximate equality.

---

tolerance\_equal/4

Compares two numbers for close equality given relative and absolute tolerances using the de facto standard formula  $\text{abs}(\text{Number1} - \text{Number2}) \leq \max(\text{RelativeTolerance} * \max(\text{abs}(\text{Number1}), \text{abs}(\text{Number2})), \text{AbsoluteTolerance})$ . Type-checked.

Compilation flags:

static

Template:

tolerance\_equal(Number1,Number2,RelativeTolerance,AbsoluteTolerance)

Mode and number of proofs:

tolerance\_equal(+number,+number,+number,+number) - zero\_or\_one

---

`=~= / 2`

Compares two numbers (or lists of numbers) for approximate equality using  $100 \times \text{epsilon}$  for the absolute error and, if that fails, 99.999% accuracy for the relative error. But these precision values may not be adequate for all cases. Type-checked.

Compilation flags:

static

Template:

`=~=(Number1,Number2)`

Mode and number of proofs:

`=~=(+number,+number) - zero_or_one`

`=~=(+list(number),+list(number)) - zero_or_one`

---

`epsilon/1`

Returns the value of epsilon used in the definition of the `(=~=)/2` predicate.

Compilation flags:

static

Template:

`epsilon(Epsilon)`

Mode and number of proofs:

`epsilon(-float) - one`

---

**Protected predicates**

run\_tests/0

Runs all defined unit tests.

Compilation flags:

static

Mode and number of proofs:

run\_tests - one

---

run\_tests/1

Runs all the tests defined in the given file.

Compilation flags:

static

Template:

run\_tests(File)

Mode and number of proofs:

run\_tests(+atom) - one

---

run\_test\_set/0

Runs a test set as part of running two or more test sets as a unified set.

Compilation flags:

static

Mode and number of proofs:

run\_test\_set - one

---

`run_quick_check_tests/5`

Runs a QuickCheck test using the given options. Returns the starting seed used to generate the random tests, the number of discarded tests, and the test label statistics.

Compilation flags:

`static`

Template:

`run_quick_check_tests(Template,Options,Seed,Discarded,Labels)`

Meta-predicate template:

`run_quick_check_tests(:,::,*,*,*)`

Mode and number of proofs:

`run_quick_check_tests(@callable,+list,--nonvar,--number,--list(pair)) - one_or_error`

---

`condition/0`

Verifies conditions for running the tests. Defaults to the goal true.

Compilation flags:

`static`

Mode and number of proofs:

`condition - zero_or_one`

---

`setup/0`

Setup environment before running the test set. Defaults to the goal true.

Compilation flags:

`static`

Mode and number of proofs:

`setup - zero_or_one`

---

cleanup/0

Cleanup environment after running the test set. Defaults to the goal true.

Compilation flags:

static

Mode and number of proofs:

cleanup - zero\_or\_one

---

make/1

Make target for automatically running the test set when calling the logtalk\_make/1 built-in predicate. No default. Possible values are all and check.

Compilation flags:

static

Template:

make(Target)

Mode and number of proofs:

make(?atom) - zero\_or\_one

---

note/1

Note to be printed after the test results. Defaults to the empty atom.

Compilation flags:

static

Template:

note(Note)

Mode and number of proofs:

note(?atom) - zero\_or\_one

---

`file_path/2`

Returns the absolute path for a file path that is relative to the tests object path. When the file path is already an absolute path, it is expanded to resolve any remaining relative file path parts.

Compilation flags:

`static`

Template:

`file_path(File,Path)`

Mode and number of proofs:

`file_path(+atom,-atom) - one`

See also:

`clean_file/1`

`clean_directory/1`

---

`suppress_text_output/0`

Suppresses text output. Useful to avoid irrelevant text output from predicates being tested to clutter the test logs.

Compilation flags:

`static`

Mode and number of proofs:

`suppress_text_output - one`

---

`suppress_binary_output/0`

Suppresses binary output. Useful to avoid irrelevant binary output from predicates being tested to clutter the test logs.

Compilation flags:

`static`

Mode and number of proofs:

`suppress_binary_output` - one

---

`set_text_input/3`

Creates a temporary file, in the same directory as the tests object, with the given text contents, and opens it for reading referenced by the given alias and using the additional options. If no `eof_action/1` option is specified, its value will be the default used by the backend compiler.

Compilation flags:

`static`

Template:

`set_text_input(Alias,Contents,Options)`

Mode and number of proofs:

`set_text_input(+atom,+atom,+list(stream_option))` - one

`set_text_input(+atom,+list(atom),+list(stream_option))` - one

See also:

`text_input_assertion/3`

`check_text_input/2`

`clean_text_input/0`

---

`set_text_input/2`

Creates a temporary file, in the same directory as the tests object, with the given text contents, and opens it for reading referenced by the given alias and using the default end-of-file action for the used backend compiler.

Compilation flags:

`static`

Template:

`set_text_input(Alias,Contents)`

Mode and number of proofs:

`set_text_input(+atom,+atom)` - one

`set_text_input(+atom,+list(atom))` - one

See also:

text\_input\_assertion/3  
check\_text\_input/2  
clean\_text\_input/0

---

set\_text\_input/1

Creates a temporary file, in the same directory as the tests object, with the given text contents, opens it for reading using the default end-of-file action for the used backend compiler, and sets the current input stream to the file.

Compilation flags:

static

Template:

set\_text\_input(Contents)

Mode and number of proofs:

set\_text\_input(+atom) - one

set\_text\_input(+list(atom)) - one

See also:

text\_input\_assertion/2  
check\_text\_input/1  
clean\_text\_input/0

---

check\_text\_input/2

Checks that the temporary file (referenced by the given alias) being read have the expected text contents.

Compilation flags:

static

Template:

check\_text\_input(Alias,Contents)

Mode and number of proofs:

check\_text\_input(+atom,+atom) - zero\_or\_one

See also:

```
set_text_input/2
set_text_input/2
text_input_assertion/3
clean_text_input/0
```

---

check\_text\_input/1

Checks that the temporary file being read have the expected text contents.

Compilation flags:

```
static
```

Template:

```
check_text_input(Contents)
```

Mode and number of proofs:

```
check_text_input(+atom) - zero_or_one
```

See also:

```
set_text_input/1
text_input_assertion/2
clean_text_input/0
```

---

text\_input\_assertion/3

Returns an assertion for checking that the temporary file (referenced by the given alias) being read have the expected text contents.

Compilation flags:

```
static
```

Template:

```
text_input_assertion(Alias,Contents,Assertion)
```

Mode and number of proofs:

```
text_input_assertion(+atom,+atom,--callable) - one
```

See also:

```
set_text_input/3
```

---

`check_text_input/2`  
`clean_text_input/0`

---

`text_input_assertion/2`

Returns an assertion for checking that the temporary file being read have the expected text contents.

Compilation flags:

`static`

Template:

`text_input_assertion(Contents,Assertion)`

Mode and number of proofs:

`text_input_assertion(+atom,--callable) - one`

See also:

`set_text_input/1`  
`check_text_input/1`  
`clean_text_input/0`

---

`clean_text_input/0`

Cleans the temporary file used when testing text input.

Compilation flags:

`static`

Mode and number of proofs:

`clean_text_input - one`

See also:

`set_text_input/3`  
`set_text_input/2`  
`set_text_input/1`

---

`set_binary_input/3`

Creates a temporary file, in the same directory as the tests object, with the given binary contents, and opens it for reading referenced by the given alias and using the additional options. If no `eof_action/1` option is specified, its value will be the default used by the backend compiler.

Compilation flags:

`static`

Template:

`set_binary_input(Alias,Bytes,Options)`

Mode and number of proofs:

`set_binary_input(+atom,+list(byte),+list(stream_option)) - one`

See also:

`binary_input_assertion/3`

`check_binary_input/2`

`clean_binary_input/0`

---

`set_binary_input/2`

Creates a temporary file, in the same directory as the tests object, with the given binary contents, and opens it for reading referenced by the given alias and using the default end-of-file action for the used backend compiler.

Compilation flags:

`static`

Template:

`set_binary_input(Alias,Bytes)`

Mode and number of proofs:

`set_binary_input(+atom,+list(byte)) - one`

See also:

`binary_input_assertion/3`

`check_binary_input/2`

`clean_binary_input/0`

---

`set_binary_input/1`

Creates a temporary file, in the same directory as the tests object, with the given binary contents, and opens it for reading using the default end-of-file action for the used backend compiler, and sets the current input stream to the file.

Compilation flags:

`static`

Template:

`set_binary_input(Bytes)`

Mode and number of proofs:

`set_binary_input(+list(byte)) - one`

See also:

`binary_input_assertion/2`

`check_binary_input/1`

`clean_binary_input/0`

---

`check_binary_input/2`

Checks that the temporary file (referenced by the given alias) being read have the expected binary contents.

Compilation flags:

`static`

Template:

`check_binary_input(Alias,Bytes)`

Mode and number of proofs:

`check_binary_input(+atom,+list(byte)) - zero_or_one`

See also:

`set_binary_input/3`

`set_binary_input/2`

`binary_input_assertion/3`

`clean_binary_input/0`

---

[check\\_binary\\_input/1](#)

Checks that the temporary file being read have the expected binary contents.

Compilation flags:

static

Template:

`check_binary_input(Bytes)`

Mode and number of proofs:

`check_binary_input(+list(byte)) - zero_or_one`

See also:

[binary\\_input\\_assertion/2](#)

[set\\_binary\\_input/1](#)

[clean\\_binary\\_input/0](#)

---

[binary\\_input\\_assertion/3](#)

Returns an assertion for checking that the temporary file (referenced by the given alias) being read have the expected binary contents.

Compilation flags:

static

Template:

`binary_input_assertion(Alias,Bytes,Assertion)`

Mode and number of proofs:

`binary_input_assertion(+atom,+list(byte),--callable) - one`

See also:

[check\\_binary\\_input/2](#)

[set\\_binary\\_input/3](#)

[set\\_binary\\_input/2](#)

[clean\\_binary\\_input/0](#)

---

`binary_input_assertion/2`

Returns an assertion for checking that the temporary file being read have the expected binary contents.

Compilation flags:

`static`

Template:

`binary_input_assertion(Bytes,Assertion)`

Mode and number of proofs:

`binary_input_assertion(+list(byte),--callable) - one`

See also:

`check_binary_input/1`

`set_binary_input/1`

`clean_binary_input/0`

---

`clean_binary_input/0`

Cleans the temporary file used when testing binary input.

Compilation flags:

`static`

Mode and number of proofs:

`clean_binary_input - one`

See also:

`set_binary_input/3`

`set_binary_input/2`

`set_binary_input/1`

---

`set_text_output/3`

Creates a temporary file, in the same directory as the tests object, with the given text contents, and opens it for writing referenced by the given alias and using the additional options.

Compilation flags:

`static`

Template:

`set_text_output(Alias,Contents,Options)`

Mode and number of proofs:

`set_text_output(+atom,+atom,+list(stream_option)) - one`

`set_text_output(+atom,+list(atom),+list(stream_option)) - one`

See also:

`text_output_assertion/4`

`check_text_output/3`

`clean_text_output/0`

---

`set_text_output/2`

Creates a temporary file, in the same directory as the tests object, with the given text contents, and referenced by the given alias.

Compilation flags:

`static`

Template:

`set_text_output(Alias,Contents)`

Mode and number of proofs:

`set_text_output(+atom,+atom) - one`

`set_text_output(+atom,+list(atom)) - one`

See also:

`text_output_assertion/3`

`check_text_output/2`

`clean_text_output/0`

---

`set_text_output/1`

Creates a temporary file, in the same directory as the tests object, with the given text contents, and sets the current output stream to the file.

Compilation flags:

`static`

Template:

`set_text_output(Contents)`

Mode and number of proofs:

`set_text_output(+atom) - one`

`set_text_output(+list(atom)) - one`

See also:

`text_output_assertion/2`

`check_text_output/1`

`clean_text_output/0`

---

`check_text_output/3`

Checks that the temporary file (open with the given options and alias in the same directory as the tests object) being written have the expected text contents.

Compilation flags:

`static`

Template:

`check_text_output(Alias,Contents,Options)`

Mode and number of proofs:

`check_text_output(+atom,+atom,+list(stream_option)) - zero_or_one`

See also:

`set_text_output/3`

`text_output_assertion/4`

`clean_text_output/0`

---

`check_text_output/2`

Checks that the temporary file (open with default options and alias in the same directory as the tests object) being written have the expected text contents.

Compilation flags:

`static`

Template:

`check_text_output(Alias,Contents)`

Mode and number of proofs:

`check_text_output(+atom,+atom) - zero_or_one`

See also:

`set_text_output/2`

`text_output_assertion/3`

`clean_text_output/0`

---

`check_text_output/1`

Checks that the temporary file being written have the expected text contents.

Compilation flags:

`static`

Template:

`check_text_output(Contents)`

Mode and number of proofs:

`check_text_output(+atom) - zero_or_one`

See also:

`set_text_output/1`

`text_output_assertion/2`

`clean_text_output/0`

---

`text_output_assertion/4`

Returns an assertion for checking that the temporary file (open with the given options and alias in the same directory as the tests object) being written have the expected text contents.

Compilation flags:

`static`

Template:

`text_output_assertion(Alias,Contents,Options,Assertion)`

Mode and number of proofs:

`text_output_assertion(+atom,+atom,+list(stream_option),--callable) - one`

See also:

`set_text_output/3`

`check_text_output/3`

`clean_text_output/0`

---

`text_output_assertion/3`

Returns an assertion for checking that the temporary file (open with default options and alias in the same directory as the tests object) being written have the expected text contents.

Compilation flags:

`static`

Template:

`text_output_assertion(Alias,Contents,Assertion)`

Mode and number of proofs:

`text_output_assertion(+atom,+atom,--callable) - one`

See also:

`set_text_output/2`

`check_text_output/2`

`clean_text_output/0`

---

`text_output_assertion/2`

Returns an assertion for checking that the temporary file (open with default options in the same directory as the tests object) being written have the expected text contents.

Compilation flags:

`static`

Template:

`text_output_assertion(Contents,Assertion)`

Mode and number of proofs:

`text_output_assertion(+atom,--callable) - one`

See also:

`set_text_output/1`

`check_text_output/1`

`clean_text_output/0`

---

`text_output_contents/3`

Returns the contents of the temporary file (open with the given options and alias in the same directory as the tests object) being written.

Compilation flags:

`static`

Template:

`text_output_contents(Alias,Contents,Options)`

Mode and number of proofs:

`text_output_contents(+atom,-list(character),+list(stream_option)) - one`

---

`text_output_contents/2`

Returns the contents of the temporary file (open with default options and alias in the same directory as the tests object) being written.

Compilation flags:

`static`

Template:

`text_output_contents(Alias,Contents)`

Mode and number of proofs:

`text_output_contents(+atom,-list(character)) - one`

---

`text_output_contents/1`

Returns the contents of the temporary file (open with default options in the same directory as the tests object) being written.

Compilation flags:

`static`

Template:

`text_output_contents(Contents)`

Mode and number of proofs:

`text_output_contents(-list(character)) - one`

---

`clean_text_output/0`

Cleans the temporary file used when testing text output.

Compilation flags:

`static`

Mode and number of proofs:

`clean_text_output - one`

See also:

set\_text\_output/3  
set\_text\_output/2  
set\_text\_output/1

---

set\_binary\_output/3

Creates a temporary file, in the same directory as the tests object, with the given binary contents, and opens it for writing referenced by the given alias and using the additional options.

Compilation flags:

static

Template:

set\_binary\_output(Alias,Contents,Options)

Mode and number of proofs:

set\_binary\_output(+atom,+list(byte),+list(stream\_option)) - one

See also:

binary\_output\_assertion/3  
check\_binary\_output/2  
clean\_binary\_output/0

---

set\_binary\_output/2

Creates a temporary file, in the same directory as the tests object, with the given binary contents, and opens it for writing referenced with the given alias.

Compilation flags:

static

Template:

set\_binary\_output(Alias,Bytes)

Mode and number of proofs:

set\_binary\_output(+atom,+list(byte)) - one

See also:

binary\_output\_assertion/3

---

`check_binary_output/2`  
`clean_binary_output/0`

---

`set_binary_output/1`

Creates a temporary file, in the same directory as the tests object, with the given binary contents, and sets the current output stream to the file.

Compilation flags:

`static`

Template:

`set_binary_output(Bytes)`

Mode and number of proofs:

`set_binary_output(+list(byte)) - one`

See also:

`binary_output_assertion/2`

`check_binary_output/1`

`clean_binary_output/0`

---

`check_binary_output/2`

Checks that the temporary file (referenced by the given alias) have the expected binary contents.

Compilation flags:

`static`

Template:

`check_binary_output(Alias,Bytes)`

Mode and number of proofs:

`check_binary_output(+atom,+list(byte)) - zero_or_one`

See also:

`set_binary_output/3`

`set_binary_output/2`

`binary_output_assertion/3`

---

`clean_binary_output/0`

---

`check_binary_output/1`

Checks that the temporary file (open in the same directory as the tests object) have the expected binary contents.

Compilation flags:

`static`

Template:

`check_binary_output(Bytes)`

Mode and number of proofs:

`check_binary_output(+list(byte)) - zero_or_one`

See also:

`set_binary_output/1`

`binary_output_assertion/2`

`clean_binary_output/0`

---

`binary_output_assertion/3`

Returns an assertion for checking that the temporary file (referenced by the given alias) have the expected binary contents.

Compilation flags:

`static`

Template:

`binary_output_assertion(Alias,Bytes,Assertion)`

Mode and number of proofs:

`binary_output_assertion(+atom,+list(byte),--callable) - one`

See also:

`set_binary_output/2`

`check_binary_output/2`

`clean_binary_output/0`

---

`binary_output_assertion/2`

Returns an assertion for checking that the temporary file (open in the same directory as the tests object) have the expected binary contents.

Compilation flags:

`static`

Template:

`binary_output_assertion(Bytes,Assertion)`

Mode and number of proofs:

`binary_output_assertion(+list(byte),--callable) - one`

See also:

`set_binary_output/1`

`check_binary_output/1`

`clean_binary_output/0`

---

`binary_output_contents/2`

Returns the binary contents of the temporary file (referenced by the given alias) being written.

Compilation flags:

`static`

Template:

`binary_output_contents(Alias,Bytes)`

Mode and number of proofs:

`binary_output_contents(+atom,-list(byte)) - one`

---

binary\_output\_contents/1

Returns the binary contents of the temporary file being written.

Compilation flags:

static

Template:

binary\_output\_contents(Bytes)

Mode and number of proofs:

binary\_output\_contents(-list(byte)) - one

---

clean\_binary\_output/0

Cleans the temporary file used when testing binary output.

Compilation flags:

static

Mode and number of proofs:

clean\_binary\_output - one

See also:

set\_binary\_output/3

set\_binary\_output/2

set\_binary\_output/1

---

create\_text\_file/3

Creates a text file with the given contents. The file is open for writing using the given options. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`create_text_file(File,Contents,Options)`

Mode and number of proofs:

`create_text_file(+atom,+atom,+list(stream_option))` - one

`create_text_file(+atom,+list(atom),+list(stream_option))` - one

---

`create_text_file/2`

Creates a text file with the given contents. The file is open for writing using default options. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`create_text_file(File,Contents)`

Mode and number of proofs:

`create_text_file(+atom,+atom)` - one

`create_text_file(+atom,+list(atom))` - one

---

`create_binary_file/2`

Creates a binary file with the given contents. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`create_binary_file(File,Bytes)`

Mode and number of proofs:

`create_binary_file(+atom,+list(byte))` - one

---

[check\\_text\\_file/3](#)

Checks that the contents of a text file match the expected contents. The file is open for reading using the given options. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`check_text_file(File,Contents,Options)`

Mode and number of proofs:

`check_text_file(+atom,+atom,+list(stream_option)) - zero_or_one`

See also:

[text\\_file\\_assertion/4](#)

---

[check\\_text\\_file/2](#)

Checks that the contents of a text file (open for reading using default options) match the expected contents. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`check_text_file(File,Contents)`

Mode and number of proofs:

`check_text_file(+atom,+atom) - zero_or_one`

See also:

[text\\_file\\_assertion/3](#)

---

[text\\_file\\_assertion/4](#)

Returns an assertion for checking that the given file have the expected text contents. The file is open for reading using the given options. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`text_file_assertion(File,Contents,Options,Assertion)`

Mode and number of proofs:

`text_file_assertion(+atom,+atom,+list(stream_option),--callable) - one`

See also:

[check\\_text\\_file/3](#)

---

[text\\_file\\_assertion/3](#)

Returns an assertion for checking that the given file have the expected text contents. The file is open for reading using default options. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`text_file_assertion(File,Contents,Assertion)`

Mode and number of proofs:

`text_file_assertion(+atom,+atom,--callable) - one`

See also:

[check\\_text\\_file/2](#)

---

[check\\_binary\\_file/2](#)

Checks the contents of a binary file match the expected contents. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`check_binary_file(File,Bytes)`

Mode and number of proofs:

`check_binary_file(+atom,+list(byte)) - zero_or_one`

See also:

[binary\\_file\\_assertion/3](#)

---

[binary\\_file\\_assertion/3](#)

Returns an assertion for checking that the given file have the expected binary contents. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`binary_file_assertion(File,Bytes,Assertion)`

Mode and number of proofs:

`binary_file_assertion(+atom,+list(byte),--callable) - one`

See also:

[check\\_binary\\_file/2](#)

---

[clean\\_file/1](#)

Closes any existing stream associated with the file and deletes the file if it exists. Relative file paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`clean_file(File)`

Mode and number of proofs:

`clean_file(+atom) - one`

See also:

[clean\\_directory/1](#)

[file\\_path/2](#)

---

[clean\\_directory/1](#)

Deletes an empty directory if it exists. Relative directory paths are interpreted as relative to the tests object path.

Compilation flags:

static

Template:

`clean_directory(Directory)`

Mode and number of proofs:

`clean_directory(+atom) - one`

See also:

[clean\\_file/1](#)

[file\\_path/2](#)

---

closed\_input\_stream/2

Opens a temporary file in the same directory as the tests object with the given options for reading, closes it, and returns its stream handle.

Compilation flags:

static

Template:

closed\_input\_stream(Stream,Options)

Mode and number of proofs:

closed\_input\_stream(-stream,+list(stream\_option)) - one

---

closed\_output\_stream/2

Opens a temporary file in the same directory as the tests object with the given options for writing, closes it, and returns its stream handle.

Compilation flags:

static

Template:

closed\_output\_stream(Stream,Options)

Mode and number of proofs:

closed\_output\_stream(-stream,+list(stream\_option)) - zero\_or\_one

---

stream\_position/1

Returns a syntactically valid stream position by opening a temporary file in the same directory as the tests object.

Compilation flags:

static

Template:

stream\_position(Position)

Mode and number of proofs:

`stream_position(-stream_position) - one`

---

test/2

Table of defined tests.

Compilation flags:

`static`

Template:

`test(Identifier,Test)`

Mode and number of proofs:

`test(?callable,?compound) - zero_or_more`

---

### Private predicates

`running_test_sets_/0`

Internal flag used when running two or more test sets as a unified set.

Compilation flags:

`dynamic`

Mode and number of proofs:

`running_test_sets_ - zero_or_one`

---

test/3

Compiled unit tests. The list of variables is used to ensure variable sharing between a test with its test options.

Compilation flags:

`static`

---

Template:

test(Identifier,Variables,Outcome)

Mode and number of proofs:

test(?callable,?list(variable),?nonvar) - zero\_or\_more

---

auxiliary\_predicate\_counter\_/1

Counter for generating unique auxiliary predicate names.

Compilation flags:

dynamic

Template:

auxiliary\_predicate\_counter\_(Counter)

Mode and number of proofs:

auxiliary\_predicate\_counter\_(?integer) - one\_or\_more

---

test\_/2

Table of compiled tests.

Compilation flags:

dynamic

Template:

test\_(Identifier,Test)

Mode and number of proofs:

test\_(?callable,?compound) - zero\_or\_more

---

selected\_test\_/1

Table of selected tests for execution.

Compilation flags:

dynamic

Template:

selected\_test\_(Identifier)

Mode and number of proofs:

selected\_test\_(?callable) - zero\_or\_more

---

skipped\_/1

Counter for skipped tests.

Compilation flags:

dynamic

Template:

skipped\_(Counter)

Mode and number of proofs:

skipped\_(?integer) - zero\_or\_one

---

passed\_/3

Counter and total time for passed tests.

Compilation flags:

dynamic

Template:

passed\_(Counter,CPUTime,WallTime)

Mode and number of proofs:

passed\_(?integer,-float,-float) - zero\_or\_one

---

failed\_/3

Counter and total time for failed tests.

Compilation flags:

dynamic

Template:

failed\_(Counter,CPUTime,WallTime)

Mode and number of proofs:

failed\_(?integer,-float,-float) - zero\_or\_one

---

flaky\_/1

Counter for failed tests that are marked as flaky.

Compilation flags:

dynamic

Template:

flaky\_(Counter)

Mode and number of proofs:

flaky\_(?integer) - zero\_or\_one

---

fired\_/3

Fired clauses when running the unit tests.

Compilation flags:

dynamic

Template:

fired\_(Entity,Predicate,Clause)

Mode and number of proofs:

fired\_(?entity\_identifier,?predicate\_indicator,?integer) - zero\_or\_more

---

covered\_/4

Auxiliary predicate for collecting statistics on clause coverage.

Compilation flags:

dynamic

Template:

covered\_(Entity,Predicate,Covered,Total)

Mode and number of proofs:

covered\_(?entity\_identifier,?callable,?integer,?integer) - zero\_or\_more

---

## Operators

op(700,xfx,=~=)

Scope:

public

category

### 1.43.4 lgtunit\_messages

Logtalk unit test framework default message translations.

Availability:

logtalk\_load(lgtunit(loader))

Author: Paulo Moura

Version: 9:1:0

Date: 2024-06-09

Compilation flags:

static

Provides:

logtalk::message\_prefix\_stream/4

logtalk::message\_tokens//2

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.43.5 minimal\_output

Intercepts unit test execution messages and outputs a minimal report.

Availability:

logtalk\_load(lgtunit(loader))

Author: Paulo Moura

Version: 3:0:0

Date: 2021-05-27

Compilation flags:

static, context\_switching\_calls

Provides:

logtalk::message\_hook/4

Remarks:

- Usage: Simply load this object before running your tests using the goal `logtalk_load(lgtunit(minimal_output))`.
- Limitations: Cannot be used when the test objects also intercept lgtunit messages.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.43.6 tap\_output

Intercepts unit test execution messages and outputs a report using the TAP format to the current output stream.

Availability:

```
logtalk_load(lgtunit(loader))
```

Author: Paulo Moura

Version: 4:0:1

Date: 2024-04-01

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
logtalk::message_hook/4
```

Remarks:

- Usage: Simply load this object before running your tests using the goal `logtalk_load(lgtunit(tap_output))`.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
  - generating\_/0
  - partial\_/1
  - test\_count\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

generating\_/0

Flag to detect report in progress when processing two or more test sets as a unified set.

Compilation flags:

dynamic

Mode and number of proofs:

generating\_ - zero\_or\_one

---

partial\_/1

Cache of total of tests per test set.

Compilation flags:

dynamic

Template:

partial\_(Count)

Mode and number of proofs:

partial\_(?integer) - zero\_or\_more

---

test\_count\_/1

Test counter.

Compilation flags:

dynamic

Template:

test\_count\_(Count)

Mode and number of proofs:

test\_count\_(?integer) - zero\_or\_one

---

## Operators

(none)

object

### 1.43.7 tap\_report

Intercepts unit test execution messages and generates a tap\_report.txt file using the TAP output format in the same directory as the tests object file.

Availability:

logtalk\_load(lgtunit(loader))

Author: Paulo Moura

Version: 5:0:1

Date: 2024-04-01

Compilation flags:

static, context\_switching\_calls

Provides:

logtalk::message\_hook/4

Uses:

logtalk

Remarks:

- Usage: Simply load this object before running your tests using the goal `logtalk_load(lgtunit(tap_report))`.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
  - `partial_/1`
  - `test_count_/1`
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

`partial_/1`

Cache of total of tests per test set.

Compilation flags:

`dynamic`

Template:

`partial_(Count)`

Mode and number of proofs:

`partial_(?integer) - zero_or_more`

test\_count\_/1

Test counter.

Compilation flags:

dynamic

Template:

test\_count\_(Count)

Mode and number of proofs:

test\_count\_(?integer) - zero\_or\_one

---

## Operators

(none)

object

### 1.43.8 xunit\_net\_v2\_output

Intercepts unit test execution messages and outputs a report using the xUnit.net v2 XML format to the current output stream.

Availability:

logtalk\_load(lgtunit(loader))

Author: Paulo Moura

Version: 4:0:1

Date: 2024-04-01

Compilation flags:

static, context\_switching\_calls

Provides:

logtalk::message\_hook/4

Uses:

user

Remarks:

- Usage: Simply load this object before running your tests using the goal `logtalk_load(lgtunit(xunit_net_v2_output))`.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
  - `message_cache_/1`
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

`message_cache_/1`

Table of messages emitted by the `lgtunit` tool when running tests.

Compilation flags:

`dynamic`

Template:

`message_cache_(Message)`

Mode and number of proofs:

`message_cache_(?callable) - zero_or_more`

## Operators

(none)

object

### 1.43.9 xunit\_net\_v2\_report

Intercepts unit test execution messages and generates a xunit\_report.xml file using the xUnit.net v2 XML format in the same directory as the tests object file.

Availability:

```
logtalk_load(lgtunit(loader))
```

Author: Paulo Moura

Version: 5:0:1

Date: 2024-04-01

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
logtalk::message_hook/4
```

Uses:

```
logtalk
```

```
user
```

Remarks:

- Usage: Simply load this object before running your tests using the goal `logtalk_load(lgtunit(xunit_net_v2_report))`.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
  - message\_cache\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

message\_cache\_/1

Table of messages emitted by the lgtunit tool when running tests.

Compilation flags:

dynamic

Template:

message\_cache\_(Message)

Mode and number of proofs:

message\_cache\_(?callable) - zero\_or\_more

---

### Operators

(none)

object

#### 1.43.10 xunit\_output

Intercepts unit test execution messages and outputs a report using the xUnit XML format to the current output stream.

Availability:

logtalk\_load(lgtunit(loader))

Author: Paulo Moura

Version: 4:0:1

Date: 2024-04-01

Compilation flags:

static, context\_switching\_calls

Provides:

logtalk::message\_hook/4

Uses:

logtalk

user

Remarks:

- Usage: Simply load this object before running your tests using the goal `logtalk_load(lgtunit(xunit_output))`.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
  - message\_cache\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

message\_cache\_/1

Table of messages emitted by the lgtunit tool when running tests.

Compilation flags:

dynamic

Template:

message\_cache\_(Message)

Mode and number of proofs:

message\_cache\_(?callable) - zero\_or\_more

---

## Operators

(none)

object

### 1.43.11 xunit\_report

Intercepts unit test execution messages and generates a xunit\_report.xml file using the xUnit XML format in the same directory as the tests object file.

Availability:

logtalk\_load(lgtunit(loader))

Author: Paulo Moura

Version: 5:0:1

Date: 2024-04-01

Compilation flags:

static, context\_switching\_calls

Provides:

logtalk::message\_hook/4

Uses:

logtalk

user

Remarks:

- Usage: Simply load this object before running your tests using the goal `logtalk_load(lgtunit(xunit_report))`.

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
  - message\_cache\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

message\_cache\_/1

Table of messages emitted by the lgtunit tool when running tests.

Compilation flags:

dynamic

Template:

message\_cache\_(Message)

Mode and number of proofs:

message\_cache\_(?callable) - zero\_or\_more

---

### Operators

(none)

## 1.44 library

protocol

### 1.44.1 cloning

Object cloning protocol.

Availability:

`logtalk_load(library(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2010-09-14

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - `clone/1`
- Protected predicates
- Private predicates
- Operators

**Public predicates**

clone/1

Clones an object, returning the identifier of the new object if none is given.

Compilation flags:

static

Template:

clone(Clone)

Mode and number of proofs:

clone(?object) - zero\_or\_one

---

**Protected predicates**

(none)

**Private predicates**

(none)

**Operators**

(none)

category

**1.44.2 counters**

Named integer counters. Counter names can be any nonvar term.

Availability:

logtalk\_load(library(loader))

Author: Paulo Moura

Version: 1:0:1

Date: 2022-02-11

Compilation flags:

static

---

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - counter/2
  - increment\_counter/1
  - decrement\_counter/1
  - reset\_counter/1
  - reset\_counters/0
- Protected predicates
- Private predicates
  - counter\_/2
- Operators

### Public predicates

counter/2

True if Counter is a counter with value Value.

Compilation flags:

static

Template:

counter(Counter,Value)

Mode and number of proofs:

counter(?nonvar,?integer) - zero\_or\_more

increment\_counter/1

Increments the named counter.

Compilation flags:

static

Template:

increment\_counter(Counter)

Mode and number of proofs:

increment\_counter(+nonvar) - one

---

decrement\_counter/1

Decrements the named counter.

Compilation flags:

static

Template:

decrement\_counter(Counter)

Mode and number of proofs:

decrement\_counter(+nonvar) - one

---

reset\_counter/1

Resets the named counter to zero. Creates the counter if it does not exist.

Compilation flags:

static

Template:

reset\_counter(Counter)

Mode and number of proofs:

reset\_counter(+nonvar) - one

---

reset\_counters/0

Resets all existing named counters to zero.

Compilation flags:

static

Mode and number of proofs:

reset\_counters - one

---

### Protected predicates

(none)

### Private predicates

counter\_/2

Table of named counters.

Compilation flags:

dynamic

Template:

counter\_(Counter,Value)

Mode and number of proofs:

counter\_(?nonvar,?integer) - zero\_or\_more

---

### Operators

(none)

object

### 1.44.3 streamvars

Stream variables (supporting logical, backtracable, adding and retrieving of terms).

Availability:

```
logtalk_load(library(loader))
```

Author: Nobukuni Kino and Paulo Moura

Version: 1:3:0

Date: 2019-06-15

Compilation flags:

```
static, context_switching_calls
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - new/1
  - new/2
  - (<=)/2
  - (=>)/2
- Protected predicates
- Private predicates
- Operators
  - op(100,xfx,<=)
  - op(100,xfx,=>)

## Public predicates

new/1

Makes Variable a stream variable. Initial state will be empty.

Compilation flags:

static

Template:

new(Variable)

Mode and number of proofs:

new(--streamvar) - one

Exceptions:

Variable is not a variable:

type\_error(variable,Variable)

---

new/2

Makes Variable a stream variable and sets its initial state to Value.

Compilation flags:

static

Template:

new(Variable,Value)

Mode and number of proofs:

new(--streamvar,@nonvar) - one

Exceptions:

Variable is not a variable:

type\_error(variable,Variable)

---

$(\leq)/2$

Sets the state of the stream variable `Variable` to `Value` (initializing the variable if needed).

Compilation flags:

static

Template:

`Variable<=Value`

Mode and number of proofs:

`(?streamvar)<=(@nonvar) - one`

---

$(=>)/2$

Unifies `Value` with the current state of the stream variable `Variable`.

Compilation flags:

static

Template:

`Variable=>Value`

Mode and number of proofs:

`+streamvar=> ?nonvar - zero_or_one`

---

### Protected predicates

(none)

### Private predicates

(none)

## Operators

op(100,xfx,<=)

Scope:

public

op(100,xfx,=>)

Scope:

public

## 1.45 listing

category

### 1.45.1 listing

Listing predicates.

Availability:

logtalk\_load(listing(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2024-01-26

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - listing/0
  - listing/1
  - portray\_clause/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

listing/0

Lists all clauses of all visible dynamic predicates to the current output stream.

Compilation flags:

static

Mode and number of proofs:

listing - one

listing/1

Lists all clauses of a visible dynamic predicate or non-terminal to the current output stream. When the argument is a clause head, lists all matching clauses.

Compilation flags:

static

Template:

listing(Spec)

Mode and number of proofs:

listing(+predicate\_indicator) - one\_or\_error

listing(+non\_terminal\_indicator) - one\_or\_error

listing(+callable) - one\_or\_error

Exceptions:

Spec is not ground:

instantiation\_error

Spec is ground but not a valid predicate indicator:

```
type_error(predicate_indicator,Spec)
```

Spec is ground but not a valid non-terminal indicator:

```
type_error(non_terminal_indicator,Spec)
```

Spec is a predicate indicator but not a visible predicate:

```
existence_error(predicate,Spec)
```

Spec is a non-terminal indicator but not a visible non-terminal:

```
existence_error(non_terminal,Spec)
```

Spec is a callable term with a Functor/Arity indicator but not a visible predicate:

```
existence_error(predicate,Functor/Arity)
```

Spec is a predicate indicator of a visible predicate but not a dynamic predicate:

```
permission_error(access,predicate,Spec)
```

Spec is a non-terminal indicator of a visible non-terminal but not a dynamic non-terminal:

```
permission_error(access,non_terminal,Spec)
```

Spec is a callable term for a visible predicate with a Functor/Arity indicator but not a dynamic predicate:

```
permission_error(access,predicate,Functor/Arity)
```

---

portray\_clause/1

Pretty prints a clause to the current output stream.

Compilation flags:

```
static
```

Template:

```
portray_clause(Clause)
```

Mode and number of proofs:

```
portray_clause(+clause) - one
```

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

# 1.46 logging

object

## 1.46.1 logger

Global logger object for logging events to files.

Availability:

`logtalk_load(logging(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2011-01-06

Compilation flags:

`static, context_switching_calls`

Implements:

`public loggingp`

Remarks:

(none)

Inherited public predicates:

`define_log_file/2 disable_logging/1 enable_logging/1 init_log_file/2 log_event/2 log_file/2 logging/1`

- Public predicates
- Protected predicates
- Private predicates

- log\_file\_/2
- logging\_to\_file\_/2
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

log\_file\_/2

Table of log files.

Compilation flags:

dynamic

Template:

log\_file\_(Alias,File)

Mode and number of proofs:

log\_file\_(?atom,?nonvar) - zero\_or\_more

---

logging\_to\_file\_/2

Table of logging file status for log files.

Compilation flags:

dynamic

Template:

logging\_to\_file\_(Alias,Status)

Mode and number of proofs:

logging\_to\_file\_(?atom,?atom) - zero\_or\_more

---

## Operators

(none)

category

### 1.46.2 logging

Logging events to files category.

Availability:

logtalk\_load(logging(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2011-01-06

Compilation flags:

static

Implements:

public loggingp

Remarks:

(none)

Inherited public predicates:

define\_log\_file\_/2 disable\_logging/1 enable\_logging/1 init\_log\_file\_/2 log\_event/2 log\_file/2  
logging/1

- Public predicates
- Protected predicates
- Private predicates
  - log\_file\_/2
  - logging\_to\_file\_/2
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

`log_file_/2`

Table of log files.

Compilation flags:

dynamic

Template:

`log_file_(Alias,File)`

Mode and number of proofs:

`log_file_(?atom,?nonvar) - zero_or_more`

---

`logging_to_file_/2`

Table of logging file status for log files.

Compilation flags:

dynamic

Template:

`logging_to_file_(Alias,Status)`

Mode and number of proofs:

`logging_to_file_(?atom,?atom) - zero_or_more`

---

## Operators

(none)

protocol

### 1.46.3 loggingp

Logging events to files protocol.

Availability:

logtalk\_load(logging(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2011-01-06

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - log\_file/2
  - define\_log\_file/2
  - init\_log\_file/2
  - log\_event/2
  - logging/1
  - enable\_logging/1
  - disable\_logging/1
- Protected predicates
- Private predicates

- Operators

### Public predicates

`log_file/2`

Access to the table of log files.

Compilation flags:

`static`

Template:

`log_file(Alias,File)`

Mode and number of proofs:

`log_file(?atom,?atom) - zero_or_more`

---

`define_log_file/2`

Defines a log file with alias `Alias` and file name `File`. If the log file already exists, its contents are kept. Logging is enabled by default.

Compilation flags:

`static`

Template:

`define_log_file(Alias,File)`

Mode and number of proofs:

`define_log_file(+atom,+atom) - one`

---

`init_log_file/2`

Initializes a new log file with alias `Alias` and file name `File`. If the log file already exists, its contents are erased. Logging is enabled by default.

Compilation flags:

`static`

---

Template:

`init_log_file(Alias,File)`

Mode and number of proofs:

`init_log_file(+atom,+atom) - one`

---

`log_event/2`

Logs an event Event to a log file with alias Alias. Fails if a log file with alias Alias is not defined.

Compilation flags:

`static`

Template:

`log_event(Alias,Event)`

Mode and number of proofs:

`log_event(+atom,+nonvar) - zero_or_one`

---

`logging/1`

True if logging to file with alias Alias is enabled.

Compilation flags:

`static`

Template:

`logging(Alias)`

Mode and number of proofs:

`logging(+atom) - zero_or_one`

---

`enable_logging/1`

Enables logging to file with alias `Alias`. Fails if a log file with alias `Alias` is not defined.

Compilation flags:

`static`

Template:

`enable_logging(Alias)`

Mode and number of proofs:

`enable_logging(+atom) - zero_or_one`

---

`disable_logging/1`

Disables logging to file with alias `Alias`. Fails if a log file with alias `Alias` is not defined.

Compilation flags:

`static`

Template:

`disable_logging(Alias)`

Mode and number of proofs:

`disable_logging(+atom) - zero_or_one`

---

### Protected predicates

(none)

### Private predicates

(none)

## Operators

(none)

See also:

logging

## 1.47 loops

object

### 1.47.1 loop

Loop control structures predicates.

Availability:

`logtalk_load(loops(loader))`

Author: Paulo Moura

Version: 1:4:1

Date: 2020-12-20

Compilation flags:

`static, context_switching_calls`

Implements:

`public loopp`

Remarks:

(none)

Inherited public predicates:

`dowhile/2 fordownto/3 fordownto/4 fordownto/5 foreach/3 foreach/4 forto/3 forto/4 forto/5 whiledo/2`

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.47.2 loopp

Loop control constructs protocol.

Availability:

logtalk\_load(loops(loader))

Author: Paulo Moura

Version: 1:3:0

Date: 2017-03-20

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - whiledo/2
  - dowhile/2
  - foreach/3
  - foreach/4
  - forto/3
  - forto/4
  - forto/5
  - fordownto/3
  - fordownto/4
  - fordownto/5
- Protected predicates
- Private predicates
- Operators

## Public predicates

whiledo/2

While Condition is true do Action.

Compilation flags:

static

Template:

whiledo(Condition,Action)

Meta-predicate template:

whiledo(0,0)

Mode and number of proofs:

whiledo(+callable,@callable) - zero\_or\_one

dowhile/2

Do Action while Condition is true.

Compilation flags:

static

Template:

dowhile(Action,Condition)

Meta-predicate template:

dowhile(0,0)

Mode and number of proofs:

dowhile(@callable,+callable) - zero\_or\_one

---

foreach/3

For each Element in List call Goal.

Compilation flags:

static

Template:

foreach(Element,List,Goal)

Meta-predicate template:

foreach(\*,\*,0)

Mode and number of proofs:

foreach(@var,+list(term),@callable) - zero\_or\_one

---

foreach/4

For each Element in List at position Index call Goal. Index starts at 1.

Compilation flags:

static

Template:

foreach(Element,Index,List,Goal)

---

Meta-predicate template:

```
foreach(*,*,*,0)
```

Mode and number of proofs:

```
foreach(@var,@var,+list(term),@callable) - zero_or_one
```

---

forto/3

Calls Goal counting up from First to Last. Increment is 1. For convenience, First and Last can be arithmetic expressions. Fails iff Goal fails.

Compilation flags:

```
static
```

Template:

```
forto(First,Last,Goal)
```

Meta-predicate template:

```
forto(*,*,0)
```

Mode and number of proofs:

```
forto(+number,+number,@callable) - zero_or_one
```

---

forto/4

Calls Goal counting up from First to Last and binding Count to each successive value. Increment is 1. For convenience, First and Last can be arithmetic expressions. Fails iff Goal fails.

Compilation flags:

```
static
```

Template:

```
forto(Count,First,Last,Goal)
```

Meta-predicate template:

```
forto(*,*,*,0)
```

Mode and number of proofs:

```
forto(@var,+number,+number,@callable) - zero_or_one
```

---

forto/5

Calls Goal counting up from First to Last and binding Count to each successive value. For convenience, First, Last, and Increment can be arithmetic expressions (uses Increment absolute value). Fails iff Goal fails.

Compilation flags:

static

Template:

forto(Count,First,Last,Increment,Goal)

Meta-predicate template:

forto(\*,\*,\*,\*,0)

Mode and number of proofs:

forto(@var,+number,+number,+number,@callable) - zero\_or\_one

---

fordownto/3

Calls Goal counting down from First to Last. Decrement is 1. For convenience, First and Last can be arithmetic expressions. Fails iff Goal fails.

Compilation flags:

static

Template:

fordownto(First,Last,Goal)

Meta-predicate template:

fordownto(\*,\*,0)

Mode and number of proofs:

fordownto(+number,+number,@callable) - zero\_or\_one

---

fordownto/4

Calls Goal counting down from First to Last and binding Count to each successive value. Decrement is 1. For convenience, First and Last can be arithmetic expressions. Fails iff Goal fails.

Compilation flags:

static

---

---

Template:

```
fordownto(Count,First,Last,Goal)
```

Meta-predicate template:

```
fordownto(*,*,*,0)
```

Mode and number of proofs:

```
fordownto(@var,+number,+number,@callable) - zero_or_one
```

---

`fordownto/5`

Calls Goal counting down from First to Last and binding Count to each successive value. For convenience, First, Last, and Decrement can be arithmetic expressions (uses Decrement absolute value). Fails iff Goal fails.

Compilation flags:

```
static
```

Template:

```
fordownto(Count,First,Last,Decrement,Goal)
```

Meta-predicate template:

```
fordownto(*,*,*,*,0)
```

Mode and number of proofs:

```
fordownto(@var,+number,+number,+number,@callable) - zero_or_one
```

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

[loop](#)

## 1.48 meta

object

### 1.48.1 meta

Some useful meta-predicates.

Availability:

```
logtalk_load(meta(loader))
```

Author: Paulo Moura

Version: 5:2:0

Date: 2016-10-06

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public metap
```

Aliases:

```
metap map/2 as succeeds/2
metap map/2 as maplist/2
metap map/3 as maplist/3
metap map/4 as maplist/4
metap map/5 as maplist/5
metap map/6 as maplist/6
metap map/7 as maplist/7
metap map/8 as maplist/8
metap include/3 as filter/3
metap fold_left/4 as foldl/4
metap fold_left_1/3 as foldl1/3
metap fold_right/4 as foldr/4
metap fold_right_1/3 as foldr1/3
metap scan_left/4 as scanl/4
metap scan_left_1/3 as scanl1/3
metap scan_right/4 as scanr/4
metap scan_right_1/3 as scanr1/3
```

Remarks:

```
(none)
```

Inherited public predicates:

exclude/3 findall\_member/4 findall\_member/5 fold\_left/4 fold\_left\_1/3 fold\_right/4  
 fold\_right\_1/3 include/3 map/2 map/3 map/4 map/5 map/6 map/7 map/8 map\_reduce/5  
 partition/4 partition/6 scan\_left/4 scan\_left\_1/3 scan\_right/4 scan\_right\_1/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`meta_compiler`

`protocol`

## 1.48.2 metap

Useful meta-predicates protocol.

Availability:

`logtalk_load(meta(loader))`

Author: Paulo Moura

Version: 6:1:0

Date: 2015-12-23

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - include/3
  - exclude/3
  - findall\_member/4
  - findall\_member/5
  - partition/4
  - partition/6
  - fold\_left/4
  - fold\_left\_1/3
  - scan\_left/4
  - scan\_left\_1/3
  - fold\_right/4
  - fold\_right\_1/3
  - scan\_right/4
  - scan\_right\_1/3
  - map/2
  - map/3
  - map/4
  - map/5
  - map/6
  - map/7
  - map/8
  - map\_reduce/5
- Protected predicates
- Private predicates
- Operators

---

## Public predicates

`include/3`

Returns a list of all list elements that satisfy a predicate.

Compilation flags:

`static`

Template:

`include(Closure,List,Included)`

Meta-predicate template:

`include(1,*,*)`

Mode and number of proofs:

`include(+callable,+list,-list) - one`

---

`exclude/3`

Returns a list of all list elements that fail to satisfy a predicate.

Compilation flags:

`static`

Template:

`exclude(Closure,List,Excluded)`

Meta-predicate template:

`exclude(1,*,*)`

Mode and number of proofs:

`exclude(+callable,+list,-list) - one`

---

`findall_member/4`

Finds all members of a list that satisfy a given test.

Compilation flags:

`static`

---

Template:

```
findall_member(Member,List,Test,Result)
```

Meta-predicate template:

```
findall_member(*,*,0,*)
```

Mode and number of proofs:

```
findall_member(@term,+list,@callable,-list) - one
```

---

[findall\\_member/5](#)

Finds all members of a list that satisfy a given test appending the given tail to the result.

Compilation flags:

```
static
```

Template:

```
findall_member(Member,List,Test,Result,Tail)
```

Meta-predicate template:

```
findall_member(*,*,0,*,*)
```

Mode and number of proofs:

```
findall_member(@term,+list,@callable,-list,+list) - one
```

---

[partition/4](#)

Partition a list of elements in two lists using a predicate.

Compilation flags:

```
static
```

Template:

```
partition(Closure,List,Included,Excluded)
```

Meta-predicate template:

```
partition(1,*,*,*)
```

Mode and number of proofs:

```
partition(+callable,+list,-list,-list) - one
```

---

---

`partition/6`

Partitions a list in lists with values less, equal, and greater than a given value using a comparison predicate with the same argument order as `compare/3`.

Compilation flags:

`static`

Template:

`partition(Closure,List,Value,Less,Equal,Greater)`

Meta-predicate template:

`partition(3,*,*,*,*)`

Mode and number of proofs:

`partition(+callable,+list,@term,-list,-list,-list) - one`

---

`fold_left/4`

List folding (left associative). Closure is extended with three arguments: accumulator, list element, and updated accumulator.

Compilation flags:

`static`

Template:

`fold_left(Closure,Accumulator,List,Result)`

Meta-predicate template:

`fold_left(3,*,*,*)`

Mode and number of proofs:

`fold_left(+callable,?term,+list,?term) - zero_or_more`

---

`fold_left_1/3`

List folding (left associative). Closure is extended with three arguments: accumulator, list element, and updated accumulator. The initial value of the accumulator is the list first element. Fails for empty lists.

Compilation flags:

`static`

Template:

fold\_left\_1(Closure,List,Result)

Meta-predicate template:

fold\_left\_1(3,\*,\*)

Mode and number of proofs:

fold\_left\_1(+callable,+list,?term) - zero\_or\_more

---

scan\_left/4

List scanning (left associative). Closure is extended with three arguments: accumulator, list element, and updated accumulator.

Compilation flags:

static

Template:

scan\_left(Closure,Accumulator,List,Results)

Meta-predicate template:

scan\_left(3,\*,\*,\*)

Mode and number of proofs:

scan\_left(+callable,?term,+list,?list) - zero\_or\_more

---

scan\_left\_1/3

List scanning (left associative). Closure is extended with three arguments: accumulator, list element, and updated accumulator. The accumulator is initialized with the list first element. Fails for empty lists.

Compilation flags:

static

Template:

scan\_left\_1(Closure,List,Results)

Meta-predicate template:

scan\_left\_1(3,\*,\*)

Mode and number of proofs:

scan\_left\_1(+callable,+list,?list) - zero\_or\_more

---

---

`fold_right/4`

List folding (right associative). Closure is extended with three arguments: list element, accumulator, and updated accumulator.

Compilation flags:

`static`

Template:

`fold_right(Closure,Accumulator,List,Result)`

Meta-predicate template:

`fold_right(3,*,*,*)`

Mode and number of proofs:

`fold_right(+callable,?term,+list,?term) - zero_or_more`

---

`fold_right_1/3`

List folding (right associative). Closure is extended with three arguments: list element, accumulator, and updated accumulator. The initial value of the accumulator is the list first element. Fails for empty lists.

Compilation flags:

`static`

Template:

`fold_right_1(Closure,List,Result)`

Meta-predicate template:

`fold_right_1(3,*,*)`

Mode and number of proofs:

`fold_right_1(+callable,+list,?term) - zero_or_more`

---

`scan_right/4`

List scanning (right associative). Closure is extended with three arguments: list element, accumulator, and updated accumulator.

Compilation flags:

`static`

Template:

```
scan_right(Closure,Accumulator,List,Results)
```

Meta-predicate template:

```
scan_right(3,*,*,*)
```

Mode and number of proofs:

```
scan_right(+callable,?term,+list,?list) - zero_or_more
```

---

scan\_right\_1/3

List scanning (right associative). Closure is extended with three arguments: list element, accumulator, and updated accumulator. The accumulator is initialized with the list first element. Fails for empty lists.

Compilation flags:

```
static
```

Template:

```
scan_right_1(Closure,List,Results)
```

Meta-predicate template:

```
scan_right_1(3,*,*)
```

Mode and number of proofs:

```
scan_right_1(+callable,+list,?list) - zero_or_more
```

---

map/2

True if the predicate succeeds for each list element.

Compilation flags:

```
static
```

Template:

```
map(Closure,List)
```

Meta-predicate template:

```
map(1,*)
```

Mode and number of proofs:

```
map(+callable,?list) - zero_or_more
```

---

---

map/3

List mapping predicate taken arguments from two lists of elements.

Compilation flags:

static

Template:

map(Closure,List1,List2)

Meta-predicate template:

map(2,\*,\*)

Mode and number of proofs:

map(+callable,?list,?list) - zero\_or\_more

---

map/4

List mapping predicate taken arguments from three lists of elements.

Compilation flags:

static

Template:

map(Closure,List1,List2,List3)

Meta-predicate template:

map(3,\*,\*,\*)

Mode and number of proofs:

map(+callable,?list,?list,?list) - zero\_or\_more

---

map/5

List mapping predicate taken arguments from four lists of elements.

Compilation flags:

static

Template:

map(Closure,List1,List2,List3,List4)

---

Meta-predicate template:

```
map(4,*,*,*,*)
```

Mode and number of proofs:

```
map(+callable,?list,?list,?list,?list) - zero_or_more
```

---

map/6

List mapping predicate taken arguments from five lists of elements.

Compilation flags:

```
static
```

Template:

```
map(Closure,List1,List2,List3,List4,List5)
```

Meta-predicate template:

```
map(5,*,*,*,*,*)
```

Mode and number of proofs:

```
map(+callable,?list,?list,?list,?list,?list) - zero_or_more
```

---

map/7

List mapping predicate taken arguments from six lists of elements.

Compilation flags:

```
static
```

Template:

```
map(Closure,List1,List2,List3,List4,List5,List6)
```

Meta-predicate template:

```
map(6,*,*,*,*,*,*)
```

Mode and number of proofs:

```
map(+callable,?list,?list,?list,?list,?list,?list) - zero_or_more
```

---

---

map/8

List mapping predicate taken arguments from seven lists of elements.

Compilation flags:

static

Template:

map(Closure,List1,List2,List3,List4,List5,List6,List7)

Meta-predicate template:

map(7,\*,\*,\*,\*,\*,\*,\*)

Mode and number of proofs:

map(+callable,?list,?list,?list,?list,?list,?list,?list) - zero\_or\_more

---

map\_reduce/5

Map a list and apply a fold left (reduce) to the resulting list.

Compilation flags:

static

Template:

map\_reduce(Map,Reduce,Accumulator,List,Result)

Meta-predicate template:

map\_reduce(2,3,\*,\*,\*)

Mode and number of proofs:

map\_reduce(+callable,+callable,+term,?list,?term) - zero\_or\_more

---

### Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

meta

## 1.49 meta\_compiler

object

### 1.49.1 meta\_compiler

Compiler for the meta object meta-predicates. Generates auxiliary predicates in order to avoid meta-call overheads.

Availability:

```
logtalk_load(meta_compiler(loader))
```

Author: Paulo Moura

Version: 0:14:2

Date: 2024-10-18

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Uses:

```
gensym
```

```
list
```

```
logtalk
```

```
user
```

Remarks:

- Usage: Compile source files with calls to the meta object meta-predicates using the compiler option `hook(meta_compiler)`.

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
  - generated\_predicate\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

generated\_predicate\_/1

Table of generated auxiliary predicates.

Compilation flags:

dynamic

Template:

generated\_predicate\_(Predicate)

Mode and number of proofs:

generated\_predicate\_(?predicate\_indicator) - zero\_or\_more

## Operators

(none)

See also:

meta

## 1.50 metagol

object

### 1.50.1 metagol

Inductive logic programming (ILP) system based on meta-interpretive learning.

Availability:

```
logtalk_load(metagol(loader))
```

Author: Metagol authors; adapted to Logtalk by Paulo Moura.

Version: 0:24:4

Date: 2024-03-15

Copyright: Copyright 2016 Metagol authors; Copyright 2018-2024 Paulo Moura

License: BSD-3-Clause

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Provides:

```
logtalk::message_tokens//2
```

```
logtalk::message_prefix_stream/4
```

Uses:

```
coroutining
```

```
integer
```

```
list
```

```
logtalk
```

```
meta
```

```
timeout
```

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
  - learn/3
  - learn/2
  - learn\_seq/2
  - learn\_with\_timeout/4
  - program\_to\_clauses/2
  - pprint/1
  - metarule/6
  - head\_pred/1
  - body\_pred/1
  - ibk/3
  - func\_test/3
  - functional/0
  - min\_clauses/1
  - max\_clauses/1
  - max\_inv\_preds/1
  - metarule\_next\_id/1
  - timeout/1
- Protected predicates
  - pprint\_clause/1
  - pprint\_clauses/1
  - compiled\_pred\_call/2
  - body\_pred\_call/2
  - type/3
- Private predicates
- Operators

### Public predicates

learn/3

Learns from a set of positive examples and a set of negative examples and returns the learned program.

Compilation flags:

static

Template:

learn(PositiveExamples,NegativeExamples,Program)

Mode and number of proofs:

learn(@list(example),@list(example),-list(term)) - zero\_or\_more

---

learn/2

Learns from a set of positive examples and a set of negative examples and pretty prints the learned program.

Compilation flags:

static

Template:

learn(PositiveExamples,NegativeExamples)

Mode and number of proofs:

learn(@list(example),@list(example)) - zero\_or\_more

---

learn\_seq/2

Learns from a sequence of examples represented as a list of PositiveExamples/NegativeExamples elements and returns the learned program.

Compilation flags:

static

Template:

learn\_seq(Examples,Program)

Mode and number of proofs:

---

```
learn_seq(@list(example),-list(clause)) - zero_or_one
```

---

```
learn_with_timeout/4
```

Learns from a set of positive examples and a set of negative examples and returns the learned program constrained by the given timeout or its default value.

Compilation flags:

```
static
```

Template:

```
learn_with_timeout(PositiveExamples,NegativeExamples,Program,Timeout)
```

Mode and number of proofs:

```
learn_with_timeout(@list(example),@list(example),-list(term),+number) - zero_or_one_or_error
```

```
learn_with_timeout(@list(example),@list(example),-list(term),-number) - zero_or_one_or_error
```

Exceptions:

Learning does not complete in the allowed time:

```
timeout(learn(PositiveExamples,NegativeExamples,Program))
```

---

```
program_to_clauses/2
```

Converts a learned program into a list of clauses.

Compilation flags:

```
static
```

Template:

```
program_to_clauses(Program,Clauses)
```

Mode and number of proofs:

```
program_to_clauses(@list(term),-list(clause)) - one
```

---

pprint/1

Pretty prints a learned program.

Compilation flags:

static

Template:

pprint(Program)

Mode and number of proofs:

pprint(@list(term)) - one

---

metarule/6

Compilation flags:

static

---

head\_pred/1

Compilation flags:

static

---

body\_pred/1

Compilation flags:

dynamic

---

ibk/3

Compilation flags:  
static

---

func\_test/3

Compilation flags:  
static

---

functional/0

Compilation flags:  
dynamic

---

min\_clauses/1

Compilation flags:  
dynamic

---

max\_clauses/1

Compilation flags:  
dynamic

---

max\_inv\_preds/1

Compilation flags:  
dynamic

---

metarule\_next\_id/1

Compilation flags:  
dynamic

---

timeout/1

Compilation flags:  
dynamic

---

### Protected predicates

pprint\_clause/1

Compilation flags:  
static

---

pprint\_clauses/1

Compilation flags:  
static

---

compiled\_pred\_call/2

Compilation flags:  
dynamic

---

body\_pred\_call/2

Compilation flags:  
dynamic

---

type/3

Compilation flags:  
dynamic

---

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)  
protocol

### 1.50.2 metagol\_example\_protocol

Convenient learning predicates for use in examples and unit tests.

Availability:  
logtalk\_load(metagol(loader))

Author: Paulo Moura.  
Version: 0:1:1  
Date: 2024-03-15

License: BSD-3-Clause

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - learn/1
  - learn/0
- Protected predicates
- Private predicates
- Operators

## Public predicates

learn/1

Learns and returns set of clauses.

Compilation flags:

static

Template:

learn(Clauses)

Mode and number of proofs:

learn(-list(clause)) - zero\_\_or\_\_more

learn/0

Learns and prints a set of clauses.

Compilation flags:

static

Mode and number of proofs:

learn - zero\_or\_more

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.51 mutations

object

### 1.51.1 default\_atom\_mutations

Default atom mutations.

Availability:

logtalk\_load(mutations(loader))

Author: Paulo Moura

Version: 0:1:0

Date: 2023-11-24

Compilation flags:

static, context\_switching\_calls

---

Provides:

mutations\_store::mutation/4

Uses:

fast\_random

list

type

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

type

object

## 1.51.2 default\_compound\_mutations

Default compound mutations.

Availability:

```
logtalk_load(mutations(loader))
```

Author: Paulo Moura

Version: 0:1:0

Date: 2023-11-23

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
mutations_store::mutation/4
```

Uses:

```
mutations_store
```

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

type

object

### 1.51.3 default\_float\_mutations

Default float mutations.

Availability:

`logtalk_load(mutations(loader))`

Author: Paulo Moura

Version: 0:1:0

Date: 2023-11-23

Compilation flags:

`static, context_switching_calls`

Provides:

`mutations_store::mutation/4`

Remarks:

(none)

Inherited public predicates:

(none)

- [Public predicates](#)
  - [Protected predicates](#)

- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

type

object

## 1.51.4 default\_integer\_mutations

Default integer mutations.

Availability:

```
logtalk_load(mutations(loader))
```

Author: Paulo Moura

Version: 0:1:0

Date: 2023-11-24

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
mutations_store::mutation/4
```

Uses:

```
fast_random
```

```
list
```

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

type

object

### 1.51.5 default\_list\_mutations

Default list mutations.

Availability:

logtalk\_load(mutations(loader))

Author: Paulo Moura

Version: 0:1:0

Date: 2023-11-24

## Compilation flags:

static, context\_switching\_calls

## Provides:

mutations\_store::mutation/4

## Uses:

fast\_random

list

mutations\_store

## Remarks:

(none)

## Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

**Public predicates**

(no local declarations; see entity ancestors if any)

**Protected predicates**

(no local declarations; see entity ancestors if any)

**Private predicates**

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

[type](#)

[category](#)

### 1.51.6 mutations

Adds mutations support to the library type object.

Availability:

`logtalk_load(mutations(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2023-11-23

Compilation flags:

`static`

Complements:

[type](#)

Uses:

[mutations\\_store](#)

Remarks:

(none)

Inherited public predicates:

(none)

- [Public predicates](#)
  - [mutation/3](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

---

## Public predicates

mutation/3

Returns a random mutation of a term into another term of the same type. The input Term is assume to be valid for the given Type.

Compilation flags:

static

Template:

mutation(Type,Term,Mutation)

Mode and number of proofs:

mutation(@callable,@term,-term) - one

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.51.7 mutations\_store

Stores mutation definitions for selected types. User extensible by defining objects or categories defining clauses for the mutation/3 predicate and using this object as a hook object for their compilation.

Availability:

logtalk\_load(mutations(loader))

Author: Paulo Moura

Version: 0:1:0

Date: 2023-11-23

Compilation flags:

static, context\_switching\_calls

Implements:

public expanding

Uses:

fast\_random

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
  - mutation/3
  - counter/2
- Protected predicates
- Private predicates
  - mutation/4
  - counter\_/2
- Operators

## Public predicates

mutation/3

Returns a random mutation of a term into another term of the same type. The input Term is assumed to be valid for the given Type.

Compilation flags:

static

Template:

mutation(Type,Term,Mutation)

Mode and number of proofs:

mutation(@callable,@term,-term) - one

counter/2

Table of the number of mutations available per type.

Compilation flags:

static

Template:

counter(Type,N)

Mode and number of proofs:

counter(?callable,?positive\_integer) - zero\_or\_more

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

mutation/4

Returns a random mutation of a term into another term of the same type using mutator N. The input Term is assume to be valid for the given Type.

Compilation flags:

static, multifile

Template:

mutation(Type,N,Term,Mutation)

Mode and number of proofs:

mutation(?callable,?positive\_integer,@term,-term) - zero\_or\_more

---

counter\_/2

Internal counter for the number of mutations available for a given type.

Compilation flags:

dynamic

Template:

counter\_(Type,N)

Mode and number of proofs:

counter\_(?callable,?positive\_integer) - zero\_or\_more

---

## Operators

(none)

See also:

type

## 1.52 nested\_dictionaries

object

### 1.52.1 navltree

Nested dictionary implementation based on the AVL tree implementation. Uses standard order to compare keys.

Availability:

logtalk\_load(nested\_dictionaries(loader))

Author: Paul Brown and Paulo Moura.

Version: 0:1:0

Date: 2021-04-09

Compilation flags:

static, context\_switching\_calls

Implements:

```
public nested_dictionary_protocol
```

Extends:

```
private avltree
```

Remarks:

(none)

Inherited public predicates:

```
as_curly_bracketed/2 as_nested_dictionary/2 delete_in/4 empty/1 insert_in/4 lookup_in/3  
new/1 update_in/4 update_in/5
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

nrmtree, nbintree

object

## 1.52.2 nbintree

Nested dictionary implementation based on the simple binary tree implementation. Uses standard order to compare keys.

Availability:

```
logtalk_load(nested_dictionaries(loader))
```

Author: Paul Brown and Paulo Moura.

Version: 0:1:0

Date: 2021-04-09

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public nested_dictionary_protocol
```

Extends:

```
private bintree
```

Remarks:

(none)

Inherited public predicates:

```
as_curly_bracketed/2 as_nested_dictionary/2 delete_in/4 empty/1 insert_in/4 lookup_in/3  
new/1 update_in/4 update_in/5
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

[nrbtree](#), [navltree](#)

[protocol](#)

### 1.52.3 nested\_dictionary\_protocol

Nested dictionary protocol.

Availability:

```
logtalk_load(nested_dictionaries(loader))
```

Author: Paul Brown and Paulo Moura

Version: 0:1:0

Date: 2021-04-07

Compilation flags:

```
static
```

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - new/1
  - empty/1
  - as\_nested\_dictionary/2
  - as\_curly\_bracketed/2
  - lookup\_in/3
  - update\_in/4
  - update\_in/5
  - insert\_in/4
  - delete\_in/4
- Protected predicates
- Private predicates
- Operators

### Public predicates

new/1

Create an empty (nested) dictionary.

Compilation flags:  
static

Template:

new(Dictionary)

Mode and number of proofs:  
new(--dictionary) - one

---

empty/1

True iff the dictionary is empty.

Compilation flags:  
static

Template:

`empty(Dictionary)`

Mode and number of proofs:

`empty(@dictionary) - zero_or_one`

---

`as_nested_dictionary/2`

Creates a (nested) dictionary term from a curly-bracketed term representation.

Compilation flags:

`static`

Template:

`as_nested_dictionary(Term,Dictionary)`

Mode and number of proofs:

`as_nested_dictionary(++term,--dictionary) - one_or_error`

---

`as_curly_bracketed/2`

Creates a a curly-bracketed term representation from a (nested) dictionary.

Compilation flags:

`static`

Template:

`as_curly_bracketed(Dictionary,Term)`

Mode and number of proofs:

`as_curly_bracketed(+dictionary,--term) - one_or_error`

---

lookup\_in/3

Lookup a chain of keys in a nested dictionary. Unifies Value with Dictionary when Keys is the empty list.

Compilation flags:

static

Template:

lookup\_in(Keys,Value,Dictionary)

Mode and number of proofs:

lookup\_in(++list(ground),?term,+dictionary) - zero\_or\_more

---

update\_in/4

Updates the value found by traversing through the nested keys.

Compilation flags:

static

Template:

update\_in(OldDictionary,Keys,Value,NewDictionary)

Mode and number of proofs:

update\_in(+dictionary,++list(ground),++term,--dictionary) - zero\_or\_one

---

update\_in/5

Updates the value found by traversing through the nested keys, only succeeding if the value found after traversal matches the old value.

Compilation flags:

static

Template:

update\_in(OldDictionary,Keys,OldValue,NewValue,NewDictionary)

Mode and number of proofs:

update\_in(+dictionary,++list(ground),?term,++term,--dictionary) - zero\_or\_one

---

insert\_in/4

Inserts a key-value pair into a dictionary by traversing through the nested keys. When the key already exists, the associated value is updated.

Compilation flags:

static

Template:

insert\_in(OldDictionary,Keys,Value,NewDictionary)

Mode and number of proofs:

insert\_in(+dictionary,++list(ground),++term,--dictionary) - zero\_or\_one

---

delete\_in/4

Deletes a matching key-value pair from a dictionary by traversing through the nested keys, returning the updated dictionary.

Compilation flags:

static

Template:

delete\_in(OldDictionary,Keys,Value,NewDictionary)

Mode and number of proofs:

delete\_in(+dictionary,++list(ground),?term,--dictionary) - zero\_or\_one

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

[navltree](#), [nbintree](#), [nrbtree](#)

object

### 1.52.4 nrbtree

Nested dictionary implementation based on the red-black tree implementation. Uses standard order to compare keys.

Availability:

```
logtalk_load(nested_dictionaries(loader))
```

Author: Paul Brown and Paulo Moura.

Version: 0:1:0

Date: 2021-04-09

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public nested_dictionary_protocol
```

Extends:

```
private rbtree
```

Remarks:

(none)

Inherited public predicates:

```
as_curly_bracketed/2 as_nested_dictionary/2 delete_in/4 empty/1 insert_in/4 lookup_in/3  
new/1 update_in/4 update_in/5
```

- [Public predicates](#)
- [Protected predicates](#)

- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

navltree, nbintree

## 1.53 optionals

object

### 1.53.1 maybe

Types and predicates for type-checking and handling optional terms. Inspired by Haskell.

Availability:

```
logtalk_load(optionals(loader))
```

Author: Paulo Moura

Version: 0:7:0

Date: 2021-01-03

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
type::type/1
```

```
type::check/2
arbitrary::arbitrary/1
arbitrary::arbitrary/2
```

Uses:

```
optional
optional(Optional)
random
type
```

Remarks:

- Type-checking support: Defines type `maybe(Type)` for checking optional terms where the value hold by the optional term must be of the given type.
- QuickCheck support: Defines clauses for the `arbitrary::arbitrary/1-2` predicates to allow generating random values for the `maybe(Type)` type.

Inherited public predicates:

(none)

- Public predicates
  - `cat/2`
- Protected predicates
- Private predicates
- Operators

## Public predicates

`cat/2`

Returns the values stored in the non-empty optional terms.

Compilation flags:

`static`

Template:

```
cat(Optionals,Values)
```

Mode and number of proofs:

```
cat(+list(optional),-list) - one
```

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`optional`, `optional(Optional)`, `type`, `arbitrary`

`object`

### 1.53.2 optional

Constructors for optional terms. An optional term is either empty or holds a value. Optional terms should be regarded as opaque terms and always used with the `optional/1` object by passing the optional term as a parameter.

Availability:

```
logtalk_load(optionals(loader))
```

Author: Paulo Moura

Version: 2:1:0

Date: 2021-01-03

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
type::type/1  
type::check/2
```

Remarks:

- Type-checking support: This object also defines a type `optional` for use with the type library object.

Inherited public predicates:

(none)

- Public predicates
  - empty/1
  - of/2
  - from\_goal/3
  - from\_goal/2
  - from\_generator/3
  - from\_generator/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

empty/1

Constructs an empty optional term.

Compilation flags:

static

Template:

empty(Optional)

Mode and number of proofs:

empty(--nonvar) - one

---

of/2

Constructs an optional term holding the given value.

Compilation flags:

static

Template:

of(Value,Optional)

Mode and number of proofs:

of(@term,--nonvar) - one

from\_goal/3

Constructs an optional term holding a value bound by calling the given goal. Returns an empty optional term if the goal fails or throws an error.

Compilation flags:

static

Template:

from\_goal(Goal,Value,Optional)

Meta-predicate template:

from\_goal(0,\*,\*)

Mode and number of proofs:

from\_goal(+callable,--term,--nonvar) - one

---

from\_goal/2

Constructs an optional term holding a value bound by calling the given closure. Returns an empty optional term if the closure fails or throws an error.

Compilation flags:

static

Template:

from\_goal(Closure,Optional)

Meta-predicate template:

from\_goal(1,\*)

Mode and number of proofs:

from\_goal(+callable,--nonvar) - one

---

`from_generator/3`

Constructs optional terms with the values generated by calling the given goal. On goal error or failure, returns an empty optional.

Compilation flags:

`static`

Template:

`from_generator(Goal,Value,Optional)`

Meta-predicate template:

`from_generator(0,*,*)`

Mode and number of proofs:

`from_generator(+callable,--term,--nonvar) - one_or_more`

---

`from_generator/2`

Constructs optional terms with the values generated by calling the given closure. On closure error or failure, returns an empty optional.

Compilation flags:

`static`

Template:

`from_generator(Closure,Optional)`

Meta-predicate template:

`from_generator(1,*)`

Mode and number of proofs:

`from_generator(+from_generator,--nonvar) - one_or_more`

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`optional(Optional)`, type

object

### 1.53.3 `optional(Optional)`

Optional term handling predicates. Requires passing an optional term (constructed using the optional object predicates) as a parameter.

Availability:

`logtalk_load(optionals(loader))`

Author: Paulo Moura

Version: 1:7:0

Date: 2019-11-26

Compilation flags:

`static, context_switching_calls`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - `is_empty/0`
  - `is_present/0`
  - `if_empty/1`

- if\_present/1
- if\_present\_or\_else/2
- filter/2
- map/2
- flat\_map/2
- or/2
- get/1
- or\_else/2
- or\_else\_get/2
- or\_else\_call/2
- or\_else\_fail/1
- or\_else\_throw/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

is\_empty/0

True if the optional term is empty. See also the if\_empty/1 predicate.

Compilation flags:

static

Mode and number of proofs:

is\_empty - zero\_or\_one

---

is\_present/0

True if the optional term holds a value. See also the if\_present/1 predicate.

Compilation flags:

static

Mode and number of proofs:

is\_present - zero\_or\_one

---

if\_empty/1

Calls a goal if the optional term is empty. Succeeds otherwise.

Compilation flags:

static

Template:

if\_empty(Goal)

Meta-predicate template:

if\_empty(0)

Mode and number of proofs:

if\_empty(+callable) - zero\_or\_more

---

if\_present/1

Applies a closure to the value hold by the optional term if not empty. Succeeds otherwise.

Compilation flags:

static

Template:

if\_present(Closure)

Meta-predicate template:

if\_present(1)

Mode and number of proofs:

if\_present(+callable) - zero\_or\_more

---

if\_present\_or\_else/2

Applies a closure to the value hold by the optional term if not empty. Otherwise calls the given goal.

Compilation flags:

static

Template:

if\_present\_or\_else(Closure,Goal)

Meta-predicate template:

if\_present\_or\_else(1,0)

Mode and number of proofs:

if\_present\_or\_else(+callable,+callable) - zero\_or\_more

---

filter/2

Returns the optional term when it is not empty and the value it holds satisfies a closure. Otherwise returns an empty optional term.

Compilation flags:

static

Template:

filter(Closure,NewOptional)

Meta-predicate template:

filter(1,\*)

Mode and number of proofs:

filter(+callable,--nonvar) - one

---

map/2

When the optional term is not empty and mapping a closure with the value it holds and the new value as additional arguments is successful, returns an optional term with the new value. Otherwise returns an empty optional term.

Compilation flags:

static

---

Template:

`map(Closure,NewOptional)`

Meta-predicate template:

`map(2,*)`

Mode and number of proofs:

`map(+callable,--nonvar) - one`

`flat_map/2`

When the optional term is not empty and mapping a closure with the value it holds and the new optional term as additional arguments is successful, returns the new optional term. Otherwise returns an empty optional term.

Compilation flags:

`static`

Template:

`flat_map(Closure,NewOptional)`

Meta-predicate template:

`flat_map(2,*)`

Mode and number of proofs:

`flat_map(+callable,--nonvar) - one`

`or/2`

Returns the same optional term if not empty. Otherwise calls closure to generate a new optional term. Fails if optional term is empty and calling the closure fails or throws an error.

Compilation flags:

`static`

Template:

`or(NewOptional,Closure)`

Meta-predicate template:

`or(*,1)`

Mode and number of proofs:

`or(--term,@callable) - zero_or_one`

get/1

Returns the value hold by the optional term if not empty. Throws an error otherwise.

Compilation flags:

static

Template:

get(Value)

Mode and number of proofs:

get(--term) - one\_or\_error

Exceptions:

Optional is empty:

existence\_error(optional\_term,Optional)

---

or\_else/2

Returns the value hold by the optional term if not empty or the given default value if the optional term is empty.

Compilation flags:

static

Template:

or\_else(Value,Default)

Mode and number of proofs:

or\_else(--term,@term) - one

---

or\_else\_get/2

Returns the value hold by the optional term if not empty. Applies a closure to compute the value otherwise. Throws an error when the optional term is empty and the value cannot be computed.

Compilation flags:

static

---

Template:

```
or_else_get(Value,Closure)
```

Meta-predicate template:

```
or_else_get(*,1)
```

Mode and number of proofs:

```
or_else_get(--term,+callable) - one_or_error
```

Exceptions:

Optional is empty and the term cannot be computed:

```
existence_error(optional_term,Optional)
```

`or_else_call/2`

Returns the value hold by the optional term if not empty or calls a goal deterministically if the optional term is empty.

Compilation flags:

```
static
```

Template:

```
or_else_call(Value,Goal)
```

Meta-predicate template:

```
or_else_call(*,0)
```

Mode and number of proofs:

```
or_else_call(--term,+callable) - zero_or_one
```

`or_else_fail/1`

Returns the value hold by the optional term if not empty. Fails otherwise. Usually called to skip over empty optional terms.

Compilation flags:

```
static
```

Template:

```
or_else_fail(Value)
```

Mode and number of proofs:

```
or_else_fail(--term) - zero_or_one
```

`or_else_throw/2`

Returns the value hold by the optional term if not empty. Throws the given error otherwise.

Compilation flags:

`static`

Template:

`or_else_throw(Value,Error)`

Mode and number of proofs:

`or_else_throw(--term,@nonvar) - one_or_error`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

`optional`

## 1.54 options

category

### 1.54.1 options

Options processing predicates. Options are represented by compound terms where the functor is the option name.

Availability:

```
logtalk_load(options(loader))
```

Author: Paulo Moura

Version: 1:2:0

Date: 2022-01-03

Compilation flags:

```
static
```

Implements:

```
public options_protocol
```

Uses:

```
list
```

Remarks:

```
(none)
```

Inherited public predicates:

```
check_option/1 check_options/1 default_option/1 default_options/1 option/2 option/3  
valid_option/1 valid_options/1
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

### 1.54.2 options\_protocol

Options protocol.

Availability:

logtalk\_load(options(loader))

Author: Paulo Moura

Version: 1:2:0

Date: 2022-01-03

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - check\_option/1
  - check\_options/1
  - valid\_option/1
  - valid\_options/1
  - default\_option/1
  - default\_options/1
  - option/2
  - option/3
- Protected predicates
  - merge\_options/2
  - fix\_options/2
  - fix\_option/2
- Private predicates
- Operators

## Public predicates

check\_option/1

Succeeds if the option is valid. Throws an error otherwise.

Compilation flags:

static

Template:

check\_option(Option)

Mode and number of proofs:

check\_option(@term) - one\_or\_error

Exceptions:

Option is a variable:

instantiation\_error

Option is neither a variable nor a compound term:

type\_error(compound,Option)

Option is a compound term but not a valid option:

domain\_error(option,Option)

check\_options/1

Succeeds if all the options in a list are valid. Throws an error otherwise.

Compilation flags:

static

Template:

check\_options(Options)

Mode and number of proofs:

check\_options(@term) - one\_or\_error

Exceptions:

Options is a variable:

instantiation\_error

Options is neither a variable nor a list:

type\_error(list,Options)

An element Option of the list Options is a variable:

instantiation\_error

An element Option of the list Options is neither a variable nor a compound term:

type\_error(compound,Option)

An element Option of the list Options is a compound term but not a valid option:

domain\_error(option,Option)

---

valid\_option/1

Succeeds if the option is valid.

Compilation flags:

static

Template:

valid\_option(Option)

Mode and number of proofs:

valid\_option(@term) - zero\_or\_one

---

valid\_options/1

Succeeds if all the options in a list are valid.

Compilation flags:

static

Template:

valid\_options(Options)

Mode and number of proofs:

valid\_options(@term) - one

---

default\_option/1

Enumerates, by backtracking, the default options.

Compilation flags:

static

Template:

default\_option(Option)

Mode and number of proofs:

default\_option(?compound) - zero\_or\_more

---

default\_options/1

Returns a list of the default options.

Compilation flags:

static

Template:

default\_options(Options)

Mode and number of proofs:

default\_options(-list(compound)) - one

---

option/2

True iff Option unifies with the first occurrence of the same option in the Options list.

Compilation flags:

static

Template:

option(Option,Options)

Mode and number of proofs:

option(+compound,+list(compound)) - zero\_or\_one

---

option/3

True iff Option unifies with the first occurrence of the same option in the Options list or, when that is not the case, if Option unifies with Default.

Compilation flags:

static

Template:

option(Option,Options,Default)

Mode and number of proofs:

option(+compound,+list(compound),+compound) - zero\_or\_one

---

## Protected predicates

merge\_options/2

Merges the user options with the default options, returning the final list of options. Calls the fix\_options/2 predicate to preprocess the options after merging. Callers must ensure, if required, that the user options are valid.

Compilation flags:

static

Template:

```
merge_options(UserOptions,Options)
```

Mode and number of proofs:

```
merge_options(+list(compound),-list(compound)) - one
```

---

```
fix_options/2
```

Fixes a list of options, returning the list of options.

Compilation flags:

```
static
```

Template:

```
fix_options(Options,FixedOptions)
```

Mode and number of proofs:

```
fix_options(+list(compound),-list(compound)) - one
```

---

```
fix_option/2
```

Fixes an option.

Compilation flags:

```
static
```

Template:

```
fix_option(Option,FixedOption)
```

Mode and number of proofs:

```
fix_option(+compound,-compound) - zero_or_one
```

---

## Private predicates

(none)

## Operators

(none)

See also:

[options](#)

## 1.55 os

object

### 1.55.1 os

Portable operating-system access predicates.

Availability:

`logtalk_load(os(loader))`

Author: Paulo Moura

Version: 1:101:1

Date: 2024-10-14

Compilation flags:

`static, context_switching_calls`

Implements:

`public osp`

Uses:

`list`

Aliases:

`osp absolute_file_name/2` as `expand_path/2`

Remarks:

- File path expansion: To ensure portability, all file paths are expanded before being handed to the backend Prolog system.
- Exception terms: Currently, there is no standardization of the exception terms thrown by the different backend Prolog systems.
- B-Prolog portability: The `wall_time/1` predicate is not supported.

- CxProlog portability: The `date_time/7` predicate returns zeros for all arguments.
- JIProlog portability: The `file_permission/2` and `command_line_arguments/1` predicates are not supported.
- Quintus Prolog: The `pid/1` and `shell/2` predicates are not supported.
- XSB portability: The `command_line_arguments/1` predicate is not supported.

#### Inherited public predicates:

`absolute_file_name/2` `change_directory/1` `command_line_arguments/1` `copy_file/2` `cpu_time/1`  
`date_time/7` `decompose_file_name/3` `decompose_file_name/4` `delete_directory/1`  
`delete_directory_and_contents/1` `delete_directory_contents/1` `delete_file/1` `directory_exists/1`  
`directory_files/2` `directory_files/3` `ensure_directory/1` `ensure_file/1` `environment_variable/2`  
`file_exists/1` `file_modification_time/2` `file_permission/2` `file_size/2` `full_device_path/1`  
`internal_os_path/2` `is_absolute_file_name/1` `make_directory/1` `make_directory_path/1`  
`null_device_path/1` `operating_system_machine/1` `operating_system_name/1`  
`operating_system_release/1` `operating_system_type/1` `path_concat/3` `pid/1`  
`read_only_device_path/1` `rename_file/2` `shell/1` `shell/2` `sleep/1` `temporary_directory/1`  
`time_stamp/1` `wall_time/1` `working_directory/1`

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

#### Protected predicates

(no local declarations; see entity ancestors if any)

#### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`os_types`

`category`

### 1.55.2 `os_types`

A set of operating-system related types.

Availability:

```
logtalk_load(os(loader))
```

Author: Paulo Moura

Version: 1:4:0

Date: 2021-02-12

Compilation flags:

```
static
```

Provides:

```
type::type/1
```

```
type::check/2
```

Uses:

```
list
```

```
os
```

Remarks:

- **Provided types:** This category adds `file`, `file(Extensions)`, `file(Extensions,Permissions)`, `directory`, `directory(Permissions)`, and `environment_variable` types for type-checking when using the `type` library object.
- **Type `file`:** For checking if a term is an atom and an existing file.
- **Type `file(Extensions)`:** For checking if a term is an atom and an existing file with one of the listed extensions (specified as `'.ext'`).
- **Type `file(Extensions,Permissions)`:** For checking if a term is an atom and an existing file with one of the listed extensions (specified as `'.ext'`) and listed permissions (`{read, write, execute}`).
- **Type `directory`:** For checking if a term is an atom and an existing directory.
- **Type `directory(Permissions)`:** For checking if a term is an atom and an existing directory with the listed permissions (`{read, write, execute}`).
- **Type `environment_variable`:** For checking if a term is an atom and an existing environment variable.

Inherited public predicates:

(none)

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

[osp](#), [os](#), [type](#)

[protocol](#)

### 1.55.3 osp

Portable operating-system access protocol.

Availability:

`logtalk_load(os(loader))`

Author: Paulo Moura

Version: 1:39:0

Date: 2024-10-14

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

- Error handling: Predicates that require a file or directory to exist throw an error when that is not the case. But the exact exception term is currently backend Prolog compiler dependent.

Inherited public predicates:

(none)

- Public predicates
  - pid/1
  - shell/2
  - shell/1
  - is\_absolute\_file\_name/1
  - absolute\_file\_name/2
  - decompose\_file\_name/3
  - decompose\_file\_name/4
  - path\_concat/3
  - internal\_os\_path/2
  - make\_directory/1
  - make\_directory\_path/1
  - delete\_directory/1
  - delete\_directory\_contents/1
  - delete\_directory\_and\_contents/1
  - change\_directory/1
  - working\_directory/1
  - temporary\_directory/1
  - null\_device\_path/1
  - full\_device\_path/1
  - read\_only\_device\_path/1
  - directory\_files/2
  - directory\_files/3
  - directory\_exists/1
  - ensure\_directory/1

- file\_exists/1
  - file\_modification\_time/2
  - file\_size/2
  - file\_permission/2
  - copy\_file/2
  - rename\_file/2
  - delete\_file/1
  - ensure\_file/1
  - environment\_variable/2
  - time\_stamp/1
  - date\_time/7
  - cpu\_time/1
  - wall\_time/1
  - operating\_system\_type/1
  - operating\_system\_name/1
  - operating\_system\_machine/1
  - operating\_system\_release/1
  - command\_line\_arguments/1
  - sleep/1
- Protected predicates
  - Private predicates
  - Operators

## Public predicates

pid/1

Returns the process identifier of the running process.

Compilation flags:

static

Template:

pid(PID)

Mode and number of proofs:

pid(-integer) - one

shell/2

Runs an operating-system shell command and returns its exit status.

Compilation flags:

static

Template:

shell(Command,Status)

Mode and number of proofs:

shell(+atom,-integer) - one

---

shell/1

Runs an operating-system shell command.

Compilation flags:

static

Template:

shell(Command)

Mode and number of proofs:

shell(+atom) - zero\_or\_one

---

is\_absolute\_file\_name/1

True iff the argument is an absolute file path. On POSIX systems, this predicate is true if File starts with a /. On Windows systems, this predicate is true if File starts with a drive letter. No attempt is made to expand File as a path.

Compilation flags:

static

Template:

is\_absolute\_file\_name(File)

Mode and number of proofs:

is\_absolute\_file\_name(+atom) - zero\_or\_one

---

`absolute_file_name/2`

Expands a file name to an absolute file path. An environment variable at the beginning of the file name is also expanded.

Compilation flags:

`static`

Template:

`absolute_file_name(File,Path)`

Mode and number of proofs:

`absolute_file_name(+atom,-atom) - one`

---

`decompose_file_name/3`

Decomposes a file name into its directory (which always ends with a slash; `./` is returned if absent) and its basename (which can be the empty atom).

Compilation flags:

`static`

Template:

`decompose_file_name(File,Directory,Basename)`

Mode and number of proofs:

`decompose_file_name(+atom,?atom,?atom) - one`

---

`decompose_file_name/4`

Decomposes a file name into its directory (which always ends with a slash; `./` is returned if absent), name (that can be the empty atom), and extension (which starts with a `.` when defined; the empty atom otherwise).

Compilation flags:

`static`

Template:

decompose\_file\_name(File,Directory,Name,Extension)

Mode and number of proofs:

decompose\_file\_name(+atom,?atom,?atom,?atom) - one

---

path\_concat/3

Concatenates a path prefix and a path suffix, adding a / separator if required. Returns Suffix when it is an absolute path. Returns Prefix with a trailing / appended if missing when Suffix is the empty atom.

Compilation flags:

static

Template:

path\_concat(Prefix,Suffix,Path)

Mode and number of proofs:

path\_concat(+atom,+atom,--atom) - one

---

internal\_os\_path/2

Converts between the internal path representation (which is backend dependent) and the operating-system native path representation.

Compilation flags:

static

Template:

internal\_os\_path(InternalPath,OSPath)

Mode and number of proofs:

internal\_os\_path(+atom,-atom) - one

internal\_os\_path(-atom,+atom) - one

---

`make_directory/1`

Makes a new directory. Succeeds if the directory already exists.

Compilation flags:

`static`

Template:

`make_directory(Directory)`

Mode and number of proofs:

`make_directory(+atom) - one`

---

`make_directory_path/1`

Makes a new directory creating all the intermediate directories if necessary. Succeeds if the directory already exists.

Compilation flags:

`static`

Template:

`make_directory_path(Directory)`

Mode and number of proofs:

`make_directory_path(+atom) - one`

---

`delete_directory/1`

Deletes an empty directory. Throws an error if the directory does not exist.

Compilation flags:

`static`

Template:

`delete_directory(Directory)`

Mode and number of proofs:

`delete_directory(+atom) - one_or_error`

---

`delete_directory_contents/1`

Deletes directory contents. Throws an error if the directory does not exist.

Compilation flags:

`static`

Template:

`delete_directory_contents(Directory)`

Mode and number of proofs:

`delete_directory_contents(+atom) - one_or_error`

---

`delete_directory_and_contents/1`

Deletes directory and its contents. Throws an error if the directory does not exist.

Compilation flags:

`static`

Template:

`delete_directory_and_contents(Directory)`

Mode and number of proofs:

`delete_directory_and_contents(+atom) - one_or_error`

---

`change_directory/1`

Changes current working directory. Throws an error if the directory does not exist.

Compilation flags:

`static`

Template:

`change_directory(Directory)`

Mode and number of proofs:

`change_directory(+atom) - one_or_error`

---

`working_directory/1`

Current working directory.

Compilation flags:

`static`

Template:

`working_directory(Directory)`

Mode and number of proofs:

`working_directory(?atom) - zero_or_one`

---

`temporary_directory/1`

Temporary directory. Tries first environment variables: TEMP and TMP on Windows systems; TMPDIR, TMP, TEMP, and TEMPDIR on POSIX systems. When not defined, tries default locations. Returns the working directory as last resort.

Compilation flags:

`static`

Template:

`temporary_directory(Directory)`

Mode and number of proofs:

`temporary_directory(?atom) - one`

---

`null_device_path/1`

Null device path: `nul` on Windows systems and `/dev/null` on POSIX systems.

Compilation flags:

`static`

Template:

`null_device_path(Path)`

Mode and number of proofs:

`null_device_path(?atom) - one`

---

`full_device_path/1`

Full device path: `/dev/full` on Linux and BSD systems. Fails on other systems. Experimental.

Compilation flags:

`static`

Template:

`full_device_path(Path)`

Mode and number of proofs:

`full_device_path(?atom) - zero_or_one`

---

`read_only_device_path/1`

Read-only device path: `/dev/urandom` on macOS. Fails on other systems. Experimental.

Compilation flags:

`static`

Template:

`read_only_device_path(Path)`

Mode and number of proofs:

`read_only_device_path(?atom) - zero_or_one`

---

---

`directory_files/2`

Returns a list of all files (including directories, regular files, and hidden directories and files) in a directory. File paths are relative to the directory. Throws an error if the directory does not exist.

Compilation flags:

`static`

Template:

`directory_files(Directory,Files)`

Mode and number of proofs:

`directory_files(+atom,-list(atom)) - one_or_error`

---

`directory_files/3`

Returns a list of files filtered using the given list of options. Invalid options are ignored. Default option values are equivalent to `directory_files/2`. Throws an error if the directory does not exist.

Compilation flags:

`static`

Template:

`directory_files(Directory,Files,Options)`

Mode and number of proofs:

`directory_files(+atom,-list(atom),+list(compound)) - one_or_error`

Remarks:

- Option `paths/1`: Possible values are relative and absolute. Default is relative.
  - Option `type/1`: Possible values are all, regular, directory. Default is all.
  - Option `extensions/1`: Argument is a list of required extensions (using the format `'.ext'`). Default is the empty list.
  - Option `prefixes/1`: Argument is a list of required file prefixes (atoms). Default is the empty list.
  - Option `suffixes/1`: Argument is a list of required file suffixes (atoms). Default is the empty list.
  - Option `dot_files/1`: Possible values are true and false. Default is true.
-

directory\_exists/1

True if the specified directory exists (irrespective of directory permissions).

Compilation flags:

static

Template:

directory\_exists(Directory)

Mode and number of proofs:

directory\_exists(+atom) - zero\_or\_one

---

ensure\_directory/1

Ensures that a directory exists, creating it if necessary.

Compilation flags:

static

Template:

ensure\_directory(Directory)

Mode and number of proofs:

ensure\_directory(+atom) - one

---

file\_exists/1

True if the specified file exists and is a regular file (irrespective of file permissions).

Compilation flags:

static

Template:

file\_exists(File)

Mode and number of proofs:

file\_exists(+atom) - zero\_or\_one

---

`file_modification_time/2`

File modification time (which can be used for comparison). Throws an error if the file does not exist.

Compilation flags:

`static`

Template:

`file_modification_time(File,Time)`

Mode and number of proofs:

`file_modification_time(+atom,-integer) - one_or_error`

---

`file_size/2`

File size (in bytes). Throws an error if the file does not exist.

Compilation flags:

`static`

Template:

`file_size(File,Size)`

Mode and number of proofs:

`file_size(+atom,-integer) - one_or_error`

---

`file_permission/2`

True iff the specified file has the specified permission (read, write, or execute). Throws an error if the file does not exist.

Compilation flags:

`static`

Template:

`file_permission(File,Permission)`

Mode and number of proofs:

`file_permission(+atom,+atom) - zero_or_one_or_error`

---

copy\_file/2

Copies a file. Throws an error if the original file does not exist or if the copy cannot be created.

Compilation flags:

static

Template:

copy\_file(File,Copy)

Mode and number of proofs:

copy\_file(+atom,+atom) - one\_or\_error

---

rename\_file/2

Renames a file or a directory. Throws an error if the file or directory does not exist.

Compilation flags:

static

Template:

rename\_file(Old,New)

Mode and number of proofs:

rename\_file(+atom,+atom) - one\_or\_error

---

delete\_file/1

Deletes a file. Throws an error if the file does not exist.

Compilation flags:

static

Template:

delete\_file(File)

Mode and number of proofs:

`delete_file(+atom) - one_or_error`

---

`ensure_file/1`

Ensures that a file exists, creating it if necessary.

Compilation flags:

`static`

Template:

`ensure_file(File)`

Mode and number of proofs:

`ensure_file(+atom) - one`

---

`environment_variable/2`

Returns an environment variable value. Fails if the variable does not exist.

Compilation flags:

`static`

Template:

`environment_variable(Variable,Value)`

Mode and number of proofs:

`environment_variable(+atom,?atom) - zero_or_one`

---

`time_stamp/1`

Returns a system-dependent time stamp, which can be used for sorting, but should be regarded otherwise as an opaque term.

Compilation flags:

`static`

---

Template:

time\_stamp(Time)

Mode and number of proofs:

time\_stamp(-ground) - one

---

date\_time/7

Returns the current date and time. Note that most backends do not provide sub-second accuracy and in those cases the value of the Milliseconds argument is always zero.

Compilation flags:

static

Template:

date\_time(Year,Month,Day,Hours,Minutes,Seconds,Milliseconds)

Mode and number of proofs:

date\_time(-integer,-integer,-integer,-integer,-integer,-integer) - one

---

cpu\_time/1

System cpu time in seconds.

Compilation flags:

static

Template:

cpu\_time(Seconds)

Mode and number of proofs:

cpu\_time(-number) - one

---

wall\_time/1

Wall time in seconds.

Compilation flags:

static

Template:

wall\_time(Seconds)

Mode and number of proofs:

wall\_time(-number) - one

---

operating\_system\_type/1

Operating system type. Possible values are unix, windows, and unknown.

Compilation flags:

static

Template:

operating\_system\_type(Type)

Mode and number of proofs:

operating\_system\_type(?atom) - zero\_or\_one

---

operating\_system\_name/1

Operating system name. On POSIX systems, it returns the value of `uname -s`. On Windows systems, it returns 'Windows'.

Compilation flags:

static

Template:

operating\_system\_name(Name)

Mode and number of proofs:

operating\_system\_name(?atom) - zero\_or\_one

---

`operating_system_machine/1`

Operating system hardware platform. On POSIX systems, it returns the value of `uname -m`. On Windows systems, it returns the value of the `PROCESSOR_ARCHITECTURE` environment variable.

Compilation flags:

`static`

Template:

`operating_system_machine(Machine)`

Mode and number of proofs:

`operating_system_machine(?atom) - zero_or_one`

---

`operating_system_release/1`

Operating system release. On POSIX systems, it returns the value of `uname -r`. On Windows systems, it uses WMI code.

Compilation flags:

`static`

Template:

`operating_system_release(Release)`

Mode and number of proofs:

`operating_system_release(?atom) - zero_or_one`

---

`command_line_arguments/1`

Returns a list with the command line arguments that occur after `--`.

Compilation flags:

`static`

Template:

command\_line\_arguments(Arguments)

Mode and number of proofs:

command\_line\_arguments(-list(atom)) - one

---

sleep/1

Suspends execution the given number of seconds.

Compilation flags:

static

Template:

sleep(Seconds)

Mode and number of proofs:

sleep(+number) - one

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

os, os\_types

## 1.56 packs

protocol

### 1.56.1 pack\_protocol

Pack specification protocol. Objects implementing this protocol should be named after the pack with a `_pack` suffix and saved in a file with the same name as the object.

Availability:

```
logtalk_load(packs(loader))
```

Author: Paulo Moura

Version: 0:17:0

Date: 2024-02-29

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - name/1
  - description/1
  - license/1
  - home/1
  - version/6
  - note/3
- Protected predicates
- Private predicates
- Operators

---

**Public predicates**

name/1

Pack name.

Compilation flags:  
staticTemplate:  
name(Name)Mode and number of proofs:  
name(?atom) - zero\_or\_one

---

description/1

Pack one line description.

Compilation flags:  
staticTemplate:  
description(Description)Mode and number of proofs:  
description(?atom) - zero\_or\_one

---

license/1Pack license. Specified using the identifier from the SPDX License List (<https://spdx.org/licenses/>) when possible.Compilation flags:  
staticTemplate:  
license(License)

Mode and number of proofs:

license(?atom) - zero\_or\_one

---

home/1

Pack home HTTPS or file URL.

Compilation flags:

static

Template:

home(Home)

Mode and number of proofs:

home(?atom) - zero\_or\_one

---

version/6

Table of available versions.

Compilation flags:

static

Template:

version(Version,Status,URL,Checksum,Dependencies,Portability)

Mode and number of proofs:

version(?compound,?atom,-atom,-pair(atom,atom),-list(pair(atom,callable)),?atom) - zero\_or\_more  
version(?compound,?atom,-atom,-pair(atom,atom),-list(pair(atom,callable)),-list(atom)) -  
zero\_or\_more

Remarks:

- Version: This argument uses the same format as entity versions: Major:Minor:Patch. Semantic versioning should be used.
- Status: Version development status. E.g stable, rc, beta, alpha, or deprecated.
- URL: File URL for a local directory, file URL for a local archive, download HTTPS URL for the pack archive, or download git archive URL for the pack archive.
- Checksum: A pair where the key is the hash algorithm and the value is the checksum. Currently, the hash algorithm must be sha256. For file:// URLs of local directories, use none instead of a pair.

- **Dependencies:** Pack dependencies list. Each dependency is a Dependency Operator Version term. Operator is a term comparison operator. Valid Dependency values are Registry::Pack, os(Name,Machine), logtalk, and a backend identifier atom.
  - **Portability:** Either the atom all or a list of the supported backend Prolog compilers (using the identifier atoms used by the prolog\_dialect flag).
  - **Clause order:** Versions must be listed ordered from newest to oldest.
- 

note/3

Table of notes per action and version.

Compilation flags:

static

Template:

note(Action,Version,Note)

Mode and number of proofs:

note(?atom,?term,-atom) - zero\_or\_more

Remarks:

- **Action:** Possible values are install, update, and uninstall. When unbound, the note apply to all actions.
  - **Version:** Version acted on (i.e. version being installed, updated to, or uninstalled). When unbound, the note apply to all versions.
  - **Note:** Note to print when performing an action on a pack version.
- 

### Protected predicates

(none)

### Private predicates

(none)

## Operators

(none)

object

### 1.56.2 packs

Pack handling predicates.

Availability:

`logtalk_load(packs(loader))`

Author: Paulo Moura

Version: 0:80:0

Date: 2024-10-16

Compilation flags:

`static, context_switching_calls`

Imports:

`public packs_common`

`public options`

Uses:

`list`

`logtalk`

`os`

`registries`

`type`

`user`

Remarks:

(none)

Inherited public predicates:

`check_option/1 check_options/1 default_option/1 default_options/1 directory/1 directory/2  
help/0 logtalk_packs/0 logtalk_packs/1 option/2 option/3 pin/0 pin/1 pinned/1 prefix/0  
prefix/1 readme/1 readme/2 reset/0 setup/0 unpin/0 unpin/1 valid_option/1 valid_options/1  
verify_commands_availability/0`

- Public predicates
  - available/2

- available/1
- available/0
- installed/4
- installed/3
- installed/1
- installed/0
- outdated/4
- outdated/1
- outdated/0
- orphaned/2
- orphaned/0
- versions/3
- describe/2
- describe/1
- search/1
- install/4
- install/3
- install/2
- install/1
- update/3
- update/2
- update/1
- update/0
- uninstall/2
- uninstall/1
- uninstall/0
- clean/2
- clean/1
- clean/0
- save/2
- save/1
- restore/2
- restore/1
- dependents/3
- dependents/2

- dependents/1
- lint/2
- lint/1
- lint/0
- Protected predicates
- Private predicates
- Operators

### Public predicates

available/2

Enumerates, by backtracking, all available packs.

Compilation flags:

static

Template:

available(Registry,Pack)

Mode and number of proofs:

available(?atom,?atom) - zero\_or\_more

Exceptions:

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

available/1

Lists all the packs that are available for installation from the given registry.

Compilation flags:

static

Template:

available(Registry)

Mode and number of proofs:

available(+atom) - one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

---

available/0

Lists all the packs that are available for installation from all defined registries.

Compilation flags:

static

Mode and number of proofs:

available - one

---

installed/4

Enumerates by backtracking all installed packs.

Compilation flags:

static

Template:

installed(Registry,Pack,Version,Pinned)

Mode and number of proofs:

installed(?atom,?atom,?compound,?boolean) - zero\_or\_more

Exceptions:

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

Version is neither a variable nor a compound term:

type\_error(compound,Version)

---

Pinned is neither a variable nor a boolean:  
`type_error(boolean,Pinned)`

---

installed/3

Enumerates by backtracking all installed packs.

Compilation flags:  
static

Template:  
installed(Registry,Pack,Version)

Mode and number of proofs:  
installed(?atom,?atom,?compound) - zero\_or\_more

Exceptions:  
Registry is neither a variable nor an atom:  
`type_error(atom,Registry)`  
Pack is neither a variable nor an atom:  
`type_error(atom,Pack)`  
Version is neither a variable nor a compound term:  
`type_error(compound,Version)`

---

installed/1

Lists all the packs that are installed from the given registry. Fails if the registry is unknown.

Compilation flags:  
static

Template:  
installed(Registry)

Mode and number of proofs:  
installed(+atom) - zero\_or\_one

Exceptions:  
Registry is a variable:

---

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

---

installed/0

Lists all the packs that are installed.

Compilation flags:

static

Mode and number of proofs:

installed - one

---

outdated/4

Enumerates by backtracking all installed but outdated packs (together with the current version installed and the latest version available).

Compilation flags:

static

Template:

outdated(Registry,Pack,Version,LatestVersion)

Mode and number of proofs:

outdated(?atom,?atom,?compound,?compound) - zero\_or\_more

Exceptions:

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

Version is neither a variable nor a compound term:

type\_error(compound,Version)

LatestVersion is neither a variable nor a compound term:

type\_error(compound,LatestVersion)

---

outdated/1

Lists all the packs from the given registry that are installed but outdated.

Compilation flags:

static

Template:

outdated(Registry)

Mode and number of proofs:

outdated(+atom) - one

Exceptions:

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

---

outdated/0

Lists all the packs that are installed but outdated.

Compilation flags:

static

Mode and number of proofs:

outdated - one

---

orphaned/2

Lists all the packs that are installed but whose registry is no longer defined.

Compilation flags:

static

Template:

orphaned(Registry,Pack)

Mode and number of proofs:

---

orphaned(?atom,?atom) - zero\_or\_more

Exceptions:

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

orphaned/0

Lists all the packs that are installed but whose registry is no longer defined.

Compilation flags:

static

Mode and number of proofs:

orphaned - one

---

versions/3

Returns a list of all available pack versions. Fails if the pack is unknown.

Compilation flags:

static

Template:

versions(Registry,Pack,Versions)

Mode and number of proofs:

versions(+atom,+atom,-list) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is a variable:

instantiation\_error

---

Pack is neither a variable nor an atom:  
type\_error(atom,Pack)

---

describe/2

Describes a registered pack, including installed version if applicable. Fails if the pack is unknown.

Compilation flags:  
static

Template:

describe(Registry,Pack)

Mode and number of proofs:

describe(+atom,+atom) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

describe/1

Describes a registered pack, including installed version if applicable. Fails if the pack is unknown.

Compilation flags:  
static

Template:

describe(Pack)

Mode and number of proofs:

describe(+atom) - zero\_or\_one

---

Exceptions:

Pack is a variable:

`instantiation_error`

Pack is neither a variable nor an atom:

`type_error(atom, Pack)`

---

`search/1`

Searches packs whose name or description includes the search term (case sensitive).

Compilation flags:

`static`

Template:

`search(Term)`

Mode and number of proofs:

`search(+atom) - one`

Exceptions:

Term is a variable:

`instantiation_error`

Term is neither a variable nor an atom:

`type_error(atom, Term)`

---

`install/4`

Installs a new pack using the specified options. Fails if the pack is unknown or already installed but not using `update(true)` or `force(true)` options. Fails also if the pack version is unknown.

Compilation flags:

`static`

Template:

`install(Registry, Pack, Version, Options)`

Mode and number of proofs:

`install(+atom, +atom, ++compound, ++list(compound)) - zero_or_one`

---

Exceptions:

Registry is a variable:

`instantiation_error`

Registry is neither a variable nor an atom:

`type_error(atom,Registry)`

Pack is a variable:

`instantiation_error`

Pack is neither a variable nor an atom:

`type_error(atom,Pack)`

Version is a variable:

`instantiation_error`

Version is neither a variable nor a valid version:

`type_error(pack_version,Version)`

Options is a variable:

`instantiation_error`

Options is neither a variable nor a list:

`type_error(list,Options)`

An element Option of the list Options is a variable:

`instantiation_error`

An element Option of the list Options is neither a variable nor a compound term:

`type_error(compound,Option)`

An element Option of the list Options is a compound term but not a valid option:

`domain_error(option,Option)`

Remarks:

- `update(Boolean)` option: Update pack if already installed. Default is false. Overrides the `force/1` option.
- `force(Boolean)` option: Force pack re-installation if already installed. Default is false.
- `compatible(Boolean)` option: Restrict installation to compatible packs. Default is true.
- `clean(Boolean)` option: Clean pack archive after installation. Default is false.
- `verbose(Boolean)` option: Verbose installing steps. Default is false.
- `checksum(Boolean)` option: Verify pack archive checksum. Default is true.
- `checksig(Boolean)` option: Verify pack archive signature. Default is false.
- `git(Atom)` option: Extra command-line options. Default is ''.
- `downloader(Atom)` option: Downloader utility. Either `curl` or `wget`. Default is `curl`.
- `curl(Atom)` option: Extra command-line options. Default is ''.
- `wget(Atom)` option: Extra command-line options. Default is ''.
- `gpg(Atom)` option: Extra command-line options. Default is ''.
- `tar(Atom)` option: Extra command-line options. Default is ''.

---

### install/3

Installs the specified version of a pack from the given registry using default options. Fails if the pack is already installed or unknown. Fails also if the pack version is unknown.

Compilation flags:

static

Template:

install(Registry,Pack,Version)

Mode and number of proofs:

install(+atom,+atom,?compound) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

Version is a variable:

instantiation\_error

Version is neither a variable nor a valid version:

type\_error(pack\_version,Version)

---

### install/2

Installs the latest version of a pack from the given registry using default options. Fails if the pack is already installed or unknown.

Compilation flags:

static

Template:

install(Registry,Pack)

Mode and number of proofs:

install(+atom,+atom) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

install/1

Installs a pack (if its name is unique among all registries) using default options. Fails if the pack is already installed or unknown. Fails also if the pack is available from multiple registries.

Compilation flags:

static

Template:

install(Pack)

Mode and number of proofs:

install(+atom) - zero\_or\_one

Exceptions:

Pack is a variable:

instantiation\_error

Pack is not an atom:

type\_error(atom,Pack)

---

update/3

Updates an outdated pack to the specified version using the specified options. Fails if the pack or the pack version is unknown or if the pack is not installed. Fails also if the pack is orphaned or pinned and not using a force(true) option.

Compilation flags:

static

Template:

```
update(Pack,Version,Options)
```

Mode and number of proofs:

```
update(+atom,++callable,++list(callable)) - zero_or_one
```

Exceptions:

Pack is a variable:

```
instantiation_error
```

Pack is neither a variable nor an atom:

```
type_error(atom,Pack)
```

Version is a variable:

```
instantiation_error
```

Version is neither a variable nor a valid version:

```
type_error(pack_version,Version)
```

Options is a variable:

```
instantiation_error
```

Options is neither a variable nor a list:

```
type_error(list,Options)
```

An element Option of the list Options is a variable:

```
instantiation_error
```

An element Option of the list Options is neither a variable nor a compound term:

```
type_error(compound,Option)
```

An element Option of the list Options is a compound term but not a valid option:

```
domain_error(option,Option)
```

Remarks:

- `install(Boolean)` option: Install pack latest version if not already installed. Default is false.
- `force(Boolean)` option: Force update if the pack is pinned or breaks installed packs. Default is false.
- `compatible(Boolean)` option: Restrict updating to compatible packs. Default is true.
- `clean(Boolean)` option: Clean pack archive after updating. Default is false.
- `verbose(Boolean)` option: Verbose updating steps. Default is false.
- `checksum(Boolean)` option: Verify pack archive checksum. Default is true.
- `checksig(Boolean)` option: Verify pack archive signature. Default is false.
- `git(Atom)` option: Extra command-line options. Default is ''.
- `downloader(Atom)` option: Downloader utility. Either curl or wget. Default is curl.
- `curl(Atom)` option: Extra command-line options. Default is ''.
- `wget(Atom)` option: Extra command-line options. Default is ''.
- `gpg(Atom)` option: Extra command-line options. Default is ''.
- `tar(Atom)` option: Extra command-line options. Default is ''.

update/2

Updates an outdated pack to its latest version using the specified options. Fails if the pack is orphaned, unknown, or not installed. Fails also if the pack is pinned and not using a force(true) option.

Compilation flags:

static

Template:

update(Pack,Options)

Mode and number of proofs:

update(+atom,++list(callable)) - zero\_or\_one

Exceptions:

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

Options is a variable:

instantiation\_error

Options is neither a variable nor a list:

type\_error(list,Options)

An element Option of the list Options is a variable:

instantiation\_error

An element Option of the list Options is neither a variable nor a compound term:

type\_error(compound,Option)

An element Option of the list Options is a compound term but not a valid option:

domain\_error(option,Option)

Remarks:

- install(Boolean) option: Install pack latest version if not already installed. Default is false.
- force(Boolean) option: Force update if the pack is pinned or breaks installed packs. Default is false.
- compatible(Boolean) option: Restrict updating to compatible packs. Default is true.
- clean(Boolean) option: Clean pack archive after updating. Default is false.
- verbose(Boolean) option: Verbose updating steps. Default is false.
- checksum(Boolean) option: Verify pack archive checksum. Default is true.
- checksig(Boolean) option: Verify pack archive signature. Default is false.
- git(Atom) option: Extra command-line options. Default is ''.
- downloader(Atom) option: Downloader utility. Either curl or wget. Default is curl.
- curl(Atom) option: Extra command-line options. Default is ''.

- `wget(Atom)` option: Extra command-line options. Default is ''.
  - `gpg(Atom)` option: Extra command-line options. Default is ''.
  - `tar(Atom)` option: Extra command-line options. Default is ''.
- 

#### update/1

Updates an outdated pack to its latest version using default options. Fails if the pack is pinned, orphaned, not installed, unknown, or breaks installed packs.

Compilation flags:

`static`

Template:

`update(Pack)`

Mode and number of proofs:

`update(+atom) - zero_or_one`

Exceptions:

Pack is a variable:

`instantiation_error`

Pack is neither a variable nor an atom:

`type_error(atom,Pack)`

---

#### update/0

Updates all outdated packs (that are not pinned) using default options.

Compilation flags:

`static`

Mode and number of proofs:

`update - zero_or_one`

---

uninstall/2

Uninstalls a pack using the specified options. Fails if the pack is unknown or not installed. Fails also if the pack is pinned or have dependents and not using a force(true) option.

Compilation flags:

static

Template:

uninstall(Pack,Options)

Mode and number of proofs:

uninstall(+atom,++list(compound)) - zero\_or\_one

Exceptions:

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

Options is a variable:

instantiation\_error

Options is neither a variable nor a list:

type\_error(list,Options)

An element Option of the list Options is a variable:

instantiation\_error

An element Option of the list Options is neither a variable nor a compound term:

type\_error(compound,Option)

An element Option of the list Options is a compound term but not a valid option:

domain\_error(option,Option)

Remarks:

- force(Boolean) option: Force deletion if the pack is pinned. Default is false.
- clean(Boolean) option: Clean pack archive after deleting. Default is false.
- verbose(Boolean) option: Verbose uninstalling steps. Default is false.

uninstall/1

Uninstalls a pack using default options. Fails if the pack is pinned, have dependents, not installed, or unknown.

Compilation flags:

static

Template:

uninstall(Pack)

Mode and number of proofs:

uninstall(+atom) - zero\_or\_one

Exceptions:

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

uninstall/0

Uninstalls all packs using the force(true) option.

Compilation flags:

static

Mode and number of proofs:

uninstall - zero\_or\_one

---

clean/2

Cleans all pack archives. Fails if the the pack is unknown.

Compilation flags:

static

Template:

`clean(Registry,Pack)`

Mode and number of proofs:

`clean(+atom,+atom) - zero_or_one`

Exceptions:

Registry is a variable:

`instantiation_error`

Registry is neither a variable nor an atom:

`type_error(atom,Registry)`

Pack is a variable:

`instantiation_error`

Pack is neither a variable nor an atom:

`type_error(atom,Pack)`

---

`clean/1`

Cleans all pack archives. Fails if the pack is unknown.

Compilation flags:

`static`

Template:

`clean(Pack)`

Mode and number of proofs:

`clean(+atom) - zero_or_one`

Exceptions:

Pack is a variable:

`instantiation_error`

Pack is neither a variable nor an atom:

`type_error(atom,Pack)`

---

---

clean/0

Cleans all archives for all packs.

Compilation flags:

static

Mode and number of proofs:

clean - one

---

save/2

Saves a list of all installed packs and registries plus pinning status to a file using the given options. Registries without installed packs are saved when using the option `save(all)` and skipped when using the option `save(installed)` (default).

Compilation flags:

static

Template:

`save(File,Options)`

Mode and number of proofs:

`save(+atom,++list(compound)) - one_or_error`

Exceptions:

File is a variable:

`instantiation_error`

File is neither a variable nor an atom:

`type_error(atom,File)`

File is an existing file but cannot be written:

`permission_error(open,source_sink,File)`

Options is a variable:

`instantiation_error`

Options is neither a variable nor a list:

`type_error(list,Options)`

An element Option of the list Options is a variable:

`instantiation_error`

An element Option of the list Options is neither a variable nor a compound term:

`type_error(compound,Option)`

An element Option of the list Options is a compound term but not a valid option:

`domain_error(option,Option)`

save/1

Saves a list of all installed packs and their registries plus pinning status to a file using default options.

Compilation flags:

static

Template:

save(File)

Mode and number of proofs:

save(+atom) - one\_or\_error

Exceptions:

File is a variable:

instantiation\_error

File is neither a variable nor an atom:

type\_error(atom,File)

File is an existing file but cannot be written:

permission\_error(open,source\_sink,File)

---

restore/2

Restores a list of registries and packs plus their pinning status from a file using the given options. Fails if restoring is not possible.

Compilation flags:

static

Template:

restore(File,Options)

Mode and number of proofs:

restore(+atom,++list(compound)) - zero\_or\_one\_or\_error

Exceptions:

File is a variable:

instantiation\_error

File is neither a variable nor an atom:

```

    type_error(atom,File)
File is an atom but not an existing file:
    existence_error(file,File)
File is an existing file but cannot be read:
    permission_error(open,source_sink,File)
Options is a variable:
    instantiation_error
Options is neither a variable nor a list:
    type_error(list,Options)
An element Option of the list Options is a variable:
    instantiation_error
An element Option of the list Options is neither a variable nor a compound term:
    type_error(compound,Option)
An element Option of the list Options is a compound term but not a valid option:
    domain_error(option,Option)

```

Remarks:

- `force(Boolean)` option: Force restoring if a registry is already defined or a pack is already installed. Default is true.
- `compatible(Boolean)` option: Restrict installation to compatible packs. Default is true.
- `clean(Boolean)` option: Clean registry and pack archives after restoring. Default is false.
- `verbose(Boolean)` option: Verbose restoring steps. Default is false.
- `checksum(Boolean)` option: Verify pack archive checksums. Default is true.
- `checksig(Boolean)` option: Verify pack archive signatures. Default is false.
- `git(Atom)` option: Extra command-line options. Default is ''.
- `downloader(Atom)` option: Downloader utility. Either curl or wget. Default is curl.
- `curl(Atom)` option: Extra command-line options. Default is ''.
- `wget(Atom)` option: Extra command-line options. Default is ''.
- `gpg(Atom)` option: Extra command-line options. Default is ''.
- `tar(Atom)` option: Extra command-line options. Default is ''.

---

restore/1

Restores a list of registries and packs plus their pinning status from a file using default options. Fails if restoring is not possible.

Compilation flags:

```
static
```

Template:

restore(File)

Mode and number of proofs:

restore(+atom) - zero\_or\_one\_or\_error

Exceptions:

File is a variable:

instantiation\_error

File is neither a variable nor an atom:

type\_error(atom,File)

File is an atom but not an existing file:

existence\_error(file,File)

File is an existing file but cannot be read:

permission\_error(open,source\_sink,File)

---

dependents/3

Returns a list of all installed packs that depend on the given pack from the given registry. Fails if the pack is unknown.

Compilation flags:

static

Template:

dependents(Registry,Pack,Dependents)

Mode and number of proofs:

dependents(+atom,+atom,-list(atom)) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

---

dependents/2

Prints a list of all installed packs that depend on the given pack from the given registry. Fails if the pack is unknown.

Compilation flags:

static

Template:

dependents(Registry,Pack)

Mode and number of proofs:

dependents(+atom,+atom) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

dependents/1

Prints a list of all installed packs that depend on the given pack if unique from all defined registries. Fails if the pack is unknown or available from multiple registries.

Compilation flags:

static

Template:

dependents(Pack)

Mode and number of proofs:

dependents(+atom) - zero\_or\_one

Exceptions:

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

`type_error(atom,Pack)`

---

lint/2

Checks the pack specification. Fails if the pack is unknown or if linting detects errors.

Compilation flags:

`static`

Template:

`lint(Registry,Pack)`

Mode and number of proofs:

`lint(+atom,+atom) - zero_or_one`

Exceptions:

Registry is a variable:

`instantiation_error`

Registry is neither a variable nor an atom:

`type_error(atom,Registry)`

Pack is a variable:

`instantiation_error`

Pack is neither a variable nor an atom:

`type_error(atom,Pack)`

---

lint/1

Checks the pack specification. Fails if the pack is unknown, or available from multiple registries, or if linting detects errors.

Compilation flags:

`static`

Template:

`lint(Pack)`

Mode and number of proofs:

`lint(+atom) - zero_or_one`

---

Exceptions:

Pack is a variable:

instantiation\_error

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

lint/0

Checks all pack specifications.

Compilation flags:

static

Mode and number of proofs:

lint - one

---

### **Protected predicates**

(no local declarations; see entity ancestors if any)

### **Private predicates**

(no local declarations; see entity ancestors if any)

### **Operators**

(none)

category

### **1.56.3 packs\_common**

Common predicates for the packs tool objects.

Availability:

logtalk\_load(packs(loader))

Author: Paulo Moura

Version: 0:32:1

Date: 2024-10-13

Compilation flags:

static

Provides:

type::type/1

type::check/2

Uses:

list

logtalk

os

type

user

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - setup/0
  - reset/0
  - verify\_commands\_availability/0
  - help/0
  - pin/1
  - pin/0
  - unpin/1
  - unpin/0
  - pinned/1
  - directory/2
  - directory/1
  - readme/2
  - readme/1
  - logtalk\_packs/1
  - logtalk\_packs/0

- prefix/1
- prefix/0
- Protected predicates
  - readme\_file\_path/2
  - print\_readme\_file\_path/1
  - command/2
  - load\_registry/1
  - tar\_command/1
  - supported\_archive/1
  - supported\_url\_archive/1
  - decode\_url\_spaces/2
- Private predicates
- Operators

### Public predicates

setup/0

Ensures that registries and packs directory structure exists. Preserves any defined registries and installed packs.

Compilation flags:

static

Mode and number of proofs:

setup - one

---

reset/0

Resets registries and packs directory structure. Deletes any defined registries and installed packs.

Compilation flags:

static

Mode and number of proofs:

reset - one

verify\_commands\_availability/0

Verifies required shell commands availability. Fails printing an error message if a command is missing.

Compilation flags:

static

Mode and number of proofs:

verify\_commands\_availability - zero\_or\_one

---

help/0

Provides help about the main predicates.

Compilation flags:

static

Mode and number of proofs:

help - one

---

pin/1

Pins a resource (pack or registry) preventing it from being updated, uninstalled, or deleted. Fails if the resource is not found.

Compilation flags:

static

Template:

pin(Resource)

Mode and number of proofs:

pin(+atom) - zero\_or\_one

Exceptions:

Resource is a variable:

instantiation\_error

Resource is neither a variable nor an atom:

type\_error(atom,Resource)

---

pin/0

Pins all resource (packs or registries) preventing them from being updated, uninstalled, or deleted. Note that resources added after calling this predicate will not be pinned.

Compilation flags:

static

Mode and number of proofs:

pin - one

---

unpin/1

Unpins a resource (pack or registry), allowing it to be updated, uninstalled, or deleted. Fails if the resource is not found.

Compilation flags:

static

Template:

unpin(Resource)

Mode and number of proofs:

unpin(+atom) - zero\_or\_one

Exceptions:

Resource is a variable:

instantiation\_error

Resource is neither a variable nor an atom:

type\_error(atom,Resource)

---

unpin/0

Unpins all resources (packs or registries), allowing them to be updated, uninstalled, or deleted.

Compilation flags:

static

Mode and number of proofs:

unpin - one

---

pinned/1

True iff the resource (pack or registry) is defined or installed and if it is pinned.

Compilation flags:

static

Template:

pinned(Resource)

Mode and number of proofs:

pinned(+atom) - zero\_or\_one

Exceptions:

Resource is a variable:

instantiation\_error

Resource is neither a variable nor an atom:

type\_error(atom,Resource)

---

directory/2

Enumerates by backtracking all packs or registries and respective installation or definition directories (using the internal backend format).

Compilation flags:

static

Template:

directory(Resource,Directory)

Mode and number of proofs:

directory(?atom,?atom) - zero\_or\_more

Exceptions:

Resource is neither a variable nor an atom:

type\_error(atom,Resource)

Directory is neither a variable nor an atom:

type\_error(atom,Directory)

---

directory/1

Prints the directory where the registry or the pack is installed (using the native operating-system format).

Compilation flags:

static

Template:

directory(Resource)

Mode and number of proofs:

directory(+atom) - zero\_or\_one

Exceptions:

Resource is a variable:

instantiation\_error

Resource is neither a variable nor an atom:

type\_error(atom,Resource)

---

readme/2

Returns the path to the resource (pack or registry) readme file (using the internal backend format). Fails if the resource is not defined or installed or if no readme file is found for it.

Compilation flags:

static

Template:

readme(Resource,ReadMeFile)

Mode and number of proofs:

readme(+atom,-atom) - zero\_or\_one

Exceptions:

Resource is a variable:

instantiation\_error

Resource is neither a variable nor an atom:

type\_error(atom,Resource)

ReadMeFile is neither a variable nor an atom:

type\_error(atom,ReadMeFile)

---

readme/1

Prints the path to the resource (pack or registry) readme file (using the native operating-system format). Fails if the resource is not defined or installed or if no readme file is found for it.

Compilation flags:

static

Template:

readme(Resource)

Mode and number of proofs:

readme(+atom) - zero\_or\_one

Exceptions:

Resource is a variable:

instantiation\_error

Resource is neither a variable nor an atom:

type\_error(atom,Resource)

---

logtalk\_packs/1

Returns the directory prefix (using the internal backend format) where the registries, packs, and archives are installed.

Compilation flags:

static

Template:

logtalk\_packs(LogtalkPacks)

Mode and number of proofs:

logtalk\_packs(-atom) - one

Exceptions:

LogtalkPacks is neither a variable nor an atom:

type\_error(atom,LogtalkPacks)

---

logtalk\_packs/0

Prints the directory prefix (using the native operating-system format) where the registries, packs, and archives are installed.

Compilation flags:

static

Mode and number of proofs:

logtalk\_packs - one

---

prefix/1

Returns the directory prefix (using the internal backend format) where the registries or packs are installed.

Compilation flags:

static

Template:

prefix(Prefix)

Mode and number of proofs:

prefix(-atom) - one

Exceptions:

Prefix is neither a variable nor an atom:

type\_error(atom,Prefix)

---

prefix/0

Prints the directory prefix (using the native operating-system format) where the registries or packs are installed.

Compilation flags:

static

Mode and number of proofs:

prefix - one

---

## Protected predicates

readme\_file\_path/2

Returns the absolute path for the given directory readme file if it exists.

Compilation flags:

static

Template:

readme\_file\_path(Directory,ReadMeFile)

Mode and number of proofs:

readme\_file\_path(+atom,-atom) - zero\_or\_one

Remarks:

- Valid file names: Case variations of README and NOTES with or without a .md or .txt extension. The recommended file name is README.md.
-

`print_readme_file_path/1`

Prints the absolute path for the given directory readme file if it exists. Succeeds otherwise.

Compilation flags:

`static`

Template:

`print_readme_file_path(Directory)`

Mode and number of proofs:

`print_readme_file_path(+atom) - one`

---

`command/2`

Executes a shell command. Prints an error message and fails if the command fails.

Compilation flags:

`static`

Template:

`command(Command,FailureMessage)`

Mode and number of proofs:

`command(+atom,@nonvar) - zero_or_one`

---

`load_registry/1`

Loads all registry files from the given directory.

Compilation flags:

`static`

Template:

`load_registry(Directory)`

Mode and number of proofs:

`load_registry(+atom) - zero_or_one`

---

tar\_command/1

Returns the name of the tar command to be used depending on the operating-system.

Compilation flags:

static

Template:

tar\_command(Command)

Mode and number of proofs:

tar\_command(-atom) - one

---

supported\_archive/1

True iff the archive format is supported.

Compilation flags:

static

Template:

supported\_archive(Extension)

Mode and number of proofs:

supported\_archive(+atom) - zero\_or\_one

---

supported\_url\_archive/1

True iff the URL archive is supported.

Compilation flags:

static

Template:

supported\_url\_archive(URL)

Mode and number of proofs:

supported\_url\_archive(+atom) - zero\_or\_one

---

decode\_url\_spaces/2

Decodes encoded spaces (%20) in URLs to spaces.

Compilation flags:

static

Template:

decode\_url\_spaces(URL,Decoded)

Mode and number of proofs:

decode\_url\_spaces(+atom,-atom) - one

---

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

category

### 1.56.4 packs\_messages

Packs default message translations.

Availability:

logtalk\_load(packs(loader))

Author: Paulo Moura

Version: 0:37:0

Date: 2024-10-16

Compilation flags:

static

Provides:

logtalk::message\_prefix\_stream/4

logtalk::message\_tokens//2

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.56.5 packs\_specs\_hook

Hook object for filtering registry and pack specification file contents.

Availability:

logtalk\_load(packs(loader))

Author: Paulo Moura

Version: 0:13:0

Date: 2022-06-28

Compilation flags:

static, context\_switching\_calls

Implements:

public expanding

Uses:

character

logtalk

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.56.6 registries

Registry handling predicates.

Availability:

```
logtalk_load(packs(loader))
```

Author: Paulo Moura

Version: 0:60:0

Date: 2024-10-09

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public packs_common
```

```
public options
```

Uses:

```
list
```

```
logtalk
```

```
os
```

```
type
```

```
user
```

Remarks:

```
(none)
```

Inherited public predicates:

```
check_option/1 check_options/1 default_option/1 default_options/1 directory/1 directory/2  
help/0 logtalk_packs/0 logtalk_packs/1 option/2 option/3 pin/0 pin/1 pinned/1 prefix/0  
prefix/1 readme/1 readme/2 reset/0 setup/0 unpin/0 unpin/1 valid_option/1 valid_options/1  
verify_commands_availability/0
```

- Public predicates

- list/0

- describe/1

- defined/4

- add/3

- add/2

- add/1

- update/2
- update/1
- update/0
- delete/2
- delete/1
- delete/0
- clean/1
- clean/0
- provides/2
- lint/1
- lint/0
- Protected predicates
- Private predicates
- Operators

## Public predicates

list/0

Prints a list of all defined registries, including how defined (git, archive, or directory) and if they are pinned.

Compilation flags:

static

Mode and number of proofs:

list - one

---

describe/1

Prints all registry entries.

Compilation flags:

static

Template:

describe(Registry)

Mode and number of proofs:

describe(+atom) - one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

---

defined/4

Enumerates by backtracking all defined registries, their definition URL, how they are defined (git, archive, or directory), and if they are pinned.

Compilation flags:

static

Template:

defined(Registry,URL,HowDefined,Pinned)

Mode and number of proofs:

defined(?atom,?atom,?atom,?boolean) - zero\_or\_more

Exceptions:

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

URL is neither a variable nor an atom:

type\_error(atom,URL)

HowDefined is neither a variable nor an atom:

type\_error(atom,HowDefined)

Pinned is neither a variable nor a boolean:

type\_error(boolean,Pinned)

---

add/3

Adds a new registry using the given options. Fails if the registry cannot be added or if it is already defined but not using `update(true)` or `force(true)` options. A `file://` URL can be used for a local directory.

Compilation flags:

`static`

Template:

`add(Registry,URL,Options)`

Mode and number of proofs:

`add(+atom,+atom,++list(compound)) - zero_or_one`

Exceptions:

Registry is a variable:

`instantiation_error`

Registry is neither a variable nor an atom:

`type_error(atom,Registry)`

URL is a variable:

`instantiation_error`

URL is neither a variable nor an atom:

`type_error(atom,URL)`

Options is a variable:

`instantiation_error`

Options is neither a variable nor a list:

`type_error(list,Options)`

An element Option of the list Options is a variable:

`instantiation_error`

An element Option of the list Options is neither a variable nor a compound term:

`type_error(compound,Option)`

An element Option of the list Options is a compound term but not a valid option:

`domain_error(option,Option)`

Remarks:

- Registry name: Must be the URL basename when using a git URL or a local directory URL. Must also be the declared registry name in the registry specification object.
- HTTPS URLs: Must end with either a `.git` extension or an archive extension.
- `update(Boolean)` option: Update registry if already defined. Default is `false`. Overrides the `force/1` option.
- `force(Boolean)` option: Force registry re-installation if already defined by first deleting the previous installation. Default is `false`.
- `clean(Boolean)` option: Clean registry archive after updating. Default is `false`.

- `verbose(Atom)` option: Verbose adding steps. Default is `false`.
  - `downloader(Atom)` option: Downloader utility. Either `curl` or `wget`. Default is `curl`.
  - `curl(Atom)` option: Extra command-line options. Default is `''`.
  - `wget(Atom)` option: Extra command-line options. Default is `''`.
  - `gpg(Atom)` option: Extra command-line options. Default is `''`.
  - `tar(Atom)` option: Extra command-line options. Default is `''`.
- 

`add/2`

Adds a new registry using default options. Fails if the registry cannot be added or if it is already defined. HTTPS URLs must end with either a `.git` extension or a an archive extension. A `file://` URL can be used for a local directory.

Compilation flags:

`static`

Template:

`add(Registry,URL)`

Mode and number of proofs:

`add(+atom,+atom) - zero_or_one`

Exceptions:

Registry is a variable:

`instantiation_error`

Registry is neither a variable nor an atom:

`type_error(atom,Registry)`

URL is a variable:

`instantiation_error`

URL is neither a variable nor an atom:

`type_error(atom,URL)`

Remarks:

- Registry name: Must be the URL basename when using a git URL or a local directory URL. Must also be the declared registry name in the registry specification object.
-

add/1

Adds a new registry from a git cloning or local directory URL using default options. Fails if the registry cannot be added or if it is already defined. HTTPS URLs must end with a .git extension. A file:// URL can be used for a local directory.

Compilation flags:

static

Template:

add(URL)

Mode and number of proofs:

add(+atom) - zero\_or\_one

Exceptions:

URL is a variable:

instantiation\_error

URL is neither a variable nor an atom:

type\_error(atom,URL)

Remarks:

- Limitations: Cannot be used for archive download URLs.
  - Registry name: Taken from the URL basename.
- 

update/2

Updates a defined registry using the specified options. Fails if the registry is not defined.

Compilation flags:

static

Template:

update(Registry,Options)

Mode and number of proofs:

update(+atom,++list(compound)) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

```
type_error(atom,Registry)
Options is a variable:
  instantiation_error
Options is neither a variable nor a list:
  type_error(list,Options)
An element Option of the list Options is a variable:
  instantiation_error
An element Option of the list Options is neither a variable nor a compound term:
  type_error(compound,Option)
An element Option of the list Options is a compound term but not a valid option:
  domain_error(option,Option)
```

Remarks:

- force(Boolean) option: Force update if the registry is pinned. Default is false.
- clean(Boolean) option: Clean registry archive after updating. Default is false.
- verbose(Boolean) option: Verbose updating steps. Default is false.
- downloader(Atom) option: Downloader utility. Either curl or wget. Default is curl.
- curl(Atom) option: Extra command-line options. Default is ''.
- wget(Atom) option: Extra command-line options. Default is ''.
- gpg(Atom) option: Extra command-line options. Default is ''.
- tar(Atom) option: Extra command-line options. Default is ''.

---

update/1

Updates a defined registry using default options. Fails if the registry is not defined.

Compilation flags:

```
static
```

Template:

```
update(Registry)
```

Mode and number of proofs:

```
update(+atom) - zero_or_one
```

Exceptions:

Registry is a variable:

```
  instantiation_error
```

Registry is neither a variable nor an atom:

```
  type_error(atom,Registry)
```

update/0

Updates all defined registries using default options.

Compilation flags:

static

Mode and number of proofs:

update - zero\_or\_one

---

delete/2

Deletes a registry using the specified options (if not pinned).

Compilation flags:

static

Template:

delete(Registry,Options)

Mode and number of proofs:

delete(+atom,++list(compound)) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Options is a variable:

instantiation\_error

Options is neither a variable nor a list:

type\_error(list,Options)

An element Option of the list Options is a variable:

instantiation\_error

An element Option of the list Options is neither a variable nor a compound term:

type\_error(compound,Option)

An element Option of the list Options is a compound term but not a valid option:

domain\_error(option,Option)

Remarks:

- `force(Boolean)` option: Force deletion if the registry is pinned or there are installed registry packs. Default is false.
  - `clean(Boolean)` option: Clean registry archive after deleting. Default is false.
  - `verbose(Boolean)` option: Verbose deleting steps. Default is false.
  - `downloader(Atom)` option: Downloader utility. Either curl or wget. Default is curl.
  - `curl(Atom)` option: Extra command-line options. Default is ''.
  - `wget(Atom)` option: Extra command-line options. Default is ''.
  - `gpg(Atom)` option: Extra command-line options. Default is ''.
  - `tar(Atom)` option: Extra command-line options. Default is ''.
- 

`delete/1`

Deletes a registry using default options.

Compilation flags:

`static`

Template:

`delete(Registry)`

Mode and number of proofs:

`delete(+atom) - zero_or_one`

Exceptions:

Registry is a variable:

`instantiation_error`

Registry is neither a variable nor an atom:

`type_error(atom,Registry)`

---

delete/0

Deletes all registries using the force(true) option.

Compilation flags:

static

Mode and number of proofs:

delete - zero\_or\_one

---

clean/1

Cleans all registry archives. Fails if the registry is not defined.

Compilation flags:

static

Template:

clean(Registry)

Mode and number of proofs:

clean(+atom) - zero\_or\_one

Exceptions:

Registry is a variable:

instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

---

clean/0

Cleans all archives for all registries.

Compilation flags:

static

Mode and number of proofs:

clean - one

---

provides/2

Enumerates by backtracking all packs provided by a registry.

Compilation flags:

static

Template:

provides(Registry,Pack)

Mode and number of proofs:

provides(?atom,?atom) - zero\_or\_more

Exceptions:

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

Pack is neither a variable nor an atom:

type\_error(atom,Pack)

---

lint/1

Checks the registry specification. Fails if the registry is not defined or if linting detects errors.

Compilation flags:

static

Template:

lint(Registry)

Mode and number of proofs:

lint(+atom) - zero\_or\_one

Exceptions:

Registry is a variable:

in instantiation\_error

Registry is neither a variable nor an atom:

type\_error(atom,Registry)

---

lint/0

Checks all registry specifications.

Compilation flags:  
static

Mode and number of proofs:  
lint - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)  
object

### 1.56.7 registry\_loader\_hook

Hook object for filtering registry loader file contents.

Availability:  
logtalk\_load(packs(loader))

Author: Paulo Moura  
Version: 0:13:0  
Date: 2022-11-20

Compilation flags:  
static, context\_switching\_calls

Implements:

public expanding

Uses:

character

logtalk

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.56.8 registry\_protocol

Registry specification protocol. Objects implementing this protocol should be named after the pack with a `_registry` suffix and saved in a file with the same name as the object.

Availability:

```
logtalk_load(packs(loader))
```

Author: Paulo Moura

Version: 0:12:0

Date: 2022-06-28

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - name/1
  - description/1
  - home/1
  - clone/1
  - archive/1
  - note/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

name/1

Registry name. Preferably a valid unquoted atom.

Compilation flags:

static

Template:

name(Name)

Mode and number of proofs:

name(?atom) - zero\_or\_one

---

description/1

Registry one line description.

Compilation flags:

static

Template:

description(Description)

Mode and number of proofs:

description(?atom) - zero\_or\_one

---

home/1

Registry home HTTPS or file URL.

Compilation flags:

static

Template:

home(Home)

Mode and number of proofs:

home(?atom) - zero\_or\_one

---

clone/1

Registry git clone HTTPS URL (must end with the .git extension). Git repos should have the same name as the registry.

Compilation flags:

static

Template:

clone(URL)

Mode and number of proofs:

clone(?atom) - zero\_or\_one

---

archive/1

Registry archive download HTTPS URL.

Compilation flags:

static

Template:

archive(URL)

Mode and number of proofs:

archive(?atom) - zero\_or\_one

---

note/2

Table of notes per action.

Compilation flags:

static

Template:

note(Action,Note)

---

Mode and number of proofs:

`note(?atom,-atom) - zero_or_more`

Remarks:

- Action: Possible values are add, update, and delete. When unbound, the note apply to all actions.
  - Note: Note to print when performing an action on a registry.
- 

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.57 pddl\_parser

object

### 1.57.1 pddl

Simple parser of PDDL 3.0 files.

Availability:

`logtalk_load(pddl_parser(loader))`

Author: Robert Sasak, Charles University in Prague. Adapted to Logtalk by Paulo Moura.

Version: 1:2:2

Date: 2024-03-14

Compilation flags:

`static, context_switching_calls`

Imports:

`public read_file`

Uses:

user

Remarks:

(none)

Inherited public predicates:

read\_file/2

- Public predicates
  - parse\_domain/3
  - parse\_domain/2
  - parse\_problem/2
  - parse\_problem/3
- Protected predicates
- Private predicates
- Operators

### Public predicates

parse\_domain/3

Parses a PDDL 3.0 domain file, returning a compound term representing its contents and rest of the file. Useful when domain and problem are in one file.

Compilation flags:

static

Template:

parse\_domain(File,Output,RestOfFile)

Mode and number of proofs:

parse\_domain(+atom,-compound,-list(atom)) - one

parse\_domain/2

Parses a PDDL 3.0 domain file, returning a compound term representing its contents.

Compilation flags:

static

Template:

parse\_domain(File,Output)

Mode and number of proofs:

parse\_domain(+atom,-compound) - one

---

parse\_problem/2

Parses a PDDL 3.0 problem file, returning a compound term representing its contents.

Compilation flags:

static

Template:

parse\_problem(File,Output)

Mode and number of proofs:

parse\_problem(+atom,-compound) - one

---

parse\_problem/3

Parses a PDDL 3.0 problem file, returning a compound term representing its contents and rest of the file. Useful when domain and problem are in one file.

Compilation flags:

static

Template:

parse\_problem(File,Output,RestOfFile)

Mode and number of proofs:

parse\_problem(+atom,-compound,-list(atom)) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

category

### 1.57.2 read\_file

Utility predicates for parsing a file as a list of atoms.

Availability:

`logtalk_load(pddl_parser(loader))`

Author: Robert Sasak, Charles University in Prague. Adapted to Logtalk by Paulo Moura.

Version: 1:0:0

Date: 2011-08-04

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- [Public predicates](#)
    - [read\\_file/2](#)

- Protected predicates
- Private predicates
- Operators

### Public predicates

`read_file/2`

Reads a file character by character, parsing it into a list of atoms.

Compilation flags:

`static`

Template:

`read_file(File,List)`

Mode and number of proofs:

`read_file(+atom,-list(atom)) - one`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.58 ports\_profiler

object

### 1.58.1 ports\_profiler

Predicate execution box model port profiler.

Availability:

```
logtalk_load(ports_profiler(loader))
```

Author: Paulo Moura

Version: 2:0:0

Date: 2024-05-18

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
logtalk::debug_handler/1
```

```
logtalk::debug_handler/3
```

Uses:

```
logtalk
```

```
user
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - start/0
  - stop/0
  - data/0
  - data/1
  - data/2
  - reset/0
  - reset/1
  - port/5
  - clause\_location/6
  - clause/5

- Protected predicates
- Private predicates
  - clause\_location\_/6
  - port\_/5
  - clause\_/5
  - entity\_defines\_/2
- Operators

### Public predicates

start/0

Activates thr ports profiler for followup goals.

Compilation flags:

static

Mode and number of proofs:

start - one

---

stop/0

Deactivates thr ports profiler.

Compilation flags:

static

Mode and number of proofs:

stop - one

---

data/0

Prints a table with all port profiling data.

Compilation flags:

static

Mode and number of proofs:

data - one

---

data/1

Prints a table with all port profiling data for the specified entity.

Compilation flags:

static

Template:

data(Entity)

Mode and number of proofs:

data(+entity\_\_identifier) - one

---

data/2

Prints a table with all port profiling data for the specified entity predicate (or non-terminal).

Compilation flags:

static

Template:

data(Entity,Predicate)

Mode and number of proofs:

data(+entity\_\_identifier,+predicate\_\_indicator) - one

data(+entity\_\_identifier,+non\_\_terminal\_\_indicator) - one

---

reset/0

Resets all port profiling data.

Compilation flags:

static

Mode and number of proofs:

reset - one

---

reset/1

Resets all port profiling data for the specified entity.

Compilation flags:

static

Template:

reset(Entity)

Mode and number of proofs:

reset(+entity\_identifier) - one

---

port/5

Enumerates, by backtracking, all collected port profiling data.

Compilation flags:

static

Template:

port(Port,Entity,Functor,Arity,Count)

Mode and number of proofs:

port(?atom,?entity\_identifier,?atom,?integer,?integer) - zero\_or\_more

---

---

clause\_location/6

Enumerates, by backtracking, all collected profiled clause location data.

Compilation flags:

static

Template:

clause\_location(Entity, Functor, Arity, ClauseNumber, File, BeginLine)

Mode and number of proofs:

clause\_location(?entity\_\_identifier, ?atom, ?integer, ?integer, ?atom, ?integer) - zero\_or\_more

---

clause/5

Enumerates, by backtracking, all collected clause profiling data.

Compilation flags:

dynamic

Template:

clause(Entity, Functor, Arity, ClauseNumber, Count)

Mode and number of proofs:

clause(?entity\_\_identifier, ?atom, ?integer, ?integer, ?integer) - zero\_or\_more

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

clause\_location\_/6

Internal table of collected profiled clause location data.

Compilation flags:

dynamic

Template:

clause\_location\_(Entity, Functor, Arity, ClauseNumber, File, BeginLine)

Mode and number of proofs:

clause\_location\_(?entity\_identifier, ?atom, ?integer, ?integer, ?atom, ?integer) - zero\_or\_more

---

port\_/5

Internal table of collected port profiling data.

Compilation flags:

dynamic

Template:

port\_(Port, Entity, Functor, Arity, Count)

Mode and number of proofs:

port\_(?atom, ?entity\_identifier, ?atom, ?integer, ?integer) - zero\_or\_more

---

clause\_/5

Internal table of collected clause profiling data.

Compilation flags:

dynamic

Template:

clause\_(Entity, Functor, Arity, ClauseNumber, Count)

Mode and number of proofs:

clause\_(?entity\_identifier, ?atom, ?integer, ?integer, ?integer) - zero\_or\_more

---

entity\_defines\_/2

Internal cache for profiled predicates.

Compilation flags:

dynamic

Template:

entity\_defines\_(Entity,Predicate)

Mode and number of proofs:

entity\_defines\_(?entity\_identifier,?predicate\_indicator) - zero\_or\_more

---

## Operators

(none)

## 1.59 queues

object

### 1.59.1 queue

Queue predicates implemented using difference lists.

Availability:

logtalk\_load(queues(loader))

Author: Paulo Moura

Version: 1:3:0

Date: 2020-12-09

Compilation flags:

static, context\_switching\_calls

Implements:

public queuep

Extends:

public compound

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 append/3 as\_list/2 check/1 depth/2  
empty/1 ground/1 head/2 join/3 join\_all/3 jump/3 jump\_all/3 jump\_all\_block/3 length/2  
map/2 map/3 new/1 numbervars/1 numbervars/3 occurs/2 serve/3 singletons/2 subsumes/2  
subterm/2 valid/1 variables/2 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.59.2 queuep

Queue protocol.

Availability:

logtalk\_load(queues(loader))

Author: Paulo Moura

Version: 1:3:0

Date: 2020-12-09

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - empty/1
  - head/2
  - join/3
  - join\_all/3
  - jump/3
  - jump\_all/3
  - jump\_all\_block/3
  - append/3
  - length/2
  - serve/3
  - as\_list/2
  - map/2
  - map/3
- Protected predicates
- Private predicates
- Operators

## Public predicates

empty/1

True if the queue is empty.

Compilation flags:

static

Template:

empty(Queue)

Mode and number of proofs:

empty(@queue) - zero\_or\_one

---

head/2

Unifies Head with the first element of the queue.

Compilation flags:

static

Template:

head(Queue,Head)

Mode and number of proofs:

head(+queue,?term) - zero\_or\_one

---

join/3

Adds the new element at the end of the queue.

Compilation flags:

static

Template:

join(Element,Queue,NewQueue)

Mode and number of proofs:

join(@term,+queue,-queue) - zero\_or\_one

---

### join\_all/3

Adds the new elements at the end of the queue. The elements are added in the same order that they appear in the list.

Compilation flags:

static

Template:

join\_all(List,Queue,NewQueue)

Mode and number of proofs:

join\_all(+list,+queue,-queue) - zero\_or\_one

---

### jump/3

Adds the new element at the front of the queue.

Compilation flags:

static

Template:

jump(Element,Queue,NewQueue)

Mode and number of proofs:

jump(@term,+queue,-queue) - zero\_or\_one

---

### jump\_all/3

Adds the new elements at the front of the queue. The last element in the list will be at the front of the queue.

Compilation flags:

static

Template:

`jump_all(Elements,Queue,NewQueue)`

Mode and number of proofs:

`jump_all(+list,+queue,-queue) - zero_or_one`

---

`jump_all_block/3`

Adds the new elements as a block at the front of the queue. The first element in the list will be at the front of the queue.

Compilation flags:

`static`

Template:

`jump_all_block(Elements,Queue,NewQueue)`

Mode and number of proofs:

`jump_all_block(+list,+queue,-queue) - zero_or_one`

---

`append/3`

Appends two queues. The new queue will have the elements of the first queue followed by the elements of the second queue.

Compilation flags:

`static`

Template:

`append(Queue1,Queue2,NewQueue)`

Mode and number of proofs:

`append(+queue,+queue,-queue) - one`

---

length/2

Queue length.

Compilation flags:

static

Template:

length(Queue,Length)

Mode and number of proofs:

length(+heap,?integer) - zero\_or\_one

---

serve/3

Removes the first element of the queue for service.

Compilation flags:

static

Template:

serve(Queue,Head,NewQueue)

Mode and number of proofs:

serve(+queue,?term,-queue) - zero\_or\_one

---

as\_list/2

Converts a queue to a list.

Compilation flags:

static

Template:

as\_list(Queue,List)

Mode and number of proofs:

as\_list(+queue,-list) - one

---

map/2

Applies a closure to all elements of a queue.

Compilation flags:

static

Template:

map(Closure,Queue)

Meta-predicate template:

map(1,\*)

Mode and number of proofs:

map(+callable,+queue) - zero\_or\_one

---

map/3

Applies a closure to all elements of a queue constructing a new queue.

Compilation flags:

static

Template:

map(Closure,Queue,NewQueue)

Meta-predicate template:

map(2,\*,\*)

Mode and number of proofs:

map(+callable,+queue,?queue) - zero\_or\_one

---

### Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

[queue](#)

## 1.60 random

object

### 1.60.1 backend\_random

Random number generator predicates using the backend Prolog compiler built-in random generator.

Availability:

```
logtalk_load(random(loader))
```

Author: Paulo Moura

Version: 1:20:0

Date: 2023-11-24

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public pseudo_random_protocol
```

Uses:

```
list
```

Remarks:

- **Implementation:** The backend Prolog compiler built-in random generator is only used for the basic `random/1`, `get_seed/1`, and `set_seed/1` predicates.
- **Portability:** B-Prolog, CxProlog, ECLiPSe, JIProlog, Qu-Prolog, and Quintus Prolog do not provide implementations for the `get_seed/1` and `set_seed/1` predicates and calling these predicates simply succeed without performing any action.

Inherited public predicates:

between/3 enumerate/2 get\_seed/1 maybe/0 maybe/1 maybe/2 maybe\_call/1 maybe\_call/2  
member/2 permutation/2 random/1 random/3 randseq/4 randset/4 select/3 select/4  
sequence/4 set/4 set\_seed/1 swap/2 swap\_consecutive/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

random, fast\_random

object

### 1.60.2 fast\_random

Fast portable random number generator predicates. Core predicates originally written by Richard O'Keefe. Based on algorithm AS 183 from Applied Statistics.

Availability:

logtalk\_load(random(loader))

Author: Paulo Moura

Version: 2:11:0

Date: 2023-11-24

Compilation flags:

static, context\_switching\_calls

Implements:

public pseudo\_random\_protocol

Uses:

list

Remarks:

- Single random number generator: This object provides a faster version of the random library object but does not support being extended to define multiple random number generators.
- Randomness: Loading this object always initializes the random generator seed to the same value, thus providing a pseudo random number generator. The randomize/1 predicate can be used to initialize the seed with a random value.

Inherited public predicates:

between/3 enumerate/2 get\_seed/1 maybe/0 maybe/1 maybe/2 maybe\_call/1 maybe\_call/2  
member/2 permutation/2 random/1 random/3 randseq/4 randset/4 select/3 select/4  
sequence/4 set/4 set\_seed/1 swap/2 swap\_consecutive/2

- Public predicates
  - reset\_seed/0
  - randomize/1
- Protected predicates
- Private predicates
  - seed\_/3
- Operators

## Public predicates

reset\_seed/0

Resets the random generator seed to its default value. Use get\_seed/1 and set\_seed/1 instead if you need reproducibility.

Compilation flags:

static, synchronized

Mode and number of proofs:

reset\_seed - one

---

randomize/1

Randomizes the random generator using a positive integer to compute a new seed. Use of a large integer is recommended. In alternative, when using a small integer argument, discard the first dozen random values.

Compilation flags:

static, synchronized

Template:

randomize(Seed)

Mode and number of proofs:

randomize(+positive\_integer) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

seed\_/3

Stores the current random generator seed values.

Compilation flags:

dynamic

Template:

seed\_(S0,S1,S2)

Mode and number of proofs:

seed\_(-integer,-integer,-integer) - one

---

## Operators

(none)

See also:

random, backend\_random

protocol

### 1.60.3 pseudo\_random\_protocol

Pseudo-random number generator protocol for seed handling predicates. These predicates are declared as synchronized when the library is compiled using a backend supporting threads.

Availability:

```
logtalk_load(random(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2021-02-21

Compilation flags:

```
static
```

Extends:

```
public random_protocol
```

Remarks:

(none)

Inherited public predicates:

```
between/3 enumerate/2 maybe/0 maybe/1 maybe/2 maybe_call/1 maybe_call/2 member/2
permutation/2 random/1 random/3 randseq/4 randset/4 select/3 select/4 sequence/4 set/4
swap/2 swap_consecutive/2
```

- Public predicates
  - get\_seed/1
  - set\_seed/1
- Protected predicates
- Private predicates
- Operators

### Public predicates

get\_seed/1

Gets the current random generator seed. Seed should be regarded as an opaque ground term.

Compilation flags:

static, synchronized

Template:

get\_seed(Seed)

Mode and number of proofs:

get\_seed(-ground) - one

---

set\_seed/1

Sets the random generator seed to a given value returned by calling the get\_seed/1 predicate.

Compilation flags:

static, synchronized

Template:

set\_seed(Seed)

Mode and number of proofs:

set\_seed(+ground) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`random`, `backend_random`, `fast_random`

object

### 1.60.4 random

Portable random number generator predicates. Core predicates originally written by Richard O'Keefe. Based on algorithm AS 183 from Applied Statistics.

Availability:

```
logtalk_load(random(loader))
```

Author: Paulo Moura

Version: 2:11:0

Date: 2023-11-24

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public pseudo_random_protocol
```

Uses:

```
list
```

Remarks:

- Multiple random number generators: To define multiple random number generators, simply extend this object. The derived objects must send to self the `reset_seed/0` message.
- Randomness: Loading this object always initializes the random generator seed to the same value, thus providing a pseudo random number generator. The `randomize/1` predicate can be used to initialize the seed with a random value.

Inherited public predicates:

```
between/3 enumerate/2 get_seed/1 maybe/0 maybe/1 maybe/2 maybe_call/1 maybe_call/2
member/2 permutation/2 random/1 random/3 randseq/4 randset/4 select/3 select/4
sequence/4 set/4 set_seed/1 swap/2 swap_consecutive/2
```

- Public predicates
  - reset\_seed/0
  - randomize/1
- Protected predicates
- Private predicates
  - seed\_/3
- Operators

## Public predicates

reset\_seed/0

Resets the random generator seed to its default value. Use get\_seed/1 and set\_seed/1 instead if you need reproducibility.

Compilation flags:

static, synchronized

Mode and number of proofs:

reset\_seed - one

---

randomize/1

Randomizes the random generator using a positive integer to compute a new seed. Use of a large integer is recommended. In alternative, when using a small integer argument, discard the first dozen random values.

Compilation flags:

static, synchronized

Template:

randomize(Seed)

Mode and number of proofs:

randomize(+positive\_integer) - one

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

seed\_/3

Stores the current random generator seed values.

Compilation flags:

dynamic

Template:

seed\_(S0,S1,S2)

Mode and number of proofs:

seed\_(-integer,-integer,-integer) - one

---

## Operators

(none)

See also:

[fast\\_random](#), [backend\\_random](#)

[protocol](#)

### 1.60.5 random\_protocol

Random number generator protocol. The predicates are declared as synchronized when the library is compiled using a backend supporting threads.

Availability:

logtalk\_load(random(loader))

Author: Paulo Moura

Version: 3:3:0

Date: 2023-11-24

Compilation flags:

static

---

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - random/1
  - between/3
  - member/2
  - select/3
  - select/4
  - swap/2
  - swap\_consecutive/2
  - enumerate/2
  - permutation/2
  - sequence/4
  - set/4
  - random/3
  - randseq/4
  - randset/4
  - maybe/0
  - maybe/1
  - maybe/2
  - maybe\_call/1
  - maybe\_call/2
- Protected predicates
- Private predicates
- Operators

---

## Public predicates

random/1

Returns a new random float value in the interval [0.0, 1.0[.

Compilation flags:

static, synchronized

Template:

random(Random)

Mode and number of proofs:

random(-float) - one

---

between/3

Returns a new random integer in the interval [Lower, Upper]. Fails if Lower or Upper are not integers or if Lower > Upper.

Compilation flags:

static

Template:

between(Lower,Upper,Random)

Mode and number of proofs:

between(+integer,+integer,-integer) - zero\_or\_one

---

member/2

Returns a random member of a list. Fails if the list is empty.

Compilation flags:

static

Template:

member(Random,List)

Mode and number of proofs:

---

member(-term,+list(term)) - zero\_or\_one

---

select/3

Returns a random member of a list and the rest of the list. Fails if the list is empty.

Compilation flags:

static

Template:

select(Random,List,Rest)

Mode and number of proofs:

select(-term,+list(term),-list(term)) - zero\_or\_one

---

select/4

Returns a random member of a list, replacing it with a new element and returning the resulting list.

Compilation flags:

static

Template:

select(Random,OldList,New,NewList)

Mode and number of proofs:

select(-term,+list(term),@term,-list(term)) - zero\_or\_one

---

swap/2

Swaps two randomly selected elements of a list. Fails if the list is empty or contains a single element.

Compilation flags:

static

Template:

swap(OldList,NewList)

Mode and number of proofs:

swap(-term,+list(term)) - zero\_or\_one

---

swap\_consecutive/2

Swaps two randomly selected consecutive elements of a list. Fails if the list is empty or contains a single element.

Compilation flags:

static

Template:

swap\_consecutive(OldList,NewList)

Mode and number of proofs:

swap\_consecutive(-term,+list(term)) - zero\_or\_one

---

enumerate/2

Enumerates the elements of a list in random order. Fails if the list is empty.

Compilation flags:

static

Template:

enumerate(List,Random)

Mode and number of proofs:

enumerate(+list(term),--term) - zero\_or\_more

---

permutation/2

Returns a random permutation of a list.

Compilation flags:

static, synchronized

Template:

permutation(List,Permutation)

Mode and number of proofs:

permutation(+list,-list) - one

---

sequence/4

Returns list of random integers of given length in random order in interval [Lower, Upper]. Fails if Length, Lower, or Upper are not integers or if Lower > Upper.

Compilation flags:

static, synchronized

Template:

sequence(Length,Lower,Upper,List)

Mode and number of proofs:

sequence(+integer,+integer,+integer,-list(integer)) - zero\_or\_one

---

set/4

Returns ordered set of random integers of given size in interval [Lower, Upper]. Fails if Length, Lower, or Upper are not integers, if Lower > Upper, or if Length > Upper - Lower + 1.

Compilation flags:

static, synchronized

Template:

set(Length,Lower,Upper,Set)

Mode and number of proofs:

set(+integer,+integer,+integer,-list(integer)) - zero\_or\_one

---

### random/3

Returns a new random value in the interval [Lower, Upper[. Fails if Lower > Upper. Deprecated. Use between/3 for integers.

Compilation flags:

static, synchronized

Template:

random(Lower,Upper,Random)

Mode and number of proofs:

random(+integer,+integer,-integer) - zero\_or\_one

random(+float,+float,-float) - zero\_or\_one

---

### randseq/4

Returns list of random values of given length in random order in interval [Lower, Upper[. Fails if Lower > Upper or if the arguments are neither integers or floats. Deprecated. Use sequence/4 for integers.

Compilation flags:

static, synchronized

Template:

randseq(Length,Lower,Upper,List)

Mode and number of proofs:

randseq(+integer,+integer,+integer,-list(integer)) - zero\_or\_one

randseq(+integer,+float,+float,-list(float)) - zero\_or\_one

---

randset/4

Returns ordered set of random values of given size in interval [Lower, Upper[. Fails if the arguments are neither integers or floats, Lower > Upper, or Length > Upper - Lower when arguments are integers. Deprecated. Use set/4 for integers.

Compilation flags:

static, synchronized

Template:

randset(Length,Lower,Upper,Set)

Mode and number of proofs:

randset(+integer,+integer,+integer,-list(integer)) - zero\_or\_one

randset(+integer,+float,+float,-list(float)) - zero\_or\_one

---

maybe/0

Succeeds or fails with equal probability.

Compilation flags:

static

Mode and number of proofs:

maybe - zero\_or\_one

---

maybe/1

Succeeds with probability Probability or fails with probability 1 - Probability. Fails if Probability is not a float or is outside the interval [0.0, 1.0].

Compilation flags:

static

Template:

maybe(Probability)

Mode and number of proofs:

maybe(+probability) - zero\_or\_one

---

maybe/2

Succeeds with probability  $K/N$  where  $K$  and  $N$  are integers satisfying the equation  $0 \leq K \leq N$ . Fails otherwise.

Compilation flags:

static

Template:

maybe(K,N)

Mode and number of proofs:

maybe(+non\_negative\_integer,+non\_negative\_integer) - zero\_or\_one

---

maybe\_call/1

Calls a goal or fails without calling it with equal probability. When the goal is called, it determines if this predicate succeeds once or fails.

Compilation flags:

static

Template:

maybe\_call(Goal)

Meta-predicate template:

maybe\_call(0)

Mode and number of proofs:

maybe\_call(+callable) - zero\_or\_one

---

`maybe_call/2`

Calls a goal or fails without calling it with probability `Probability`. When the goal is called, it determines if this predicate succeeds once or fails.

Compilation flags:

`static`

Template:

`maybe_call(Probability,Goal)`

Meta-predicate template:

`maybe_call(*,0)`

Mode and number of proofs:

`maybe_call(+probability,+callable) - zero_or_one`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

`random`, `backend_random`, `fast_random`

## 1.61 reader

object

### 1.61.1 reader

Predicates for reading text file and text stream contents to lists of terms, characters, or character codes and for reading binary file and binary stream contents to lists of bytes.

Availability:

```
logtalk_load(reader(loader))
```

Author: Paulo Moura

Version: 2:2:0

Date: 2023-11-14

Compilation flags:

```
static, context_switching_calls
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - file\_to\_codes/2
  - file\_to\_codes/3
  - file\_to\_chars/2
  - file\_to\_chars/3
  - file\_to\_terms/2
  - file\_to\_terms/3
  - file\_to\_bytes/2
  - file\_to\_bytes/3
  - stream\_to\_codes/2
  - stream\_to\_codes/3
  - stream\_to\_chars/2
  - stream\_to\_chars/3
  - stream\_to\_terms/2

- stream\_to\_terms/3
- stream\_to\_bytes/2
- stream\_to\_bytes/3
- line\_to\_chars/2
- line\_to\_chars/3
- line\_to\_codes/2
- line\_to\_codes/3
- Protected predicates
- Private predicates
- Operators

### Public predicates

file\_to\_codes/2

Reads a text file into a list of character codes.

Compilation flags:

static

Template:

file\_to\_codes(File,Codes)

Mode and number of proofs:

file\_to\_codes(+atom,-list(character\_code)) - one

---

file\_to\_codes/3

Reads a text file into a list of character codes. The list is terminated by the given tail.

Compilation flags:

static

Template:

file\_to\_codes(File,Codes,Tail)

Mode and number of proofs:

file\_to\_codes(+atom,-list(character\_code),@term) - one

`file_to_chars/2`

Reads a text file into a list of characters.

Compilation flags:

`static`

Template:

`file_to_chars(File,Chars)`

Mode and number of proofs:

`file_to_chars(+atom,-list(character)) - one`

---

`file_to_chars/3`

Reads a text file into a list of characters. The list is terminated by the given tail.

Compilation flags:

`static`

Template:

`file_to_chars(File,Chars,Tail)`

Mode and number of proofs:

`file_to_chars(+atom,-list(character),@term) - one`

---

`file_to_terms/2`

Reads a text file into a list of terms.

Compilation flags:

`static`

Template:

`file_to_terms(File,Terms)`

Mode and number of proofs:

`file_to_terms(+atom,-list(term))` - one

---

`file_to_terms/3`

Reads a text file into a list of terms. The list is terminated by the given tail.

Compilation flags:

`static`

Template:

`file_to_terms(File,Terms,Tail)`

Mode and number of proofs:

`file_to_terms(+atom,-list(term),@term)` - one

---

`file_to_bytes/2`

Reads a binary file into a list of bytes.

Compilation flags:

`static`

Template:

`file_to_bytes(File,Bytes)`

Mode and number of proofs:

`file_to_bytes(+atom,-list(byte))` - one

---

`file_to_bytes/3`

Reads a binary file into a list of bytes. The list is terminated by the given tail.

Compilation flags:

`static`

Template:

`file_to_bytes(File,Bytes,Tail)`

Mode and number of proofs:

`file_to_bytes(+atom,-list(byte),@term) - one`

---

`stream_to_codes/2`

Reads a text stream into a list of character codes. Does not close the stream.

Compilation flags:

`static`

Template:

`stream_to_codes(Stream,Codes)`

Mode and number of proofs:

`stream_to_codes(+stream_or_alias,-list(character_code)) - one`

---

`stream_to_codes/3`

Reads a text stream into a list of character codes. Does not close the stream. The list is terminated by the given tail.

Compilation flags:

`static`

Template:

`stream_to_codes(Stream,Codes,Tail)`

Mode and number of proofs:

`stream_to_codes(+stream_or_alias,-list(character_code),@term) - one`

---

`stream_to_chars/2`

Reads a text stream into a list of characters. Does not close the stream.

Compilation flags:

`static`

Template:

`stream_to_chars(Stream,Chars)`

Mode and number of proofs:

`stream_to_chars(+stream_or_alias,-list(char)) - one`

---

`stream_to_chars/3`

Reads a text stream into a list of characters. Does not close the stream. The list is terminated by the given tail.

Compilation flags:

`static`

Template:

`stream_to_chars(Stream,Chars,Tail)`

Mode and number of proofs:

`stream_to_chars(+stream_or_alias,-list(char),@term) - one`

---

`stream_to_terms/2`

Reads a text stream into a list of terms. Does not close the stream.

Compilation flags:

`static`

Template:

`stream_to_terms(Stream,Terms)`

Mode and number of proofs:

`stream_to_terms(+stream_or_alias,-list(term)) - one`

---

`stream_to_terms/3`

Reads a text stream into a list of terms. Does not close the stream. The list is terminated by the given tail.

Compilation flags:

`static`

Template:

`stream_to_terms(Stream, Terms, Tail)`

Mode and number of proofs:

`stream_to_terms(+stream_or_alias, -list(term), @term) - one`

---

`stream_to_bytes/2`

Reads a binary stream into a list of bytes. Does not close the stream.

Compilation flags:

`static`

Template:

`stream_to_bytes(Stream, Bytes)`

Mode and number of proofs:

`stream_to_bytes(+stream_or_alias, -list(byte)) - one`

---

`stream_to_bytes/3`

Reads a binary stream into a list of bytes. Does not close the stream. The list is terminated by the given tail.

Compilation flags:

`static`

Template:

`stream_to_bytes(Stream, Bytes, Tail)`

---

Mode and number of proofs:

`stream_to_bytes(+stream_or_alias,-list(byte),@term) - one`

---

`line_to_chars/2`

Reads a line from a text stream into a list of characters. Discards the end-of-line characters. Unifies Chars with `end_of_file` at the end of the file.

Compilation flags:

`static`

Template:

`line_to_chars(Stream,Chars)`

Mode and number of proofs:

`line_to_chars(+stream_or_alias,-types([atom,list(character)])) - one`

---

`line_to_chars/3`

Reads a line from a text stream into a list of characters. Keeps the end-of-line marker normalized to the line feed control character. The list is terminated by the given tail, which is unified with the empty list at the end of the file.

Compilation flags:

`static`

Template:

`line_to_chars(Stream,Chars,Tail)`

Mode and number of proofs:

`line_to_chars(+stream_or_alias,-list(character),?term) - one`

---

line\_to\_codes/2

Reads a line from a text stream into a list of character codes. Discards the end-of-line character codes. Unifies Codes with end\_of\_file at the end of the file.

Compilation flags:

static

Template:

line\_to\_codes(Stream,Codes)

Mode and number of proofs:

line\_to\_codes(+stream\_or\_alias,-types([atom,list(character\_code)])) - one

---

line\_to\_codes/3

Reads a line from a text stream into a list of character codes. Keeps the end-of-line marker normalized to the line feed control character code. The list is terminated by the given tail, which is unified with the empty list at the end of the file.

Compilation flags:

static

Template:

line\_to\_codes(Stream,Codes,Tail)

Mode and number of proofs:

line\_to\_codes(+stream\_or\_alias,-list(character\_code),?term) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.62 recorded\_database

object

### 1.62.1 recorded\_database

Legacy recorded database predicates. Provides an application global database.

Availability:

```
logtalk_load(recorded_database(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2023-12-17

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public recorded_database_core
```

Remarks:

(none)

Inherited public predicates:

```
erase/1 instance/2 recorda/2 recorda/3 recorded/2 recorded/3 recordz/2 recordz/3
```

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

**Public predicates**

(no local declarations; see entity ancestors if any)

**Protected predicates**

(no local declarations; see entity ancestors if any)

**Private predicates**

(no local declarations; see entity ancestors if any)

**Operators**

(none)

category

**1.62.2** recorded\_database\_core

Legacy recorded database predicates. Can be imported into an object to provide a local database.

Availability:

```
logtalk_load(recorded_database(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2023-12-17

Compilation flags:

```
static
```

Dependencies:

(none)

Remarks:

- References: Opaque ground terms.

Inherited public predicates:

(none)

- Public predicates
  - recorda/3
  - recorda/2
  - recordz/3
  - recordz/2
  - recorded/3
  - recorded/2
  - erase/1
  - instance/2
- Protected predicates
- Private predicates
  - record\_/3
  - reference\_/1
- Operators

## Public predicates

recorda/3

Adds a term as the first term for the given key, returning its reference.

Compilation flags:

static

Template:

recorda(Key,Term,Reference)

Mode and number of proofs:

recorda(+recorded\_database\_key,+term,--recorded\_database\_reference) - one\_or\_error

Exceptions:

Key is a variable:

instantiation\_error

Key is neither a variable nor an atomic term or compound term:

type\_error(recorded\_database\_key,Key)

Reference is not a variable:

uninstantiation\_error(Reference)

recorda/2

Adds a term as the first term for the given key.

Compilation flags:

static

Template:

recorda(Key,Term)

Mode and number of proofs:

recorda(+recorded\_database\_key,+term) - one\_or\_error

Exceptions:

Key is a variable:

instantiation\_error

Key is neither a variable nor an atomic term or compound term:

type\_error(recorded\_database\_key,Key)

---

recordz/3

Adds a term as the last term for the given key, returning its reference.

Compilation flags:

static

Template:

recordz(Key,Term,Reference)

Mode and number of proofs:

recordz(+recorded\_database\_key,+term,--recorded\_database\_reference) - one\_or\_error

Exceptions:

Key is a variable:

instantiation\_error

Key is neither a variable nor an atomic term or compound term:

type\_error(recorded\_database\_key,Key)

Reference is not a variable:

uninstantiation\_error(Reference)

---

recordz/2

Adds a term as the last term for the given key.

Compilation flags:

static

Template:

recordz(Key,Term)

Mode and number of proofs:

recordz(+recorded\_database\_key,+term) - one\_or\_error

Exceptions:

Key is a variable:

instantiation\_error

Key is neither a variable nor an atomic term or compound term:

type\_error(recorded\_database\_key,Key)

---

recorded/3

Enumerates, by backtracking, all record key-term pairs and their references.

Compilation flags:

static

Template:

recorded(Key,Term,Reference)

Mode and number of proofs:

recorded(?recorded\_database\_key,?term,-recorded\_database\_reference) - zero\_or\_more

recorded(?recorded\_database\_key,?term,+recorded\_database\_reference) - zero\_or\_one

recorded/2

Enumerates, by backtracking, all record key-term pairs.

Compilation flags:

static

Template:

recorded(Key,Term)

Mode and number of proofs:

recorded(?recorded\_database\_key,?term) - zero\_or\_more

---

erase/1

Erases the record indexed by the given reference. Fails if there is no record with the given reference.

Compilation flags:

static

Template:

erase(Reference)

Mode and number of proofs:

erase(@recorded\_database\_reference) - zero\_or\_one\_or\_error

Exceptions:

Reference is a variable:

instantiation\_error

---

instance/2

.

Compilation flags:

static

Template:

instance(Reference,Term)

Mode and number of proofs:

instance(@recorded\_database\_reference,?term) - zero\_or\_one\_or\_error

Exceptions:

Reference is a variable:

instantiation\_error

---

### Protected predicates

(none)

### Private predicates

record\_/3

Records table.

Compilation flags:

dynamic

Template:

record\_(Key,Term,Reference)

Mode and number of proofs:

record\_(?recorded\_database\_key,?term,?recorded\_database\_reference) - zero\_or\_more

---

reference\_/1

Reference count.

Compilation flags:

dynamic

Template:

reference\_(Reference)

Mode and number of proofs:

reference\_(?non\_negative\_integer) - zero\_or\_one

## Operators

(none)

## 1.63 redis

object

### 1.63.1 redis

Redis client. Inspired by Sean Charles GNU Prolog Redis client.

Availability:

```
logtalk_load(redis(loader))
```

Author: Paulo Moura

Version: 0:5:1

Date: 2021-12-06

Compilation flags:

```
static, context_switching_calls
```

Provides:

```
logtalk::message_tokens//2
```

Uses:

```
list
```

```
logtalk
```

Remarks:

- **Command representation:** Use the Redis command name as the functor of a compound term where the arguments are the command arguments.
- **Valid arguments:** Atoms, integers, and floats. Always use atoms instead of double-quoted “strings”. This helps portability by not depending on the value of the `double_quotes` flag.

Inherited public predicates:

(none)

- Public predicates
  - connect/1
  - connect/3
  - disconnect/1
  - send/3
  - console/1
- Protected predicates
- Private predicates
- Operators

### Public predicates

connect/1

Connect to a Redis server running on localhost using the default 6379 port.

Compilation flags:  
static

Template:

connect(Connection)

Mode and number of proofs:  
connect(--ground) - one

---

connect/3

Connect to a Redis server running on the given host and port.

Compilation flags:  
static

Template:

connect(Host,Port,Connection)

Mode and number of proofs:  
connect(+atom,+integer,--ground) - one

---

disconnect/1

Disconnect from a Redis server.

Compilation flags:

static

Template:

disconnect(Connection)

Mode and number of proofs:

disconnect(++ground) - one

---

send/3

Sends a request to the a Redis server and returns its reply.

Compilation flags:

static

Template:

send(Connection,Request,Reply)

Mode and number of proofs:

send(++ground,++callable,--callable) - one

---

console/1

Sends a request to a Redis server running on localhost at the default 6379 port and prints the reply.

Compilation flags:

static

Template:

console(Request)

Mode and number of proofs:

console(++callable) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.64 sets

object

### 1.64.1 set

Set predicates implemented using ordered lists. Uses `==/2` for element comparison and standard term ordering.

Availability:

`logtalk_load(sets(loader))`

Author: Richard O'Keefe (main predicates); adapted to Logtalk by Paulo Moura.

Version: 1:12:0

Date: 2019-05-23

Compilation flags:

`static, context_switching_calls`

Implements:

`public setp`

Extends:

`public compound`

Aliases:

`setp size/2 as length/2`

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 as\_list/2 as\_set/2 check/1 delete/3 depth/2 disjoint/2 empty/1 equal/2 ground/1 insert/3 insert\_all/3 intersect/2 intersection/3 intersection/4 member/2 memberchk/2 new/1 numbervars/1 numbervars/3 occurs/2 powerset/2 product/3 select/3 selectchk/3 singletons/2 size/2 subset/2 subsumes/2 subterm/2 subtract/3 symdiff/3 union/3 union/4 valid/1 variables/2 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`set(Type)`

object

#### 1.64.2 `set(Type)`

Set predicates with elements constrained to a single type and custom comparing rules.

Availability:

```
logtalk_load(sets(loader))
```

Author: Paulo Moura and Adrian Arroyo

Version: 1:24:0

Date: 2022-02-03

Compilation flags:

static, context\_switching\_calls

Extends:

public set

Uses:

list

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 as\_list/2 as\_set/2 check/1 delete/3 depth/2 disjoint/2 empty/1 equal/2 ground/1 insert/3 insert\_all/3 intersect/2 intersection/3 intersection/4 member/2 memberchk/2 new/1 numbervars/1 numbervars/3 occurs/2 powerset/2 product/3 select/3 selectchk/3 singletons/2 size/2 subset/2 subsumes/2 subterm/2 subtract/3 symdiff/3 union/3 union/4 valid/1 variables/2 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
  - sort/2
  - partition/4
- Operators

## Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

sort/2

Sorts a list in ascending order.

Compilation flags:

static

Template:

sort(List,Sorted)

Mode and number of proofs:

sort(+list,-list) - one

---

partition/4

List partition in two sub-lists using a pivot.

Compilation flags:

static

Template:

partition(List,Pivot,Lowes,Biggers)

Mode and number of proofs:

partition(+list,+nonvar,-list,-list) - one

---

### Operators

(none)

protocol

---

### 1.64.3 setp

Set protocol.

Availability:

```
logtalk_load(sets(loader))
```

Author: Paulo Moura

Version: 1:6:0

Date: 2019-05-23

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - as\_set/2
  - as\_list/2
  - delete/3
  - disjoint/2
  - equal/2
  - empty/1
  - insert/3
  - insert\_all/3
  - intersect/2
  - intersection/3
  - intersection/4
  - size/2
  - member/2

- memberchk/2
- powerset/2
- product/3
- select/3
- selectchk/3
- subset/2
- subtract/3
- symdiff/3
- union/3
- union/4
- Protected predicates
- Private predicates
- Operators

### Public predicates

`as_set/2`

Returns a set with all unique elements from the given list.

Compilation flags:

`static`

Template:

`as_set(List,Set)`

Mode and number of proofs:

`as_set(@list,-set) - one`

---

`as_list/2`

Returns a list with all elements of the given set.

Compilation flags:

`static`

Template:

`as_list(Set,List)`

Mode and number of proofs:

`as_list(@set,-list) - one`

---

`delete/3`

Deletes an element from a set returning the set of remaining elements.

Compilation flags:

`static`

Template:

`delete(Set,Element,Remaining)`

Mode and number of proofs:

`delete(+set,@term,?set) - one`

---

`disjoint/2`

True if the two sets have no element in common.

Compilation flags:

`static`

Template:

`disjoint(Set1,Set2)`

Mode and number of proofs:

`disjoint(+set,+set) - zero_or_one`

---

---

equal/2

True if the two sets are equal.

Compilation flags:

static

Template:

equal(Set1,Set2)

Mode and number of proofs:

equal(+set,+set) - zero\_or\_one

---

empty/1

True if the set is empty.

Compilation flags:

static

Template:

empty(Set)

Mode and number of proofs:

empty(+set) - zero\_or\_one

---

insert/3

Inserts an element in a set, returning the resulting set.

Compilation flags:

static

Template:

insert(In,Element,Out)

Mode and number of proofs:

insert(+set,+term,?set) - one

---

insert\_all/3

Inserts a list of elements in a set, returning the resulting set.

Compilation flags:

static

Template:

insert\_all(List,In,Out)

Mode and number of proofs:

insert\_all(+list,+set,?set) - one

---

intersect/2

True if the two sets have at least one element in common.

Compilation flags:

static

Template:

intersect(Set1,Set2)

Mode and number of proofs:

intersect(+set,+set) - zero\_or\_one

---

intersection/3

Returns the intersection of Set1 and Set2.

Compilation flags:

static

Template:

intersection(Set1,Set2,Intersection)

Mode and number of proofs:

intersection(+set,+set,?set) - zero\_or\_one

---

intersection/4

True if Intersection is the intersection of Set1 and Set2 and Difference is the difference between Set2 and Set1.

Compilation flags:

static

Template:

intersection(Set1,Set2,Intersection,Difference)

Mode and number of proofs:

intersection(+set,+set,?set,?set) - zero\_or\_one

---

size/2

Number of set elements.

Compilation flags:

static

Template:

size(Set,Size)

Mode and number of proofs:

size(+set,?integer) - zero\_or\_one

---

member/2

Element is a member of set Set.

Compilation flags:

static

Template:

member(Element,Set)

Mode and number of proofs:

member(+term,+set) - zero\_or\_one

member(-term,+set) - zero\_or\_more

---

---

memberchk/2

Checks if a term is a member of a set.

Compilation flags:  
static

Template:

memberchk(Element,Set)

Mode and number of proofs:

memberchk(+term,+set) - zero\_or\_one

---

powerset/2

Returns the power set of a set, represented as a list of sets.

Compilation flags:  
static

Template:

powerset(Set,Powerset)

Mode and number of proofs:

powerset(+set,-list) - one

---

product/3

Returns the cartesian product of two sets.

Compilation flags:  
static

Template:

product(Set1,Set2,Product)

Mode and number of proofs:

---

product(+set,+set,-set) - one

---

select/3

Selects an element from a set, returning the set of remaining elements.

Compilation flags:

static

Template:

select(Element,Set,Remaining)

Mode and number of proofs:

select(?term,+set,?set) - zero\_or\_more

---

selectchk/3

Checks that an element can be selected from a set, returning the set of remaining elements.

Compilation flags:

static

Template:

selectchk(Element,Set,Remaining)

Mode and number of proofs:

selectchk(?term,+set,?set) - zero\_or\_one

---

subset/2

True if Subset is a subset of Set.

Compilation flags:

static

Template:

subset(Subset,Set)

Mode and number of proofs:

subset(+set,+set) - zero\_or\_one

---

subtract/3

True when Difference contains all and only the elements of Set1 which are not also in Set2.

Compilation flags:

static

Template:

subtract(Set1,Set2,Difference)

Mode and number of proofs:

subtract(+set,+set,?set) - zero\_or\_one

---

symdiff/3

True if Difference is the symmetric difference of Set1 and Set2, containing all elements that are not in the sets intersection.

Compilation flags:

static

Template:

symdiff(Set1,Set2,Difference)

Mode and number of proofs:

symdiff(+set,+set,?set) - zero\_or\_one

---

union/3

True if Union is the union of Set1 and Set2.

Compilation flags:

static

Template:

union(Set1,Set2,Union)

Mode and number of proofs:

union(+set,+set,?set) - zero\_or\_one

---

union/4

True if Union is the union of Set1 and Set2 and Difference is the difference between Set2 and Set1.

Compilation flags:

static

Template:

union(Set1,Set2,Union,Difference)

Mode and number of proofs:

union(+set,+set,?set,?set) - zero\_or\_one

---

### Protected predicates

(none)

### Private predicates

(none)

## Operators

(none)

See also:

set, set(Type)

## 1.65 statistics

object

### 1.65.1 population

Statistical population represented as a list of numbers.

Availability:

```
logtalk_load(statistics(loader))
```

Author: Paulo Moura

Version: 1:3:0

Date: 2020-02-02

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public statistics
```

Remarks:

(none)

Inherited public predicates:

```
arithmetic_mean/2 average_deviation/3 coefficient_of_variation/2 fractile/3 geometric_mean/2  
harmonic_mean/2 kurtosis/2 max/2 mean_deviation/2 median/2 median_deviation/2 min/2  
min_max/3 modes/2 product/2 range/2 relative_standard_deviation/2 skewness/2  
standard_deviation/2 sum/2 valid/1 variance/2 weighted_mean/3 z_normalization/2
```

- Public predicates
- Protected predicates
- Private predicates

- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

[sample](#)

object

## 1.65.2 [sample](#)

Statistical sample represented as a list of numbers.

Availability:

```
logtalk_load(statistics(loader))
```

Author: Paulo Moura

Version: 1:4:0

Date: 2020-02-02

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public statistics
```

Remarks:

```
(none)
```

Inherited public predicates:

arithmetic\_mean/2 average\_deviation/3 coefficient\_of\_variation/2 fractile/3 geometric\_mean/2  
harmonic\_mean/2 kurtosis/2 max/2 mean\_deviation/2 median/2 median\_deviation/2 min/2  
min\_max/3 modes/2 product/2 range/2 relative\_standard\_deviation/2 skewness/2  
standard\_deviation/2 sum/2 valid/1 variance/2 weighted\_mean/3 z\_normalization/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

population

category

## 1.65.3 statistics

Statistical calculations over a list of numbers.

Availability:

```
logtalk_load(statistics(loader))
```

Author: Paulo Moura

Version: 1:7:1

Date: 2023-05-29

## Compilation flags:

static

## Implements:

public statisticsp

## Uses:

list

numberlist

## Remarks:

(none)

## Inherited public predicates:

arithmetic\_mean/2 average\_deviation/3 coefficient\_of\_variation/2 fractile/3 geometric\_mean/2  
harmonic\_mean/2 kurtosis/2 max/2 mean\_deviation/2 median/2 median\_deviation/2 min/2  
min\_max/3 modes/2 product/2 range/2 relative\_standard\_deviation/2 skewness/2  
standard\_deviation/2 sum/2 valid/1 variance/2 weighted\_mean/3 z\_normalization/2

- Public predicates
- Protected predicates
- Private predicates
  - arithmetic\_mean/5
  - squares\_and\_cubes/6
  - squares\_and\_hypers/6
  - variance/6
- Operators

**Public predicates**

(no local declarations; see entity ancestors if any)

**Protected predicates**

(no local declarations; see entity ancestors if any)

### Private predicates

arithmetic\_mean/5

Auxiliary predicate for computing the arithmetic mean.

Compilation flags:

static

Template:

arithmetic\_mean(List,Length0,Length,Sum,Mean)

Mode and number of proofs:

arithmetic\_mean(+list(number),+integer,-integer,+number,-float) - one

---

squares\_and\_cubes/6

Auxiliary predicate for computing the skewness.

Compilation flags:

static

Template:

squares\_and\_cubes(List,Mean,Squares0,Squares,Cubes0,Cubes)

Mode and number of proofs:

squares\_and\_cubes(+list(number),+float,+float,-float,+float,-float) - one

---

squares\_and\_hypers/6

Auxiliary predicate for computing the kurtosis.

Compilation flags:

static

Template:

squares\_and\_hypers(List,Mean,Squares0,Squares,Hypers0,Hypers)

Mode and number of proofs:

squares\_and\_hypers(+list(number),+float,+float,-float,+float,-float) - one

---

variance/6

Auxiliary predicate for computing the variance.

Compilation flags:

static

Template:

variance(List,Length0,Length,Mean,M20,M2)

Mode and number of proofs:

variance(+list(number),+integer,-integer,+float,+float,-float) - one

---

## Operators

(none)

protocol

### 1.65.4 statisticsp

Statistical calculations over a list of numbers protocol.

Availability:

logtalk\_load(statistics(loader))

Author: Paulo Moura

Version: 1:3:0

Date: 2022-06-20

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - product/2
  - sum/2
  - min/2
  - max/2
  - min\_max/3
  - range/2
  - arithmetic\_mean/2
  - geometric\_mean/2
  - harmonic\_mean/2
  - weighted\_mean/3
  - median/2
  - modes/2
  - average\_deviation/3
  - mean\_deviation/2
  - median\_deviation/2
  - standard\_deviation/2
  - coefficient\_of\_variation/2
  - relative\_standard\_deviation/2
  - skewness/2
  - kurtosis/2
  - variance/2
  - z\_normalization/2
  - fractile/3
  - valid/1
- Protected predicates
- Private predicates
- Operators

**Public predicates**

product/2

Calculates the product of all list numbers. Fails if the list is empty.

Compilation flags:

static

Template:

product(List,Product)

Mode and number of proofs:

product(+list(number),-number) - zero\_or\_one

---

sum/2

Calculates the sum of all list numbers. Fails if the list is empty.

Compilation flags:

static

Template:

sum(List,Sum)

Mode and number of proofs:

sum(+list(number),-number) - zero\_or\_one

---

min/2

Determines the minimum value in a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

min(List,Minimum)

Mode and number of proofs:

min(+list,-number) - zero\_or\_one

---

max/2

Determines the list maximum value in a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

max(List,Maximum)

Mode and number of proofs:

max(+list,-number) - zero\_or\_one

---

min\_max/3

Determines the minimum and maximum values in a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

min\_max(List,Minimum,Maximum)

Mode and number of proofs:

min\_max(+list(number),-number,-number) - zero\_or\_one

---

range/2

Range is the length of the smallest interval which contains all the numbers in List. Fails if the list is empty.

Compilation flags:

static

Template:

range(List,Range)

Mode and number of proofs:

`range(+list,-number) - zero_or_one`

---

`arithmetic_mean/2`

Calculates the arithmetic mean of a list of numbers. Fails if the list is empty.

Compilation flags:

`static`

Template:

`arithmetic_mean(List,Mean)`

Mode and number of proofs:

`arithmetic_mean(+list(number),-float) - zero_or_one`

---

`geometric_mean/2`

Calculates the geometric mean of a list of numbers. Fails if the list is empty.

Compilation flags:

`static`

Template:

`geometric_mean(List,Mean)`

Mode and number of proofs:

`geometric_mean(+list(number),-float) - zero_or_one`

---

`harmonic_mean/2`

Calculates the harmonic mean of a list of numbers. Fails if the list is empty.

Compilation flags:

`static`

Template:

harmonic\_mean(List,Mean)

Mode and number of proofs:

harmonic\_mean(+list(number),-float) - zero\_or\_one

---

weighted\_mean/3

Calculates the weighted mean of a list of numbers. Fails if the list is empty or if the two lists have different lengths. Wights are assume to be non-negative.

Compilation flags:

static

Template:

weighted\_mean(Weights,List,Mean)

Mode and number of proofs:

weighted\_mean(+list(number),+list(number),-float) - zero\_or\_one

---

median/2

Calculates the median of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

median(List,Median)

Mode and number of proofs:

median(+list(number),-float) - zero\_or\_one

---

modes/2

Returns the list of modes of a list of numbers in ascending order. Fails if the list is empty.

Compilation flags:

static

Template:

modes(List,Modes)

Mode and number of proofs:

modes(+list(number),-list(number)) - zero\_or\_one

---

average\_deviation/3

Calculates the average absolute deviation of a list of numbers given a central tendency (e.g. mean, median, or mode). Fails if the list is empty.

Compilation flags:

static

Template:

average\_deviation(List,CentralTendency,Deviation)

Mode and number of proofs:

average\_deviation(+list(number),+float,-float) - zero\_or\_one

---

mean\_deviation/2

Calculates the mean absolute deviation of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

mean\_deviation(List,Deviation)

Mode and number of proofs:

mean\_deviation(+list(number),-float) - zero\_or\_one

---

---

median\_deviation/2

Calculates the median absolute deviation of a list of numbers. Fails if the list is empty.

Compilation flags:  
static

Template:  
median\_deviation(List,Deviation)

Mode and number of proofs:  
median\_deviation(+list(number),-float) - zero\_or\_one

---

standard\_deviation/2

Calculates the standard deviation of a list of numbers. Fails if the list is empty.

Compilation flags:  
static

Template:  
standard\_deviation(List,Deviation)

Mode and number of proofs:  
standard\_deviation(+list(number),-float) - zero\_or\_one

---

coefficient\_of\_variation/2

Calculates the coefficient of variation of a list of numbers. Fails if the list is empty.

Compilation flags:  
static

Template:  
coefficient\_of\_variation(List,Coefficient)

Mode and number of proofs:

coefficient\_of\_variation(+list(number),-float) - zero\_or\_one

---

relative\_standard\_deviation/2

Calculates the relative standard deviation of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

relative\_standard\_deviation(List,Percentage)

Mode and number of proofs:

relative\_standard\_deviation(+list(number),-float) - zero\_or\_one

---

skewness/2

Calculates the (moment) skewness of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

skewness(List,Skewness)

Mode and number of proofs:

skewness(+list(number),-float) - zero\_or\_one

---

kurtosis/2

Calculates the (excess) kurtosis of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

kurtosis(List,Kurtosis)

Mode and number of proofs:

kurtosis(+list(number),-float) - zero\_or\_one

---

variance/2

Calculates the unbiased variance of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

variance(List,Variance)

Mode and number of proofs:

variance(+list(number),-float) - zero\_or\_one

---

z\_normalization/2

Normalizes a list of number such that for the resulting list the mean of is close to zero and the standard deviation is close to 1. Fails if the list is empty.

Compilation flags:

static

Template:

z\_normalization(List,NormalizedList)

Mode and number of proofs:

z\_normalization(+list(number),-list(float)) - zero\_or\_one

---

---

fractile/3

Calculates the smallest value in a list of numbers such that the list elements in its fraction P are less or equal to that value (with P in the open interval (0.0, 1.0)). Fails if the list is empty.

Compilation flags:

static

Template:

fractile(P,List,Fractile)

Mode and number of proofs:

fractile(+float,+list(integer),-integer) - zero\_or\_one

fractile(+float,+list(float),-float) - zero\_or\_one

---

valid/1

Term is a closed list of numbers.

Compilation flags:

static

Template:

valid(Term)

Mode and number of proofs:

valid(@nonvar) - zero\_or\_one

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

statistics, sample, population

## 1.66 term\_io

object

### 1.66.1 term\_io

Term input/output from/to atom, chars, and codes.

Availability:

`logtalk_load(term_io(loader))`

Author: Paulo Moura

Version: 1:3:0

Date: 2023-11-14

Compilation flags:

`static, context_switching_calls`

Implements:

`public term_io_protocol`

Uses:

`os`

Remarks:

(none)

Inherited public predicates:

`format_to_atom/3 format_to_chars/3 format_to_chars/4 format_to_codes/3  
format_to_codes/4 read_from_atom/2 read_from_chars/2 read_from_codes/2  
read_term_from_atom/3 read_term_from_chars/3 read_term_from_chars/4  
read_term_from_codes/3 read_term_from_codes/4 with_output_to/2 write_term_to_atom/3  
write_term_to_chars/3 write_term_to_chars/4 write_term_to_codes/3  
write_term_to_codes/4 write_to_atom/2 write_to_chars/2 write_to_codes/2`

- Public predicates
- Protected predicates
- Private predicates
  - temporary\_file\_/1
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

temporary\_file\_/1

Logtalk session and term\_io specific temporary file path.

Compilation flags:

dynamic

Template:

temporary\_file\_(Path)

Mode and number of proofs:

temporary\_file\_(-atom) - one

---

### Operators

(none)

protocol

## 1.66.2 term\_io\_protocol

Predicates for term input/output from/to atom, chars, and codes. The predicates are declared as synchronized when the library is compiled using a backend supporting threads.

Availability:

```
logtalk_load(term_io(loader))
```

Author: Paulo Moura

Version: 1:3:0

Date: 2021-10-04

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

- Portability notes: To keep calls to these library predicates portable, use only standard read/write options and specify output formats using atoms.

Inherited public predicates:

```
(none)
```

- Public predicates
  - read\_term\_from\_atom/3
  - read\_from\_atom/2
  - read\_term\_from\_chars/3
  - read\_term\_from\_chars/4
  - read\_from\_chars/2
  - read\_term\_from\_codes/3
  - read\_term\_from\_codes/4
  - read\_from\_codes/2
  - write\_term\_to\_atom/3
  - write\_to\_atom/2
  - write\_term\_to\_chars/3

- write\_term\_to\_chars/4
  - write\_to\_chars/2
  - write\_term\_to\_codes/3
  - write\_term\_to\_codes/4
  - write\_to\_codes/2
  - format\_to\_atom/3
  - format\_to\_chars/3
  - format\_to\_chars/4
  - format\_to\_codes/3
  - format\_to\_codes/4
  - with\_output\_to/2
- Protected predicates
  - Private predicates
  - Operators

## Public predicates

read\_term\_from\_atom/3

Reads a term from an atom using the given read options. A period at the end of the atom is optional. Valid options are those supported by the standard read\_term/3 predicate.

Compilation flags:

static, synchronized

Template:

read\_term\_from\_atom(Atom,Term,Options)

Mode and number of proofs:

read\_term\_from\_atom(+atom,-term,+list(read\_option)) - one\_or\_error

`read_from_atom/2`

Reads a term from an atom using default read options. Shorthand for `read_term_from_atom(Atom,Term,[])`. A period at the end of the atom is optional.

Compilation flags:

`static`

Template:

`read_from_atom(Atom,Term)`

Mode and number of proofs:

`read_from_atom(+atom,-term) - one_or_error`

---

`read_term_from_chars/3`

Reads a term from a list of characters using the given read options. A period at the end of the list is optional. Valid options are those supported by the standard `read_term/3` predicate.

Compilation flags:

`static, synchronized`

Template:

`read_term_from_chars(Chars,Term,Options)`

Mode and number of proofs:

`read_term_from_chars(+list(character),-term,+list(read_option)) - one_or_error`

---

`read_term_from_chars/4`

Reads a term from a list of characters using the given read options, also returning the remaining characters. A period at the end of the term is required. Valid options are those supported by the standard `read_term/3` predicate.

Compilation flags:

`static`

Template:

`read_term_from_chars(Chars,Term,Tail,Options)`

---

---

Mode and number of proofs:

```
read_term_from_chars(+list(character),-term,-list(character),+list(read_option)) - one_or_error
```

---

read\_from\_chars/2

Reads a term from a list of characters using default read options. Shorthand for `read_term_from_chars(Chars,Term,[])`. A period at the end of the list is optional.

Compilation flags:

```
static
```

Template:

```
read_from_chars(Chars,Term)
```

Mode and number of proofs:

```
read_from_chars(+list(character),-term) - one_or_error
```

---

read\_term\_from\_codes/3

Reads a term from a list of character codes using the given read options. A period at the end of the list is optional. Valid options are those supported by the standard `read_term/3` predicate.

Compilation flags:

```
static, synchronized
```

Template:

```
read_term_from_codes(Codes,Term,Options)
```

Mode and number of proofs:

```
read_term_from_codes(+list(character_code),-term,+list(read_option)) - one_or_error
```

---

`read_term_from_codes/4`

Reads a term from a list of character codes using the given read options, also returning the remaining character codes. A period at the end of the term is required. Valid options are those supported by the standard `read_term/3` predicate.

Compilation flags:

`static`

Template:

`read_term_from_codes(Codes,Term,Tail,Options)`

Mode and number of proofs:

`read_term_from_codes(+list(character_code),-term,-list(character_code),+list(read_option)) - one_or_error`

---

`read_from_codes/2`

Reads a term from a list of character codes using default read options. Shorthand for `read_term_from_codes(Codes,Term,[])`. A period at the end of the list is optional.

Compilation flags:

`static`

Template:

`read_from_codes(Codes,Term)`

Mode and number of proofs:

`read_from_codes(+list(character_code),-term) - one_or_error`

---

`write_term_to_atom/3`

Writes a term to an atom using the given write options. Valid options are those supported by the standard `write_term/3` predicate.

Compilation flags:

`static, synchronized`

Template:

`write_term_to_atom(Term,Atom,Options)`

Mode and number of proofs:

`write_term_to_atom(@term,-atom,+list(write_option)) - one`

---

`write_to_atom/2`

Writes a term to an atom using default write options. Shorthand for `write_term_to_atom(Term,Atom,[])`.

Compilation flags:

`static`

Template:

`write_to_atom(Term,Atom)`

Mode and number of proofs:

`write_to_atom(@term,-atom) - one`

---

`write_term_to_chars/3`

Writes a term to a list of characters using the given write options. Shorthand for `write_term_to_chars(Term,Chars,[],Options)`. Valid options are those supported by the standard `write_term/3` predicate.

Compilation flags:

`static`

Template:

`write_term_to_chars(Term,Chars,Options)`

Mode and number of proofs:

`write_term_to_chars(@term,-list(character),+list(write_option)) - one`

---

`write_term_to_chars/4`

Writes a term to a list of characters with the given tail using the given write options. Valid options are those supported by the standard `write_term/3` predicate.

Compilation flags:

`static, synchronized`

Template:

`write_term_to_chars(Term,Chars,Tail,Options)`

Mode and number of proofs:

`write_term_to_chars(@term,-list(character),@term,+list(write_option)) - one`

---

`write_to_chars/2`

Writes a term to a list of characters using default write options. Shorthand for `write_term_to_chars(Term,Chars,[],[])`.

Compilation flags:

`static`

Template:

`write_to_chars(Term,Chars)`

Mode and number of proofs:

`write_to_chars(@term,-list(character)) - one`

---

`write_term_to_codes/3`

Writes a term to a list of character codes using the given write options. Shorthand for `write_term_to_codes(Term,Codes,[],Options)`. Valid options are those supported by the standard `write_term/3` predicate.

Compilation flags:

`static`

Template:

`write_term_to_codes(Term,Codes,Options)`

---

Mode and number of proofs:

```
write_term_to_codes(@term,-list(character_code),+list(write_option)) - one
```

---

write\_term\_to\_codes/4

Writes a term to a list of character codes with the given tail using the given write options. Valid options are those supported by the standard write\_term/3 predicate.

Compilation flags:

```
static, synchronized
```

Template:

```
write_term_to_codes(Term,Codes,Tail,Options)
```

Mode and number of proofs:

```
write_term_to_codes(@term,-list(character_code),@term,+list(write_option)) - one
```

---

write\_to\_codes/2

Writes a term to a list of character codes using default write options. Shorthand for write\_term\_to\_chars(Term,Codes,[],[]).

Compilation flags:

```
static
```

Template:

```
write_to_codes(Term,Codes)
```

Mode and number of proofs:

```
write_to_codes(@term,-list(character_code)) - one
```

---

`format_to_atom/3`

Writes a list of arguments to an atom using the given format (specified as in the de facto standard `format/2` predicate).

Compilation flags:

`static, synchronized`

Template:

`format_to_atom(Format,Arguments,Atom)`

Mode and number of proofs:

`format_to_atom(@atom,+list(term),-atom) - one`

---

`format_to_chars/3`

Writes a list of arguments to a list of characters using the given format (specified as in the de facto standard `format/2` predicate). Shorthand for `format_to_chars(Format,Arguments,Chars,[])`.

Compilation flags:

`static`

Template:

`format_to_chars(Format,Arguments,Chars)`

Mode and number of proofs:

`format_to_chars(@term,+list(term),-list(character)) - one`

---

`format_to_chars/4`

Writes a term to a list of characters with the given tail using the given format (specified as in the de facto standard `format/2` predicate).

Compilation flags:

`static, synchronized`

Template:

`format_to_chars(Format,Arguments,Chars,Tail)`

Mode and number of proofs:

`format_to_chars(@term,+list(term),-list(character),@term) - one`

---

`format_to_codes/3`

Writes a list of arguments to a list of character codes using the given format (specified as in the de facto standard `format/2` predicate). Shorthand for `format_to_codes(Format,Arguments,Codes,[])`.

Compilation flags:

`static`

Template:

`format_to_codes(Format,Arguments,Codes)`

Mode and number of proofs:

`format_to_codes(@term,+list(term),-list(character_code)) - one`

---

`format_to_codes/4`

Writes a list of arguments to a list of character codes with the given tail using the given format (specified as in the de facto standard `format/2` predicate).

Compilation flags:

`static, synchronized`

Template:

`format_to_codes(Format,Arguments,Codes,Tail)`

Mode and number of proofs:

`format_to_codes(@term,+list(term),-list(character_code),@term) - one`

---

`with_output_to/2`

Calls a goal deterministically with output to the given format: `atom(Atom)`, `chars(Chars)`, `chars(Chars,Tail)`, `codes(Codes)`, or `codes(Codes,Tail)`.

Compilation flags:

`static`, `synchronized`

Template:

`with_output_to(Output,Goal)`

Meta-predicate template:

`with_output_to(*,0)`

Mode and number of proofs:

`with_output_to(+compound,+callable) - zero_or_one`

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

## 1.67 timeout

object

### 1.67.1 timeout

Predicates for calling goal with a time limit.

Availability:

`logtalk_load(timeout(loader))`

Author: Paulo Moura

Version: 0:10:0

Date: 2022-06-15

Compilation flags:

static, context\_switching\_calls

Dependencies:

(none)

Remarks:

- Supported backend Prolog systems: B-Prolog, ECLiPSe, XVM, SICStus Prolog, SWI-Prolog, Trealla Prolog, XSB, and YAP.

Inherited public predicates:

(none)

- Public predicates
  - call\_with\_timeout/2
  - call\_with\_timeout/3
- Protected predicates
- Private predicates
- Operators

## Public predicates

call\_with\_timeout/2

Calls a goal deterministically with the given time limit (expressed in seconds). Note that the goal may fail or throw an error before exhausting the time limit.

Compilation flags:

static

Template:

call\_with\_timeout(Goal,Timeout)

Meta-predicate template:

call\_with\_timeout(0,\*)

Mode and number of proofs:

call\_with\_timeout(+callable,+positive\_number) - zero\_or\_one

Exceptions:

Goal does not complete in the allowed time:  
    timeout(Goal)

---

call\_with\_timeout/3

Calls a goal deterministically with the given time limit (expressed in seconds) returning a reified result: true, fail, timeout, or error(Error).

Compilation flags:

    static

Template:

    call\_with\_timeout(Goal,Timeout,Result)

Meta-predicate template:

    call\_with\_timeout(0,\*,\*)

Mode and number of proofs:

    call\_with\_timeout(+callable,+positive\_number,--atom) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.68 toychr

object

### 1.68.1 toychrdb

Simple CHR interpreter/debugger based on the refined operational semantics of CHRs.

Availability:

```
logtalk_load(toychr(loader))
```

Author: Gregory J. Duck; adapted to Logtalk by Paulo Moura.

Version: 0:7:1

Date: 2024-03-15

Copyright: Copyright 2004 Gregory J. Duck; Copyright 2019-2024 Paulo Moura

License: GPL-2.0-or-later

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Uses:

```
list
```

```
user
```

Remarks:

```
(none)
```

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
  - chr\_is/2
  - chr\_trace/0
  - chr\_notrace/0
  - chr\_spy/1
  - chr\_nospy/0
  - chr\_no\_spy/1
  - chr\_option/2
- Protected predicates

- current\_prog/1
- chr\_option\_print\_trace/0
- chr\_option\_trace\_interactive/0
- chr\_option\_optimization\_level/1
- chr\_option\_show\_stack/0
- chr\_option\_show\_store/0
- chr\_option\_show\_history/0
- chr\_option\_show\_id/0
- chr\_option\_allow\_deep\_guards/0
- chr\_next\_state/1
- chr\_spy\_point/1
- Private predicates
  - chr\_rule\_/1
- Operators

### Public predicates

chr\_is/2

Compilation flags:  
static

---

chr\_trace/0

Compilation flags:  
static

---

chr\_notrace/0

Compilation flags:  
static

---

chr\_spy/1

Compilation flags:  
static

---

chr\_nospy/0

Compilation flags:  
static

---

chr\_no\_spy/1

Compilation flags:  
static

---

chr\_option/2

Compilation flags:  
static

---

### Protected predicates

current\_prog/1

Compilation flags:  
static

---

chr\_option\_print\_trace/0

Compilation flags:  
dynamic

---

chr\_option\_trace\_interactive/0

Compilation flags:  
dynamic

---

chr\_option\_optimization\_level/1

Compilation flags:  
dynamic

---

chr\_option\_show\_stack/0

Compilation flags:  
dynamic

---

chr\_option\_show\_store/0

Compilation flags:  
dynamic

---

chr\_option\_show\_history/0

Compilation flags:  
dynamic

---

chr\_option\_show\_id/0

Compilation flags:  
dynamic

---

chr\_option\_allow\_deep\_guards/0

Compilation flags:  
dynamic

---

chr\_next\_state/1

Compilation flags:  
dynamic

---

chr\_spy\_point/1

Compilation flags:  
dynamic

---

### Private predicates

chr\_rule\_/1

Compilation flags:  
dynamic

---

### Operators

(none)

## 1.69 tsv

object

### 1.69.1 tsv

TSV files reading and writing predicates using the option Header-keep.

Availability:  
logtalk\_load(tsv(loader))

Author: Paulo Moura  
Version: 1:0:0  
Date: 2023-11-15

Compilation flags:  
static, context\_switching\_calls

Extends:  
public tsv(keep)

Remarks:  
(none)

Inherited public predicates:  
read\_file/2 read\_file/3 read\_file\_by\_line/2 read\_file\_by\_line/3 read\_stream/2  
read\_stream/3 read\_stream\_by\_line/2 read\_stream\_by\_line/3 write\_file/3 write\_stream/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.69.2 tsv(Header)

- Header - Header handling option with possible values skip and keep (default).

TSV file and stream reading and writing predicates.

Availability:

```
logtalk_load(tsv(loader))
```

Author: Paulo Moura

Version: 1:0:1

Date: 2024-03-11

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public tsv_protocol
```

Uses:

list  
logtalk  
reader  
type

Remarks:

(none)

Inherited public predicates:

read\_file/2 read\_file/3 read\_file\_by\_line/2 read\_file\_by\_line/3 read\_stream/2  
read\_stream/3 read\_stream\_by\_line/2 read\_stream\_by\_line/3 write\_file/3 write\_stream/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

### 1.69.3 tsv\_protocol

TSV file and stream reading and writing protocol.

Availability:

```
logtalk_load(tsv(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2023-11-15

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

- Type-checking: Some of the predicate file and stream argument type-checking exceptions depend on the Prolog backend compliance with standards.

Inherited public predicates:

```
(none)
```

- Public predicates
  - read\_file/3
  - read\_stream/3
  - read\_file/2
  - read\_stream/2
  - read\_file\_by\_line/3
  - read\_stream\_by\_line/3
  - read\_file\_by\_line/2
  - read\_stream\_by\_line/2
  - write\_file/3
  - write\_stream/3
- Protected predicates
- Private predicates

- Operators

## Public predicates

`read_file/3`

Reads a TSV file saving the data as clauses for the specified object predicate. Fails if the file cannot be parsed.

Compilation flags:

`static`

Template:

`read_file(File, Object, Predicate)`

Mode and number of proofs:

`read_file(+atom, +object_identifier, +predicate_indicator) - zero_or_one`

Exceptions:

File is a variable:

`instantiation_error`

File is neither a variable nor an atom:

`type_error(atom, File)`

File is an atom but not an existing file:

`existence_error(file, File)`

File is an existing file but cannot be opened for reading:

`permission_error(open, source_sink, File)`

Object is a variable:

`instantiation_error`

Object is neither a variable nor an object identifier:

`type_error(object_identifier, Object)`

Object is a valid object identifier but not an existing object:

`existence_error(object, Object)`

Predicate is a variable:

`instantiation_error`

Predicate is neither a variable nor a predicate indicator:

`type_error(predicate_indicator, Predicate)`

Predicate is a valid predicate indicator but not an existing public predicate:

`existence_error(predicate, Predicate)`

read\_stream/3

Reads a TSV stream saving the data as clauses for the specified object predicate. Fails if the stream cannot be parsed.

Compilation flags:

static

Template:

read\_stream(Stream, Object, Predicate)

Mode and number of proofs:

read\_stream(+stream\_or\_alias, +object\_identifier, +predicate\_indicator) - zero\_or\_one

Exceptions:

Stream is a variable:

instantiation\_error

Stream is neither a variable nor a stream-term or alias:

domain\_error(stream\_or\_alias, Stream)

Stream is not an open stream:

existence\_error(stream, Stream)

Stream is an output stream:

permission\_error(input, stream, Stream)

Stream is a binary stream:

permission\_error(input, binary\_stream, Stream)

Object is a variable:

instantiation\_error

Object is neither a variable nor an object identifier:

type\_error(object\_identifier, Object)

Object is a valid object identifier but not an existing object:

existence\_error(object, Object)

Predicate is a variable:

instantiation\_error

Predicate is neither a variable nor a predicate indicator:

type\_error(predicate\_indicator, Predicate)

Predicate is a valid predicate indicator but not an existing public predicate:

existence\_error(predicate, Predicate)

---

read\_file/2

Reads a TSV file returning the data as a list of rows, each row a list of fields. Fails if the file cannot be parsed.

Compilation flags:

static

Template:

read\_file(File,Rows)

Mode and number of proofs:

read\_file(+atom,-list(list)) - zero\_or\_one

Exceptions:

File is a variable:

instantiation\_error

File is neither a variable nor an atom:

type\_error(atom,File)

File is an atom but not an existing file:

existence\_error(file,File)

File is an existing file but cannot be opened for reading:

permission\_error(open,source\_sink,File)

---

read\_stream/2

Reads a TSV stream returning the data as a list of rows, each row a list of fields. Fails if the stream cannot be parsed.

Compilation flags:

static

Template:

read\_stream(Stream,Rows)

Mode and number of proofs:

read\_stream(+stream\_or\_alias,-list(list)) - zero\_or\_one

Exceptions:

Stream is a variable:

instantiation\_error

Stream is neither a variable nor a stream-term or alias:

---

```
domain_error(stream_or_alias,Stream)
```

Stream is not an open stream:

```
existence_error(stream,Stream)
```

Stream is an output stream:

```
permission_error(input,stream,Stream)
```

Stream is a binary stream:

```
permission_error(input,binary_stream,Stream)
```

---

`read_file_by_line/3`

Reads a TSV file saving the data as clauses for the specified object predicate. The file is read line by line. Fails if the file cannot be parsed.

Compilation flags:

```
static
```

Template:

```
read_file_by_line(File,Object,Predicate)
```

Mode and number of proofs:

```
read_file_by_line(+atom,+object_identifier,+predicate_indicator) - zero_or_one
```

Exceptions:

File is a variable:

```
instantiation_error
```

File is neither a variable nor an atom:

```
type_error(atom,File)
```

File is an atom but not an existing file:

```
existence_error(file,File)
```

File is an existing file but cannot be opened for reading:

```
permission_error(open,source_sink,File)
```

Object is a variable:

```
instantiation_error
```

Object is neither a variable nor an object identifier:

```
type_error(object_identifier,Object)
```

Object is a valid object identifier but not an existing object:

```
existence_error(object,Object)
```

Predicate is a variable:

```
instantiation_error
```

Predicate is neither a variable nor a predicate indicator:

```
type_error(predicate_indicator,Predicate)
```

Predicate is a valid predicate indicator but not an existing public predicate:

```
existence_error(predicate,Predicate)
```

`read_stream_by_line/3`

Reads a TSV stream saving the data as clauses for the specified object predicate. The stream is read line by line. Fails if the stream cannot be parsed.

Compilation flags:

`static`

Template:

`read_stream_by_line(Stream, Object, Predicate)`

Mode and number of proofs:

`read_stream_by_line(+stream_or_alias, +object_identifier, +predicate_indicator) - zero_or_one`

Exceptions:

Stream is a variable:

`instantiation_error`

Stream is neither a variable nor a stream-term or alias:

`domain_error(stream_or_alias, Stream)`

Stream is not an open stream:

`existence_error(stream, Stream)`

Stream is an output stream:

`permission_error(input, stream, Stream)`

Stream is a binary stream:

`permission_error(input, binary_stream, Stream)`

Object is a variable:

`instantiation_error`

Object is neither a variable nor an object identifier:

`type_error(object_identifier, Object)`

Object is a valid object identifier but not an existing object:

`existence_error(object, Object)`

Predicate is a variable:

`instantiation_error`

Predicate is neither a variable nor a predicate indicator:

`type_error(predicate_indicator, Predicate)`

Predicate is a valid predicate indicator but not an existing public predicate:

`existence_error(predicate, Predicate)`

---

`read_file_by_line/2`

Reads a TSV file returning the data as a list of rows, each row a list of fields. The file is read line by line. Fails if the file cannot be parsed.

Compilation flags:

`static`

Template:

`read_file_by_line(File,Rows)`

Mode and number of proofs:

`read_file_by_line(+atom,-list(list)) - zero_or_one`

Exceptions:

File is a variable:

`instantiation_error`

File is neither a variable nor an atom:

`type_error(atom,File)`

File is an atom but not an existing file:

`existence_error(file,File)`

File is an existing file but cannot be opened for reading:

`permission_error(open,source_sink,File)`

---

`read_stream_by_line/2`

Reads a TSV stream returning the data as a list of rows, each row a list of fields. The stream is read line by line. Fails if the stream cannot be parsed.

Compilation flags:

`static`

Template:

`read_stream_by_line(Stream,Rows)`

Mode and number of proofs:

`read_stream_by_line(+stream_or_alias,-list(list)) - zero_or_one`

Exceptions:

Stream is a variable:

`instantiation_error`

Stream is neither a variable nor a stream-term or alias:

domain\_error(stream\_or\_alias,Stream)  
Stream is not an open stream:  
existence\_error(stream,Stream)  
Stream is an output stream:  
permission\_error(input,stream,Stream)  
Stream is a binary stream:  
permission\_error(input,binary\_stream,Stream)

---

write\_file/3

Writes a TSV file with the data represented by the clauses of the specified object predicate.

Compilation flags:

static

Template:

write\_file(File,Object,Predicate)

Mode and number of proofs:

write\_file(+atom,+object\_identifier,+predicate\_indicator) - one

Exceptions:

File is a variable:

instantiation\_error

File is neither a variable nor an atom:

type\_error(atom,File)

File is an atom but cannot be opened for writing:

permission\_error(open,source\_sink,File)

Object is a variable:

instantiation\_error

Object is neither a variable nor an object identifier:

type\_error(object\_identifier,Object)

Object is a valid object identifier but not an existing object:

existence\_error(object,Object)

Predicate is a variable:

instantiation\_error

Predicate is neither a variable nor a predicate indicator:

type\_error(predicate\_indicator,Predicate)

Predicate is a valid predicate indicator but not an existing public predicate:

existence\_error(predicate,Predicate)

---

write\_stream/3

Writes a TSV stream with the data represented by the clauses of the specified object predicate.

Compilation flags:

static

Template:

write\_stream(Stream, Object, Predicate)

Mode and number of proofs:

write\_stream(+stream\_or\_alias, +object\_identifier, +predicate\_indicator) - one

Exceptions:

Stream is a variable:

instantiation\_error

Stream is neither a variable nor a stream-term or alias:

domain\_error(stream\_or\_alias, Stream)

Stream is not an open stream:

existence\_error(stream, Stream)

Stream is an input stream:

permission\_error(output, stream, Stream)

Stream is a binary stream:

permission\_error(output, binary\_stream, Stream)

Object is a variable:

instantiation\_error

Object is neither a variable nor an object identifier:

type\_error(object\_identifier, Object)

Object is a valid object identifier but not an existing object:

existence\_error(object, Object)

Predicate is a variable:

instantiation\_error

Predicate is neither a variable nor a predicate indicator:

type\_error(predicate\_indicator, Predicate)

Predicate is a valid predicate indicator but not an existing public predicate:

existence\_error(predicate, Predicate)

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.70 tutor

object

### 1.70.1 tutor

This object adds explanations and suggestions to selected compiler warning and error messages.

Availability:

`logtalk_load(tutor(loader))`

Author: Paulo Moura

Version: 0:74:0

Date: 2024-10-16

Compilation flags:

`static, context_switching_calls`

Provides:

`logtalk::message_hook/4`

Uses:

`list`

`logtalk`

Remarks:

- Usage: Simply load this object at startup using the goal `logtalk_load(tutor(loader))`.

Inherited public predicates:

(none)

- Public predicates
  - explain//1
- Protected predicates
- Private predicates
- Operators

### Public predicates

explain//1

Generates an explanation for a message.

Compilation flags:

static

Mode and number of proofs:

explain(@callable) - zero\_or\_one

aergnames:

[Message]

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.71 types

object

### 1.71.1 atom

Atom data type predicates.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 1:9:0

Date: 2023-04-12

Compilation flags:

`static, context_switching_calls`

Extends:

`public atomic`

Uses:

`user`

Remarks:

(none)

Inherited public predicates:

`(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 check/1 depth/2 ground/1 new/1  
numbervars/1 numbervars/3 occurs/2 singletons/2 subsumes/2 subterm/2 valid/1 variables/2  
variant/2 varnumbers/2 varnumbers/3`

- Public predicates
  - `replace_sub_atom/4`
  - `split/3`
- Protected predicates
- Private predicates
- Operators

**Public predicates**

replace\_sub\_atom/4

Replaces all occurrences of Old by New in Input returning Output. Returns Input if Old is the empty atom. Fails when Output does not unify with the resulting atom.

Compilation flags:

static

Template:

replace\_sub\_atom(Old,New,Input,Output)

Mode and number of proofs:

replace\_sub\_atom(+atom,+atom,+atom,?atom) - zero\_or\_one

---

split/3

Splits an atom at a given delimiter into a list of sub-atoms.

Compilation flags:

static

Template:

split(Atom,Delimiter,SubAtoms)

Mode and number of proofs:

split(+atom,+atom,-list(atom)) - one

---

**Protected predicates**

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.71.2 atomic

Atomic data type predicates.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 1:3:0

Date: 2018-07-11

Compilation flags:

`static, context_switching_calls`

Extends:

`public term`

Remarks:

(none)

Inherited public predicates:

`(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 check/1 depth/2 ground/1 new/1  
numbervars/1 numbervars/3 occurs/2 singletons/2 subsumes/2 subterm/2 valid/1 variables/2  
variant/2 varnumbers/2 varnumbers/3`

- Public predicates
- Protected predicates
- Private predicates
- Operators

## Public predicates

(no local declarations; see entity ancestors if any)

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.71.3 callable

Callable term type predicates.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 1:4:0

Date: 2018-07-11

Compilation flags:

`static, context_switching_calls`

Extends:

`public term`

Remarks:

(none)

Inherited public predicates:

`(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 check/1 depth/2 ground/1 new/1  
numbervars/1 numbervars/3 occurs/2 singletons/2 subsumes/2 subterm/2 valid/1 variables/2  
variant/2 varnumbers/2 varnumbers/3`

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.71.4 character

Character predicates (most of them assume an ASCII representation).

Availability:

```
logtalk_load(types(loader))
```

Author: Paulo Moura

Version: 1:9:0

Date: 2019-06-29

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public characterp
```

Extends:

```
public atom
```

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 check/1 depth/2 ground/1 is\_alpha/1  
 is\_alphanumeric/1 is\_ascii/1 is\_bin\_digit/1 is\_control/1 is\_dec\_digit/1 is\_end\_of\_line/1  
 is\_hex\_digit/1 is\_layout/1 is\_letter/1 is\_lower\_case/1 is\_newline/1 is\_octal\_digit/1  
 is\_period/1 is\_punctuation/1 is\_quote/1 is\_upper\_case/1 is\_vowel/1 is\_white\_space/1  
 lower\_upper/2 new/1 numbervars/1 numbervars/3 occurs/2 parenthesis/2 replace\_sub\_atom/4  
 singletons/2 split/3 subsumes/2 subterm/2 valid/1 variables/2 variant/2 varnumbers/2  
 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.71.5 characterp

Character protocol.

Availability:

logtalk\_load(types(loader))

Author: Paulo Moura

Version: 1:3:0

Date: 2019-06-29

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - is\_ascii/1
  - is\_alphanumeric/1
  - is\_alpha/1
  - is\_letter/1
  - is\_bin\_digit/1
  - is\_octal\_digit/1
  - is\_dec\_digit/1
  - is\_hex\_digit/1
  - is\_lower\_case/1
  - is\_upper\_case/1
  - is\_vowel/1
  - is\_white\_space/1
  - is\_layout/1
  - is\_quote/1
  - is\_punctuation/1
  - is\_period/1
  - is\_control/1
  - is\_newline/1
  - is\_end\_of\_line/1
  - parenthesis/2

– lower\_upper/2

- Protected predicates
- Private predicates
- Operators

## Public predicates

is\_ascii/1

True if the argument is an ASCII character.

Compilation flags:

static

Template:

is\_ascii(Char)

Mode and number of proofs:

is\_ascii(+char) - zero\_or\_one

---

is\_alphanumeric/1

True if the argument is an alphanumeric character.

Compilation flags:

static

Template:

is\_alphanumeric(Char)

Mode and number of proofs:

is\_alphanumeric(+char) - zero\_or\_one

---

is\_alpha/1

True if the argument is a letter or an underscore.

Compilation flags:

static

Template:

is\_alpha(Char)

Mode and number of proofs:

is\_alpha(+char) - zero\_or\_one

---

is\_letter/1

True if the argument is a letter.

Compilation flags:

static

Template:

is\_letter(Char)

Mode and number of proofs:

is\_letter(+char) - zero\_or\_one

---

is\_bin\_digit/1

True if the argument is a binary digit.

Compilation flags:

static

Template:

is\_bin\_digit(Char)

Mode and number of proofs:

is\_bin\_digit(+char) - zero\_or\_one

---

---

`is_octal_digit/1`

True if the argument is an octal digit.

Compilation flags:

`static`

Template:

`is_octal_digit(Char)`

Mode and number of proofs:

`is_octal_digit(+char) - zero_or_one`

---

`is_dec_digit/1`

True if the argument is a decimal digit.

Compilation flags:

`static`

Template:

`is_dec_digit(Char)`

Mode and number of proofs:

`is_dec_digit(+char) - zero_or_one`

---

`is_hex_digit/1`

True if the argument is an hexadecimal digit.

Compilation flags:

`static`

Template:

`is_hex_digit(Char)`

Mode and number of proofs:

`is_hex_digit(+char) - zero_or_one`

---

is\_lower\_case/1

True if the argument is a lower case letter.

Compilation flags:

static

Template:

is\_lower\_case(Char)

Mode and number of proofs:

is\_lower\_case(+char) - zero\_or\_one

---

is\_upper\_case/1

True if the argument is a upper case letter.

Compilation flags:

static

Template:

is\_upper\_case(Char)

Mode and number of proofs:

is\_upper\_case(+char) - zero\_or\_one

---

is\_vowel/1

True if the argument is a vowel.

Compilation flags:

static

Template:

is\_vowel(Char)

Mode and number of proofs:

is\_vowel(+char) - zero\_or\_one

---

---

`is_white_space/1`

True if the argument is a white space character (a space or a tab) inside a line of characters.

Compilation flags:

`static`

Template:

`is_white_space(Char)`

Mode and number of proofs:

`is_white_space(+char) - zero_or_one`

---

`is_layout/1`

True if the argument is a layout character.

Compilation flags:

`static`

Template:

`is_layout(Char)`

Mode and number of proofs:

`is_layout(+char) - zero_or_one`

---

`is_quote/1`

True if the argument is a quote character.

Compilation flags:

`static`

Template:

`is_quote(Char)`

Mode and number of proofs:

`is_quote(+char) - zero_or_one`

---

is\_punctuation/1

True if the argument is a sentence punctuation character.

Compilation flags:

static

Template:

is\_punctuation(Char)

Mode and number of proofs:

is\_punctuation(+char) - zero\_or\_one

---

is\_period/1

True if the argument is a character that ends a sentence.

Compilation flags:

static

Template:

is\_period(Char)

Mode and number of proofs:

is\_period(+char) - zero\_or\_one

---

is\_control/1

True if the argument is an ASCII control character.

Compilation flags:

static

Template:

is\_control(Char)

Mode and number of proofs:

is\_control(+char) - zero\_or\_one

---

`is_newline/1`

True if the argument is the ASCII newline character.

Compilation flags:

`static`

Template:

`is_newline(Char)`

Mode and number of proofs:

`is_newline(+char) - zero_or_one`

---

`is_end_of_line/1`

True if the argument is the ASCII end-of-line character (either a carriage return or a line feed).

Compilation flags:

`static`

Template:

`is_end_of_line(Char)`

Mode and number of proofs:

`is_end_of_line(+char) - zero_or_one`

---

`parenthesis/2`

Recognizes and converts between open and close parenthesis.

Compilation flags:

`static`

Template:

`parenthesis(Char1,Char2)`

Mode and number of proofs:

`parenthesis(?char,?char) - zero_or_more`

`parenthesis(+char,?char) - zero_or_one`

`parenthesis(?char,+char) - zero_or_one`

---

`lower_upper/2`

Recognizes and converts between lower and upper case letters.

Compilation flags:

`static`

Template:

`lower_upper(Char1,Char2)`

Mode and number of proofs:

`lower_upper(?char,?char) - zero_or_more`

`lower_upper(+char,?char) - zero_or_one`

`lower_upper(?char,+char) - zero_or_one`

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

[character](#)

[protocol](#)

### 1.71.6 comparingp

Comparing protocol using overloading of standard operators.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 1:0:0  
Date: 2000-07-24

Compilation flags:  
static

Dependencies:  
(none)

Remarks:  
(none)

Inherited public predicates:  
(none)

- Public predicates
  - ( $<$ )/2
  - ( $=<$ )/2
  - ( $>$ )/2
  - ( $>=$ )/2
  - ( $=:=$ )/2
  - ( $=\backslash=$ )/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

( $<$ )/2

True if Term1 is less than Term2.

Compilation flags:  
static

Template:  
Term1<Term2

Mode and number of proofs:

+term< +term - zero\_or\_one

---

(=<)/2

True if Term1 is less or equal than Term2.

Compilation flags:

static

Template:

Term1=<Term2

Mode and number of proofs:

+term=< +term - zero\_or\_one

---

(>)/2

True if Term1 is greater than Term2.

Compilation flags:

static

Template:

Term1>Term2

Mode and number of proofs:

+term> +term - zero\_or\_one

---

(>=)/2

True if Term1 is equal or grater than Term2.

Compilation flags:

static

Template:

---

Term1>=Term2

Mode and number of proofs:

+term>= +term - zero\_or\_one

---

(:=)/2

True if Term1 is equal to Term2.

Compilation flags:

static

Template:

Term1:=Term2

Mode and number of proofs:

+term:= +term - zero\_or\_one

---

(=\)/2

True if Term1 is not equal to Term2.

Compilation flags:

static

Template:

Term1=\Term2

Mode and number of proofs:

+term=\ +term - zero\_or\_one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

object

## 1.71.7 compound

Compound data type.

Availability:

logtalk\_load(types(loader))

Author: Paulo Moura

Version: 1:3:0

Date: 2018-07-11

Compilation flags:

static, context\_switching\_calls

Extends:

public term

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 check/1 depth/2 ground/1 new/1  
numbervars/1 numbervars/3 occurs/2 singletons/2 subsumes/2 subterm/2 valid/1 variables/2  
variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates

- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.71.8 difflist

Difference list predicates.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 2:0:0

Date: 2020-05-11

Compilation flags:

`static, context_switching_calls`

Implements:

`public listp`

Extends:

`public compound`

Uses:

`list`

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 append/2 append/3 check/1 delete/3  
delete\_matches/3 depth/2 drop/3 empty/1 flatten/2 ground/1 hamming\_distance/3 keysort/2  
last/2 length/2 max/2 member/2 memberchk/2 min/2 msort/2 msort/3 new/1 nextto/3  
nth0/3 nth0/4 nth1/3 nth1/4 numbervars/1 numbervars/3 occurrences/2 occurrences/3  
occurs/2 partition/5 permutation/2 prefix/2 prefix/3 proper\_prefix/2 proper\_prefix/3  
proper\_suffix/2 proper\_suffix/3 remove\_duplicates/2 reverse/2 same\_length/2 same\_length/3  
select/3 select/4 selectchk/3 selectchk/4 sequential\_occurrences/2 sequential\_occurrences/3  
singletons/2 sort/2 sort/3 sort/4 split/4 sublist/2 subsequence/3 subsequence/4 substitute/4  
subsumes/2 subterm/2 subtract/3 suffix/2 suffix/3 take/3 valid/1 variables/2 variant/2  
varnumbers/2 varnumbers/3

- Public predicates
  - add/3
  - as\_list/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

add/3

Adds a term to the end of a difference list.

Compilation flags:

static

Template:

add(Term,DiffList,NewDiffList)

Mode and number of proofs:

add(@term,+difference\_list,-difference\_list) - one

---

as\_list/2

Returns a list with the elements of the difference list.

Compilation flags:

static

Template:

as\_list(DiffList,List)

Mode and number of proofs:

as\_list(@difference\_list,-list) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

list, list(Type), numberlist, varlist

object

### 1.71.9 float

Floating point numbers data type predicates.

Availability:

logtalk\_load(types(loader))

Author: Paulo Moura

Version: 1:5:0

Date: 2018-07-15

Compilation flags:

static, context\_switching\_calls

Extends:

public number

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 =~= / 2 (>)/2 (>=)/2 approximately\_equal/2  
approximately\_equal/3 check/1 depth/2 essentially\_equal/3 ground/1 new/1 numbervars/1  
numbervars/3 occurs/2 singletons/2 subsumes/2 subterm/2 tolerance\_equal/4 valid/1  
variables/2 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.71.10 integer

Integer data type predicates.

Availability:

```
logtalk_load(types(loader))
```

Author: Paulo Moura

Version: 1:55:0

Date: 2022-06-21

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public number
```

Remarks:

- Portability notes: This object will use the backend Prolog system between/3, plus/3, and succ/2 built-in predicates when available.

Inherited public predicates:

```
(<)/2 (=:=)/2 (= <)/2 (= \=)/2 =~/2 (>)/2 (>=)/2 approximately_equal/2
approximately_equal/3 check/1 depth/2 essentially_equal/3 ground/1 new/1 numbervars/1
numbervars/3 occurs/2 singletons/2 subsumes/2 subterm/2 tolerance_equal/4 valid/1
variables/2 variant/2 varnumbers/2 varnumbers/3
```

- Public predicates
  - between/3
  - plus/3
  - succ/2
  - sequence/3
  - sequence/4
- Protected predicates
- Private predicates
- Operators

## Public predicates

between/3

Returns integers in the interval defined by the two first arguments.

Compilation flags:

static

Template:

between(Lower,Upper,Integer)

Mode and number of proofs:

between(+integer,+integer,+integer) - zero\_or\_one

between(+integer,+integer,-integer) - zero\_or\_more

---

plus/3

Reversible integer sum. At least two of the arguments must be instantiated to integers.

Compilation flags:

static

Template:

plus(I,J,Sum)

Mode and number of proofs:

plus(+integer,+integer,?integer) - zero\_or\_one

plus(+integer,?integer,+integer) - zero\_or\_one

plus(?integer,+integer,+integer) - zero\_or\_one

---

succ/2

Successor of a natural number. At least one of the arguments must be instantiated to a natural number.

Compilation flags:

static

Template:

---

```
succ(I,J)
```

Mode and number of proofs:

```
succ(+integer,?integer) - zero_or_one
```

```
succ(?integer,+integer) - zero_or_one
```

---

```
sequence/3
```

Generates a list with the sequence of all integers in the interval [Lower,Upper]. Assumes Lower =< Upper and fails otherwise.

Compilation flags:

```
static
```

Template:

```
sequence(Lower,Upper,List)
```

Mode and number of proofs:

```
sequence(+integer,+integer,-list(integer)) - zero_or_one
```

---

```
sequence/4
```

Generates a list with the sequence of integers in the interval [Lower,Upper] by Step. Assumes Lower =< Upper, Step >= 1 and fails otherwise.

Compilation flags:

```
static
```

Template:

```
sequence(Lower,Upper,Step,List)
```

Mode and number of proofs:

```
sequence(+integer,+integer,+integer,-list(integer)) - zero_or_one
```

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.71.11 list

List predicates.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 4:3:0

Date: 2024-05-24

Compilation flags:

`static, context_switching_calls`

Implements:

`public listp`

Extends:

`public compound`

Remarks:

- Portability notes: This object will use the backend Prolog system `msort/2` and `sort/4` built-in predicates when available.

Inherited public predicates:

`(<)/2 (=:=)/2 (= <)/2 (= \=)/2 (>)/2 (>=)/2 append/2 append/3 check/1 delete/3 delete_matches/3 depth/2 drop/3 empty/1 flatten/2 ground/1 hamming_distance/3 keysort/2 last/2 length/2 max/2 member/2 memberchk/2 min/2 msort/2 msort/3 new/1 nextto/3 nth0/3 nth0/4 nth1/3 nth1/4 numbervars/1 numbervars/3 occurrences/2 occurrences/3 occurs/2 partition/5 permutation/2 prefix/2 prefix/3 proper_prefix/2 proper_prefix/3`

proper\_suffix/2 proper\_suffix/3 remove\_duplicates/2 reverse/2 same\_length/2 same\_length/3  
 select/3 select/4 selectchk/3 selectchk/4 sequential\_occurrences/2 sequential\_occurrences/3  
 singletons/2 sort/2 sort/3 sort/4 split/4 sublist/2 subsequence/3 subsequence/4 substitute/4  
 subsumes/2 subterm/2 subtract/3 suffix/2 suffix/3 take/3 valid/1 variables/2 variant/2  
 varnumbers/2 varnumbers/3

- Public predicates
  - as\_difflist/2
- Protected predicates
- Private predicates
- Operators

### Public predicates

as\_difflist/2

Converts a list to a difference list.

Compilation flags:

static

Template:

as\_difflist(List,Diffist)

Mode and number of proofs:

as\_difflist(+list,-difference\_list) - one

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

`list(Type)`, `numberlist`, `varlist`, `difflist`

object

### 1.71.12 `list(Type)`

List predicates with elements constrained to a single type.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 1:22:0

Date: 2018-07-11

Compilation flags:

`static, context_switching_calls`

Extends:

public `list`

Remarks:

(none)

Inherited public predicates:

`(<)/2` `(=:)/2` `(=<)/2` `(=\=)/2` `(>)/2` `(>=)/2` `append/2` `append/3` `as_difflist/2` `check/1`  
`delete/3` `delete_matches/3` `depth/2` `drop/3` `empty/1` `flatten/2` `ground/1` `hamming_distance/3`  
`keysort/2` `last/2` `length/2` `max/2` `member/2` `memberchk/2` `min/2` `msort/2` `msort/3` `new/1`  
`nextto/3` `nth0/3` `nth0/4` `nth1/3` `nth1/4` `numbervars/1` `numbervars/3` `occurrences/2`  
`occurrences/3` `occurs/2` `partition/5` `permutation/2` `prefix/2` `prefix/3` `proper_prefix/2`  
`proper_prefix/3` `proper_suffix/2` `proper_suffix/3` `remove_duplicates/2` `reverse/2` `same_length/2`  
`same_length/3` `select/3` `select/4` `selectchk/3` `selectchk/4` `sequential_occurrences/2`  
`sequential_occurrences/3` `singletons/2` `sort/2` `sort/3` `sort/4` `split/4` `sublist/2` `subsequence/3`  
`subsequence/4` `substitute/4` `subsumes/2` `subterm/2` `subtract/3` `suffix/2` `suffix/3` `take/3` `valid/1`  
`variables/2` `variant/2` `varnumbers/2` `varnumbers/3`

- Public predicates
- Protected predicates

- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`list`, `numberlist`, `varlist`, `difflist`

`protocol`

### 1.71.13 `listp`

List protocol.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 1:18:0

Date: 2024-05-24

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - append/2
  - append/3
  - delete/3
  - delete\_matches/3
  - empty/1
  - flatten/2
  - hamming\_distance/3
  - keysort/2
  - last/2
  - length/2
  - max/2
  - member/2
  - memberchk/2
  - min/2
  - msort/2
  - msort/3
  - nextto/3
  - nth0/3
  - nth0/4
  - nth1/3
  - nth1/4
  - sequential\_occurrences/2
  - sequential\_occurrences/3
  - occurrences/2
  - occurrences/3
  - partition/5
  - permutation/2
  - prefix/2
  - prefix/3
  - proper\_prefix/2
  - proper\_prefix/3

- remove\_duplicates/2
  - reverse/2
  - same\_length/2
  - same\_length/3
  - select/3
  - selectchk/3
  - select/4
  - selectchk/4
  - sort/2
  - sort/3
  - sort/4
  - split/4
  - sublist/2
  - subsequence/3
  - subsequence/4
  - substitute/4
  - subtract/3
  - suffix/2
  - suffix/3
  - proper\_suffix/2
  - proper\_suffix/3
  - take/3
  - drop/3
- Protected predicates
  - Private predicates
  - Operators

## Public predicates

append/2

Appends all lists in a list of lists.

Compilation flags:

static

Template:

append(Lists,Concatenation)

Mode and number of proofs:

append(+list(list),?list) - zero\_or\_one

---

append/3

Appends two lists.

Compilation flags:

static

Template:

append(List1,List2,List)

Mode and number of proofs:

append(?list,?list,?list) - zero\_or\_more

---

delete/3

Deletes from a list all occurrences of an element returning the list of remaining elements. Uses ==/2 for element comparison.

Compilation flags:

static

Template:

delete(List,Element,Remaining)

Mode and number of proofs:

delete(@list,@term,?list) - one

---

delete\_matches/3

Deletes all matching elements from a list, returning the list of remaining elements. Uses =/2 for element comparison.

Compilation flags:

static

Template:

delete\_matches(List,Element,Remaining)

Mode and number of proofs:

delete\_matches(@list,@term,?list) - one

---

empty/1

True if the argument is an empty list.

Compilation flags:

static

Template:

empty(List)

Mode and number of proofs:

empty(@list) - zero\_or\_one

---

flatten/2

Flattens a list of lists into a list.

Compilation flags:

static

Template:

flatten(List,Flatted)

Mode and number of proofs:

flatten(+list,-list) - one

---

hamming\_distance/3

Calculates the Hamming distance between two lists (using equality to compare list elements). Fails if the two lists are not of the same length.

Compilation flags:

static

Template:

hamming\_distance(List1,List2,Distance)

Mode and number of proofs:

hamming\_distance(+list,+list,-integer) - zero\_or\_one

---

keysort/2

Sorts a list of key-value pairs in ascending order.

Compilation flags:

static

Template:

keysort(List,Sorted)

Mode and number of proofs:

keysort(+list(pair),-list(pair)) - one

---

last/2

List last element (if it exists).

Compilation flags:

static

Template:

last(List,Last)

---

Mode and number of proofs:

last(?list,?term) - zero\_or\_more

---

length/2

List length.

Compilation flags:

static

Template:

length(List,Length)

Mode and number of proofs:

length(?list,?integer) - zero\_or\_more

---

max/2

Determines the list maximum value using standard order. Fails if the list is empty.

Compilation flags:

static

Template:

max(List,Maximum)

Mode and number of proofs:

max(+list,-term) - zero\_or\_one

---

member/2

Element is a list member.

Compilation flags:

static

---

Template:

member(Element,List)

Mode and number of proofs:

member(?term,?list) - zero\_or\_more

---

memberchk/2

Checks if a term is a member of a list.

Compilation flags:

static

Template:

memberchk(Element,List)

Mode and number of proofs:

memberchk(?term,?list) - zero\_or\_one

---

min/2

Determines the minimum value in a list using standard order. Fails if the list is empty.

Compilation flags:

static

Template:

min(List,Minimum)

Mode and number of proofs:

min(+list,-term) - zero\_or\_one

---

`mSORT/2`

Sorts a list in ascending order (duplicated elements are not removed).

Compilation flags:

`static`

Template:

`mSORT(List,Sorted)`

Mode and number of proofs:

`mSORT(+list,-list) - one`

---

`mSORT/3`

Sorts a list using a user-specified comparison predicate modeled on the standard `compare/3` predicate (duplicated elements are not removed).

Compilation flags:

`static`

Template:

`mSORT(Closure,List,Sorted)`

Meta-predicate template:

`mSORT(3,*,*)`

Mode and number of proofs:

`mSORT(+callable,+list,-list) - one`

---

`nextto/3`

X and Y are consecutive elements in List.

Compilation flags:

`static`

Template:

`nextto(X,Y,List)`

Mode and number of proofs:

`nextto(?term,?term,?list) - zero_or_more`

---

`nth0/3`

Nth element of a list (counting from zero).

Compilation flags:

`static`

Template:

`nth0(Nth,List,Element)`

Mode and number of proofs:

`nth0(?integer,?list,?term) - zero_or_more`

---

`nth0/4`

Nth element of a list (counting from zero). Rest is a list of all the other elements. Can be used to either select the nth element of List or to insert an element before the nth element in Rest.

Compilation flags:

`static`

Template:

`nth0(Nth,List,Element,Rest)`

Mode and number of proofs:

`nth0(?integer,?list,?term,?list) - zero_or_more`

---

`nth1/3`

Nth element of a list (counting from one).

Compilation flags:

`static`

---

---

Template:

`nth1(Nth,List,Element)`

Mode and number of proofs:

`nth1(?integer,?list,?term) - zero_or_more`

---

`nth1/4`

Nth element of a list (counting from one). Rest is a list of all the other elements. Can be used to either select the nth element of List or to insert an element before the nth element in Rest.

Compilation flags:

`static`

Template:

`nth1(Nth,List,Element,Rest)`

Mode and number of proofs:

`nth1(?integer,?list,?term,?list) - zero_or_more`

---

`sequential_occurrences/2`

Counts the number of sequential occurrences of each List element, unifying Occurrences with a list of Element-Count pairs. Uses term equality for element comparison.

Compilation flags:

`static`

Template:

`sequential_occurrences(List,Occurrences)`

Mode and number of proofs:

`sequential_occurrences(@list,-list(pair(term,positive_integer))) - one`

---

sequential\_occurrences/3

Counts the number of sequential occurrences of each List element, unifying Occurrences with a list of Element-Count pairs. Uses Closure for element comparison.

Compilation flags:

static

Template:

sequential\_occurrences(List,Closure,Occurrences)

Mode and number of proofs:

sequential\_occurrences(@list,@callable,-list(pair(term,positive\_integer))) - one

---

occurrences/2

Counts the number of occurrences of each List element, unifying Occurrences with a sorted list of Element-Count pairs. Uses term equality for element comparison.

Compilation flags:

static

Template:

occurrences(List,Occurrences)

Mode and number of proofs:

occurrences(@list,-list(pair(term,positive\_integer))) - one

---

occurrences/3

Counts the number of occurrences of each List element, unifying Occurrences with a sorted list of Element-Count pairs. Uses Closure for element comparison.

Compilation flags:

static

Template:

occurrences(List,Closure,Occurrences)

Meta-predicate template:

---

occurrences(\*,2,\*)

Mode and number of proofs:

occurrences(@list,@callable,-list(pair(term,positive\_integer))) - one

---

partition/5

Partitions a list in lists with values less, equal, and greater than a given value (using standard order).

Compilation flags:

static

Template:

partition(List,Value,Less,Equal,Greater)

Mode and number of proofs:

partition(+list,+number,-list,-list,-list) - one

---

permutation/2

The two lists are a permutation of the same list.

Compilation flags:

static

Template:

permutation(List,Permutation)

Mode and number of proofs:

permutation(?list,?list) - zero\_or\_more

---

prefix/2

Prefix is a prefix of List.

Compilation flags:

static

Template:

prefix(Prefix,List)

Mode and number of proofs:

prefix(?list,+list) - zero\_or\_more

---

prefix/3

Prefix is a prefix of length Length of List.

Compilation flags:

static

Template:

prefix(Prefix,Length,List)

Mode and number of proofs:

prefix(?list,+integer,+list) - zero\_or\_one

prefix(?list,-integer,+list) - zero\_or\_more

---

proper\_prefix/2

Prefix is a proper prefix of List.

Compilation flags:

static

Template:

proper\_prefix(Prefix,List)

Mode and number of proofs:

proper\_prefix(?list,+list) - zero\_or\_more

---

`proper_prefix/3`

Prefix is a proper prefix of length Length of List.

Compilation flags:

`static`

Template:

`proper_prefix(Prefix,Length,List)`

Mode and number of proofs:

`proper_prefix(?list,+integer,+list) - zero_or_one`

`proper_prefix(?list,-integer,+list) - zero_or_more`

---

`remove_duplicates/2`

Removes duplicated list elements using equality (`==/2`) for comparison and keeping the left-most element when repeated.

Compilation flags:

`static`

Template:

`remove_duplicates(List,Set)`

Mode and number of proofs:

`remove_duplicates(+list,-list) - one`

---

`reverse/2`

Reverses a list.

Compilation flags:

`static`

Template:

reverse(List,Reversed)

Mode and number of proofs:

reverse(+list,?list) - zero\_or\_one

reverse(?list,+list) - zero\_or\_one

reverse(-list,-list) - one\_or\_more

---

same\_length/2

The two lists have the same length.

Compilation flags:

static

Template:

same\_length(List1,List2)

Mode and number of proofs:

same\_length(+list,?list) - zero\_or\_one

same\_length(?list,+list) - zero\_or\_one

same\_length(-list,-list) - one\_or\_more

---

same\_length/3

The two lists have the same length.

Compilation flags:

static

Template:

same\_length(List1,List2,Length)

Mode and number of proofs:

same\_length(+list,?list,?integer) - zero\_or\_one

same\_length(?list,+list,?integer) - zero\_or\_one

same\_length(-list,-list,-integer) - one\_or\_more

---

select/3

Selects an element from a list, returning the list of remaining elements.

Compilation flags:

static

Template:

select(Element,List,Remaining)

Mode and number of proofs:

select(?term,?list,?list) - zero\_or\_more

---

selectchk/3

Checks that an element can be selected from a list, returning the list of remaining elements.

Compilation flags:

static

Template:

selectchk(Element,List,Remaining)

Mode and number of proofs:

selectchk(?term,?list,?list) - zero\_or\_one

---

select/4

Selects an element from a list, replacing it by a new element and returning the resulting list.

Compilation flags:

static

Template:

select(Old,OldList,New,NewList)

Mode and number of proofs:

select(?term,?list,?term,?list) - zero\_or\_more

---

selectchk/4

Checks that an element from a list can be replaced by a new element, returning the resulting list.

Compilation flags:

static

Template:

selectchk(Old,OldList,New,NewList)

Mode and number of proofs:

selectchk(?term,?list,?term,?list) - zero\_or\_one

---

sort/2

Sorts a list in ascending order (duplicated elements are removed).

Compilation flags:

static

Template:

sort(List,Sorted)

Mode and number of proofs:

sort(+list,-list) - one

---

sort/3

Sorts a list using a user-specified comparison predicate modeled on the standard compare/3 predicate (duplicated elements are removed).

Compilation flags:

static

Template:

sort(Closure,List,Sorted)

Meta-predicate template:

sort(3,\*,\*)

Mode and number of proofs:

---

---

`sort(+callable,+list,-list) - one`

---

`sort/4`

Sorts a list using the given key and order. Uses the standard term comparison operators for the order. The key selects the argument in each element in the list to use for comparisons. A key value of zero uses the whole element for comparisons.

Compilation flags:

`static`

Template:

`sort(Key,Order,List,Sorted)`

Mode and number of proofs:

`sort(+non_negative_integer,+atom,+list,-list) - one`

Remarks:

- Removing duplicates: Use one of the `@<` or `@>` orders.
  - Keeping duplicates: Use one of the `@=<` or `@>=` orders.
  - Sorting in ascending order: Use one of the `@<` or `@=<` orders.
  - Sorting in descending order: Use one of the `@>` or `@>=` orders.
- 

`split/4`

Splits a list into sublists of a given length. Also returns a list with the remaining elements. Fails if the length is zero or negative.

Compilation flags:

`static`

Template:

`split(List,Length,Sublists,Remaining)`

Mode and number of proofs:

`split(+list,+integer,-list(list),-list) - zero_or_one`

---

sublist/2

The first list is a sublist of the second.

Compilation flags:

static

Template:

sublist(Sublist,List)

Mode and number of proofs:

sublist(?list,+list) - zero\_or\_more

---

subsequence/3

List is an interleaving of Subsequence and Remaining. Element order is preserved.

Compilation flags:

static

Template:

subsequence(List,Subsequence,Remaining)

Mode and number of proofs:

subsequence(?list,?list,?list) - zero\_or\_more

---

subsequence/4

Generates subsequences of a given length from a list. Also returns the remaining elements. Element order is preserved.

Compilation flags:

static

Template:

subsequence(List,Length,Subsequence,Remaining)

Mode and number of proofs:

subsequence(+list,+integer,?list,?list) - zero\_or\_more

---

substitute/4

Substitutes all occurrences of Old in List by New, returning NewList. Uses term equality for element comparison.

Compilation flags:

static

Template:

substitute(Old,List,New,NewList)

Mode and number of proofs:

substitute(@term,@list,@term,-list) - one

---

subtract/3

Removes all elements in the second list from the first list, returning the list of remaining elements.

Compilation flags:

static

Template:

subtract(List,Elements,Remaining)

Mode and number of proofs:

subtract(+list,+list,-list) - one

---

suffix/2

Suffix is a suffix of List.

Compilation flags:

static

Template:

suffix(Suffix,List)

---

Mode and number of proofs:

suffix(?list,+list) - zero\_or\_more

---

suffix/3

Suffix is a suffix of length Length of List.

Compilation flags:

static

Template:

suffix(Suffix,Length,List)

Mode and number of proofs:

suffix(?list,+integer,+list) - zero\_or\_one

suffix(?list,-integer,+list) - zero\_or\_more

---

proper\_suffix/2

Suffix is a proper suffix of List.

Compilation flags:

static

Template:

proper\_suffix(Suffix,List)

Mode and number of proofs:

proper\_suffix(?list,+list) - zero\_or\_more

---

---

`proper_suffix/3`

Suffix is a proper suffix of length Length of List.

Compilation flags:

`static`

Template:

`proper_suffix(Suffix,Length,List)`

Mode and number of proofs:

`proper_suffix(?list,+integer,+list) - zero_or_one`

`proper_suffix(?list,-integer,+list) - zero_or_more`

---

`take/3`

Takes the first N elements of a list. Fails if the list have fewer than N elements.

Compilation flags:

`static`

Template:

`take(N,List,Elements)`

Mode and number of proofs:

`take(+integer,+list,-list) - zero_or_one`

---

`drop/3`

Drops the first N elements of a list. Fails if the list have fewer than N elements.

Compilation flags:

`static`

Template:

`drop(N,List,Remaining)`

Mode and number of proofs:

`drop(+integer,+list,-list) - zero_or_one`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

list, list(Type), numberlistp, varlistp

object

### 1.71.14 natural

Natural numbers data type predicates.

Availability:

logtalk\_load(types(loader))

Author: Paulo Moura

Version: 1:1:0

Date: 2009-03-06

Compilation flags:

static, context\_switching\_calls

Extends:

public integer

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 =~= / 2 (>)/2 (>=)/2 approximately\_equal/2  
approximately\_equal/3 between/3 check/1 depth/2 essentially\_equal/3 ground/1 new/1  
numbervars/1 numbervars/3 occurs/2 plus/3 sequence/3 sequence/4 singletons/2 subsumes/2  
subterm/2 succ/2 tolerance\_equal/4 valid/1 variables/2 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.71.15 number

Number data type predicates.

Availability:

```
logtalk_load(types(loader))
```

Author: Paulo Moura

Version: 1:14:0

Date: 2023-12-07

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public atomic
```

Remarks:

(none)

Inherited public predicates:

(<)/2 (:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 check/1 depth/2 ground/1 new/1  
numbervars/1 numbervars/3 occurs/2 singletons/2 subsumes/2 subterm/2 valid/1 variables/2  
variant/2 varnumbers/2 varnumbers/3

- Public predicates
  - approximately\_equal/2
  - approximately\_equal/3
  - essentially\_equal/3
  - tolerance\_equal/4
  - ==~ / 2
- Protected predicates
- Private predicates
- Operators
  - op(700,xfx,==~)

## Public predicates

approximately\_equal/2

Compares two numbers for approximate equality given the epsilon arithmetic constant value using the de facto standard formula  $\text{abs}(\text{Number1} - \text{Number2}) \leq \max(\text{abs}(\text{Number1}), \text{abs}(\text{Number2})) * \text{epsilon}$ . No type-checking.

Compilation flags:

static

Template:

approximately\_equal(Number1,Number2)

Mode and number of proofs:

approximately\_equal(+number,+number) - zero\_or\_one

---

`approximately_equal/3`

Compares two numbers for approximate equality given a user-defined epsilon value using the de facto standard formula  $\text{abs}(\text{Number1} - \text{Number2}) \leq \max(\text{abs}(\text{Number1}), \text{abs}(\text{Number2})) * \text{Epsilon}$ . No type-checking.

Compilation flags:

`static`

Template:

`approximately_equal(Number1,Number2,Epsilon)`

Mode and number of proofs:

`approximately_equal(+number,+number,+number) - zero_or_one`

Remarks:

- Epsilon range: Epsilon should be the epsilon arithmetic constant value or a small multiple of it. Only use a larger value if a greater error is expected.
  - Comparison with essential equality: For the same epsilon value, approximate equality is weaker requirement than essential equality.
- 

`essentially_equal/3`

Compares two numbers for essential equality given an epsilon value using the de facto standard formula  $\text{abs}(\text{Number1} - \text{Number2}) \leq \min(\text{abs}(\text{Number1}), \text{abs}(\text{Number2})) * \text{Epsilon}$ . No type-checking.

Compilation flags:

`static`

Template:

`essentially_equal(Number1,Number2,Epsilon)`

Mode and number of proofs:

`essentially_equal(+number,+number,+number) - zero_or_one`

Remarks:

- Comparison with approximate equality: For the same epsilon value, essential equality is a stronger requirement than approximate equality.
-

tolerance\_equal/4

Compares two numbers for close equality given relative and absolute tolerances using the de facto standard formula  $\text{abs}(\text{Number1} - \text{Number2}) \leq \max(\text{RelativeTolerance} * \max(\text{abs}(\text{Number1}), \text{abs}(\text{Number2})), \text{AbsoluteTolerance})$ . No type-checking.

Compilation flags:

static

Template:

tolerance\_equal(Number1,Number2,RelativeTolerance,AbsoluteTolerance)

Mode and number of proofs:

tolerance\_equal(+number,+number,+number,+number) - zero\_or\_one

---

=~=/ 2

Compares two floats (or lists of floats) for approximate equality using 100\*epsilon for the absolute error and, if that fails, 99.999% accuracy for the relative error. Note that these precision values may not be adequate for all cases. No type-checking.

Compilation flags:

static

Template:

=~=(Float1,Float2)

Mode and number of proofs:

=~=(+number,+number) - zero\_or\_one

=~=(+list(number),+list(number)) - zero\_or\_one

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

op(700,xfx,=~=)

Scope:

public

object

### 1.71.16 numberlist

List of numbers predicates.

Availability:

logtalk\_load(types(loader))

Author: Paulo Moura

Version: 1:15:2

Date: 2024-06-12

Compilation flags:

static, context\_switching\_calls

Implements:

public numberlistp

Extends:

public list

Uses:

list

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 append/2 append/3 as\_difflist/2 average/2  
chebyshev\_distance/3 chebyshev\_norm/2 check/1 delete/3 delete\_matches/3 depth/2 drop/3  
empty/1 euclidean\_distance/3 euclidean\_norm/2 flatten/2 ground/1 hamming\_distance/3  
keysort/2 last/2 least\_common\_multiple/2 length/2 manhattan\_distance/3 manhattan\_norm/2  
max/2 median/2 member/2 memberchk/2 min/2 min\_max/3 modes/2 msort/2 msort/3

new/1 nextto/3 normalize\_range/2 normalize\_range/4 normalize\_scalar/2 normalize\_unit/2  
nth0/3 nth0/4 nth1/3 nth1/4 numbervars/1 numbervars/3 occurrences/2 occurrences/3  
occurs/2 partition/5 permutation/2 prefix/2 prefix/3 product/2 proper\_prefix/2  
proper\_prefix/3 proper\_suffix/2 proper\_suffix/3 remove\_duplicates/2 rescale/3 reverse/2  
same\_length/2 same\_length/3 scalar\_product/3 select/3 select/4 selectchk/3 selectchk/4  
sequential\_occurrences/2 sequential\_occurrences/3 singletons/2 sort/2 sort/3 sort/4 split/4  
sublist/2 subsequence/3 subsequence/4 substitute/4 subsumes/2 subterm/2 subtract/3 suffix/2  
suffix/3 sum/2 take/3 valid/1 variables/2 variant/2 varnumbers/2 varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

list, list(Type), varlist, difflist

protocol

### 1.71.17 numberlistp

List of numbers protocol.

Availability:

logtalk\_load(types(loader))

Author: Paulo Moura

Version: 1:9:0

Date: 2023-12-10

Compilation flags:

static

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - min/2
  - max/2
  - min\_max/3
  - product/2
  - sum/2
  - average/2
  - median/2
  - modes/2
  - euclidean\_norm/2
  - chebyshev\_norm/2
  - manhattan\_norm/2
  - euclidean\_distance/3
  - chebyshev\_distance/3
  - manhattan\_distance/3
  - scalar\_product/3
  - normalize\_range/2
  - normalize\_range/4
  - normalize\_unit/2
  - normalize\_scalar/2
  - rescale/3
  - least\_common\_multiple/2

- Protected predicates
- Private predicates
- Operators

### Public predicates

min/2

Determines the minimum value in a list using arithmetic order. Fails if the list is empty.

Compilation flags:

static

Template:

min(List,Minimum)

Mode and number of proofs:

min(+list(number),-number) - zero\_or\_one

---

max/2

Determines the list maximum value using arithmetic order. Fails if the list is empty.

Compilation flags:

static

Template:

max(List,Maximum)

Mode and number of proofs:

max(+list(number),-number) - zero\_or\_one

---

min\_max/3

Determines the minimum and maximum values in a list using arithmetic order. Fails if the list is empty.

Compilation flags:

static

Template:

min\_max(List,Minimum,Maximum)

Mode and number of proofs:

min\_max(+list(number),-number,-number) - zero\_or\_one

---

product/2

Calculates the product of all list numbers. Fails if the list is empty.

Compilation flags:

static

Template:

product(List,Product)

Mode and number of proofs:

product(+list(number),-number) - zero\_or\_one

---

sum/2

Calculates the sum of all list numbers. Returns the integer zero if the list is empty.

Compilation flags:

static

Template:

sum(List,Sum)

Mode and number of proofs:

sum(+list(number),-number) - one

---

average/2

Calculates the average (i.e. arithmetic mean) of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

average(List,Average)

Mode and number of proofs:

average(+list(number),-float) - zero\_or\_one

---

median/2

Calculates the median of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

median(List,Median)

Mode and number of proofs:

median(+list(number),-float) - zero\_or\_one

---

modes/2

Returns the list of modes of a list of numbers in ascending order. Fails if the list is empty.

Compilation flags:

static

Template:

modes(List,Modes)

Mode and number of proofs:

modes(+list(number),-list(number)) - zero\_or\_one

---

euclidean\_norm/2

Calculates the Euclidean norm of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

euclidean\_norm(List, Norm)

Mode and number of proofs:

euclidean\_norm(+list(number), -float) - zero\_or\_one

---

chebyshev\_norm/2

Calculates the Chebyshev norm of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

chebyshev\_norm(List, Norm)

Mode and number of proofs:

chebyshev\_norm(+list(integer), -integer) - zero\_or\_one

chebyshev\_norm(+list(float), -float) - zero\_or\_one

---

manhattan\_norm/2

Calculates the Manhattan norm of a list of numbers. Fails if the list is empty.

Compilation flags:

static

Template:

manhattan\_norm(List, Norm)

Mode and number of proofs:

manhattan\_norm(+list(integer), -integer) - zero\_or\_one

manhattan\_norm(+list(float), -float) - zero\_or\_one

---

euclidean\_distance/3

Calculates the Euclidean distance between two lists of numbers. Fails if the two lists are empty or not of the same length.

Compilation flags:

static

Template:

euclidean\_distance(List1,List2,Distance)

Mode and number of proofs:

euclidean\_distance(+list(number),+list(number),-float) - zero\_or\_one

---

chebyshev\_distance/3

Calculates the Chebyshev distance between two lists of numbers. Fails if the two lists are empty or not of the same length.

Compilation flags:

static

Template:

chebyshev\_distance(List1,List2,Distance)

Mode and number of proofs:

chebyshev\_distance(+list(integer),+list(integer),-integer) - zero\_or\_one

chebyshev\_distance(+list(float),+list(float),-float) - zero\_or\_one

---

manhattan\_distance/3

Calculates the Manhattan distance between two lists of numbers. Fails if the two lists are empty or not of the same length.

Compilation flags:

static

---

Template:

```
manhattan_distance(List1,List2,Distance)
```

Mode and number of proofs:

```
manhattan_distance(+list(integer),+list(integer),-integer) - zero_or_one  
manhattan_distance(+list(float),+list(float),-float) - zero_or_one
```

---

scalar\_product/3

Calculates the scalar product of two lists of numbers. Fails if the two lists are empty or not of the same length.

Compilation flags:

```
static
```

Template:

```
scalar_product(List1,List2,Product)
```

Mode and number of proofs:

```
scalar_product(+list(integer),+list(integer),-integer) - zero_or_one  
scalar_product(+list(float),+list(float),-float) - zero_or_one
```

---

normalize\_range/2

Normalizes a list of numbers into the [0.0,1.0] range. Caller must handle arithmetic exceptions if the input list is not normalizable.

Compilation flags:

```
static
```

Template:

```
normalize_range(List,NormalizedList)
```

Mode and number of proofs:

```
normalize_range(+list(number),-list(float)) - one
```

---

`normalize_range/4`

Normalizes a list of numbers into the given range. Caller must handle arithmetic exceptions if the input list if not normalizable.

Compilation flags:

`static`

Template:

`normalize_range(List,Minimum,Maximum,NormalizedList)`

Mode and number of proofs:

`normalize_range(+list(number),+number,+number,-list(float)) - one`

---

`normalize_unit/2`

Normalizes a list of numbers returning its unit vector (i.e. a list with Euclidean norm equal to one). Caller must handle arithmetic exceptions if the input list if not normalizable.

Compilation flags:

`static`

Template:

`normalize_unit(List,NormalizedList)`

Mode and number of proofs:

`normalize_unit(+list(number),-list(float)) - one`

---

`normalize_scalar/2`

Normalizes a list of numbers such that the sum of all numbers is equal to one. Caller must handle arithmetic exceptions if the input list if not normalizable.

Compilation flags:

`static`

Template:

`normalize_scalar(List,NormalizedList)`

Mode and number of proofs:

---

`normalize_scalar(+list(number),-list(float)) - one`

---

`rescale/3`

Rescales all numbers in a list by the given factor.

Compilation flags:

`static`

Template:

`rescale(List,Factor,RescaledList)`

Mode and number of proofs:

`rescale(+list(integer),+integer,-list(integer)) - one`

`rescale(+list(number),+float,-list(float)) - one`

---

`least_common_multiple/2`

Computes the least common multiple of a list of two or more positive integers. Fails if the list is empty or contains a single element. Fails also if any of the elements is zero. May require backend support for unbound integer arithmetic.

Compilation flags:

`static`

Template:

`least_common_multiple(Integers,LeastCommonMultiple)`

Mode and number of proofs:

`least_common_multiple(+list(positive_integer),-positive_integer) - zero_or_one`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

numberlist, listp, varlistp

object

## 1.71.18 pairs

Useful predicates over lists of pairs (key-value terms).

Availability:

```
logtalk_load(types(loader))
```

Author: Paulo Moura

Version: 2:1:1

Date: 2023-11-21

Compilation flags:

```
static, context_switching_calls
```

Dependencies:

(none)

Remarks:

- Usage: This object can be loaded independently of other entities in the types library by using the goal `logtalk_load(types(pairs))`.

Inherited public predicates:

(none)

- Public predicates
  - keys\_values/3
  - keys/2
  - key/2
  - values/2
  - value/3
  - transpose/2
  - group\_sorted\_by\_key/2
  - group\_consecutive\_by\_key/2
  - group\_by\_key/2
  - map/3
- Protected predicates
- Private predicates
- Operators

## Public predicates

keys\_values/3

Converts between a list of pairs and lists of keys and values. When converting to pairs, this predicate fails if the list of keys and the list of values have different lengths.

Compilation flags:

static

Template:

keys\_values(Pairs,Keys,Values)

Mode and number of proofs:

keys\_values(+list(pair),-list,-list) - one

keys\_values(-list(pair),+list,+list) - zero\_or\_one

keys/2

Returns a list of keys from a list of pairs.

Compilation flags:

static

Template:

keys(Pairs,Keys)

Mode and number of proofs:

keys(+list(pair),-list) - one

---

key/2

Enumerates by backtracking all keys from a list of pairs.

Compilation flags:

static

Template:

key(Pairs,Key)

Mode and number of proofs:

key(+list(pair),-term) - zero\_or\_more

---

values/2

Returns a list of values from a list of pairs.

Compilation flags:

static

Template:

values(Pairs,Values)

Mode and number of proofs:

values(+list(pair),-list) - one

---

---

value/3

Returns a value addressed by the given path (a key or a list of keys in the case of nested list of pairs). Fails if path does not exist.

Compilation flags:

static

Template:

value(Pairs,Path,Value)

Mode and number of proofs:

value(+list(pair),+term,-term) - zero\_or\_one

value(+list(pair),+list,-term) - zero\_or\_one

---

transpose/2

Transposes a list of pairs by swapping each pair key and value. The relative order of the list elements is kept.

Compilation flags:

static

Template:

transpose(Pairs,TransposedPairs)

Mode and number of proofs:

transpose(+list(pair),-list(pair)) - one

---

group\_sorted\_by\_key/2

Groups pairs by key by sorting them and then constructing new pairs by grouping all values for a given key in a list. Keys are compared using equality. Relative order of values per key is kept. Resulting list of pairs is sorted by key.

Compilation flags:

static

Template:

---

```
group_sorted_by_key(Pairs,Groups)
```

Mode and number of proofs:

```
group_sorted_by_key(+list(pair),-list(pair)) - one
```

---

```
group_consecutive_by_key/2
```

Groups pairs by constructing new pairs by grouping all values for consecutive key in a list. Keys are compared using equality. The relative order of the values for the same key is kept.

Compilation flags:

```
static
```

Template:

```
group_consecutive_by_key(Pairs,Groups)
```

Mode and number of proofs:

```
group_consecutive_by_key(+list(pair),-list(pair)) - one
```

---

```
group_by_key/2
```

Same as the `group_sorted_by_key/2` predicate. Deprecated.

Compilation flags:

```
static
```

Template:

```
group_by_key(Pairs,Groups)
```

Mode and number of proofs:

```
group_by_key(+list(pair),-list(pair)) - one
```

---

map/3

Maps a list into pairs using a closure that applies to each list element to compute its key.

Compilation flags:

static

Template:

map(Closure,List,Pairs)

Meta-predicate template:

map(2,\*,\*)

Mode and number of proofs:

map(@callable,+list,-list(pair)) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

object

### 1.71.19 term

Term utility predicates.

Availability:

logtalk\_load(types(loader))

Author: Paulo Moura

Version: 1:11:0

Date: 2022-05-13

Compilation flags:

static, context\_switching\_calls

---

Implements:

public term

Aliases:

term variables/2 as vars/2

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 check/1 depth/2 ground/1 new/1  
numbervars/1 numbervars/3 occurs/2 singletons/2 subsumes/2 subterm/2 valid/1 variables/2  
variant/2 varnumbers/2 varnumbers/3

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.71.20 term

Term utility predicates protocol.

Availability:

```
logtalk_load(types(loader))
```

Author: Paulo Moura

Version: 1:35:0

Date: 2022-05-13

Compilation flags:

```
static
```

Extends:

```
public comparingp
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2
```

- Public predicates
  - depth/2
  - ground/1
  - new/1
  - occurs/2
  - subsumes/2
  - subterm/2
  - valid/1
  - check/1
  - variant/2
  - variables/2
  - singletons/2
  - numbervars/3
  - numbervars/1

- varnumbers/3
- varnumbers/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

depth/2

True if the depth of Term is Depth. The depth of atomic terms is zero; the depth of a compound term is one plus the maximum depth of its sub-terms.

Compilation flags:

static

Template:

depth(Term,Depth)

Mode and number of proofs:

depth(@term,?integer) - zero\_or\_one

---

ground/1

True if the argument is ground. Deprecated. Use the ground/1 standard predicate instead.

Compilation flags:

static

Template:

ground(Term)

Mode and number of proofs:

ground(@term) - zero\_or\_one

---

new/1

Creates a new term instance (if meaningful).

Compilation flags:

static

Template:

new(Term)

Mode and number of proofs:

new(-nonvar) - zero\_or\_one

---

occurs/2

True if the variable occurs in the term.

Compilation flags:

static

Template:

occurs(Variable,Term)

Mode and number of proofs:

occurs(@var,@term) - zero\_or\_one

---

subsumes/2

The first term subsumes the second term. Deprecated. Use the `subsumes_term/2` standard predicate instead.

Compilation flags:

static

Template:

subsumes(General,Specific)

Mode and number of proofs:

subsumes(@term,@term) - zero\_or\_one

---

subterm/2

The first term is a subterm of the second term.

Compilation flags:

static

Template:

subterm(Subterm,Term)

Mode and number of proofs:

subterm(?term,+term) - zero\_or\_more

---

valid/1

Term is valid.

Compilation flags:

static

Template:

valid(Term)

Mode and number of proofs:

valid(@nonvar) - zero\_or\_one

---

check/1

Checks if a term is valid. Throws an exception if the term is not valid.

Compilation flags:

static

Template:

check(Term)

Mode and number of proofs:

check(@nonvar) - one

---

---

variant/2

Each term is a variant of the other (i.e. they are structurally equivalent).

Compilation flags:

static

Template:

variant(Term1,Term2)

Mode and number of proofs:

variant(@term,@term) - zero\_or\_one

---

variables/2

Returns a list of all term variables (ordered as found when doing a depth-first, left-to-right traversal of Term). Deprecated. Use the standard term\_variables/2 predicate instead.

Compilation flags:

static

Template:

variables(Term,List)

Mode and number of proofs:

variables(@term,-list) - one

---

singletons/2

Returns a list of all term singleton variables (ordered as found when doing a depth-first, left-to-right traversal of Term).

Compilation flags:

static

Template:

singletons(Term,Singletons)

Mode and number of proofs:

singletons(@term,-list) - one

---

numbervars/3

Grounds a term by replacing all variables with '\$VAR'(N) terms with N starting at From. The Next argument is unified with the next value for N after binding all variables.

Compilation flags:

static

Template:

numbervars(Term,From,Next)

Mode and number of proofs:

numbervars(?term,+integer,?integer) - zero\_or\_one

---

numbervars/1

Grounds a term by replacing all variables with '\$VAR'(N) terms with N starting at 0.

Compilation flags:

static

Template:

numbervars(Term)

Mode and number of proofs:

numbervars(?term) - zero\_or\_one

---

varnumbers/3

Replaces all '\$VAR'(N) sub-terms in a term with fresh variables for all values of N greater or equal to From. Variables in Term are shared with Copy.

Compilation flags:

static

Template:

varnumbers(Term,From,Copy)

Mode and number of proofs:

varnumbers(@term,+integer,?term) - zero\_or\_one

---

varnumbers/2

Replaces all '\$VAR'(N) sub-terms in a term with fresh variables for all values of N greater or equal to 0. Variables in Term are shared with Copy.

Compilation flags:

static

Template:

varnumbers(Term,Copy)

Mode and number of proofs:

varnumbers(@term,?term) - zero\_or\_one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

[term](#)

[object](#)

### 1.71.21 type

Type checking predicates. User extensible. New types can be defined by adding clauses for the type/1 and check/2 multifile predicates.

Availability:

```
logtalk_load(types(loader))
```

Author: Paulo Moura

Version: 2:5:1

Date: 2024-09-26

Compilation flags:

```
static, context_switching_calls, complements(restrict)
```

Uses:

```
list
```

Remarks:

- Logtalk specific types: entity, object, protocol, category, entity\_identifier, object\_identifier, protocol\_identifier, category\_identifier, event, predicate.
- Prolog module related types (when the backend compiler supports modules): module, module\_identifier, qualified\_callable.
- Prolog base types: term, var, nonvar, atomic, atom, number, integer, float, compound, callable, ground.
- Atom derived types: non\_quoted\_atom, non\_empty\_atom, boolean, character, in\_character, char, operator\_specifier, hex\_char.
- Atom derived parametric types: atom(CharSet), atom(CharSet,Length), non\_empty\_atom(CharSet), character(CharSet), in\_character(CharSet), char(CharSet).
- Number derived types: positive\_number, negative\_number, non\_positive\_number, non\_negative\_number.
- Float derived types: positive\_float, negative\_float, non\_positive\_float, non\_negative\_float, probability.
- Integer derived types: positive\_integer, negative\_integer, non\_positive\_integer, non\_negative\_integer, byte, in\_byte, character\_code, in\_character\_code, code, operator\_priority, hex\_code.
- Integer derived parametric types: character\_code(CharSet), in\_character\_code(CharSet), code(CharSet).
- List types (compound derived types): list, non\_empty\_list, partial\_list, list\_or\_partial\_list, list(Type), list(Type,Length), list(Type,Min,Max), list(Type,Length,Min,Max), non\_empty\_list(Type), codes, chars.
- Difference list types (compound derived types): difference\_list, difference\_list(Type).

- Other compound derived types: `compound(Name,Types)`, `predicate_indicator`, `non_terminal_indicator`, `predicate_or_non_terminal_indicator`, `clause`, `grammar_rule`, `pair`, `pair(KeyType,ValueType)`, `cyclic`, `acyclic`.
- Stream types: `stream`, `stream_or_alias`, `stream(Property)`, `stream_or_alias(Property)`.
- Other types: `Object::Closure`, `between(Type,Lower,Upper)`, `property(Type,LambdaExpression)`, `one_of(Type,Set)`, `var_or(Type)`, `ground(Type)`, `types(Types)`, `constrain(Type,Closure)`, `type`.
- Type predicate notes: This type is used to check for an object public predicate specified as `Object::Functor/Arity`.
- Type boolean notes: The two value of this type are the atoms `true` and `false`.
- Stream types notes: In the case of the `stream(Property)` and `stream_or_alias(Property)` types, `Property` must be a valid stream property.
- Type order notes: The three possible values of this type are the single character atoms `<`, `=`, and `>`.
- Type `character_code` notes: This type takes into account Unicode support by the backend compiler. When Unicode is supported, it distinguishes between BMP and full support. When Unicode is not supported, it assumes a byte representation for characters.
- Type `Object::Closure` notes: Allows calling a public object predicate for type-checking. The predicate should provide `valid/2` predicate semantics and assume called with a bound argument. The `Closure` closure is extended with a single argument, the value to be checked.
- Type `compound(Name,Types)` notes: This type verifies that a compound term have the given `Name` and its arguments conform to `Types`.
- Type `between(Type, Lower, Upper)` notes: The type argument allows distinguishing between numbers and other types. It also allows choosing between mixed integer/float comparisons and strict float or integer comparisons. The term is type-checked before testing for interval membership.
- Type `property(Type, Lambda)` notes: Verifies that `Term` satisfies a property described using a lambda expression of the form `[Parameter]>>Goal`. The lambda expression is applied in the context of `user`. The term is type-checked before calling the goal.
- Type `one_of(Type, Set)` notes: For checking if a given term is an element of a set. The set is represented using a list. The term is type-checked before testing for set membership.
- Type `var_or(Type)` notes: Allows checking if a term is either a variable or a valid value of the given type.
- Type `ground(Type)` notes: Allows checking if a term is ground and a valid value of the given type.
- Type `types(Types)` notes: Allows checking if a term is a valid value for one of the types in a list of types.
- Type `constrain(Type,Closure)` notes: Allows checking if a term is a valid value for the given type and satisfies the given closure.
- Type `type` notes: Allows checking if a term is a valid type.
- Type `qualified_callable` notes: Allows checking if a term is a possibly module-qualified callable term. When the term is qualified, it also checks that the qualification modules are type correct. When the term is not qualified, its semantics are the same as the callable type.
- Design choices: The main predicates are `valid/2` and `check/3`. These are defined using the predicate `check/2`. Defining clauses for `check/2` instead of `valid/2` gives the user full control of exception terms without requiring an additional predicate.
- Error context: The built-in execution-context method `context/1` can be used to provide the calling context for errors when using the predicate `check/3`.

- Registering new types: New types can be registered by defining clauses for the `type/1` and `check/2` multifile predicates. Clauses for both predicates must have a bound first argument to avoid introducing spurious choice-points when type-checking terms.
- Meta-types: Meta-types are types that have one or more sub-type arguments. E.g. `var_or(Type)`. The sub-types of a meta-type can be enumerated by defining a clause for the `meta_type/3` multifile predicate.
- Character sets: When testing character or character code based terms (e.g. `atom`), it is possible to choose a character set (`ascii_identifier`, `ascii_printable`, `ascii_full`, `byte`, `unicode_bmp`, or `unicode_full`) using the parameterizable types.
- Caveats: The type argument (and any type parameterization) to the predicates is not type-checked (or checked for consistency) for performance reasons.
- Unicode limitations: Currently, correct character/code type-checking is only ensured for XVM and SWI-Prolog as other backends do not provide support for querying a Unicode code point category.

Inherited public predicates:

`arbitrary/1` `arbitrary/2` `edge_case/2` `get_seed/1` `max_size/1` `mutation/3` `set_seed/1` `shrink/3`  
`shrink_sequence/3` `shrinker/1`

- Public predicates
  - `type/1`
  - `meta_type/3`
  - `valid/2`
  - `check/3`
  - `check/2`
- Protected predicates
- Private predicates
- Operators

## Public predicates

`type/1`

Table of defined types. A new type can be registered by defining a clause for this predicate and adding a clause for the `check/2` multifile predicate.

Compilation flags:

`static`, `multifile`

Template:

`type(Type)`

Mode and number of proofs:

---

`type(?callable) - zero_or_more`

---

`meta_type/3`

Table of defined meta-types. A registered type that is a meta-type can be described by defining a clause for this predicate to enumerate its sub-types and optional values in case of a single sub-type.

Compilation flags:

`static, multifile`

Template:

`meta_type(MetaType,SubTypes,Values)`

Mode and number of proofs:

`meta_type(?callable,-list,-list) - zero_or_more`

---

`valid/2`

True if the given term is of the specified type. Fails otherwise.

Compilation flags:

`static`

Template:

`valid(Type,Term)`

Mode and number of proofs:

`valid(@callable,@term) - zero_or_one`

---

`check/3`

True if the given term is of the specified type. Throws an error otherwise using the format `error(Error, Context)`. For the possible values of `Error` see the `check/2` predicate.

Compilation flags:

`static`

---

Template:

`check(Type,Term,Context)`

Mode and number of proofs:

`check(@callable,@term,@term) - one_or_error`

---

`check/2`

True if the given term is of the specified type. Throws an error otherwise. A new type can be added by defining a clause for this predicate and registering it by adding a clause for the `type/1` multifile predicate.

Compilation flags:

`static, multifile`

Template:

`check(Type,Term)`

Meta-predicate template:

`check(:,*)`

Mode and number of proofs:

`check(@callable,@term) - one_or_error`

Exceptions:

Term is not bound as required:

`instantiation_error`

Term is bound but not of the specified type:

`type_error(Type,Term)`

Term is the of the correct type but not in the specified domain:

`domain_error(Domain,Term)`

Term is the of the correct type and domain but the resource it represents does not exist:

`existence_error(Type,Term)`

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

See also:

arbitrary, os\_types, either, maybe

object

### 1.71.22 varlist

List of variables predicates.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 2:0:0

Date: 2020-05-11

Compilation flags:

`static, context_switching_calls`

Implements:

`public varlistp`

Remarks:

(none)

Inherited public predicates:

`append/3 check/1 delete/3 empty/1 flatten/2 last/2 length/2 memberchk/2 nextto/3 nth0/3  
nth0/4 nth1/3 nth1/4 permutation/2 prefix/2 remove_duplicates/2 reverse/2 same_length/2  
select/3 sublist/2 subtract/3 suffix/2 valid/1`

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`list`, `list(Type)`, `numberlist`, `difflist`

`protocol`

### 1.71.23 varlistp

List of variables protocol.

Availability:

`logtalk_load(types(loader))`

Author: Paulo Moura

Version: 1:3:0

Date: 2022-09-19

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - append/3
  - delete/3
  - empty/1
  - flatten/2
  - last/2
  - length/2
  - memberchk/2
  - nextto/3
  - nth0/3
  - nth0/4
  - nth1/3
  - nth1/4
  - permutation/2
  - prefix/2
  - remove\_duplicates/2
  - reverse/2
  - same\_length/2
  - select/3
  - sublist/2
  - subtract/3
  - suffix/2
  - valid/1
  - check/1
- Protected predicates
- Private predicates
- Operators

### Public predicates

append/3

Appends two lists.

Compilation flags:

static

Template:

append(List1,List2,List)

Mode and number of proofs:

append(?list,?list,?list) - zero\_or\_more

---

delete/3

Deletes from a list all occurrences of an element returning the list of remaining elements.

Compilation flags:

static

Template:

delete(List,Element,Remaining)

Mode and number of proofs:

delete(@list,@term,?list) - one

---

empty/1

True if the argument is an empty list.

Compilation flags:

static

Template:

empty(List)

Mode and number of proofs:

empty(@list) - zero\_or\_one

---

flatten/2

Flattens a list of lists into a list.

Compilation flags:

static

Template:

flatten(List,Flatted)

Mode and number of proofs:

flatten(@list,-list) - one

---

last/2

List last element (if it exists).

Compilation flags:

static

Template:

last(List,Last)

Mode and number of proofs:

last(@list,@var) - zero\_or\_one

---

length/2

List length.

Compilation flags:

static

Template:

length(List,Length)

Mode and number of proofs:

length(@list,?integer) - zero\_or\_one

---

memberchk/2

Checks if a variable is a member of a list.

Compilation flags:

static

Template:

memberchk(Element,List)

Mode and number of proofs:

memberchk(@var,@list) - zero\_or\_one

---

nextto/3

X and Y are consecutive elements in List.

Compilation flags:

static

Template:

nextto(X,Y,List)

Mode and number of proofs:

nextto(@var,@var,?list) - zero\_or\_more

---

nth0/3

Nth element of a list (counting from zero).

Compilation flags:

static

Template:

nth0(Nth,List,Element)

Mode and number of proofs:

nth0(?integer,+list,@var) - zero\_or\_more

---

---

`nth0/4`

Nth element of a list (counting from zero). Rest is a list of all the other elements. Can be used to either select the nth element of List or to insert an element before the nth element in Rest.

Compilation flags:

`static`

Template:

`nth0(Nth,List,Element,Rest)`

Mode and number of proofs:

`nth0(?integer,+list,@var,?list) - zero_or_more`

---

`nth1/3`

Nth element of a list (counting from one).

Compilation flags:

`static`

Template:

`nth1(Nth,List,Element)`

Mode and number of proofs:

`nth1(?integer,+list,@var) - zero_or_more`

---

`nth1/4`

Nth element of a list (counting from zero). Rest is a list of all the other elements. Can be used to either select the nth element of List or to insert an element before the nth element in Rest.

Compilation flags:

`static`

Template:

`nth1(Nth,List,Element,Rest)`

Mode and number of proofs:

`nth1(?integer,+list,@var,?list) - zero_or_more`

---

permutation/2

The two lists are a permutation of the same list.

Compilation flags:

static

Template:

permutation(List,Permutation)

Mode and number of proofs:

permutation(@list,@list) - zero\_or\_one

---

prefix/2

Prefix is a prefix of List.

Compilation flags:

static

Template:

prefix(Prefix,List)

Mode and number of proofs:

prefix(?list,@list) - zero\_or\_more

---

remove\_duplicates/2

Removes duplicated variables and keeping the left-most variable when repeated.

Compilation flags:

static

Template:

remove\_duplicates(List,Set)

Mode and number of proofs:

---

`remove_duplicates(+list,-list) - one`

---

`reverse/2`

Reverses a list.

Compilation flags:

`static`

Template:

`reverse(List,Reversed)`

Mode and number of proofs:

`reverse(@list,?list) - zero_or_one`

`reverse(?list,@list) - zero_or_one`

`reverse(-list,-list) - one_or_more`

---

`same_length/2`

The two lists have the same length.

Compilation flags:

`static`

Template:

`same_length(List1,List2)`

Mode and number of proofs:

`same_length(@list,?list) - zero_or_one`

`same_length(?list,@list) - zero_or_one`

`same_length(-list,-list) - one_or_more`

---

select/3

Selects an element from a list, returning the list of remaining elements.

Compilation flags:

static

Template:

select(Element,List,Remaining)

Mode and number of proofs:

select(@var,?list,?list) - zero\_or\_more

---

sublist/2

The first list is a sublist of the second.

Compilation flags:

static

Template:

sublist(Sublist,List)

Mode and number of proofs:

sublist(?list,@list) - zero\_or\_more

---

subtract/3

Removes all elements in the second list from the first list, returning the list of remaining elements.

Compilation flags:

static

Template:

subtract(List,Elements,Remaining)

Mode and number of proofs:

subtract(@list,@list,-list) - one

---

suffix/2

Suffix is a suffix of List.

Compilation flags:

static

Template:

suffix(Suffix,List)

Mode and number of proofs:

suffix(?list,@list) - zero\_or\_more

---

valid/1

Term is a valid list of variables.

Compilation flags:

static

Template:

valid(Term)

Mode and number of proofs:

valid(@nonvar) - zero\_or\_one

---

check/1

Checks if a term is a valid list of variables. Throws an exception if the term is not valid.

Compilation flags:

static

Template:

check(Term)

Mode and number of proofs:

check(@nonvar) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

`varlist`, `listp`, `numberlistp`

## 1.72 ulid

object

### 1.72.1 ulid

Universally Unique Lexicographically Sortable Identifier (ULID) generator using an atom representation.

Availability:

```
logtalk_load(ulid(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2023-05-19

Compilation flags:

```
static, context_switching_calls
```

Extends:

```
public ulid(atom)
```

Remarks:

(none)

Inherited public predicates:

```
generate/1 generate/2 generate/8 timestamp/2 timestamp/8
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`ulid(Representation)`, `ulid_types`, `uuid`, `uuid(Representation)`, `ids`, `ids(Representation,Bytes)`  
object

#### 1.72.2 `ulid(Representation)`

- Representation - Text representation for the ULID. Possible values are atom, chars, and codes.

Universally Unique Lexicographically Sortable Identifier (ULID) generator.

Availability:

```
logtalk_load(ulid(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2023-05-19

Compilation flags:

```
static, context_switching_calls
```

Implements:

public ulid\_protocol

Uses:

fast\_random  
iso8601  
list  
os

Remarks:

(none)

Inherited public predicates:

generate/1 generate/2 generate/8 timestamp/2 timestamp/8

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

ulid, ulid\_types, uuid(Representation), uuid, ids, ids(Representation,Bytes)

protocol

### 1.72.3 ulid\_protocol

Universally Unique Lexicographically Sortable Identifier (ULID) generator protocol.

Availability:

```
logtalk_load(ulid(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2023-05-17

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - generate/1
  - generate/2
  - generate/8
  - timestamp/2
  - timestamp/8
- Protected predicates
- Private predicates
- Operators

## Public predicates

generate/1

Generates a new ULID.

Compilation flags:

static

Template:

generate(ULID)

Mode and number of proofs:

generate(--ulid) - one

---

generate/2

Generates a new ULID from a timestamp (number of milliseconds since the Unix epoch: 00:00:00 UTC on January 1, 1970).

Compilation flags:

static

Template:

generate(Milliseconds,ULID)

Mode and number of proofs:

generate(+integer,--ulid) - one

---

generate/8

Generates a new ULID from a timestamp discrete components.

Compilation flags:

static

Template:

generate(Year,Month,Day,Hours,Minutes,Seconds,Milliseconds,ULID)

Mode and number of proofs:

---

generate(+integer,+integer,+integer,+integer,+integer,+integer,+integer,--ulid) - one

---

timestamp/2

Returns the given ULID timestamp (number of milliseconds since the Unix epoch: 00:00:00 UTC on January 1, 1970).

Compilation flags:

static

Template:

timestamp(ULID,Milliseconds)

Mode and number of proofs:

timestamp(++ulid,-integer) - one

---

timestamp/8

Decodes a ULID into its timestamp discrete components.

Compilation flags:

static

Template:

timestamp(ULID,Year,Month,Day,Hours,Minutes,Seconds,Milliseconds)

Mode and number of proofs:

timestamp(++ulid,-integer,-integer,-integer,-integer,-integer,-integer,-integer) - one

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

category

### 1.72.4 ulid\_types

ULID type definition.

Availability:

`logtalk_load(ulid(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2023-05-19

Compilation flags:

`static`

Provides:

`type::type/1`

`type::check/2`

Uses:

`list`

`type`

Remarks:

- **Provided types:** This category adds a `ulid(Representation)` type for type-checking when using the `ulid` library object. Valid representation values are `atom`, `chars`, and `codes`.

Inherited public predicates:

(none)

- [Public predicates](#)
  - [Protected predicates](#)

- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`ulid(Representation)`, `ulid`

## 1.73 union\_find

object

### 1.73.1 union\_find

Union find data structure implementation.

Availability:

`logtalk_load(union_find(loader))`

Author: José Antonio Rianza Valverde; adapted to Logtalk by Paulo Moura

Version: 1:0:0

Date: 2022-02-18

Compilation flags:

`static`, `context_switching_calls`

Implements:

`public union_find_protocol`

Extends:

public compound

Uses:

avltree

Remarks:

(none)

Inherited public predicates:

(<)/2 (=:=)/2 (=<)/2 (=\\=)/2 (>)/2 (>=)/2 check/1 depth/2 disjoint\_sets/2 find/4  
find/5 ground/1 make\_set/3 new/1 new/2 numbervars/1 numbervars/3 occurs/2 singletons/2  
subsumes/2 subterm/2 union/4 union\_all/3 valid/1 variables/2 variant/2 varnumbers/2  
varnumbers/3

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.73.2 union\_find\_protocol

Union-find data structure protocol.

Availability:

```
logtalk_load(union_find(loader))
```

Author: José Antonio Riaza Valverde; adapted to Logtalk by Paulo Moura

Version: 1:0:0

Date: 2022-02-17

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - new/2
  - make\_set/3
  - union/4
  - union\_all/3
  - find/4
  - find/5
  - disjoint\_sets/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

`new/2`

Creates a new union-find data structure with a list of elements as keys.

Compilation flags:

`static`

Template:

`new(Elements,UnionFind)`

Mode and number of proofs:

`new(+list(element),?union_find) - zero_or_one`

---

`make_set/3`

Makes a new set by creating a new element with a unique key `Element`, a rank of 0, and a parent pointer to itself. The parent pointer to itself indicates that the element is the representative member of its own set.

Compilation flags:

`static`

Template:

`make_set(UnionFind,Element,NewUnionFind)`

Mode and number of proofs:

`make_set(+union_find,+element,?union_find) - zero_or_one`

---

`union/4`

Merges the two trees, if distinct, that contain the given elements. The trees are joined by attaching the shorter tree (by rank) to the root of the taller tree. Fails if any of the elements is not found.

Compilation flags:

`static`

Template:

`union(UnionFind,Element1,Element2,NewUnionFind)`

---

Mode and number of proofs:

`union(+union_find,+element,+element,?union_find) - zero_or_one`

---

`union_all/3`

Merges the distinct trees for all the given elements returning the resulting union-find data structure. Fails if any of the elements is not found.

Compilation flags:

`static`

Template:

`union_all(UnionFind,Elements,NewUnionFind)`

Mode and number of proofs:

`union_all(+union_find,+list(element),?union_find) - zero_or_one`

---

`find/4`

Finds the root element of a set by following the chain of parent pointers from the given element. Root is the representative member of the set to which the element belongs, and may be element itself. Fails if the element is not found.

Compilation flags:

`static`

Template:

`find(UnionFind,Element,Root,NewUnionFind)`

Mode and number of proofs:

`find(+union_find,+element,?element,?union_find) - zero_or_one`

Remarks:

- Path compression: The structure of the tree containing the element is flattened by making every node point to the root whenever this predicate is used on it.
-

find/5

Same as the find/4 predicate, but returning also the rank of the root. Fails if the element is not found.

Compilation flags:

static

Template:

find(UnionFind,Element,Root,Rank,UnionFindOut)

Mode and number of proofs:

find(+union\_find,+element,?element,?rank,?union\_find) - zero\_or\_one

Remarks:

- Path compression: The structure of the tree containing the element is flattened by making every node point to the root whenever this predicate is used on it.
- 

disjoint\_sets/2

Returns the list of disjoint sets in the given union-find data structure.

Compilation flags:

static

Template:

disjoint\_sets(UnionFind,Sets)

Mode and number of proofs:

disjoint\_sets(+union\_find,?sets) - zero\_or\_one

---

### Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

See also:

`union_find`

## 1.74 uuid

object

### 1.74.1 uuid

Universally unique identifier (UUID) generator using an atom representation.

Availability:

`logtalk_load(uuid(loader))`

Author: Paulo Moura

Version: 0:2:0

Date: 2022-11-23

Compilation flags:

`static, context_switching_calls`

Extends:

`public uuid(atom)`

Remarks:

(none)

Inherited public predicates:

`random_node/1 uuid_null/1 uuid_v1/2 uuid_v4/1`

- [Public predicates](#)
- [Protected predicates](#)

- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

`uuid(Representation)`, `ulid`, `ulid(Representation)`, `ids`, `ids(Representation,Bytes)`  
object

### 1.74.2 `uuid(Representation)`

- Representation - Text representation for the UUID. Possible values are atom, chars, and codes.

Universally unique identifier (UUID) generator.

Availability:

```
logtalk_load(uuid(loader))
```

Author: Paulo Moura

Version: 0:5:0

Date: 2022-11-23

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public uuid_protocol
```

Uses:

```
fast_random
```

iso8601  
list  
os

Remarks:  
(none)

Inherited public predicates:  
random\_node/1 uuid\_null/1 uuid\_v1/2 uuid\_v4/1

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

See also:

uuid, ulid, ulid(Representation), ids, ids(Representation,Bytes)

protocol

### 1.74.3 uuid\_protocol

Universally unique identifier (UUID) generator protocol.

Availability:

```
logtalk_load(uuid(loader))
```

Author: Paulo Moura

Version: 0:3:0

Date: 2021-03-13

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - uuid\_v1/2
  - uuid\_v4/1
  - uuid\_null/1
  - random\_node/1
- Protected predicates
- Private predicates
- Operators

**Public predicates**`uuid_v1/2`

Returns a version 1 UUID for the given MAC address (a list of six bytes). The MAC address can be replaced by a random 6 bytes node identifier as per RFC 4122 when the MAC address is not available or should not be disclosed.

Compilation flags:

`static`

Template:

`uuid_v1(MAC,UUID)`

Mode and number of proofs:

`uuid_v1(+list(byte),--ground) - one`

---

`uuid_v4/1`

Returns a version 4 UUID.

Compilation flags:

`static`

Template:

`uuid_v4(UUID)`

Mode and number of proofs:

`uuid_v4(--ground) - one`

---

`uuid_null/1`

Returns the null UUID.

Compilation flags:

`static`

Template:

`uuid_null(UUID)`

Mode and number of proofs:  
    uuid\_null(--ground) - one

---

random\_node/1

Generates a list with six random bytes that can be used in alternative to a MAC address when generating version 1 UUIDs.

Compilation flags:  
    static

Template:  
    random\_node(Node)  
Mode and number of proofs:  
    random\_node(--list(byte)) - one

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

## 1.75 verdi\_neruda

object

### 1.75.1 a\_star\_interpreter(W)

A\* interpreter for general logic programs. The parameter W is used to fine tune the behavior. W = 0 gives us a breadth-first search and W = 1 gives us a greedy best-first search. The default value for W is 0.5.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Victor Lagerkvist

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

```
static, context_switching_calls
```

Imports:

```
public best_first
```

Remarks:

```
(none)
```

Inherited public predicates:

```
prove/2 prove/3
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.75.2 benchmark\_generators

Generates random data structures for use in benchmarks.

Availability:

`logtalk_load(verdi_neruda(loader))`

Author: Victor Lagerkvist

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

`static, context_switching_calls`

Uses:

`random`

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - `random_tree/1`
- Protected predicates
- Private predicates

- Operators

## Public predicates

`random_tree/1`

Generates a random tree.

Compilation flags:

`static`

Template:

`random_tree(Tree)`

Mode and number of proofs:

`random_tree(-tree) - one`

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

category

### 1.75.3 `best_first`

Best-first framework for general logic programs.

Availability:

`logtalk_load(verdi_neruda(loader))`

Author: Victor Lagerkvist

Version: 1:1:0

Date: 2019-03-08

Compilation flags:

static

Implements:

public interpreterp

Uses:

counter

minheap

Remarks:

(none)

Inherited public predicates:

prove/2 prove/3

- Public predicates
- Protected predicates
  - f/4
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

f/4

.

Compilation flags:

static

Template:

f(Length1,Length2,Depth,Cost)

Mode and number of proofs:

f(+float,+float,+float,-float) - zero\_or\_more

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.75.4 bfs\_interpreter

Breadth-first interpreter for general logic programs.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Victor Lagerkvist

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public interpreterp
```

Uses:

```
counter
```

```
queue
```

Remarks:

(none)

Inherited public predicates:

```
prove/2 prove/3
```

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.75.5 bup\_interpreter

Semi-naive bottom-up interpreter for general (stratified) logic programs. Magic transformation is realized through an expansion hook.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Ulf Nilsson. Ported to Logtalk and augmented with negation by Victor Lagerkvist.

Version: 1:1:3

Date: 2023-11-30

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public interpreterp
```

Uses:

```
counter
```

```
list
```

```
magic
```

```
term
```

Remarks:

```
(none)
```

Inherited public predicates:

`prove/2` `prove/3`

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.75.6 counter

Counter implemented with `asserta/retract`.

Availability:

`logtalk_load(verdi_neruda(loader))`

Author: Victor Lagerkvist

Version: 1:0:1

Date: 2022-10-08

Compilation flags:

`static, context_switching_calls`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - increment/0
  - increase/1
  - set/1
  - value/1
  - reset/0
- Protected predicates
- Private predicates
  - c/1
- Operators

### Public predicates

increment/0

Increment the counter by 1.

Compilation flags:

static

Mode and number of proofs:

increment - one

increase/1

Increments the counter by the specified amount.

Compilation flags:

static

Template:

increase(I)

Mode and number of proofs:

increase(+number) - one

---

set/1

Sets the counter to the specified amount.

Compilation flags:

static

Template:

set(N)

Mode and number of proofs:

set(+number) - one

---

value/1

Gets the current value of the counter.

Compilation flags:

static

Template:

value(N)

Mode and number of proofs:

value(?number) - one

---

reset/0

Resets the counter to zero.

Compilation flags:

static

Mode and number of proofs:

reset - one

---

### Protected predicates

(none)

### Private predicates

c/1

Stores the current value of the counter.

Compilation flags:

dynamic

Template:

c(N)

Mode and number of proofs:

c(?number) - zero\_or\_one

---

### Operators

(none)

protocol

## 1.75.7 databasep

Database protocol.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Victor Lagerkvist

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

```
(none)
```

Inherited public predicates:

```
(none)
```

- Public predicates
  - rule/4
  - rule/3
  - rule/2
  - bench\_goal/1
- Protected predicates
- Private predicates
- Operators

## Public predicates

rule/4

Clauses for this predicate are automatically generated using term-expansion. The third argument contains the length of Body.

Compilation flags:

static

Template:

rule(Head,Body,Length,Tail)

Mode and number of proofs:

rule(?callable,?callable,-,-) - zero\_or\_more

---

rule/3

Clauses for this predicate are automatically generated using term-expansion. The third argument denotes the tail of the Body.

Compilation flags:

static

Template:

rule(Head,Body,Tail)

Mode and number of proofs:

rule(?callable,?callable,-) - zero\_or\_more

---

rule/2

Clauses for this predicate are automatically generated using term-expansion.

Compilation flags:

static

Template:

rule(Head,Body)

---

Mode and number of proofs:

rule(?callable,-list(callable)) - zero\_or\_more

---

bench\_goal/1

Table of benchmark goals. They are used from shell.lgt to make benchmarking easier.

Compilation flags:

static

Template:

bench\_goal(Goal)

Mode and number of proofs:

bench\_goal(?callable) - zero\_or\_more

---

## Protected predicates

(none)

## Private predicates

(none)

## Operators

(none)

object

### 1.75.8 debug\_expansion(Mode)

Expands debug/1 calls. The parameter Mode can be either the atom “debug” or “production”.

Availability:

logtalk\_load(verdi\_neruda(loader))

Author: Paulo Moura

Version: 1:0:0

Date: 2010-04-15

Compilation flags:

static, context\_switching\_calls

Implements:

public expanding

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.75.9 demodb

Availability:

logtalk\_load(verdi\_neruda(loader))

Compilation flags:

static, context\_switching\_calls

Implements:

public databasep

Remarks:

(none)

Inherited public predicates:

bench\_goal/1 rule/2 rule/3 rule/4

- Public predicates
- Protected predicates
- Private predicates
- Operators

#### Public predicates

(no local declarations; see entity ancestors if any)

#### Protected predicates

(no local declarations; see entity ancestors if any)

#### Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.75.10 dfs\_interpreter

Depth-first interpreter for general logic programs.

Availability:

`logtalk_load(verdi_neruda(loader))`

Author: Victor Lagerkvist

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

`static, context_switching_calls`

Implements:

`public interpreterp`

Uses:

`counter`

Remarks:

(none)

Inherited public predicates:

`prove/2 prove/3`

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

**Public predicates**

(no local declarations; see entity ancestors if any)

**Protected predicates**

(no local declarations; see entity ancestors if any)

**Private predicates**

(no local declarations; see entity ancestors if any)

**Operators**

(none)

category

**1.75.11 flattening**

Flattens conjunction of goals with the form `f and g` into a list `[f,g]`.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Victor Lagerkvist

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

```
static
```

source: Based on source code from *The Craft of Prolog*, by Richard O'Keefe.

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
- Protected predicates
  - `flatten_goals//1`
- Private predicates
- Operators

### Public predicates

(none)

### Protected predicates

`flatten_goals//1`

Flattens a conjunction of goals.

Compilation flags:

`static`

Template:

`flatten_goals(Conjunction)`

Mode and number of proofs:

`flatten_goals(+callable) - one`

---

### Private predicates

(none)

### Operators

(none)

object

### 1.75.12 heuristic\_expansion(Mode)

Expands rules of the form `p if f and g` to `rule(p, [f,g|Tail], Length, Tail)`.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Victor Lagerkvist

Version: 1:0:2

Date: 2022-10-08

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Extends:

```
public rule_expansion(Mode)
```

Uses:

```
list
```

Remarks:

```
(none)
```

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- [Public predicates](#)
- [Protected predicates](#)
- [Private predicates](#)
- [Operators](#)

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.75.13 iddfs\_interpreter(Increment)

Iterative deepening depth-first interpreter for general logic programs. Based on source code from The Craft of Prolog, by Richard O’Keefe. The default value for the increment is 1.

Availability:

`logtalk_load(verdi_neruda(loader))`

Author: Victor Lagerkvist

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

`static, context_switching_calls`

Implements:

`public interpreterp`

Uses:

`counter`

`dfs_interpreter`

Remarks:

(none)

Inherited public predicates:

`prove/2 prove/3`

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

protocol

## 1.75.14 interpreterp

Protocol for an interpreter.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Victor Lagerkvist

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

```
static
```

Dependencies:

```
(none)
```

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - prove/2
  - prove/3
- Protected predicates
- Private predicates
- Operators

### Public predicates

prove/2

True if goal is provable in the specified database.

Compilation flags:

static

Template:

prove(Goal,DB)

Mode and number of proofs:

prove(+goal,+database) - zero\_or\_more

---

prove/3

True if goal is provable within the given depth-limit in the specified database.

Compilation flags:

static

Template:

prove(Goal,Limit,DB)

Mode and number of proofs:

prove(+goal,+limit,+database) - zero\_or\_more

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

object

### 1.75.15 magic

Object encapsulating magic methods.

Availability:

logtalk\_load(verdi\_neruda(loader))

Author: Ulf Nilsson. Ported to Logtalk and augmented with stratified negation by Victor Lagerkvist.

Version: 1:0:0

Date: 2010-06-13

Compilation flags:

static, context\_switching\_calls

Uses:

list

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - magicise/4

– magic/2

- Protected predicates
- Private predicates
- Operators

## Public predicates

magicise/4

Transform (Head :- Body) into a magic clause (NewHead :- NewBody).

Compilation flags:

static

Template:

magicise(Head,Body,NewHead,NewBody)

Mode and number of proofs:

magicise(+term,+list,-term,-list) - zero\_or\_one

---

magic/2

Prefix the predicate symbol of Old with magic.

Compilation flags:

static

Template:

magic(Old,New)

Mode and number of proofs:

magic(+callable,-callable) - zero\_or\_one

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.75.16 magic\_expansion(Mode)

Expands rules of the form  $p$  if  $f$  and  $g$  to the more manageable rule( $p$ , [ $f,g$ ]) and performs magic transformation of clauses.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Victor Lagerkvist

Version: 1:0:2

Date: 2022-10-08

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Imports:

```
public flatting
```

Extends:

```
public debug_expansion(Mode)
```

Uses:

```
list
```

```
magic
```

Remarks:

(none)

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

### 1.75.17 rule\_expansion(Mode)

Expands rules of the form  $p$  if  $f$  and  $g$  to the more manageable rule( $p$ , [ $f,g$ ]).

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Victor Lagerkvist

Version: 1:0:2

Date: 2022-10-08

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Imports:

```
public flatting
```

Extends:

```
public debug_expansion(Mode)
```

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

object

## 1.75.18 shell

User frontend to start the application.

Availability:

```
logtalk_load(verdi_neruda(loader))
```

Author: Paulo Moura

Version: 1:0:0

Date: 2019-03-20

Compilation flags:

static, context\_switching\_calls

Uses:

shell(Interpreters)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - welcome/0
  - start/0
- Protected predicates
- Private predicates
- Operators

### Public predicates

welcome/0

Compilation flags:

static

---

start/0

Compilation flags:

static

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)

object

### 1.75.19 shell(Interpreters)

Prolog shell for the interpreters.

Availability:

`logtalk_load(verdi_neruda(loader))`

Author: Victor Lagerkvist and Paulo Moura

Version: 1:1:3

Date: 2024-03-15

Compilation flags:

`static, context_switching_calls`

Uses:

`counter`

`list`

`meta`

`pairs`

Remarks:

(none)

Inherited public predicates:

(none)

- [Public predicates](#)
  - [init/0](#)

- Protected predicates
- Private predicates
- Operators

## Public predicates

init/0

Compilation flags:  
static

---

## Protected predicates

(no local declarations; see entity ancestors if any)

## Private predicates

(no local declarations; see entity ancestors if any)

## Operators

(none)  
object

### 1.75.20 shell\_expansion(Mode)

Expansion object for the shell.

Availability:  
logtalk\_load(verdi\_neruda(loader))

Author: Victor Lagerkvist  
Version: 1:0:1  
Date: 2022-10-08

Compilation flags:  
static, context\_switching\_calls

Implements:

public expanding

Extends:

public rule\_expansion(Mode)

Remarks:

(none)

Inherited public predicates:

goal\_expansion/2 term\_expansion/2

- Public predicates
- Protected predicates
- Private predicates
- Operators

### Public predicates

(no local declarations; see entity ancestors if any)

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

(no local declarations; see entity ancestors if any)

### Operators

(none)

## 1.76 wrapper

object

## 1.76.1 wrapper

Adviser tool for porting and wrapping plain Prolog applications.

Availability:

```
logtalk_load(wrapper(loader))
```

Author: Paulo Moura

Version: 0:12:2

Date: 2024-05-10

Compilation flags:

```
static, context_switching_calls
```

Implements:

```
public expanding
```

Provides:

```
logtalk::message_hook/4
```

```
logtalk::message_prefix_stream/4
```

```
logtalk::message_tokens//2
```

Uses:

```
logtalk
```

```
os
```

Remarks:

- `prolog_extensions(Extensions)` option: List of file name extensions used to recognize Prolog source files (default is `['.pl', '.pro', '.prolog']`).
- `logtalk_extension(Extension)` option: Logtalk file name extension to be used for the generated wrapper files (default is `'.lgt'`).
- `exclude_files(Files)` option: List of Prolog source files names to exclude (default is `[]`).
- `exclude_directories(Files)` option: List of sub-directory names to exclude (default is `[]`).
- `include_wrapped_files(Boolean)`: Generate `include/1` directives for the wrapped Prolog source files (default is `true`).

Inherited public predicates:

```
goal_expansion/2 term_expansion/2
```

- Public predicates
  - `rdirectory/2`

- rdirectory/1
- directory/2
- directory/1
- directories/2
- directories/1
- files/2
- files/1
- file/2
- file/1
- save/1
- save/0
- default\_option/1
- default\_options/1
- Protected predicates
- Private predicates
  - merge\_options/2
  - predicate\_called\_but\_not\_defined\_/2
  - object\_predicate\_called\_/3
  - module\_predicate\_called\_/3
  - unknown\_predicate\_called\_/2
  - missing\_predicate\_directive\_/3
  - non\_standard\_predicate\_call\_/2
  - dynamic\_directive\_/3
  - multifile\_directive\_/3
  - add\_directive\_before\_entity\_/2
  - add\_directive\_/2
  - add\_directive\_/3
  - remove\_directive\_/2
  - file\_being\_advised\_/4
- Operators

## Public predicates

`rdirectory/2`

Advises the user on missing directives for converting all plain Prolog files in a directory and its sub-directories to Logtalk objects using the specified options.

Compilation flags:

`static`

Template:

`rdirectory(Directory,Options)`

Mode and number of proofs:

`rdirectory(+atom,+list(compound)) - one`

---

`rdirectory/1`

Advises the user on missing directives for converting all plain Prolog files in a directory and its sub-directories to Logtalk objects using default options.

Compilation flags:

`static`

Template:

`rdirectory(Directory)`

Mode and number of proofs:

`rdirectory(+atom) - one`

---

`directory/2`

Advises the user on missing directives for converting all plain Prolog files in a directory to Logtalk objects using the specified options.

Compilation flags:

`static`

Template:

directory(Directory,Options)

Mode and number of proofs:

directory(+atom,+list(compound)) - one

---

directory/1

Advises the user on missing directives for converting all plain Prolog files in a directory to Logtalk objects using default options.

Compilation flags:

static

Template:

directory(Directory)

Mode and number of proofs:

directory(+atom) - one

---

directories/2

Advises the user on missing directives for converting all Prolog files in a set of directories to Logtalk objects using the specified options.

Compilation flags:

static

Template:

directories(Directories,Options)

Mode and number of proofs:

directories(+list(atom),+list(compound)) - one

---

directories/1

Advises the user on missing directives for converting all Prolog files in a set of directories to Logtalk objects using default options.

Compilation flags:

static

Template:

directories(Directories)

Mode and number of proofs:

directories(+list(atom)) - one

---

files/2

Advises the user on missing directives for converting a list of plain Prolog files to Logtalk objects using the specified options.

Compilation flags:

static

Template:

files(Files,Options)

Mode and number of proofs:

files(+list(atom),+list(compound)) - one

---

files/1

Advises the user on missing directives for converting a list of plain Prolog files to Logtalk objects using default options.

Compilation flags:

static

Template:

files(Files)

Mode and number of proofs:

---

files(+list(atom)) - one

---

file/2

Advises the user on missing directives for converting a plain Prolog file to Logtalk objects using the specified options.

Compilation flags:

static

Template:

file(File,Options)

Mode and number of proofs:

file(+atom,+list(compound)) - one

---

file/1

Advises the user on missing directives for converting a plain Prolog file to Logtalk objects using default options.

Compilation flags:

static

Template:

file(File)

Mode and number of proofs:

file(+atom) - one

---

save/1

Saves the generated wrapper objects (plus a loader file per directory) for all advised files using the specified options. The wrapper objects are saved to the same directories that contain the wrapped Prolog files.

Compilation flags:

static

Template:

save(Options)

Mode and number of proofs:

save(+list(compound)) - one

---

save/0

Saves the generated wrapper objects (plus a loader file per directory) for all advised files using default options. The wrapper objects are saved to the same directories that contain the wrapped Prolog files.

Compilation flags:

static

Mode and number of proofs:

save - one

---

default\_option/1

Enumerates by backtracking the default options used when generating the wrapper objects.

Compilation flags:

static

Template:

default\_option(DefaultOption)

Mode and number of proofs:

default\_option(?compound) - zero\_or\_more

---

default\_options/1

Returns a list of the default options used when generating the wrapper objects.

Compilation flags:

static

Template:

default\_options(DefaultOptions)

Mode and number of proofs:

default\_options(-list(compound)) - one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

merge\_options/2

Merges the user options with the default options, returning the list of options used when generating the wrapper objects.

Compilation flags:

static

Template:

merge\_options(UserOptions,Options)

Mode and number of proofs:

merge\_options(+list(compound),-list(compound)) - one

---

predicate\_called\_but\_not\_defined\_/2

Table of called object predicates that are not locally defined.

Compilation flags:

dynamic

Template:

predicate\_called\_but\_not\_defined\_(Object,Predicate)

Mode and number of proofs:

predicate\_called\_but\_not\_defined\_(?atom,?predicate\_indicator) - zero\_or\_more

---

object\_predicate\_called\_/3

Table of called object predicates.

Compilation flags:

dynamic

Template:

object\_predicate\_called\_(Object,Other,Predicate)

Mode and number of proofs:

object\_predicate\_called\_(?atom,?atom,?predicate\_indicator) - zero\_or\_more

---

module\_predicate\_called\_/3

Table of called module predicates.

Compilation flags:

dynamic

Template:

module\_predicate\_called\_(Object,Module,Predicate)

Mode and number of proofs:

module\_predicate\_called\_(?atom,?atom,?predicate\_indicator) - zero\_or\_more

---

---

unknown\_predicate\_called\_/2

Table of predicates called but not defined.

Compilation flags:

dynamic

Template:

unknown\_predicate\_called\_(Object,Predicate)

Mode and number of proofs:

unknown\_predicate\_called\_(?atom,?predicate\_indicator) - zero\_or\_more

---

missing\_predicate\_directive\_/3

Table of missing predicate directives.

Compilation flags:

dynamic

Template:

missing\_predicate\_directive\_(Object,Directive,Predicate)

Mode and number of proofs:

missing\_predicate\_directive\_(?atom,?predicate\_indicator,?predicate\_indicator) - zero\_or\_more

---

non\_standard\_predicate\_call\_/2

Table of called non-standard predicates.

Compilation flags:

dynamic

Template:

non\_standard\_predicate\_call\_(Object,Predicate)

Mode and number of proofs:

non\_standard\_predicate\_call\_(?atom,?predicate\_indicator) - zero\_or\_more

---

dynamic\_directive\_/3

Table of declared dynamic predicates.

Compilation flags:

dynamic

Template:

dynamic\_directive\_(Object,Line,Predicate)

Mode and number of proofs:

dynamic\_directive\_(?atom,?integer,?predicate\_indicator) - zero\_or\_more

---

multifile\_directive\_/3

Table of declared multifile predicates.

Compilation flags:

dynamic

Template:

multifile\_directive\_(Object,Line,Predicate)

Mode and number of proofs:

multifile\_directive\_(?atom,?integer,?predicate\_indicator) - zero\_or\_more

---

add\_directive\_before\_entity\_/2

Table of directives to be added before the entity opening directive.

Compilation flags:

dynamic

Template:

add\_directive\_before\_entity\_(Object,Directive)

Mode and number of proofs:

add\_directive\_before\_entity\_(?atom,?predicate\_indicator) - zero\_or\_more

---

---

add\_directive\_/2

Table of directives to be added.

Compilation flags:

dynamic

Template:

add\_directive\_(Object,Directive)

Mode and number of proofs:

add\_directive\_(?atom,?predicate\_indicator) - zero\_or\_more

---

add\_directive\_/3

Table of directives to be added to complement existing directives.

Compilation flags:

dynamic

Template:

add\_directive\_(Object,Directive,NewDirective)

Mode and number of proofs:

add\_directive\_(?atom,?predicate\_indicator,?predicate\_indicator) - zero\_or\_more

---

remove\_directive\_/2

Table of directives to be removed.

Compilation flags:

dynamic

Template:

remove\_directive\_(Object,Directive)

Mode and number of proofs:

remove\_directive\_(?atom,?predicate\_indicator) - zero\_or\_more

---

file\_being\_advised\_/4

Table of files being advised are respective directories and names (basename without extension).

Compilation flags:

dynamic

Template:

file\_being\_advised\_(File,Path,Directory,Name)

Mode and number of proofs:

file\_being\_advised\_(?atom,?atom,?atom,?atom) - zero\_or\_more

---

## Operators

(none)

## 1.77 xml\_parser

object

### 1.77.1 xml

Bi-directional XML parser.

Availability:

logtalk\_load(xml\_parser(loader))

Author: John Fletcher; adapted to Logtalk by Paulo Moura.

Version: 3:8:4

Date: 2024-03-14

Copyright: Copyright (C) 2001-2005 Binding Time Limited, Copyright (C) 2005-2013 John Fletcher

License: This program is offered free of charge, as unsupported source code. You may use it, copy it, distribute it, modify it or sell it without restriction, but entirely at your own risk.

Compilation flags:

static, context\_switching\_calls

Uses:

list  
term

Remarks:

- On-line documentation: [https://binding-time.co.uk/index.php/Parsing\\_XML\\_with\\_Prolog](https://binding-time.co.uk/index.php/Parsing_XML_with_Prolog)
- Compliance: This XML parser supports a subset of XML suitable for XML Data and Worldwide Web applications. It is neither as strict nor as comprehensive as the XML 1.0 Specification mandates.
- Compliance-strictness: It is not as strict, because, while the specification must eliminate ambiguities, not all errors need to be regarded as faults, and some reasonable examples of real XML usage would have to be rejected if they were.
- Compliance-comprehensive: It is not as comprehensive, because, where the XML specification makes provision for more or less complete DTDs to be provided as part of a document, xml.pl actions the local definition of ENTITIES only. Other DTD extensions are treated as commentary.
- Bi-directional conversions: Conversions are not fully symmetrical as weaker XML is accepted than can be generated. Notably, in-bound (Codes -> Document) parsing does not require strictly well-formed XML. If Codes does not represent well-formed XML, Document is instantiated to the term malformed(<attributes>,<content>).

Inherited public predicates:

(none)

- Public predicates
  - parse/2
  - parse/3
  - subterm/2
  - pp/1
- Protected predicates
- Private predicates
  - xml\_to\_document/3
  - empty\_map/1
  - map\_member/3
  - map\_store/4
  - pp\_string/1
  - fault/5
  - exception/4
  - document\_generation//2
  - pcd\_data\_7bit//1
  - character\_data\_format/3

- cdata\_generation//1
- Operators

## Public predicates

parse/2

Parses a list of character codes to/from a data structure of the form `xml(<atts>,<content>)`.

Compilation flags:

static

Template:

parse(Codes,Document)

Mode and number of proofs:

parse(+list(character\_code),?nonvar) - zero\_or\_one

parse(?list(character\_code),+nonvar) - zero\_or\_one

---

parse/3

Parses a list of character codes to/from a data structure of the form `xml(<atts>,<content>)` using the given list of options.

Compilation flags:

static

Template:

parse(Options,Codes,Document)

Mode and number of proofs:

parse(++list(compound),+list(character\_code),?nonvar) - zero\_or\_one

parse(++list(compound),?list(character\_code),+nonvar) - zero\_or\_one

Remarks:

- `extended_characters(Boolean)` option: Use the extended character entities for XHTML (default true).
- `format(Boolean)` option: For parsing, strip layouts when no character data appears between elements (default true). For generating, indent the element content (default true).
- `remove_attribute_prefixes(Boolean)` option: Remove namespace prefixes from attributes when it's the same as the prefix of the parent element (default false).

- `allow_ampersand(Boolean)` option: Allow unescaped ampersand characters (&) to occur in PCDATA (default false).
- 

subterm/2

Unifies Subterm with a sub-term of XMLTerm. Note that XMLTerm is a sub-term of itself.

Compilation flags:

static

Template:

subterm(XMLTerm,Subterm)

Mode and number of proofs:

subterm(+nonvar,?nonvar) - zero\_or\_one

---

pp/1

Pretty prints a XML document on the current output stream.

Compilation flags:

static

Template:

pp(XMLDocument)

Mode and number of proofs:

pp(+nonvar) - zero\_or\_one

---

### Protected predicates

(no local declarations; see entity ancestors if any)

### Private predicates

xml\_to\_document/3

Translates the list of character codes XML into the Prolog term Document. Options is a list of terms controlling the treatment of layout characters and character entities.

Compilation flags:

static

Template:

xml\_to\_document(Options,XML,Document)

Mode and number of proofs:

xml\_to\_document(+nonvar,+nonvar,?nonvar) - zero\_or\_one

---

empty\_map/1

True if Map is a null map.

Compilation flags:

static

Template:

empty\_map(Map)

Mode and number of proofs:

empty\_map(?nonvar) - zero\_or\_one

---

map\_member/3

True if Map is a ordered map structure which records the pair Key-Data. Key must be ground.

Compilation flags:

static

Template:

map\_member(Key,Map,Data)

Mode and number of proofs:

`map_member(+nonvar,+nonvar,?nonvar) - zero_or_one`

---

`map_store/4`

True if Map0 is an ordered map structure, Key must be ground, and Map1 is identical to Map0 except that the pair Key-Data is recorded by Map1.

Compilation flags:

`static`

Template:

`map_store(Map0,Key,Data,Map1)`

Mode and number of proofs:

`map_store(+nonvar,+nonvar,+nonvar,?nonvar) - zero_or_one`

---

`pp_string/1`

Prints String onto the current output stream. If String contains only 7-bit chars it is printed in shorthand quoted format, otherwise it is written as a list.

Compilation flags:

`static`

Template:

`pp_string(String)`

Mode and number of proofs:

`pp_string(+nonvar) - zero_or_one`

---

fault/5

Identifies SubTerm as a sub-term of Term which cannot be serialized after Indentation. Message is an atom naming the type of error; Path is a string encoding a list of SubTerm's ancestor elements in the form <tag>{(id)}\* where <tag> is the element tag and <id> is the value of any attribute `__named__ id`.

Compilation flags:

static

Template:

fault(Term,Indentation,SubTerm,Path,Message)

Mode and number of proofs:

fault(+nonvar,+nonvar,?nonvar,?nonvar,?nonvar) - zero\_or\_one

---

exception/4

Hook to raise an exception to be raised in respect of a fault in the XML Term Document.

Compilation flags:

static

Template:

exception(Message,Document,Culprit,Path)

Mode and number of proofs:

exception(+atom,+nonvar,+nonvar,+nonvar) - one

---

document\_generation//2

DCG generating Document as a list of character codes. Format is true|false defining whether layouts, to provide indentation, should be added between the element content of the resultant "string". Note that formatting is disabled for elements that are interspersed with pcdat/1 terms, such as XHTML's 'inline' elements. Also, Format is over-ridden, for an individual element, by an explicit 'xml:space'="preserve" attribute.

Compilation flags:

static

Template:

---

---

document\_generation(Format,Document)

Mode and number of proofs:

document\_generation(+nonvar,+nonvar) - zero\_or\_one

---

pcdata\_7bit//1

Represents the ASCII character set in its simplest format, using the character entities &amp;, &quot;, &lt;, and &gt; which are common to both XML and HTML. The numeric entity &#39; is used in place of &apos; because browsers don't recognize it in HTML.

Compilation flags:

static

Template:

pcdata\_7bit(Code)

Mode and number of proofs:

pcdata\_7bit(?nonvar) - zero\_or\_one

---

character\_data\_format/3

Holds when Format0 and Format1 are the statuses of XML formatting before and after Codes - which may be null.

Compilation flags:

static

Template:

character\_data\_format(Codes,Format0,Format1)

Mode and number of proofs:

character\_data\_format(+nonvar,+nonvar,?nonvar) - zero\_or\_one

---

`cdata_generation//1`

Holds when Format0 and Format1 are the statuses of XML formatting before and after Codes - which may be null.

Compilation flags:

`static`

Template:

`cdata_generation(Codes)`

Mode and number of proofs:

`cdata_generation(+list) - zero_or_one`

---

## Operators

(none)

## 1.78 zippers

protocol

### 1.78.1 zipperp

Zipper protocol.

Availability:

`logtalk_load(zippers(loader))`

Author: Paulo Moura

Version: 1:0:0

Date: 2019-01-20

Compilation flags:

`static`

Dependencies:

(none)

Remarks:

(none)

Inherited public predicates:

(none)

- Public predicates
  - zip/2
  - zip/3
  - unzip/2
  - current/2
  - next/2
  - next/3
  - previous/2
  - previous/3
  - rewind/2
  - rewind/3
  - forward/2
  - forward/3
  - apply/2
  - insert\_before/3
  - insert\_after/3
  - replace/3
  - delete\_and\_previous/2
  - delete\_and\_next/2
  - delete\_and\_unzip/2
  - delete\_all\_before/2
  - delete\_all\_before\_and\_unzip/2
  - delete\_all\_after/2
  - delete\_all\_after\_and\_unzip/2
- Protected predicates
- Private predicates
- Operators

## Public predicates

zip/2

Adds a zipper to a compound term holding a sequence of elements. Fails if the sequence is empty.

Compilation flags:

static

Template:

zip(Sequence,Zipper)

Mode and number of proofs:

zip(+sequence,--zipper) - zero\_or\_one

---

zip/3

Adds a zipper to a compound term holding a sequence of elements. Also returns the first element. Fails if the sequence is empty.

Compilation flags:

static

Template:

zip(Sequence,Zipper,First)

Mode and number of proofs:

zip(+sequence,--zipper,--term) - zero\_or\_one

---

unzip/2

Removes a zipper from a sequence.

Compilation flags:

static

Template:

unzip(Zipper,Sequence)

Mode and number of proofs:

`unzip(@zipper,--sequence) - one`

---

`current/2`

Current element.

Compilation flags:

`static`

Template:

`current(Zipper,Current)`

Mode and number of proofs:

`current(+zipper,?term) - zero_or_one`

---

`next/2`

Moves to the next element. Fails if already at the last elements.

Compilation flags:

`static`

Template:

`next(Zipper,NewZipper)`

Mode and number of proofs:

`next(+zipper,--zipper) - zero_or_one`

---

`next/3`

Moves to and returns the next element. Fails if already at the last elements.

Compilation flags:

`static`

Template:

`next(Zipper,NewZipper,Next)`

Mode and number of proofs:

`next(+zipper,--zipper,-term) - zero_or_one`

---

`previous/2`

Moves to the previous element. Fails if already at the first elements.

Compilation flags:

`static`

Template:

`previous(Zipper,NewZipper)`

Mode and number of proofs:

`previous(+zipper,--zipper) - zero_or_one`

---

`previous/3`

Moves to and returns the previous element. Fails if already at the first element.

Compilation flags:

`static`

Template:

`previous(Zipper,NewZipper,Previous)`

Mode and number of proofs:

`previous(+zipper,--zipper,-term) - zero_or_one`

---

rewind/2

Rewinds the zipper so that the first element becomes the current element.

Compilation flags:

static

Template:

rewind(Zipper,NewZipper)

Mode and number of proofs:

rewind(+zipper,--zipper) - one

---

rewind/3

Rewinds the zipper so that the first element becomes the current element. Also returns the first element.

Compilation flags:

static

Template:

rewind(Zipper,NewZipper,First)

Mode and number of proofs:

rewind(+zipper,--zipper,?term) - zero\_or\_one

---

forward/2

Forward the zipper so that the last element becomes the current element.

Compilation flags:

static

Template:

forward(Zipper,NewZipper)

Mode and number of proofs:

forward(+zipper,--zipper) - one

---

forward/3

Forward the zipper so that the last element becomes the current element. Also returns the last element.

Compilation flags:

static

Template:

forward(Zipper,NewZipper,Last)

Mode and number of proofs:

forward(+zipper,--zipper,?term) - zero\_or\_one

---

apply/2

Applies a closure to the current element.

Compilation flags:

static

Template:

apply(Closure,Zipper)

Meta-predicate template:

apply(1,\*)

Mode and number of proofs:

apply(+callable,+zipper) - zero\_or\_more

---

insert\_before/3

Inserts an element before the current one.

Compilation flags:

static

Template:

insert\_before(Zipper,Element,NewZipper)

Mode and number of proofs:

insert\_before(+zipper,?term,--zipper) - zero\_or\_one

---

`insert_after/3`

Inserts an element after the current one.

Compilation flags:

`static`

Template:

`insert_after(Zipper,Element,NewZipper)`

Mode and number of proofs:

`insert_after(+zipper,?term,--zipper) - zero_or_one`

---

`replace/3`

Replaces the current element with a new element.

Compilation flags:

`static`

Template:

`replace(Zipper,NewCurrent,NewZipper)`

Mode and number of proofs:

`replace(+zipper,?term,--zipper) - one`

---

`delete_and_previous/2`

Deletes the current element and moves to the previous element. Fails if no previous element exists.

Compilation flags:

`static`

Template:

`delete_and_previous(Zipper,NewZipper)`

Mode and number of proofs:

`delete_and_previous(+zipper,--zipper) - zero_or_one`

---

`delete_and_next/2`

Deletes the current element and moves to the next element. Fails if no next element exists.

Compilation flags:

`static`

Template:

`delete_and_next(Zipper,NewZipper)`

Mode and number of proofs:

`delete_and_next(+zipper,--zipper) - zero_or_one`

---

`delete_and_unzip/2`

Deletes the current element and removes the zipper returning the resulting sequence.

Compilation flags:

`static`

Template:

`delete_and_unzip(Zipper,Sequence)`

Mode and number of proofs:

`delete_and_unzip(+zipper,--sequence) - one`

---

`delete_all_before/2`

Deletes all elements before the current element.

Compilation flags:

`static`

Template:

```
delete_all_before(Zipper,NewZipper)
```

Mode and number of proofs:

```
delete_all_before(+zipper,--zipper) - one
```

---

```
delete_all_before_and_unzip/2
```

Deletes all elements before the current element and removes the zipper returning the resulting sequence.

Compilation flags:

```
static
```

Template:

```
delete_all_before_and_unzip(Zipper,NewZipper)
```

Mode and number of proofs:

```
delete_all_before_and_unzip(+zipper,--sequence) - one
```

---

```
delete_all_after/2
```

Deletes all elements after the current element.

Compilation flags:

```
static
```

Template:

```
delete_all_after(Zipper,NewZipper)
```

Mode and number of proofs:

```
delete_all_after(+zipper,--zipper) - one
```

---

`delete_all_after_and_unzip/2`

Deletes all elements after the current element and removes the zipper returning the resulting sequence.

Compilation flags:

`static`

Template:

`delete_all_after_and_unzip(Zipper,NewZipper)`

Mode and number of proofs:

`delete_all_after_and_unzip(+zipper,--sequence) - one`

---

### Protected predicates

(none)

### Private predicates

(none)

### Operators

(none)

See also:

`zlist`

object

### 1.78.2 `zlist`

Zipper list predicates. Zippers should be regarded as opaque terms.

Availability:

`logtalk_load(zippers(loader))`

Author: Paulo Moura

Version: 1:0:1

Date: 2019-03-12

Compilation flags:

static, context\_switching\_calls

Implements:

public zipperp

Remarks:

(none)

Inherited public predicates:

apply/2 current/2 delete\_all\_after/2 delete\_all\_after\_and\_unzip/2 delete\_all\_before/2  
 delete\_all\_before\_and\_unzip/2 delete\_and\_next/2 delete\_and\_previous/2 delete\_and\_unzip/2  
 forward/2 forward/3 insert\_after/3 insert\_before/3 next/2 next/3 previous/2 previous/3  
 replace/3 rewind/2 rewind/3 unzip/2 zip/2 zip/3

- Public predicates
  - zip\_at\_index/4
- Protected predicates
- Private predicates
- Operators

## Public predicates

zip\_at\_index/4

Adds a zipper to a list opened at the given index and also returns the element at the index. Fails if the list is empty or the index (starting at 1) does not exist.

Compilation flags:

static

Template:

zip\_at\_index(Index,List,Zipper,Element)

Mode and number of proofs:

zip\_at\_index(+natural,+list,--zipper,--term) - zero\_or\_one

**Protected predicates**

(no local declarations; see entity ancestors if any)

**Private predicates**

(no local declarations; see entity ancestors if any)

**Operators**

(none)

## **DIRECTORIES**

To load an entity, always load the library that includes it using the goal `logtalk_load(library_name(loader))` instead of using its path. The library loader file ensures that all the required dependencies are also loaded and that any required flags are used. The loading goal can be found in the entity documentation.



- 2.1** [contributions/flags/](#)
- 2.2** [contributions/iso8601/](#)
- 2.3** [contributions/pddl\\_parser/](#)
- 2.4** [contributions/verdi\\_neruda/](#)
- 2.5** [contributions/xml\\_parser/](#)
- 2.6** [core/](#)
- 2.7** [library/](#)
- 2.8** [library/arbitrary/](#)
- 2.9** [library/assignvars/](#)
- 2.10** [library/base64/](#)
- 2.11** [library/cbor/](#)
- 2.12** [library/coroutining/](#)
- 2.13** [library/csv/](#)
- 2.14** [library/dates/](#)
- 2.15** [library/dependents/](#)
- 2.16** [library/dictionaries/](#)
- 2.17** [library/dif/](#)
- 2.18** [library/edcg/](#)
- 2.19** [library/events/](#)
- 2.20** [library/expand\\_library\\_alias\\_paths/](#)
- 2.1.** [contributions/flags/](#)
- 2.21** [library/expecteds/](#)



## **ENTITIES**

To load an entity, always load the library that includes it using the goal `logtalk_load(library_name(loader))` instead of loading just the entity. The library loader file ensures that all the required dependencies are also loaded and that any required flags are used. The loading goal can be found in the entity documentation.

### **3.1 Categories**

### **3.2 Objects**

### **3.3 Protocols**



**PREDICATES**

This index lists all entities declaring a given predicate. To load an entity providing the predicate that you want to call, always load the library that includes it using the goal `logtalk_load(library_name(loader))` instead of loading just the entity. The library loader file ensures that all the required dependencies are also loaded and that any required flags are used. The loading goal can be found in the entity documentation.

**4.1** `(/)/2`

- `help`

**4.2** `(//)/2`

- `help`

**4.3** `(<)/2`

- `comparingp`

**4.4** `(<=)/2`

- `assignvarsp`
- `streamvars`

**4.5** `(=:=)/2`

- `comparingp`

#### 4.6 (= <)/2

- comparingp

#### 4.7 (= >)/2

- assignvarsp
- streamvars

#### 4.8 (= \=)/2

- comparingp

#### 4.9 = ~ = / 2

- lgtunit
- number

#### 4.10 (>)/2

- comparingp

#### 4.11 (>=)/2

- comparingp

#### 4.12 absolute\_file\_name/2

- osp

#### 4.13 activate\_debug\_handler/1

- logtalk

#### 4.14 activate\_monitor/0

- monitorp

#### 4.15 active\_debug\_handler/1

- logtalk

#### 4.16 add/1

- registries

#### 4.17 add/2

- registries

#### 4.18 add/3

- difflist
- registries

#### 4.19 addDependent/1

- subject

#### 4.20 after/2

- intervalp

#### 4.21 after/3

- monitoring

## 4.22 all/0

- code\_metric
- dead\_code\_scanner
- lgtdocp

## 4.23 all/1

- code\_metric
- dead\_code\_scanner
- lgtdocp

## 4.24 all\_files/0

- diagram(Format)
- diagrams(Format)

## 4.25 all\_files/1

- diagram(Format)
- diagrams(Format)

## 4.26 all\_libraries/0

- diagram(Format)
- diagrams(Format)

## 4.27 all\_libraries/1

- diagram(Format)
- diagrams(Format)

#### 4.28 all\_score/1

- code\_metric

#### 4.29 ancestor/1

- hierarchyp

#### 4.30 ancestors/1

- hierarchyp

#### 4.31 apis/0

- help\_info\_support

#### 4.32 apis/1

- help\_info\_support

#### 4.33 append/2

- listp

#### 4.34 append/3

- listp
- queuep
- varlistp

#### 4.35 apply/2

- zipperp

### 4.36 apply/4

- dictionaryp

### 4.37 approximately\_equal/2

- lgtunit
- number

### 4.38 approximately\_equal/3

- lgtunit
- number

### 4.39 arbitrary/1

- arbitrary

### 4.40 arbitrary/2

- arbitrary

### 4.41 archive/1

- registry\_protocol

### 4.42 arithmetic\_mean/2

- statisticsp

### 4.43 array\_list/2

- java\_utils\_protocol

#### 4.44 array\_to\_list/2

- java\_utils\_protocol

#### 4.45 array\_to\_terms/2

- java\_utils\_protocol

#### 4.46 array\_to\_terms/3

- java\_utils\_protocol

#### 4.47 as\_curly\_bracketed/2

- dictionaryp
- nested\_dictionary\_protocol

#### 4.48 as\_dictionary/2

- dictionaryp

#### 4.49 as\_difflist/2

- list

#### 4.50 as\_heap/2

- heapp

#### 4.51 as\_list/2

- dictionaryp
- difflist
- heapp
- queuep
- setp

#### 4.52 as\_nested\_dictionary/2

- nested\_dictionary\_protocol

#### 4.53 as\_set/2

- setp

#### 4.54 ask\_question/5

- logtalk

#### 4.55 assertion/1

- assertions(Mode)
- lgtunit

#### 4.56 assertion/2

- assertions(Mode)
- lgtunit

#### 4.57 assignable/1

- assignvarsp

#### 4.58 assignable/2

- assignvarsp

#### 4.59 available/0

- packs

#### 4.60 available/1

- packs

#### 4.61 available/2

- packs

#### 4.62 average/2

- numberlistp

#### 4.63 average\_deviation/3

- statisticsp

#### 4.64 before/2

- intervalp

#### 4.65 before/3

- monitoring

#### 4.66 bench\_goal/1

- databasep

#### 4.67 benchmark/2

- lgtunit

#### 4.68 benchmark/3

- lgtunit

#### 4.69 benchmark/4

- lgtunit

#### 4.70 benchmark\_reified/3

- lgtunit

#### 4.71 between/3

- integer
- random\_protocol

#### 4.72 bit//1

- number\_grammars(Format)

#### 4.73 bits//1

- number\_grammars(Format)

#### 4.74 blank//0

- blank\_grammars(Format)

#### 4.75 blanks//0

- blank\_grammars(Format)

#### **4.76** body\_pred/1

- metagol

#### **4.77** branch/2

- git\_protocol

#### **4.78** built\_in\_directive/4

- help

#### **4.79** built\_in\_flag/2

- flags

#### **4.80** built\_in\_method/4

- help

#### **4.81** built\_in\_non\_terminal/4

- help

#### **4.82** built\_in\_predicate/4

- help

#### **4.83** calendar\_month/3

- iso8601

#### 4.84 call\_with\_timeout/2

- timeout

#### 4.85 call\_with\_timeout/3

- timeout

#### 4.86 cat/2

- maybe

#### 4.87 change\_directory/1

- osp

#### 4.88 changed/0

- subject

#### 4.89 changed/1

- subject

#### 4.90 chebyshev\_distance/3

- numberlistp

#### 4.91 chebyshev\_norm/2

- numberlistp

## 4.92 check/1

- temp
- varlistp

## 4.93 check/2

- type

## 4.94 check/3

- type

## 4.95 check\_option/1

- options\_protocol

## 4.96 check\_options/1

- options\_protocol

## 4.97 chr\_is/2

- toychrdb

## 4.98 chr\_no\_spy/1

- toychrdb

## 4.99 chr\_nospy/0

- toychrdb

#### 4.100 chr\_notrace/0

- toychrdb

#### 4.101 chr\_option/2

- toychrdb

#### 4.102 chr\_spy/1

- toychrdb

#### 4.103 chr\_trace/0

- toychrdb

#### 4.104 class/1

- class\_hierarchy

#### 4.105 classes/1

- class\_hierarchy

#### 4.106 clause/5

- ports\_profiler

#### 4.107 clause\_location/6

- ports\_profiler

**4.108** clean/0

- packs
- registries

**4.109** clean/1

- packs
- registries

**4.110** clean/2

- packs

**4.111** clone/1

- cloning
- registry\_protocol

**4.112** clone/3

- dictionaryp

**4.113** clone/4

- dictionaryp

**4.114** coefficient\_of\_variation/2

- statisticsp

#### 4.115 `command_line_arguments/1`

- `osp`

#### 4.116 `commit_author/2`

- `git_protocol`

#### 4.117 `commit_date/2`

- `git_protocol`

#### 4.118 `commit_hash/2`

- `git_protocol`

#### 4.119 `commit_hash_abbreviated/2`

- `git_protocol`

#### 4.120 `commit_log/3`

- `git_protocol`

#### 4.121 `commit_message/2`

- `git_protocol`

#### 4.122 `compile_aux_clauses/1`

- `logtalk`

**4.123** compile\_predicate\_heads/4

- logtalk

**4.124** compile\_predicate\_indicators/3

- logtalk

**4.125** completion/2

- help

**4.126** completions/2

- help

**4.127** connect/1

- redis

**4.128** connect/3

- redis

**4.129** console/1

- redis

**4.130** contains/2

- intervalp

#### 4.131 control//0

- blank\_grammars(Format)

#### 4.132 control\_construct/4

- help

#### 4.133 controls//0

- blank\_grammars(Format)

#### 4.134 copy\_file/2

- osp

#### 4.135 counter/2

- counters
- mutations\_store

#### 4.136 cover/1

- lgtunit

#### 4.137 cpu\_time/1

- osp
- timep

#### 4.138 current/2

- zipperp

**4.139** data/0

- ports\_profiler

**4.140** data/1

- ports\_profiler

**4.141** data/2

- ports\_profiler

**4.142** date/4

- iso8601

**4.143** date/5

- iso8601

**4.144** date/6

- iso8601

**4.145** date/7

- iso8601

**4.146** date\_string/3

- iso8601

#### 4.147 date\_time/7

- osp

#### 4.148 days\_in\_month/3

- datep

#### 4.149 deactivate\_debug\_handler/0

- logtalk

#### 4.150 debug/0

- debuggerp

#### 4.151 debug\_handler/1

- logtalk

#### 4.152 debug\_handler/3

- logtalk

#### 4.153 debugging/0

- debuggerp

#### 4.154 debugging/1

- debuggerp

**4.155** decide/1

- fcube

**4.156** decide/2

- fcube

**4.157** decode\_exception/2

- java\_utils\_protocol

**4.158** decode\_exception/3

- java\_utils\_protocol

**4.159** decompile\_predicate\_heads/4

- logtalk

**4.160** decompile\_predicate\_indicators/4

- logtalk

**4.161** decompose\_file\_name/3

- osp

**4.162** decompose\_file\_name/4

- osp

#### 4.163 decrement\_counter/1

- counters

#### 4.164 default\_option/1

- options\_protocol
- wrapper

#### 4.165 default\_options/1

- options\_protocol
- wrapper

#### 4.166 define\_log\_file/2

- loggingp

#### 4.167 defined/4

- registries

#### 4.168 defined\_flag/6

- flags

#### 4.169 del\_monitors/0

- event\_registryp

#### 4.170 del\_monitors/4

- event\_registryp

**4.171** del\_spy\_points/4

- monitorp

**4.172** delete/0

- registries

**4.173** delete/1

- registries

**4.174** delete/2

- registries

**4.175** delete/3

- listp
- setp
- varlistp

**4.176** delete/4

- dictionaryp
- heapp

**4.177** delete\_all\_after/2

- zipperp

**4.178** delete\_all\_after\_and\_unzip/2

- zipperp

**4.179** delete\_all\_before/2

- zipperp

**4.180** delete\_all\_before\_and\_unzip/2

- zipperp

**4.181** delete\_and\_next/2

- zipperp

**4.182** delete\_and\_previous/2

- zipperp

**4.183** delete\_and\_unzip/2

- zipperp

**4.184** delete\_directory/1

- osp

**4.185** delete\_directory\_and\_contents/1

- osp

**4.186** delete\_directory\_contents/1

- osp

**4.187** delete\_file/1

- osp

**4.188** delete\_in/4

- nested\_dictionary\_protocol

**4.189** delete\_matches/3

- listp

**4.190** delete\_max/4

- dictionaryp

**4.191** delete\_min/4

- dictionaryp

**4.192** dependents/1

- packs
- subject

**4.193** dependents/2

- packs

**4.194** dependents/3

- packs

#### 4.195 depth/2

- temp

#### 4.196 descendant/1

- hierarchyp

#### 4.197 descendant\_class/1

- class\_hierarchyp

#### 4.198 descendant\_classes/1

- class\_hierarchyp

#### 4.199 descendant\_instance/1

- class\_hierarchyp

#### 4.200 descendant\_instances/1

- class\_hierarchyp

#### 4.201 descendants/1

- hierarchyp

#### 4.202 describe/1

- packs
- registries

#### 4.203 describe/2

- packs

#### 4.204 description/1

- pack\_protocol
- registry\_protocol

#### 4.205 deterministic/1

- lgtunit

#### 4.206 deterministic/2

- lgtunit

#### 4.207 diagram\_description/1

- diagram(Format)

#### 4.208 diagram\_name\_suffix/1

- diagram(Format)

#### 4.209 dif/1

- coroutining
- dif

#### 4.210 dif/2

- coroutining
- dif

#### 4.211 digit//1

- number\_grammars(Format)

#### 4.212 digits//1

- number\_grammars(Format)

#### 4.213 directories/1

- lgtdocp
- wrapper

#### 4.214 directories/2

- diagram(Format)
- diagrams(Format)
- lgtdocp
- wrapper

#### 4.215 directories/3

- diagram(Format)
- diagrams(Format)

#### 4.216 directory/1

- code\_metric
- dead\_code\_scanner
- diagram(Format)
- diagrams(Format)
- lgtdocp
- packs\_common
- wrapper

#### 4.217 directory/2

- code\_metric
- dead\_code\_scanner
- diagram(Format)
- diagrams(Format)
- lgtdocp
- packs\_common
- wrapper

#### 4.218 directory/3

- diagram(Format)
- diagrams(Format)

#### 4.219 directory\_exists/1

- osp

#### 4.220 directory\_files/2

- osp

#### 4.221 directory\_files/3

- osp

#### 4.222 directory\_score/2

- code\_metric

#### 4.223 disable/1

- debug\_messages

#### 4.224 disable/2

- debug\_messages

#### 4.225 disable\_logging/1

- loggingp

#### 4.226 disconnect/1

- redis

#### 4.227 disjoint/2

- setp

#### 4.228 disjoint\_sets/2

- union\_find\_protocol

#### 4.229 doc\_goal/1

- doclet

#### 4.230 dot//1

- number\_grammars(Format)

**4.231** dowhile/2

- loopp

**4.232** drop/3

- listp

**4.233** during/2

- intervalp

**4.234** easter\_day/3

- iso8601

**4.235** edge/6

- graph\_language\_protocol

**4.236** edge\_case/2

- arbitrary

**4.237** either/3

- expected(Expected)

**4.238** empty/1

- dictionaryp
- heapp
- listp
- nested\_dictionary\_protocol
- optional
- queuep
- setp
- varlistp

#### 4.239 enable/1

- debug\_messages

#### 4.240 enable/2

- debug\_messages

#### 4.241 enable\_logging/1

- loggingp

#### 4.242 enabled/1

- debug\_messages

#### 4.243 enabled/2

- debug\_messages

#### 4.244 ensure\_directory/1

- osp

#### 4.245 ensure\_file/1

- osp

#### 4.246 entity/1

- code\_metric
- dead\_code\_scanner
- help
- xref\_diagram(Format)

**4.247** entity/2

- xref\_diagram(Format)

**4.248** entity\_info\_pair\_score\_hook/3

- doc\_metric

**4.249** entity\_info\_score\_hook/2

- doc\_metric

**4.250** entity\_predicates\_weights\_hook/2

- doc\_metric

**4.251** entity\_prefix/2

- logtalk

**4.252** entity\_score/2

- code\_metric

**4.253** enumerate/2

- random\_protocol

**4.254** environment\_variable/2

- osp

#### 4.255 epsilon/1

- lgtunit

#### 4.256 equal/2

- intervalp
- setp

#### 4.257 erase/1

- recorded\_database\_core

#### 4.258 essentially\_equal/3

- lgtunit
- number

#### 4.259 euclidean\_distance/3

- numberlistp

#### 4.260 euclidean\_norm/2

- numberlistp

#### 4.261 exclude/3

- metap

#### 4.262 execution\_context/7

- logtalk

**4.263** expand\_library\_path/2

- logtalk

**4.264** expected/1

- expected(Expected)

**4.265** expecteds/2

- either

**4.266** explain//1

- tutor

**4.267** extension/1

- proto\_hierarchy

**4.268** extensions/1

- proto\_hierarchy

**4.269** false/1

- java\_utils\_protocol

**4.270** fcube/0

- fcube

### 4.271 file/1

- code\_metric
- dead\_code\_scanner
- entity\_diagram(Format)
- lgtdocp
- wrapper

### 4.272 file/2

- code\_metric
- dead\_code\_scanner
- entity\_diagram(Format)
- lgtdocp
- wrapper

### 4.273 file\_exists/1

- osp

### 4.274 file\_footer/3

- graph\_language\_protocol

### 4.275 file\_header/3

- graph\_language\_protocol

### 4.276 file\_modification\_time/2

- osp

**4.277** file\_permission/2

- osp

**4.278** file\_score/2

- code\_metric

**4.279** file\_size/2

- osp

**4.280** file\_to\_bytes/2

- reader

**4.281** file\_to\_bytes/3

- reader

**4.282** file\_to\_chars/2

- reader

**4.283** file\_to\_chars/3

- reader

**4.284** file\_to\_codes/2

- reader

#### 4.285 file\_to\_codes/3

- reader

#### 4.286 file\_to\_terms/2

- reader

#### 4.287 file\_to\_terms/3

- reader

#### 4.288 file\_type\_extension/2

- logtalk

#### 4.289 files/1

- diagram(Format)
- diagrams(Format)
- lgtdocp
- wrapper

#### 4.290 files/2

- diagram(Format)
- diagrams(Format)
- lgtdocp
- wrapper

#### 4.291 files/3

- diagram(Format)
- diagrams(Format)

**4.292** filter/2

- optional(Optional)

**4.293** find/4

- union\_find\_protocol

**4.294** find/5

- union\_find\_protocol

**4.295** findall\_member/4

- metap

**4.296** findall\_member/5

- metap

**4.297** finished\_by/2

- intervalp

**4.298** finishes/2

- intervalp

**4.299** flag\_group\_chk/1

- flags

### 4.300 flag\_groups/1

- flags

### 4.301 flat\_map/2

- expected(Expected)
- optional(Optional)

### 4.302 flatten/2

- listp
- varlistp

### 4.303 float//1

- number\_grammars(Format)

### 4.304 fold\_left/4

- metap

### 4.305 fold\_left\_1/3

- metap

### 4.306 fold\_right/4

- metap

### 4.307 fold\_right\_1/3

- metap

**4.308** fordownto/3

- loopp

**4.309** fordownto/4

- loopp

**4.310** fordownto/5

- loopp

**4.311** foreach/3

- loopp

**4.312** foreach/4

- loopp

**4.313** format/2

- format

**4.314** format/3

- format

**4.315** format\_entity\_score//2

- code\_metric

### 4.316 `format_object/1`

- `diagram(Format)`

### 4.317 `format_to_atom/3`

- `term_io_protocol`

### 4.318 `format_to_chars/3`

- `term_io_protocol`

### 4.319 `format_to_chars/4`

- `term_io_protocol`

### 4.320 `format_to_codes/3`

- `term_io_protocol`

### 4.321 `format_to_codes/4`

- `term_io_protocol`

### 4.322 `forto/3`

- `loopp`

### 4.323 `forto/4`

- `loopp`

**4.324** forto/5

- loopp

**4.325** forward/1

- forwarding

**4.326** forward/2

- zipperp

**4.327** forward/3

- zipperp

**4.328** fractile/3

- statisticsp

**4.329** freeze/2

- coroutining

**4.330** from\_generator/2

- expected
- optional

**4.331** from\_generator/3

- expected
- optional

#### 4.332 from\_generator/4

- expected

#### 4.333 from\_goal/2

- expected
- optional

#### 4.334 from\_goal/3

- expected
- optional

#### 4.335 from\_goal/4

- expected

#### 4.336 frozen/2

- coroutining

#### 4.337 full\_device\_path/1

- osp

#### 4.338 func\_test/3

- metagol

#### 4.339 functional/0

- metagol

#### 4.340 generate/1

- `ids(Representation,Bytes)`
- `ulid_protocol`

#### 4.341 generate/2

- `base64`
- `base64url`
- `cbor(StringRepresentation)`
- `html`
- `json_protocol`
- `ulid_protocol`

#### 4.342 generate/8

- `ulid_protocol`

#### 4.343 genint/2

- `genint_core`

#### 4.344 gensym/2

- `gensym_core`

#### 4.345 geometric\_mean/2

- `statisticsp`

#### 4.346 get/1

- `optional(Optional)`

**4.347** `get_field/2`

- `java_access_protocol`

**4.348** `get_flag_value/2`

- `flags`

**4.349** `get_seed/1`

- `arbitrary`
- `pseudo_random_protocol`

**4.350** `gnu/0`

- `fcube`

**4.351** `goal_expansion/2`

- `expanding`

**4.352** `graph_footer/5`

- `graph_language_protocol`

**4.353** `graph_header/5`

- `graph_language_protocol`

**4.354** `ground/1`

- `temp`

---

**4.355** group\_by\_key/2

- pairs

**4.356** group\_consecutive\_by\_key/2

- pairs

**4.357** group\_sorted\_by\_key/2

- pairs

**4.358** guess\_arity/2

- csv\_protocol

**4.359** guess\_separator/2

- csv\_protocol

**4.360** hamming\_distance/3

- listp

**4.361** handbook/0

- help\_info\_support

**4.362** handbook/1

- help\_info\_support

### 4.363 harmonic\_mean/2

- statisticsp

### 4.364 head/2

- queuep

### 4.365 head\_pred/1

- metagol

### 4.366 help/0

- help
- packs\_common

### 4.367 hex\_digit//1

- number\_grammars(Format)

### 4.368 hex\_digits//1

- number\_grammars(Format)

### 4.369 home/1

- pack\_protocol
- registry\_protocol

### 4.370 ibk/3

- metagol

**4.371** if\_empty/1

- optional(Optional)

**4.372** if\_expected/1

- expected(Expected)

**4.373** if\_expected\_or\_else/2

- expected(Expected)

**4.374** if\_present/1

- optional(Optional)

**4.375** if\_present\_or\_else/2

- optional(Optional)

**4.376** if\_unexpected/1

- expected(Expected)

**4.377** include/3

- metap

**4.378** increase/1

- counter

### 4.379 increment/0

- counter

### 4.380 increment\_counter/1

- counters

### 4.381 init/0

- shell(Interpreters)

### 4.382 init\_log\_file/2

- loggingp

### 4.383 inorder/2

- bintree

### 4.384 insert/3

- setp

### 4.385 insert/4

- dictionaryp
- heapp

### 4.386 insert\_after/3

- zipperp

**4.387** insert\_all/3

- heapp
- setp

**4.388** insert\_before/3

- zipperp

**4.389** insert\_in/4

- nested\_dictionary\_protocol

**4.390** install/1

- packs

**4.391** install/2

- packs

**4.392** install/3

- packs

**4.393** install/4

- packs

**4.394** installed/0

- packs

### 4.395 installed/1

- packs

### 4.396 installed/3

- packs

### 4.397 installed/4

- packs

### 4.398 instance/1

- class\_hierarchy

### 4.399 instance/2

- recorded\_database\_core

### 4.400 instances/1

- class\_hierarchy

### 4.401 integer//1

- number\_grammars(Format)

### 4.402 internal\_os\_path/2

- osp

---

#### 4.403 intersect/2

- setp

#### 4.404 intersection/2

- dictionaryp

#### 4.405 intersection/3

- dictionaryp
- setp

#### 4.406 intersection/4

- setp

#### 4.407 invoke/1

- java\_access\_protocol

#### 4.408 invoke/2

- java\_access\_protocol

#### 4.409 ipv4//1

- ip\_grammars(Format)

#### 4.410 ipv6//1

- ip\_grammars(Format)

#### 4.411 is\_absolute\_file\_name/1

- osp

#### 4.412 is\_alpha/1

- characterp

#### 4.413 is\_alphanumeric/1

- characterp

#### 4.414 is\_ascii/1

- characterp

#### 4.415 is\_bin\_digit/1

- characterp

#### 4.416 is\_control/1

- characterp

#### 4.417 is\_dec\_digit/1

- characterp

#### 4.418 is\_empty/0

- optional(Optional)

**4.419** is\_end\_of\_line/1

- characterp

**4.420** is\_expected/0

- expected(Expected)

**4.421** is\_false/1

- java\_utils\_protocol

**4.422** is\_hex\_digit/1

- characterp

**4.423** is\_layout/1

- characterp

**4.424** is\_letter/1

- characterp

**4.425** is\_lower\_case/1

- characterp

**4.426** is\_newline/1

- characterp

#### 4.427 is\_null/1

- java\_utils\_protocol

#### 4.428 is\_object/1

- java\_utils\_protocol

#### 4.429 is\_octal\_digit/1

- characterp

#### 4.430 is\_period/1

- characterp

#### 4.431 is\_present/0

- optional(Optional)

#### 4.432 is\_punctuation/1

- characterp

#### 4.433 is\_quote/1

- characterp

#### 4.434 is\_true/1

- java\_utils\_protocol

**4.435** is\_unexpected/0

- expected(Expected)

**4.436** is\_upper\_case/1

- characterp

**4.437** is\_void/1

- java\_utils\_protocol

**4.438** is\_vowel/1

- characterp

**4.439** is\_white\_space/1

- characterp

**4.440** iterator\_element/2

- java\_utils\_protocol

**4.441** join/3

- queuep

**4.442** join\_all/3

- queuep

#### 4.443 jump/3

- queuep

#### 4.444 jump\_all/3

- queuep

#### 4.445 jump\_all\_block/3

- queuep

#### 4.446 key/2

- pairs

#### 4.447 keys/2

- dictionaryp
- pairs

#### 4.448 keys\_values/3

- pairs

#### 4.449 keysort/2

- listp

#### 4.450 kurtosis/2

- statisticsp

#### 4.451 language\_object/2

- graph\_language\_registry

#### 4.452 last/2

- listp
- varlistp

#### 4.453 leaf/1

- hierarchyp

#### 4.454 leaf\_class/1

- class\_hierarchyp

#### 4.455 leaf\_classes/1

- class\_hierarchyp

#### 4.456 leaf\_instance/1

- class\_hierarchyp

#### 4.457 leaf\_instances/1

- class\_hierarchyp

#### 4.458 leap\_year/1

- datep
- iso8601

#### 4.459 learn/0

- metagol\_example\_protocol

#### 4.460 learn/1

- metagol\_example\_protocol

#### 4.461 learn/2

- metagol

#### 4.462 learn/3

- metagol

#### 4.463 learn\_seq/2

- metagol

#### 4.464 learn\_with\_timeout/4

- metagol

#### 4.465 leash/1

- debuggerp

#### 4.466 leashing/1

- debuggerp

#### 4.467 least\_common\_multiple/2

- numberlistp

#### 4.468 leaves/1

- hierarchyp

#### 4.469 length/2

- listp
- queuep
- varlistp

#### 4.470 libraries/1

- diagram(Format)
- diagrams(Format)
- lgtdocp

#### 4.471 libraries/2

- diagram(Format)
- diagrams(Format)
- lgtdocp

#### 4.472 libraries/3

- diagram(Format)
- diagrams(Format)

#### 4.473 library/0

- help

#### 4.474 library/1

- code\_metric
- dead\_code\_scanner
- diagram(Format)
- diagrams(Format)
- help
- lgtdocp

#### 4.475 library/2

- code\_metric
- dead\_code\_scanner
- diagram(Format)
- diagrams(Format)
- lgtdocp

#### 4.476 library\_score/2

- code\_metric

#### 4.477 license/1

- pack\_protocol

#### 4.478 line\_to\_chars/2

- reader

**4.479** line\_to\_chars/3

- reader

**4.480** line\_to\_codes/2

- reader

**4.481** line\_to\_codes/3

- reader

**4.482** lint/0

- packs
- registries

**4.483** lint/1

- packs
- registries

**4.484** lint/2

- packs

**4.485** list/0

- registries

**4.486** list\_to\_array/2

- java\_utils\_protocol

#### 4.487 listing/0

- listing

#### 4.488 listing/1

- listing

#### 4.489 loaded\_file/1

- logtalk

#### 4.490 loaded\_file\_property/2

- logtalk
- modules\_diagram\_support

#### 4.491 log/3

- debuggerp

#### 4.492 log\_event/2

- loggingp

#### 4.493 log\_file/2

- loggingp

#### 4.494 logging/1

- loggingp

**4.495** logging/3

- debuggerp

**4.496** logtalk\_packs/0

- packs\_common

**4.497** logtalk\_packs/1

- packs\_common

**4.498** lookup/2

- dictionaryp

**4.499** lookup/3

- dictionaryp

**4.500** lookup\_in/3

- nested\_dictionary\_protocol

**4.501** lower\_upper/2

- characterp

**4.502** magic/2

- magic

#### 4.503 magicise/4

- magic

#### 4.504 make\_directory/1

- osp

#### 4.505 make\_directory\_path/1

- osp

#### 4.506 make\_set/3

- union\_find\_protocol

#### 4.507 man/1

- help\_info\_support

#### 4.508 manhattan\_distance/3

- numberlistp

#### 4.509 manhattan\_norm/2

- numberlistp

#### 4.510 manuals/0

- help

### 4.511 map/2

- dictionaryp
- expected(Expected)
- metap
- optional(Optional)
- queuep

### 4.512 map/3

- dictionaryp
- metap
- pairs
- queuep

### 4.513 map/4

- metap

### 4.514 map/5

- metap

### 4.515 map/6

- metap

### 4.516 map/7

- metap

#### 4.517 map/8

- metap

#### 4.518 map\_element/2

- java\_utils\_protocol

#### 4.519 map\_reduce/5

- metap

#### 4.520 max/2

- listp
- numberlistp
- statisticsp

#### 4.521 max/3

- dictionaryp

#### 4.522 max\_clauses/1

- metagol

#### 4.523 max\_inv\_preds/1

- metagol

#### 4.524 max\_size/1

- arbitrary

**4.525** maybe/0

- random\_protocol

**4.526** maybe/1

- random\_protocol

**4.527** maybe/2

- random\_protocol

**4.528** maybe\_call/1

- random\_protocol

**4.529** maybe\_call/2

- random\_protocol

**4.530** mean\_deviation/2

- statisticsp

**4.531** median/2

- numberlistp
- statisticsp

**4.532** median\_deviation/2

- statisticsp

### 4.533 meets/2

- intervalp

### 4.534 member/2

- listp
- random\_protocol
- setp

### 4.535 memberchk/2

- listp
- setp
- varlistp

### 4.536 merge/3

- heapp

### 4.537 message\_hook/4

- logtalk

### 4.538 message\_prefix\_stream/4

- logtalk

### 4.539 message\_tokens//2

- logtalk

---

**4.540** met\_by/2

- intervalp

**4.541** meta\_type/3

- type

**4.542** metarule/6

- metagol

**4.543** metarule\_next\_id/1

- metagol

**4.544** min/2

- listp
- numberlistp
- statisticsp

**4.545** min/3

- dictionaryp

**4.546** min\_clauses/1

- metagol

**4.547** min\_max/3

- numberlistp
- statisticsp

#### 4.548 modes/2

- numberlistp
- statisticsp

#### 4.549 module\_property/2

- modules\_diagram\_support

#### 4.550 monitor/1

- event\_registry

#### 4.551 monitor/4

- event\_registry

#### 4.552 monitor\_activated/0

- monitorp

#### 4.553 monitored/1

- event\_registry

#### 4.554 monitors/1

- event\_registry

#### 4.555 msort/2

- listp

### 4.556 msort/3

- listp

### 4.557 mutation/3

- mutations
- mutations\_store

### 4.558 name/1

- pack\_protocol
- registry\_protocol

### 4.559 name\_of\_day/3

- datep

### 4.560 name\_of\_month/3

- datep

### 4.561 natural//1

- number\_grammars(Format)

### 4.562 new/1

- java\_access\_protocol
- nested\_dictionary\_protocol
- streamvars
- temp

### 4.563 new/2

- java\_access\_protocol
- streamvars
- union\_find\_protocol

### 4.564 new/3

- intervalp

### 4.565 new\_line//0

- blank\_grammars(Format)

### 4.566 new\_lines//0

- blank\_grammars(Format)

### 4.567 next/2

- zipperp

### 4.568 next/3

- zipperp

### 4.569 next/4

- dictionaryp

### 4.570 nextto/3

- listp
- varlistp

**4.571** node/7

- graph\_language\_protocol

**4.572** nodebug/0

- debuggerp

**4.573** nolog/3

- debuggerp

**4.574** nologall/0

- debuggerp

**4.575** non\_blank//1

- blank\_grammars(Format)

**4.576** non\_blanks//1

- blank\_grammars(Format)

**4.577** normal\_element/2

- html

**4.578** normalize\_range/2

- numberlistp

**4.579** normalize\_range/4

- numberlistp

**4.580** normalize\_scalar/2

- numberlistp

**4.581** normalize\_unit/2

- numberlistp

**4.582** nospy/1

- debuggerp

**4.583** nospy/3

- debuggerp

**4.584** nospy/4

- debuggerp

**4.585** nospyall/0

- debuggerp

**4.586** note/2

- registry\_protocol

**4.587** note/3

- pack\_protocol

**4.588** notrace/0

- debuggerp

**4.589** now/3

- timep

**4.590** nth0/3

- listp
- varlistp

**4.591** nth0/4

- listp
- varlistp

**4.592** nth1/3

- listp
- varlistp

**4.593** nth1/4

- listp
- varlistp

#### 4.594 null/1

- java\_utils\_protocol

#### 4.595 null\_device\_path/1

- osp

#### 4.596 number//1

- number\_grammars(Format)

#### 4.597 number\_of\_tests/1

- lgtunit

#### 4.598 numbervars/1

- temp

#### 4.599 numbervars/3

- temp

#### 4.600 occurrences/2

- listp

#### 4.601 occurrences/3

- listp

**4.602** occurs/2

- temp

**4.603** of/2

- optional

**4.604** of\_expected/2

- expected

**4.605** of\_unexpected/2

- expected

**4.606** one\_or\_more//0

- sequence\_grammars

**4.607** one\_or\_more//1

- sequence\_grammars

**4.608** one\_or\_more//2

- sequence\_grammars

**4.609** operating\_system\_machine/1

- osp

#### 4.610 operating\_system\_name/1

- osp

#### 4.611 operating\_system\_release/1

- osp

#### 4.612 operating\_system\_type/1

- osp

#### 4.613 option/2

- options\_protocol

#### 4.614 option/3

- options\_protocol

#### 4.615 or/2

- optional(Optional)

#### 4.616 or\_else/2

- expected(Expected)
- optional(Optional)

#### 4.617 or\_else\_call/2

- expected(Expected)
- optional(Optional)

**4.618** or\_else\_fail/1

- expected(Expected)
- optional(Optional)

**4.619** or\_else\_get/2

- expected(Expected)
- optional(Optional)

**4.620** or\_else\_throw/1

- expected(Expected)

**4.621** or\_else\_throw/2

- optional(Optional)

**4.622** orphaned/0

- packs

**4.623** orphaned/2

- packs

**4.624** outdated/0

- packs

**4.625** outdated/1

- packs

#### 4.626 outdated/4

- packs

#### 4.627 output\_file\_name/2

- graph\_language\_protocol

#### 4.628 overlapped\_by/2

- intervalp

#### 4.629 overlaps/2

- intervalp

#### 4.630 parent/1

- proto\_hierarchyp

#### 4.631 parenthesis/2

- characterp

#### 4.632 parents/1

- proto\_hierarchyp

#### 4.633 parse/2

- base64
- base64url
- cbor(StringRepresentation)
- json\_protocol
- xml

**4.634** parse/3

- xml

**4.635** parse\_domain/2

- pddl

**4.636** parse\_domain/3

- pddl

**4.637** parse\_problem/2

- pddl

**4.638** parse\_problem/3

- pddl

**4.639** partial\_map/4

- rbtrees

**4.640** partition/3

- either

**4.641** partition/4

- metap

#### 4.642 partition/5

- listp

#### 4.643 partition/6

- metap

#### 4.644 path\_concat/3

- osp

#### 4.645 permutation/2

- listp
- random\_protocol
- varlistp

#### 4.646 pid/1

- osp

#### 4.647 pin/0

- packs\_common

#### 4.648 pin/1

- packs\_common

#### 4.649 pinned/1

- packs\_common

**4.650** plus/3

- integer

**4.651** port/5

- ports\_profiler

**4.652** portray\_clause/1

- listing

**4.653** postorder/2

- bintree

**4.654** powerset/2

- setp

**4.655** pp/1

- xml

**4.656** pprint/1

- metagol

**4.657** predicate/2

- dead\_code\_scanner

#### 4.658 predicate\_info\_pair\_score\_hook/4

- doc\_metric

#### 4.659 predicate\_info\_score\_hook/3

- doc\_metric

#### 4.660 predicate\_mode\_score\_hook/3

- doc\_metric

#### 4.661 predicate\_mode\_score\_hook/5

- doc\_metric

#### 4.662 predicates/2

- dead\_code\_scanner

#### 4.663 prefix/0

- packs\_common

#### 4.664 prefix/1

- packs\_common

#### 4.665 prefix/2

- listp
- varlistp

**4.666** prefix/3

- listp

**4.667** preorder/2

- bintree

**4.668** previous/2

- zipperp

**4.669** previous/3

- zipperp

**4.670** previous/4

- dictionaryp

**4.671** print\_flags/0

- flags
- flags\_validator

**4.672** print\_flags/1

- flags

**4.673** print\_message/3

- logtalk

#### 4.674 print\_message\_token/4

- logtalk

#### 4.675 print\_message\_tokens/3

- logtalk

#### 4.676 product/2

- numberlistp
- statisticsp

#### 4.677 product/3

- setp

#### 4.678 program\_to\_clauses/2

- metagol

#### 4.679 proper\_prefix/2

- listp

#### 4.680 proper\_prefix/3

- listp

#### 4.681 proper\_suffix/2

- listp

**4.682** proper\_suffix/3

- listp

**4.683** prove/2

- interpreterp

**4.684** prove/3

- interpreterp

**4.685** provides/2

- registries

**4.686** question\_hook/6

- logtalk

**4.687** question\_prompt\_stream/4

- logtalk

**4.688** quick\_check/1

- lgtunit

**4.689** quick\_check/2

- lgtunit

#### 4.690 quick\_check/3

- lgtunit

#### 4.691 random/1

- random\_protocol

#### 4.692 random/3

- random\_protocol

#### 4.693 random\_node/1

- uuid\_protocol

#### 4.694 random\_tree/1

- benchmark\_generators

#### 4.695 randomize/1

- fast\_random
- random

#### 4.696 randseq/4

- random\_protocol

#### 4.697 randset/4

- random\_protocol

## 4.698 range/2

- statisticsp

## 4.699 rdirectories/1

- lgtdocp

## 4.700 rdirectories/2

- lgtdocp

## 4.701 rdirectory/1

- code\_metric
- dead\_code\_scanner
- diagram(Format)
- diagrams(Format)
- lgtdocp
- wrapper

## 4.702 rdirectory/2

- code\_metric
- dead\_code\_scanner
- diagram(Format)
- diagrams(Format)
- lgtdocp
- wrapper

## 4.703 rdirectory/3

- diagram(Format)
- diagrams(Format)

#### 4.704 rdirectory\_score/2

- code\_metric

#### 4.705 read\_file/2

- csv\_protocol
- read\_file
- tsv\_protocol

#### 4.706 read\_file/3

- csv\_protocol
- tsv\_protocol

#### 4.707 read\_file\_by\_line/2

- csv\_protocol
- tsv\_protocol

#### 4.708 read\_file\_by\_line/3

- csv\_protocol
- tsv\_protocol

#### 4.709 read\_from\_atom/2

- term\_io\_protocol

#### 4.710 read\_from\_chars/2

- term\_io\_protocol

**4.711** read\_from\_codes/2

- term\_io\_protocol

**4.712** read\_only\_device\_path/1

- osp

**4.713** read\_stream/2

- csv\_protocol
- tsv\_protocol

**4.714** read\_stream/3

- csv\_protocol
- tsv\_protocol

**4.715** read\_stream\_by\_line/2

- csv\_protocol
- tsv\_protocol

**4.716** read\_stream\_by\_line/3

- csv\_protocol
- tsv\_protocol

**4.717** read\_term\_from\_atom/3

- term\_io\_protocol

#### 4.718 read\_term\_from\_chars/3

- term\_io\_protocol

#### 4.719 read\_term\_from\_chars/4

- term\_io\_protocol

#### 4.720 read\_term\_from\_codes/3

- term\_io\_protocol

#### 4.721 read\_term\_from\_codes/4

- term\_io\_protocol

#### 4.722 readme/1

- packs\_common

#### 4.723 readme/2

- packs\_common

#### 4.724 recorda/2

- recorded\_database\_core

#### 4.725 recorda/3

- recorded\_database\_core

**4.726** recorded/2

- recorded\_database\_core

**4.727** recorded/3

- recorded\_database\_core

**4.728** recordz/2

- recorded\_database\_core

**4.729** recordz/3

- recorded\_database\_core

**4.730** relative\_standard\_deviation/2

- statisticsp

**4.731** removeDependent/1

- subject

**4.732** remove\_duplicates/2

- listp
- varlistp

**4.733** rename\_file/2

- osp

#### 4.734 replace/3

- zipperp

#### 4.735 replace\_sub\_atom/4

- atom

#### 4.736 rescale/3

- numberlistp

#### 4.737 reset/0

- counter
- debuggerp
- packs\_common
- ports\_profiler

#### 4.738 reset/1

- ports\_profiler

#### 4.739 reset\_counter/1

- counters

#### 4.740 reset\_counters/0

- counters

#### 4.741 reset\_flags/0

- flags

**4.742** reset\_flags/1

- flags

**4.743** reset\_genint/0

- genint\_core

**4.744** reset\_genint/1

- genint\_core

**4.745** reset\_gensym/0

- gensym\_core

**4.746** reset\_gensym/1

- gensym\_core

**4.747** reset\_monitor/0

- monitorp

**4.748** reset\_seed/0

- fast\_random
- random

**4.749** restore/1

- packs

#### 4.750 restore/2

- packs

#### 4.751 reverse/2

- listp
- varlistp

#### 4.752 rewind/2

- zipperp

#### 4.753 rewind/3

- zipperp

#### 4.754 rlibraries/1

- lgtdocp

#### 4.755 rlibraries/2

- lgtdocp

#### 4.756 rlibrary/1

- code\_metric
- dead\_code\_scanner
- diagram(Format)
- diagrams(Format)
- lgtdocp

**4.757** rlibrary/2

- code\_metric
- dead\_code\_scanner
- diagram(Format)
- diagrams(Format)
- lgtdocp

**4.758** rlibrary\_score/2

- code\_metric

**4.759** rule/2

- databasep

**4.760** rule/3

- databasep

**4.761** rule/4

- databasep

**4.762** run/0

- lgtunit

**4.763** run/1

- lgtunit

#### 4.764 run/2

- lgtunit

#### 4.765 run\_test\_sets/1

- lgtunit

#### 4.766 same\_length/2

- listp
- varlistp

#### 4.767 same\_length/3

- listp

#### 4.768 save/0

- wrapper

#### 4.769 save/1

- packs
- wrapper

#### 4.770 save/2

- packs

#### 4.771 scalar\_product/3

- numberlistp

**4.772** scan\_left/4

- metap

**4.773** scan\_left\_1/3

- metap

**4.774** scan\_right/4

- metap

**4.775** scan\_right\_1/3

- metap

**4.776** search/1

- packs

**4.777** select/3

- listp
- random\_protocol
- setp
- varlistp

**4.778** select/4

- listp
- random\_protocol

#### 4.779 selectchk/3

- listp
- setp

#### 4.780 selectchk/4

- listp

#### 4.781 send/3

- redis

#### 4.782 sequence/3

- integer

#### 4.783 sequence/4

- integer
- random\_protocol

#### 4.784 sequential\_occurrences/2

- listp

#### 4.785 sequential\_occurrences/3

- listp

#### 4.786 serve/3

- queuep

**4.787** set/1

- counter

**4.788** set/4

- random\_protocol

**4.789** set\_element/2

- java\_utils\_protocol

**4.790** set\_field/2

- java\_access\_protocol

**4.791** set\_flag\_value/2

- flags

**4.792** set\_flag\_value/3

- flags

**4.793** set\_monitor/4

- event\_registry

**4.794** set\_seed/1

- arbitrary
- pseudo\_random\_protocol

**4.795** set\_spy\_point/4

- monitorp

**4.796** setup/0

- packs\_common

**4.797** shell/1

- osp

**4.798** shell/2

- osp

**4.799** shell\_command/1

- docket

**4.800** shrink/3

- arbitrary

**4.801** shrink\_sequence/3

- arbitrary

**4.802** shrinker/1

- arbitrary

**4.803** sign//1

- number\_grammars(Format)

**4.804** singletons/2

- temp

**4.805** size/2

- dictionaryp
- heapp
- setp

**4.806** skewness/2

- statisticsp

**4.807** sleep/1

- osp

**4.808** sort/2

- listp

**4.809** sort/3

- listp

**4.810** sort/4

- listp

#### 4.811 source\_file\_extension/1

- modules\_diagram\_support

#### 4.812 space//0

- blank\_grammars(Format)

#### 4.813 spaces//0

- blank\_grammars(Format)

#### 4.814 split/3

- atom

#### 4.815 split/4

- listp

#### 4.816 spy/1

- debuggerp

#### 4.817 spy/3

- debuggerp

#### 4.818 spy/4

- debuggerp

**4.819** spy\_point/4

- monitorp

**4.820** spying/1

- debuggerp

**4.821** spying/3

- debuggerp

**4.822** spying/4

- debuggerp

**4.823** standard\_deviation/2

- statisticsp

**4.824** start/0

- ports\_profiler
- shell

**4.825** start\_redirect\_to\_file/2

- dump\_trace

**4.826** started\_by/2

- intervalp

**4.827** starts/2

- intervalp

**4.828** stop/0

- ports\_profiler

**4.829** stop\_redirect\_to\_file/0

- dump\_trace

**4.830** stream\_to\_bytes/2

- reader

**4.831** stream\_to\_bytes/3

- reader

**4.832** stream\_to\_chars/2

- reader

**4.833** stream\_to\_chars/3

- reader

**4.834** stream\_to\_codes/2

- reader

**4.835** stream\_to\_codes/3

- reader

**4.836** stream\_to\_terms/2

- reader

**4.837** stream\_to\_terms/3

- reader

**4.838** subclass/1

- class\_hierarchy

**4.839** subclasses/1

- class\_hierarchy

**4.840** sublist/2

- listp
- varlistp

**4.841** subsequence/3

- listp

**4.842** subsequence/4

- listp

#### 4.843 subset/2

- setp

#### 4.844 substitute/4

- listp

#### 4.845 subsumes/2

- termp

#### 4.846 subterm/2

- termp
- xml

#### 4.847 subtract/3

- listp
- setp
- varlistp

#### 4.848 succ/2

- integer

#### 4.849 suffix/2

- listp
- varlistp

**4.850** suffix/3

- listp

**4.851** sum/2

- numberlistp
- statisticsp

**4.852** superclass/1

- class\_hierarchy

**4.853** superclasses/1

- class\_hierarchy

**4.854** suspend\_monitor/0

- monitorp

**4.855** swap/2

- random\_protocol

**4.856** swap\_consecutive/2

- random\_protocol

**4.857** symdiff/3

- setp

#### 4.858 tab//0

- blank\_grammars(Format)

#### 4.859 tabs//0

- blank\_grammars(Format)

#### 4.860 take/3

- listp

#### 4.861 temporary\_directory/1

- osp

#### 4.862 term\_expansion/2

- expanding

#### 4.863 terms\_to\_array/2

- java\_utils\_protocol

#### 4.864 test/1

- lgtunit

#### 4.865 time\_stamp/1

- osp

**4.866** timeout/1

- metagol

**4.867** timestamp/2

- ulid\_protocol

**4.868** timestamp/8

- ulid\_protocol

**4.869** today/3

- datep

**4.870** tolerance\_equal/4

- lgtunit
- number

**4.871** top/3

- heapp

**4.872** top\_next/5

- heapp

**4.873** trace/0

- debuggerp

#### 4.874 trace\_event/2

- logtalk

#### 4.875 transpose/2

- pairs

#### 4.876 true/1

- java\_utils\_protocol

#### 4.877 type/1

- type

#### 4.878 unexpected/1

- expected(Expected)

#### 4.879 unexpecteds/2

- either

#### 4.880 uninstall/0

- packs

#### 4.881 uninstall/1

- packs

**4.882** `uninstall/2`

- `packs`

**4.883** `union/3`

- `setp`

**4.884** `union/4`

- `setp`
- `union_find_protocol`

**4.885** `union_all/3`

- `union_find_protocol`

**4.886** `unpin/0`

- `packs_common`

**4.887** `unpin/1`

- `packs_common`

**4.888** `unzip/2`

- `zipperp`

**4.889** `update/0`

- `doclet`
- `packs`
- `registries`

## 4.890 update/1

- observer
- packs
- registries

## 4.891 update/2

- packs
- registries

## 4.892 update/3

- dictionaryp
- packs

## 4.893 update/4

- dictionaryp

## 4.894 update/5

- dictionaryp

## 4.895 update\_in/4

- nested\_dictionary\_protocol

## 4.896 update\_in/5

- nested\_dictionary\_protocol

**4.897** uuid\_null/1

- uuid\_protocol

**4.898** uuid\_v1/2

- uuid\_protocol

**4.899** uuid\_v4/1

- uuid\_protocol

**4.900** valid/1

- intervalp
- statisticsp
- temp
- varlistp

**4.901** valid/2

- type

**4.902** valid/3

- datep
- timep

**4.903** valid\_date/3

- iso8601

#### 4.904 valid\_option/1

- options\_protocol

#### 4.905 valid\_options/1

- options\_protocol

#### 4.906 validate/1

- flags\_validator

#### 4.907 value/1

- counter

#### 4.908 value/3

- pairs

#### 4.909 value\_reference/2

- java\_utils\_protocol

#### 4.910 values/2

- dictionaryp
- pairs

#### 4.911 variables/2

- temp

**4.912** variance/2

- statisticsp

**4.913** variant/2

- lgtunit
- temp

**4.914** varnumbers/2

- temp

**4.915** varnumbers/3

- temp

**4.916** verify\_commands\_availability/0

- packs\_common

**4.917** version/6

- pack\_protocol

**4.918** versions/3

- packs

**4.919** void/1

- java\_utils\_protocol

**4.920** void\_element/1

- html

**4.921** wall\_time/1

- osp

**4.922** weighted\_mean/3

- statisticsp

**4.923** welcome/0

- shell

**4.924** when/2

- coroutining

**4.925** whiledo/2

- loopp

**4.926** white\_space//0

- blank\_grammars(Format)

**4.927** white\_spaces//0

- blank\_grammars(Format)

**4.928** with\_output\_to/2

- term\_io\_protocol

**4.929** without//2

- sequence\_grammars

**4.930** working\_directory/1

- osp

**4.931** write\_file/3

- csv\_protocol
- tsv\_protocol

**4.932** write\_stream/3

- csv\_protocol
- tsv\_protocol

**4.933** write\_term\_to\_atom/3

- term\_io\_protocol

**4.934** write\_term\_to\_chars/3

- term\_io\_protocol

**4.935** write\_term\_to\_chars/4

- term\_io\_protocol

#### 4.936 write\_term\_to\_codes/3

- term\_io\_protocol

#### 4.937 write\_term\_to\_codes/4

- term\_io\_protocol

#### 4.938 write\_to\_atom/2

- term\_io\_protocol

#### 4.939 write\_to\_chars/2

- term\_io\_protocol

#### 4.940 write\_to\_codes/2

- term\_io\_protocol

#### 4.941 z\_normalization/2

- statisticsp

#### 4.942 zero\_or\_more//0

- sequence\_grammars

#### 4.943 zero\_or\_more//1

- sequence\_grammars

#### 4.944 zero\_or\_more//2

- sequence\_grammars

#### 4.945 zip/2

- zipperp

#### 4.946 zip/3

- zipperp

#### 4.947 zip\_at\_index/4

- zlist



## INDICES AND TABLES

- [genindex](#)
- [search](#)

Generated on Tue Oct 22 12:02:00 WEST 2024



## Symbols

(/)/2, 350  
 (//)/2, 351  
 (<)/2, 837  
 (<=)/2, 15, 536  
 (:=)/2, 839  
 (=<)/2, 838  
 (=>)/2, 15, 537  
 (=\\=)/2, 839  
 (>)/2, 838  
 (>=)/2, 838  
 =~= / 2, 482, 878

## A

a\_star\_interpreter(W), 938  
 absolute\_file\_name/2, 627  
 acc\_info/5, 263  
 acc\_info/7, 263  
 activate\_debug\_handler/1, 74  
 activate\_monitor/0, 275  
 active\_debug\_handler/1, 73  
 active\_debug\_handler\_/1, 80  
 add/1, 690  
 add/2, 690  
 add/3, 688, 842  
 add\_directive\_/2, 980  
 add\_directive\_/3, 981  
 add\_directive\_before\_entity\_/2, 980  
 add\_library\_documentation\_url/4, 224  
 add\_link\_options/3, 171  
 add\_node\_zoom\_option/4, 171  
 addDependent/1, 149  
 after/2, 407  
 after/3, 82  
 after\_event\_registry, 265  
 all/0, 31, 116, 463  
 all/1, 31, 116, 463  
 all\_files/0, 161, 183  
 all\_files/1, 161, 183  
 all\_libraries/0, 155, 177  
 all\_libraries/1, 154, 177  
 all\_score/1, 34  
 ancestor/1, 368  
 ancestor/4, 42  
 ancestors/1, 368  
 apis/0, 357  
 apis/1, 357  
 append/2, 853  
 append/3, 718, 854, 911  
 apply/2, 996  
 apply/4, 254  
 approximately\_equal/2, 480, 876  
 approximately\_equal/3, 480, 876  
 arbitrary, 1  
 arbitrary/1, 4  
 arbitrary/2, 4  
 archive/1, 701  
 arithmetic\_mean/2, 781  
 arithmetic\_mean/5, 776  
 array\_list/2, 439  
 array\_to\_list/2, 439  
 array\_to\_terms/2, 438  
 array\_to\_terms/3, 438  
 as\_curly\_bracketed/2, 245, 595  
 as\_dictionary/2, 245  
 as\_difflist/2, 849  
 as\_heap/2, 345  
 as\_list/2, 245, 344, 719, 763, 842  
 as\_nested\_dictionary/2, 595  
 as\_set/2, 763  
 ask\_question/5, 71  
 assertion/1, 10, 475  
 assertion/2, 10, 475  
 assertions, 7  
 assertions(Mode), 9  
 assertions\_messages, 11  
 assignable/1, 14  
 assignable/2, 14  
 assignvars, 12  
 assignvarsp, 13  
 atom, 822  
 atomic, 824  
 automation\_report, 464  
 auxiliary\_predicate\_counter\_/1, 513

available/0, 649  
available/1, 648  
available/2, 648  
average/2, 883  
average\_deviation/3, 783  
avltree, 239

## B

backend\_adapter\_hook, 377  
backend\_random, 721  
base64, 17  
base64url, 19  
base\_/2, 316  
before/2, 406  
before/3, 82  
before\_event\_registry, 266  
bench\_goal/1, 951  
benchmark/2, 478  
benchmark/3, 479  
benchmark/4, 479  
benchmark\_generators, 940  
benchmark\_reified/3, 478  
best\_first, 941  
between/3, 731, 846  
bfs\_interpreter, 943  
binary\_file\_assertion/3, 509  
binary\_input\_assertion/2, 493  
binary\_input\_assertion/3, 493  
binary\_output\_assertion/2, 504  
binary\_output\_assertion/3, 503  
binary\_output\_contents/1, 504  
binary\_output\_contents/2, 504  
bintree, 241  
bit//1, 332  
bits//1, 332  
blank//0, 326  
blank\_grammars(Format), 322  
blanks//0, 326  
body\_pred/1, 574  
body\_pred\_call/2, 577  
branch/2, 319  
breakpoint\_/2, 127  
built\_in\_directive/4, 352  
built\_in\_flag/2, 302  
built\_in\_method/4, 352  
built\_in\_non\_terminal/4, 353  
built\_in\_predicate/4, 352  
bup\_interpreter, 944

## C

c/1, 948  
calendar\_month/3, 421  
call\_with\_timeout/2, 801  
call\_with\_timeout/3, 802

callable, 825  
cat/2, 600  
cbor, 21  
cbor(StringRepresentation), 22  
cc\_metric, 24  
cdata\_generation//1, 989  
change\_directory/1, 630  
changed/0, 148  
changed/1, 148  
character, 826  
character\_data\_format/3, 989  
characterp, 827  
chebyshev\_distance/3, 886  
chebyshev\_norm/2, 885  
check/1, 900, 919  
check/2, 908  
check/3, 907  
check\_binary\_file/2, 508  
check\_binary\_input/1, 492  
check\_binary\_input/2, 492  
check\_binary\_output/1, 503  
check\_binary\_output/2, 502  
check\_option/1, 615  
check\_options/1, 615  
check\_text\_file/2, 507  
check\_text\_file/3, 506  
check\_text\_input/1, 489  
check\_text\_input/2, 488  
check\_text\_output/1, 497  
check\_text\_output/2, 496  
check\_text\_output/3, 496  
chr\_is/2, 804  
chr\_next\_state/1, 807  
chr\_no\_spy/1, 805  
chr\_nospy/0, 805  
chr\_notrace/0, 804  
chr\_option/2, 805  
chr\_option\_allow\_deep\_guards/0, 807  
chr\_option\_optimization\_level/1, 806  
chr\_option\_print\_trace/0, 805  
chr\_option\_show\_history/0, 806  
chr\_option\_show\_id/0, 807  
chr\_option\_show\_stack/0, 806  
chr\_option\_show\_store/0, 806  
chr\_option\_trace\_interactive/0, 806  
chr\_rule\_/1, 808  
chr\_spy/1, 804  
chr\_spy\_point/1, 807  
chr\_trace/0, 804  
class/1, 361  
class\_hierarchy, 358  
class\_hierarchyp, 360  
classes/1, 361  
clause/5, 711

clause\_/5, 712  
 clause\_location/6, 710  
 clause\_location\_/6, 711  
 clean/0, 664, 695  
 clean/1, 664, 695  
 clean/2, 663  
 clean\_binary\_input/0, 494  
 clean\_binary\_output/0, 505  
 clean\_directory/1, 510  
 clean\_file/1, 509  
 clean\_text\_input/0, 490  
 clean\_text\_output/0, 500  
 cleanup/0, 484  
 clone/1, 531, 701  
 clone/3, 246  
 clone/4, 246  
 cloning, 530  
 closed\_input\_stream/2, 510  
 closed\_output\_stream/2, 511  
 code\_metric, 25  
 code\_metrics, 38  
 code\_metrics\_messages, 40  
 code\_metrics\_utilities, 41  
 coefficient\_of\_variation/2, 784  
 command/2, 681  
 command\_line\_arguments/1, 640  
 commit\_author/2, 319  
 commit\_date/2, 320  
 commit\_hash/2, 320  
 commit\_hash\_abbreviated/2, 321  
 commit\_log/3, 321  
 commit\_message/2, 321  
 comparingp, 836  
 compile\_aux\_clauses/1, 77  
 compile\_predicate\_heads/4, 77  
 compile\_predicate\_indicators/3, 78  
 compiled\_pred\_call/2, 576  
 completion/2, 351  
 completions/2, 351  
 compound, 840  
 condition/0, 484  
 conditional\_breakpoint\_/3, 130  
 connect/1, 756  
 connect/3, 756  
 console/1, 757  
 contains/2, 409  
 control//0, 327  
 control\_construct/4, 353  
 controls//0, 328  
 copy\_file/2, 636  
 core\_messages, 62  
 coroutining, 84  
 counter, 945  
 counter/2, 532, 588

counter\_/2, 313, 534, 589  
 counters, 531  
 coupling\_metric, 46  
 cover/1, 471  
 coverage\_report, 465  
 covered\_/4, 515  
 cpu\_time/1, 109, 638  
 create\_binary\_file/2, 506  
 create\_text\_file/2, 506  
 create\_text\_file/3, 505  
 csv, 87  
 csv(Header Separator IgnoreQuotes), 89  
 csv\_guess\_questions, 90  
 csv\_protocol, 91  
 current/2, 993  
 current\_entity/1, 42  
 current\_prog/1, 805

## D

data/0, 708  
 data/1, 709  
 data/2, 709  
 databasep, 948  
 date, 102  
 date/4, 413  
 date/5, 414  
 date/6, 415  
 date/7, 416  
 date\_string/3, 417  
 date\_time/7, 638  
 datep, 103  
 days\_in\_month/3, 105  
 deactivate\_debug\_handler/0, 74  
 dead\_code\_scanner, 110  
 dead\_code\_scanner\_messages, 118  
 debug/0, 135  
 debug\_expansion(Mode), 951  
 debug\_handler/1, 73  
 debug\_handler/3, 74  
 debug\_messages, 119  
 debugger, 123  
 debugger\_messages, 132  
 debuggerp, 133  
 debugging/0, 136  
 debugging/1, 136  
 debugging\_/0, 125  
 decide/1, 296  
 decide/2, 296  
 declares\_predicate/2, 43  
 decode\_exception/2, 441  
 decode\_exception/3, 441  
 decode\_url\_spaces/2, 682  
 decompile\_predicate\_heads/4, 78  
 decompile\_predicate\_indicators/4, 79

decompose\_file\_name/3, 627  
decompose\_file\_name/4, 627  
decrement\_counter/1, 533  
default\_atom\_mutations, 579  
default\_compound\_mutations, 580  
default\_float\_mutations, 582  
default\_integer\_mutations, 583  
default\_list\_mutations, 584  
default\_option/1, 617, 976  
default\_options/1, 617, 976  
default\_workflow\_hook, 378  
define\_flag/1, 303  
define\_flag/2, 303  
define\_log\_file/2, 546  
defined/4, 688  
defined\_flag/6, 302  
defined\_flag\_/6, 304  
defines\_predicate/2, 43  
defines\_predicate/3, 44  
del\_monitors/0, 271  
del\_monitors/4, 271  
del\_spy\_points/4, 276  
delete/0, 694  
delete/1, 694  
delete/2, 693  
delete/3, 764, 854, 912  
delete/4, 247, 343  
delete\_all\_after/2, 999  
delete\_all\_after\_and\_unzip/2, 999  
delete\_all\_before/2, 998  
delete\_all\_before\_and\_unzip/2, 999  
delete\_and\_next/2, 998  
delete\_and\_previous/2, 997  
delete\_and\_unzip/2, 998  
delete\_directory/1, 629  
delete\_directory\_and\_contents/1, 630  
delete\_directory\_contents/1, 630  
delete\_file/1, 636  
delete\_in/4, 597  
delete\_matches/3, 854  
delete\_max/4, 252  
delete\_min/4, 252  
demodb, 952  
dependent\_/1, 150  
dependents/1, 149, 669  
dependents/2, 668  
dependents/3, 668  
depth/2, 898  
descendant/1, 369  
descendant\_class/1, 366  
descendant\_classes/1, 366  
descendant\_instance/1, 365  
descendant\_instances/1, 365  
descendants/1, 369  
describe/1, 654, 687  
describe/2, 654  
description/1, 643, 700  
deterministic/1, 474  
deterministic/2, 474  
dfs\_interpreter, 954  
diagram(Format), 151  
diagram\_caption/3, 163  
diagram\_description/1, 162  
diagram\_name\_suffix/1, 162  
diagrams, 173  
diagrams(Format), 174  
dictionary, 243  
dif, 257  
dif/1, 85, 258  
dif/2, 85, 258  
difflist, 841  
digit//1, 332  
digits//1, 333  
directories/1, 460, 973  
directories/2, 157, 179, 459, 973  
directories/3, 156, 179  
directory/1, 29, 113, 159, 181, 461, 677, 973  
directory/2, 28, 113, 159, 181, 460, 676, 972  
directory/3, 158, 181  
directory\_dependency\_diagram, 184  
directory\_dependency\_diagram(Format), 185  
directory\_diagram(Format), 187  
directory\_entity\_/4, 449  
directory\_exists/1, 633  
directory\_files/2, 632  
directory\_files/3, 633  
directory\_load\_diagram, 191  
directory\_load\_diagram(Format), 192  
directory\_score/2, 33  
disable/1, 120  
disable/2, 121  
disable\_logging/1, 548  
disconnect/1, 756  
disjoint/2, 764  
disjoint\_sets/2, 932  
dit\_metric, 48  
doc\_goal/1, 260  
doc\_metric, 49  
doclet, 259  
doctype/1, 397  
document\_generation//2, 988  
dot//1, 335  
dot\_graph\_language, 194  
dowhile/2, 551  
drop/3, 873  
dump\_trace, 144  
during/2, 409  
dynamic\_directive\_/3, 979

## E

easter\_day/3, 421  
 edcg, 261  
 edge/5, 166  
 edge/6, 214  
 edge\_/5, 173  
 edge\_case/2, 5  
 either, 279  
 either/3, 291  
 empty/1, 248, 344, 594, 602, 716, 765, 855, 912  
 empty\_map/1, 986  
 enable/1, 120  
 enable/2, 121  
 enable\_logging/1, 547  
 enabled/1, 121  
 enabled/2, 122  
 enabled\_/1, 122  
 enabled\_/2, 123  
 ensure\_directory/1, 634  
 ensure\_file/1, 637  
 entity/1, 27, 112, 237, 354  
 entity/2, 237  
 entity\_calls/3, 44  
 entity\_defines\_/2, 712  
 entity\_diagram, 196  
 entity\_diagram(Format), 197  
 entity\_info\_pair\_score\_hook/3, 51  
 entity\_info\_score\_hook/2, 51  
 entity\_kind/2, 44  
 entity\_predicates\_weights\_hook/2, 50  
 entity\_prefix/2, 77  
 entity\_property/2, 45  
 entity\_score/2, 32  
 entity\_updates/3, 45  
 enumerate/2, 733  
 environment\_variable/2, 637  
 epsilon/1, 482  
 equal/2, 410, 764  
 erase/1, 753  
 essentially\_equal/3, 481, 877  
 euclidean\_distance/3, 886  
 euclidean\_norm/2, 884  
 event\_registry, 267  
 event\_registryp, 268  
 exception/4, 988  
 exclude/3, 559  
 execution\_context/7, 79  
 expand\_library\_alias\_paths, 277  
 expand\_library\_path/2, 75  
 expanding, 63  
 expected, 281  
 expected(Expected), 286  
 expected/1, 289  
 expecteds/2, 280

explain//1, 821  
 extension/1, 373  
 extensions/1, 373  
 external\_predicate\_/1, 239

## F

f/4, 942  
 failed\_/3, 514  
 false/1, 435  
 fast\_random, 722  
 fault/5, 987  
 fcube, 294  
 fcube/0, 296  
 file/1, 28, 112, 198, 462, 975  
 file/2, 28, 112, 198, 462, 975  
 file\_being\_advised\_/4, 981  
 file\_dependency\_diagram, 201  
 file\_dependency\_diagram(Format), 202  
 file\_diagram(Format), 204  
 file\_exists/1, 634  
 file\_footer/3, 212  
 file\_header/3, 212  
 file\_line\_hit\_count\_/3, 131  
 file\_load\_diagram, 207  
 file\_load\_diagram(Format), 209  
 file\_modification\_time/2, 634  
 file\_path/2, 485  
 file\_permission/2, 635  
 file\_score/2, 33  
 file\_size/2, 635  
 file\_to\_bytes/2, 742  
 file\_to\_bytes/3, 742  
 file\_to\_chars/2, 741  
 file\_to\_chars/3, 741  
 file\_to\_codes/2, 740  
 file\_to\_codes/3, 740  
 file\_to\_terms/2, 741  
 file\_to\_terms/3, 742  
 file\_type\_extension/2, 76  
 files/1, 160, 183, 461, 974  
 files/2, 160, 182, 461, 974  
 files/3, 160, 182  
 filter/2, 608  
 filter\_external\_file\_extension/3, 170  
 filter\_file\_extension/3, 170  
 find/4, 931  
 find/5, 931  
 findall\_member/4, 559  
 findall\_member/5, 560  
 finished\_by/2, 410  
 finishes/2, 410  
 fired\_/3, 515  
 fix\_option/2, 619  
 fix\_options/2, 619

- flag\_group\_chk/1, 301
- flag\_groups/1, 301
- flag\_value\_/2, 304
- flags, 298
- flags\_validator, 305
- flaky\_/1, 515
- flat\_map/2, 290, 609
- flatten/2, 855, 912
- flatten\_goals//1, 956
- flattening, 955
- float, 843
- float//1, 334
- fold\_left/4, 561
- fold\_left\_1/3, 561
- fold\_right/4, 562
- fold\_right\_1/3, 563
- fordownto/3, 554
- fordownto/4, 554
- fordownto/5, 555
- foreach/3, 552
- foreach/4, 552
- format, 307
- format/2, 308
- format/3, 308
- format\_entity\_score//2, 34
- format\_object/1, 161
- format\_to\_atom/3, 797
- format\_to\_chars/3, 798
- format\_to\_chars/4, 798
- format\_to\_codes/3, 799
- format\_to\_codes/4, 799
- forto/3, 553
- forto/4, 553
- forto/5, 553
- forward/1, 66
- forward/2, 995
- forward/3, 995
- forwarding, 65
- fractile/3, 786
- freeze/2, 86
- from\_generator/2, 285, 604
- from\_generator/3, 285, 603
- from\_generator/4, 284
- from\_goal/2, 284, 603
- from\_goal/3, 283, 603
- from\_goal/4, 283
- frozen/2, 86
- full\_device\_path/1, 632
- func\_test/3, 575
- functional/0, 575

**G**

- generate/1, 402, 924
- generate/2, 18, 20, 23, 396, 447, 924

- generate/8, 924
- generated\_predicate\_/1, 569
- generating\_/0, 520
- genint, 309
- genint/2, 312
- genint\_core, 310
- gensym, 313
- gensym/2, 316
- gensym\_core, 314
- geometric\_mean/2, 781
- get/1, 609
- get\_field/2, 429
- get\_flag\_value/2, 299
- get\_seed/1, 6, 726
- git, 317
- git\_protocol, 318
- gnu/0, 295
- goal\_expansion/2, 64
- grammar\_rules\_hook, 379
- graph\_footer/5, 213
- graph\_header/5, 213
- graph\_language\_protocol, 211
- graph\_language\_registry, 215
- ground/1, 898
- ground\_entity\_identifier/3, 170
- group\_by\_key/2, 894
- group\_consecutive\_by\_key/2, 894
- group\_sorted\_by\_key/2, 893
- guess\_arity/2, 101
- guess\_separator/2, 100

## H

- halstead\_metric, 53
- halstead\_metric(Stroud), 54
- hamming\_distance/3, 856
- handbook/0, 356
- handbook/1, 356
- harmonic\_mean/2, 781
- head/2, 716
- head\_pred/1, 574
- heap(Order), 340
- heapp, 341
- help, 349
- help/0, 350, 674
- help\_info\_support, 355
- heuristic\_expansion(Mode), 956
- hex\_digit//1, 333
- hex\_digits//1, 333
- hierarchyp, 367
- home/1, 644, 700
- hook\_pipeline(Pipeline), 374
- hook\_set(Set), 375
- html, 395
- html5, 398

## I

ibk/3, 574  
 iddfs\_interpreter(Increment), 958  
 identity\_hook, 380  
 ids, 400  
 ids(Representation Bytes), 401  
 if\_empty/1, 607  
 if\_expected/1, 288  
 if\_expected\_or\_else/2, 289  
 if\_present/1, 607  
 if\_present\_or\_else/2, 607  
 if\_unexpected/1, 288  
 include/3, 559  
 included\_directory\_/1, 190  
 included\_entity\_/1, 199  
 included\_file\_/1, 206  
 included\_library\_/2, 225  
 included\_module\_/1, 199  
 included\_predicate\_/1, 238  
 increase/1, 946  
 increment/0, 946  
 increment\_counter/1, 532  
 inheritance\_diagram, 216  
 inheritance\_diagram(Format), 217  
 init/0, 968  
 init\_log\_file/2, 546  
 inorder/2, 242  
 insert/3, 765  
 insert/4, 247, 342  
 insert\_after/3, 997  
 insert\_all/3, 343, 765  
 insert\_before/3, 996  
 insert\_in/4, 597  
 install/1, 658  
 install/2, 657  
 install/3, 656  
 install/4, 655  
 installed/0, 651  
 installed/1, 650  
 installed/3, 650  
 installed/4, 649  
 instance/1, 362  
 instance/2, 753  
 instances/1, 362  
 integer, 844  
 integer//1, 334  
 internal\_os\_path/2, 628  
 interpreterp, 959  
 intersect/2, 766  
 intersection/2, 250  
 intersection/3, 250, 766  
 intersection/4, 766  
 interval, 403  
 intervalp, 404  
 invocation\_number\_/1, 128  
 invoke/1, 430  
 invoke/2, 431  
 ip\_grammars(Format), 328  
 ipv4//1, 329  
 ipv6//1, 330  
 is\_absolute\_file\_name/1, 626  
 is\_alpha/1, 829  
 is\_alphanumeric/1, 829  
 is\_ascii/1, 829  
 is\_bin\_digit/1, 830  
 is\_control/1, 834  
 is\_dec\_digit/1, 831  
 is\_empty/0, 606  
 is\_end\_of\_line/1, 835  
 is\_expected/0, 287  
 is\_false/1, 436  
 is\_hex\_digit/1, 831  
 is\_layout/1, 833  
 is\_letter/1, 830  
 is\_lower\_case/1, 831  
 is\_newline/1, 834  
 is\_null/1, 437  
 is\_object/1, 437  
 is\_octal\_digit/1, 830  
 is\_period/1, 834  
 is\_present/0, 606  
 is\_punctuation/1, 833  
 is\_quote/1, 833  
 is\_true/1, 436  
 is\_unexpected/0, 287  
 is\_upper\_case/1, 832  
 is\_validator/1, 305  
 is\_void/1, 436  
 is\_vowel/1, 832  
 is\_white\_space/1, 832  
 iso8601, 411  
 issue\_creator, 423  
 iterator\_element/2, 440

## J

java, 424  
 java(Reference), 425  
 java(Reference ReturnValue), 426  
 java\_access\_protocol, 428  
 java\_hook, 431  
 java\_utils\_protocol, 433  
 join/3, 716  
 join\_all/3, 717  
 json, 442  
 json(ObjectRepresentation PairRepresentation StringRepresentation)  
     444  
 json(StringRepresentation), 443  
 json\_protocol, 446

jump/3, 717  
jump\_all/3, 717  
jump\_all\_block/3, 718  
jump\_to\_invocation\_number\_/1, 129

## K

key/2, 892  
keys/2, 253, 891  
keys\_values/3, 891  
keysort/2, 856  
kurtosis/2, 785

## L

language\_object/2, 216  
last/2, 856, 913  
leaf/1, 368  
leaf\_class/1, 364  
leaf\_classes/1, 365  
leaf\_instance/1, 364  
leaf\_instances/1, 364  
leap\_year/1, 104, 420  
leaping\_/1, 126  
learn/0, 578  
learn/1, 578  
learn/2, 572  
learn/3, 572  
learn\_seq/2, 572  
learn\_with\_timeout/4, 573  
leash/1, 137  
leashing/1, 137  
leashing\_/1, 128  
least\_common\_multiple/2, 889  
leaves/1, 369  
length/2, 718, 857, 913  
lgtdoc, 448  
lgtdoc\_messages, 451  
lgtdocp, 452  
lgtunit, 467  
lgtunit\_messages, 516  
libraries/1, 154, 176, 456  
libraries/2, 154, 176, 456  
libraries/3, 153, 176  
library/0, 353  
library/1, 30, 115, 156, 178, 354, 457  
library/2, 30, 114, 156, 178, 457  
library\_dependency\_diagram, 219  
library\_dependency\_diagram(Format), 220  
library\_diagram(Format), 222  
library\_entity\_/4, 449  
library\_load\_diagram, 226  
library\_load\_diagram(Format), 228  
library\_score/2, 32  
license/1, 643  
line\_to\_chars/2, 746

line\_to\_chars/3, 746  
line\_to\_codes/2, 746  
line\_to\_codes/3, 747  
lint/0, 671, 697  
lint/1, 670, 696  
lint/2, 670  
list, 848  
list(Type), 850  
list/0, 687  
list\_to\_array/2, 439  
listing, 538  
listing/0, 539  
listing/1, 539  
listp, 851  
load\_registry/1, 681  
loaded\_file/1, 75  
loaded\_file\_property/2, 75, 231  
locate\_directory/2, 169  
locate\_file/5, 169  
locate\_library/2, 169  
log/3, 142  
log\_event/2, 547  
log\_file/2, 546  
log\_file\_/2, 542, 544  
log\_point\_/3, 130  
logger, 541  
logging, 543  
logging/1, 547  
logging/3, 142  
logging\_to\_file\_/2, 542, 544  
loggingp, 545  
logtalk, 67  
logtalk\_packs/0, 679  
logtalk\_packs/1, 678  
lookup/2, 249  
lookup/3, 249  
lookup\_in/3, 595  
loop, 549  
loopp, 550  
lower\_upper/2, 836

## M

magic, 961  
magic/2, 962  
magic\_expansion(Mode), 963  
magicise/4, 962  
make/1, 485  
make\_directory/1, 628  
make\_directory\_path/1, 629  
make\_set/3, 930  
man/1, 358  
manhattan\_distance/3, 886  
manhattan\_norm/2, 885  
manuals/0, 354

map/2, 253, 290, 564, 608, 719  
 map/3, 254, 564, 720, 894  
 map/4, 565  
 map/5, 565  
 map/6, 566  
 map/7, 566  
 map/8, 566  
 map\_element/2, 440  
 map\_member/3, 986  
 map\_reduce/5, 567  
 map\_store/4, 987  
 max/2, 780, 857, 882  
 max/3, 251  
 max\_clauses/1, 575  
 max\_inv\_preds/1, 575  
 max\_size/1, 7  
 maxheap, 346  
 maybe, 599  
 maybe/0, 736  
 maybe/1, 736  
 maybe/2, 737  
 maybe\_call/1, 737  
 maybe\_call/2, 737  
 mean\_deviation/2, 783  
 median/2, 782, 884  
 median\_deviation/2, 784  
 meets/2, 407  
 member/2, 731, 767, 857  
 memberchk/2, 768, 858, 913  
 merge/3, 343  
 merge\_options/2, 618, 977  
 message\_cache\_/1, 524, 526, 527, 529  
 message\_diagram\_description/1, 172  
 message\_hook/4, 71  
 message\_prefix\_stream/4, 70  
 message\_tokens//2, 70  
 met\_by/2, 407  
 meta, 556  
 meta\_compiler, 568  
 meta\_type/3, 907  
 metagol, 570  
 metagol\_example\_protocol, 577  
 metap, 557  
 metarule/6, 574  
 metarule\_next\_id/1, 576  
 min/2, 779, 858, 882  
 min/3, 251  
 min\_clauses/1, 575  
 min\_max/3, 780, 882  
 minheap, 347  
 minimal\_output, 517  
 missing\_predicate\_directive\_/3, 979  
 modes/2, 782, 884  
 module\_predicate\_called\_/3, 978

module\_property/2, 231  
 modules\_diagram\_support, 230  
 monitor, 272  
 monitor/1, 270  
 monitor/4, 270  
 monitor\_activated/0, 275  
 monitored/1, 270  
 monitoring, 81  
 monitorp, 273  
 monitors/1, 269  
 msort/2, 858  
 msort/3, 859  
 multifile\_directive\_/3, 980  
 mutation/3, 587, 588  
 mutation/4, 589  
 mutations, 586  
 mutations\_store, 587

## N

name/1, 643, 700  
 name\_of\_day/3, 105  
 name\_of\_month/3, 105  
 natural, 874  
 natural//1, 334  
 navltree, 590  
 nbintree, 591  
 nested\_dictionary\_protocol, 593  
 new/1, 430, 536, 594, 898  
 new/2, 430, 536, 930  
 new/3, 406  
 new\_line//0, 325  
 new\_lines//0, 326  
 next/2, 993  
 next/3, 993  
 next/4, 251  
 nextto/3, 859, 914  
 noc\_metric, 56  
 node/6, 166  
 node/7, 213  
 node\_/6, 172  
 nodebug/0, 135  
 nolog/3, 142  
 nologall/0, 143  
 non\_blank//1, 327  
 non\_blanks//1, 327  
 non\_standard\_predicate\_call\_/2, 979  
 nor\_metric, 58  
 normal\_element/2, 397  
 normalize\_range/2, 887  
 normalize\_range/4, 887  
 normalize\_scalar/2, 888  
 normalize\_unit/2, 888  
 nospy/1, 139  
 nospy/3, 140

- nospyspy/4, 141
- nospyspyall/0, 141
- not\_excluded\_file/3, 45
- not\_excluded\_file/4, 168
- note/1, 485
- note/2, 701
- note/3, 645
- notrace/0, 137
- now/3, 109
- nrbtree, 598
- nth0/3, 860, 914
- nth0/4, 860, 914
- nth1/3, 860, 915
- nth1/4, 861, 915
- null/1, 435
- null\_device\_path/1, 631
- number, 875
- number//1, 335
- number\_grammars(Format), 330
- number\_of\_tests/1, 473
- numberlist, 879
- numberlistp, 880
- numbervars/1, 902
- numbervars/3, 902

## O

- object\_file\_/2, 466
- object\_predicate\_called\_/3, 978
- object\_wrapper\_hook, 382
- object\_wrapper\_hook(Name Relations), 384
- object\_wrapper\_hook(Protocol), 383
- observer, 146
- occurrences/2, 862
- occurrences/3, 862
- occurs/2, 899
- of/2, 602
- of\_expected/2, 283
- of\_unexpected/2, 282
- omit\_path\_prefix/3, 171
- one\_or\_more//0, 339
- one\_or\_more//1, 338
- one\_or\_more//2, 337
- operating\_system\_machine/1, 640
- operating\_system\_name/1, 639
- operating\_system\_release/1, 640
- operating\_system\_type/1, 639
- option/2, 617
- option/3, 618
- optional, 601
- optional(Optional), 605
- options, 612
- options\_protocol, 614
- or/2, 609
- or\_else/2, 291, 610

- or\_else\_call/2, 292, 611
- or\_else\_fail/1, 293, 611
- or\_else\_get/2, 292, 610
- or\_else\_throw/1, 293
- or\_else\_throw/2, 612
- orphaned/0, 653
- orphaned/2, 652
- os, 620
- os\_types, 622
- osp, 623
- outdated/0, 652
- outdated/1, 651
- outdated/4, 651
- output\_edges/1, 167
- output externals/1, 164
- output\_file/4, 165
- output\_file\_name/2, 212
- output\_file\_path/4, 168
- output\_files/2, 164
- output\_library/3, 163
- output\_missing externals/1, 167
- output\_node/6, 166
- output\_rdirectory/3, 164
- output\_rlibrary/3, 163
- output\_sub\_diagrams/1, 165
- overlapped\_by/2, 408
- overlaps/2, 408

## P

- pack\_protocol, 641
- packs, 646
- packs\_common, 671
- packs\_messages, 683
- packs\_specs\_hook, 684
- pairs, 890
- parent/1, 372
- parenthesis/2, 835
- parents/1, 372
- parse/2, 18, 20, 23, 447, 984
- parse/3, 984
- parse\_domain/2, 703
- parse\_domain/3, 703
- parse\_problem/2, 704
- parse\_problem/3, 704
- partial\_/1, 520, 522
- partial\_map/4, 256
- partition/3, 280
- partition/4, 560, 761
- partition/5, 863
- partition/6, 560
- pass\_info/1, 264
- pass\_info/2, 264
- passed\_/3, 514
- path\_concat/3, 628

pcd\_data\_7bit//1, 989  
 pddl, 702  
 permutation/2, 733, 863, 916  
 pid/1, 625  
 pin/0, 675  
 pin/1, 674  
 pinned/1, 676  
 plus/3, 846  
 population, 772  
 port/5, 710  
 port\_/5, 712  
 portray\_clause/1, 540  
 ports\_profiler, 706  
 postorder/2, 242  
 powerset/2, 768  
 pp/1, 985  
 pp\_string/1, 987  
 pprint/1, 573  
 pprint\_clause/1, 576  
 pprint\_clauses/1, 576  
 pred\_info/3, 263  
 predicate/2, 117  
 predicate\_called\_but\_not\_defined\_/2, 977  
 predicate\_entity\_/4, 450  
 predicate\_info\_pair\_score\_hook/4, 53  
 predicate\_info\_score\_hook/3, 52  
 predicate\_mode\_score\_hook/3, 51  
 predicate\_mode\_score\_hook/5, 52  
 predicates/2, 116  
 prefix/0, 680  
 prefix/1, 679  
 prefix/2, 863, 916  
 prefix/3, 864  
 preorder/2, 242  
 previous/2, 994  
 previous/3, 994  
 previous/4, 250  
 print\_flags/0, 301, 306  
 print\_flags/1, 302  
 print\_goal\_hook, 386  
 print\_message/3, 69  
 print\_message\_token/4, 70  
 print\_message\_tokens/3, 69  
 print\_readme\_file\_path/1, 680  
 process\_all/1, 37  
 process\_directory/2, 36  
 process\_entity/2, 35  
 process\_file/2, 35  
 process\_library/2, 36  
 process\_rdirectory/2, 36  
 process\_rlibrary/2, 37  
 product/2, 779, 883  
 product/3, 768  
 program\_to\_clauses/2, 573

prolog\_module\_hook(Module), 387  
 proper\_prefix/2, 864  
 proper\_prefix/3, 865  
 proper\_suffix/2, 872  
 proper\_suffix/3, 872  
 proto\_hierarchy, 370  
 proto\_hierarchyp, 371  
 prove/2, 960  
 prove/3, 960  
 provides/2, 696  
 pseudo\_random\_protocol, 725

## Q

quasi\_skipping\_/0, 126  
 question\_hook/6, 72  
 question\_prompt\_stream/4, 72  
 queue, 713  
 queuep, 714  
 quick\_check/1, 477  
 quick\_check/2, 476  
 quick\_check/3, 476

## R

random, 727  
 random/1, 731  
 random/3, 735  
 random\_node/1, 938  
 random\_protocol, 729  
 random\_tree/1, 941  
 randomize/1, 724, 728  
 randseq/4, 735  
 randset/4, 735  
 range/2, 780  
 rbtree, 255  
 rdirectories/1, 458  
 rdirectories/2, 458  
 rdirectory/1, 29, 114, 158, 180, 459, 972  
 rdirectory/2, 29, 114, 158, 180, 458, 972  
 rdirectory/3, 157, 180  
 rdirectory\_score/2, 34  
 read\_file, 705  
 read\_file/2, 94, 706, 813  
 read\_file/3, 93, 812  
 read\_file\_by\_line/2, 97, 816  
 read\_file\_by\_line/3, 96, 815  
 read\_from\_atom/2, 791  
 read\_from\_chars/2, 793  
 read\_from\_codes/2, 794  
 read\_only\_device\_path/1, 632  
 read\_stream/2, 95, 814  
 read\_stream/3, 93, 812  
 read\_stream\_by\_line/2, 98, 817  
 read\_stream\_by\_line/3, 97, 816  
 read\_term\_from\_atom/3, 791

- read\_term\_from\_chars/3, 792
- read\_term\_from\_chars/4, 792
- read\_term\_from\_codes/3, 793
- read\_term\_from\_codes/4, 793
- reader, 738
- readme/1, 678
- readme/2, 677
- readme\_file\_path/2, 680
- record\_/3, 754
- recorda/2, 750
- recorda/3, 750
- recorded/2, 752
- recorded/3, 752
- recorded\_database, 748
- recorded\_database\_core, 749
- recordz/2, 751
- recordz/3, 751
- redis, 755
- reference\_/1, 754
- referenced\_entity\_/2, 200
- referenced\_logtalk\_directory\_/1, 190
- referenced\_logtalk\_file\_/1, 206
- referenced\_logtalk\_library\_/2, 225
- referenced\_module\_/2, 200
- referenced\_predicate\_/1, 238
- referenced\_prolog\_directory\_/1, 190
- referenced\_prolog\_file\_/1, 207
- referenced\_prolog\_library\_/2, 226
- registries, 685
- registry\_loader\_hook, 697
- registry\_protocol, 698
- relative\_standard\_deviation/2, 785
- remember\_included\_directory/1, 189
- remember\_included\_file/1, 205
- remember\_included\_library/2, 224
- remember\_referenced\_logtalk\_directory/1, 189
- remember\_referenced\_logtalk\_file/1, 205
- remember\_referenced\_logtalk\_library/2, 224
- remember\_referenced\_prolog\_directory/1, 189
- remember\_referenced\_prolog\_file/1, 206
- remember\_referenced\_prolog\_library/2, 225
- remove\_directive\_/2, 981
- remove\_duplicates/2, 865, 916
- removeDependent/1, 149
- rename\_file/2, 636
- replace/3, 997
- replace\_sub\_atom/4, 823
- rescale/3, 889
- reset/0, 135, 165, 673, 709, 947
- reset/1, 710
- reset\_counter/1, 533
- reset\_counters/0, 533
- reset\_flags/0, 300
- reset\_flags/1, 300

- reset\_genint/0, 312
- reset\_genint/1, 312
- reset\_gensym/0, 315
- reset\_gensym/1, 315
- reset\_monitor/0, 275
- reset\_seed/0, 723, 728
- restore/1, 667
- restore/2, 666
- reverse/2, 865, 917
- rewind/2, 994
- rewind/3, 995
- rlibraries/1, 454
- rlibraries/2, 454
- rlibrary/1, 31, 115, 155, 178, 455
- rlibrary/2, 30, 115, 155, 177, 455
- rlibrary\_score/2, 32
- rule/2, 950
- rule/3, 950
- rule/4, 950
- rule\_expansion(Mode), 964
- run/0, 471
- run/1, 472
- run/2, 472
- run\_quick\_check\_tests/5, 483
- run\_test\_set/0, 483
- run\_test\_sets/1, 473
- run\_tests/0, 483
- run\_tests/1, 483
- running\_test\_sets\_/0, 512

## S

- same\_length/2, 866, 917
- same\_length/3, 866
- sample, 773
- save/0, 976
- save/1, 666, 975
- save/2, 665
- save\_edge/5, 167
- scalar\_product/3, 887
- scan\_left/4, 562
- scan\_left\_1/3, 562
- scan\_right/4, 563
- scan\_right\_1/3, 564
- search/1, 655
- seed\_/3, 724, 729
- select/3, 732, 769, 866, 917
- select/4, 732, 867
- selectchk/3, 769, 867
- selectchk/4, 867
- selected\_test\_/1, 513
- send/3, 757
- sequence/3, 847
- sequence/4, 734, 847
- sequence\_grammars, 336

sequential\_occurrences/2, 861  
 sequential\_occurrences/3, 861  
 serve/3, 719  
 set, 758  
 set(Type), 759  
 set/1, 947  
 set/4, 734  
 set\_binary\_input/1, 491  
 set\_binary\_input/2, 491  
 set\_binary\_input/3, 490  
 set\_binary\_output/1, 502  
 set\_binary\_output/2, 501  
 set\_binary\_output/3, 501  
 set\_element/2, 440  
 set\_field/2, 429  
 set\_flag\_value/2, 299  
 set\_flag\_value/3, 300  
 set\_monitor/4, 271  
 set\_seed/1, 6, 726  
 set\_spy\_point/4, 276  
 set\_text\_input/1, 488  
 set\_text\_input/2, 487  
 set\_text\_input/3, 487  
 set\_text\_output/1, 495  
 set\_text\_output/2, 495  
 set\_text\_output/3, 494  
 setp, 761  
 setup/0, 484, 673  
 shell, 965  
 shell(Interpreters), 967  
 shell/1, 626  
 shell/2, 626  
 shell\_command/1, 260  
 shell\_expansion(Mode), 968  
 shrink/3, 5  
 shrink\_sequence/3, 5  
 shrinker/1, 4  
 sign//1, 335  
 singletons/2, 901  
 size/2, 254, 344, 767  
 size\_metric, 59  
 skewness/2, 785  
 skipped\_/1, 514  
 skipping\_/0, 125  
 skipping\_unleashed\_/1, 126  
 sleep/1, 641  
 sort/2, 761, 868  
 sort/3, 868  
 sort/4, 869  
 source\_file\_extension/1, 231  
 space//0, 324  
 spaces//0, 324  
 split/3, 823  
 split/4, 869  
 spy/1, 138  
 spy/3, 139  
 spy/4, 140  
 spy\_point/4, 276  
 spy\_point\_/4, 273  
 spying/1, 138  
 spying/3, 139  
 spying/4, 140  
 spying\_context\_/4, 128  
 spying\_predicate\_/3, 127  
 squares\_and\_cubes/6, 776  
 squares\_and\_hypers/6, 776  
 standard\_deviation/2, 784  
 start/0, 708, 966  
 start\_redirect\_to\_file/2, 145  
 started\_by/2, 409  
 starts/2, 408  
 statistics, 774  
 statisticsp, 777  
 stop/0, 708  
 stop\_redirect\_to\_file/0, 145  
 stream\_position/1, 511  
 stream\_to\_bytes/2, 745  
 stream\_to\_bytes/3, 745  
 stream\_to\_chars/2, 743  
 stream\_to\_chars/3, 744  
 stream\_to\_codes/2, 743  
 stream\_to\_codes/3, 743  
 stream\_to\_terms/2, 744  
 stream\_to\_terms/3, 745  
 streamvars, 534  
 sub\_diagram\_/1, 203, 210, 222, 229  
 sub\_diagram\_/2, 187, 194  
 sub\_directory/2, 37  
 sub\_library/2, 38  
 subclass/1, 362  
 subclasses/1, 363  
 subject, 147  
 sublist/2, 869, 918  
 subsequence/3, 870  
 subsequence/4, 870  
 subset/2, 769  
 substitute/4, 871  
 subsumes/2, 899  
 subterm/2, 899, 985  
 subtract/3, 770, 871, 918  
 succ/2, 846  
 suffix/2, 871, 918  
 suffix/3, 872  
 sum/2, 779, 883  
 superclass/1, 363  
 superclasses/1, 363  
 supported\_archive/1, 682  
 supported\_url\_archive/1, 682

suppress\_binary\_output/0, 486  
suppress\_goal\_hook, 388  
suppress\_text\_output/0, 486  
suspend\_monitor/0, 275  
swap/2, 732  
swap\_consecutive/2, 733  
syndiff/3, 770

## T

tab//0, 325  
tabs//0, 325  
take/3, 873  
tap\_output, 518  
tap\_report, 521  
tar\_command/1, 681  
temporary\_directory/1, 631  
temporary\_file\_/1, 789  
term, 895  
term\_expansion/2, 64  
term\_io, 788  
term\_io\_protocol, 789  
termp, 896  
terms\_to\_array/2, 437  
test/1, 473  
test/2, 512  
test/3, 512  
test\_/2, 513  
test\_count\_/1, 520, 522  
text\_file\_assertion/3, 508  
text\_file\_assertion/4, 507  
text\_input\_assertion/2, 490  
text\_input\_assertion/3, 489  
text\_output\_assertion/2, 498  
text\_output\_assertion/3, 498  
text\_output\_assertion/4, 497  
text\_output\_contents/1, 500  
text\_output\_contents/2, 499  
text\_output\_contents/3, 499  
time, 107  
time\_stamp/1, 637  
timeout, 800  
timeout/1, 576  
timep, 108  
timestamp/2, 925  
timestamp/8, 925  
timestamp\_/6, 466  
today/3, 104  
tolerance\_equal/4, 481, 877  
top/3, 345  
top\_next/5, 345  
toychrdb, 802  
trace/0, 136  
trace\_event/2, 72  
tracing\_/0, 125

transpose/2, 893  
triggered\_breakpoint\_/4, 130  
triggered\_breakpoint\_enabled\_/2, 131  
true/1, 434  
tsv, 808  
tsv(Header), 809  
tsv\_protocol, 810  
tutor, 820  
type, 903  
type/1, 906  
type/3, 577  
type\_entity\_/4, 450

## U

ulid, 920  
ulid(Representation), 921  
ulid\_protocol, 922  
ulid\_types, 926  
unexpected/1, 289  
unexpecteds/2, 280  
uninstall/0, 663  
uninstall/1, 662  
uninstall/2, 661  
union/3, 770  
union/4, 771, 930  
union\_all/3, 931  
union\_find, 927  
union\_find\_protocol, 928  
unknown\_predicate\_called\_/2, 978  
unpin/0, 675  
unpin/1, 675  
unsafe\_set\_flag\_value/2, 303  
unzip/2, 992  
update/0, 260, 661, 693  
update/1, 147, 661, 692  
update/2, 659, 691  
update/3, 248, 658  
update/4, 247  
update/5, 248  
update\_in/4, 596  
update\_in/5, 596  
upn\_metric, 61  
user, 83  
uses\_diagram, 232  
uses\_diagram(Format), 233  
uuid, 933  
uuid(Representation), 934  
uuid\_null/1, 937  
uuid\_protocol, 935  
uuid\_v1/2, 937  
uuid\_v4/1, 937

## V

valid/1, 406, 787, 900, 919

valid/2, 907  
 valid/3, 106, 109  
 valid\_date/3, 419  
 valid\_option/1, 616  
 valid\_options/1, 616  
 validate/1, 306  
 validate/3, 305  
 validate\_type/1, 305  
 value/1, 947  
 value/3, 892  
 value\_reference/2, 434  
 values/2, 253, 892  
 variables/2, 901  
 variance/2, 786  
 variance/6, 777  
 variant/2, 479, 900  
 varlist, 909  
 varlistp, 910  
 varnumbers/2, 903  
 varnumbers/3, 902  
 verify\_commands\_availability/0, 674  
 version/6, 644  
 versions/3, 653  
 void/1, 435  
 void\_element/1, 396

## W

wall\_time/1, 638  
 weighted\_mean/3, 782  
 welcome/0, 966  
 when/2, 87  
 whiledo/2, 551  
 white\_space//0, 324  
 white\_spaces//0, 324  
 with\_output\_to/2, 799  
 without//2, 339  
 working\_directory/1, 631  
 wrapper, 969  
 write\_file/3, 99, 818  
 write\_max\_depth\_/1, 129  
 write\_stream/3, 99, 818  
 write\_term\_to\_atom/3, 794  
 write\_term\_to\_chars/3, 795  
 write\_term\_to\_chars/4, 795  
 write\_term\_to\_codes/3, 796  
 write\_term\_to\_codes/4, 797  
 write\_to\_atom/2, 795  
 write\_to\_chars/2, 796  
 write\_to\_codes/2, 797  
 write\_to\_file\_hook(File), 390  
 write\_to\_file\_hook(File Options), 391  
 write\_to\_stream\_hook(Stream), 392  
 write\_to\_stream\_hook(Stream Options), 394

## X

xhtml11, 399  
 xml, 982  
 xml\_to\_document/3, 986  
 xref\_diagram, 235  
 xref\_diagram(Format), 236  
 xunit\_net\_v2\_output, 523  
 xunit\_net\_v2\_report, 525  
 xunit\_output, 526  
 xunit\_report, 528

## Z

z\_normalization/2, 786  
 zap\_to\_port\_/1, 129  
 zero\_or\_more//0, 339  
 zero\_or\_more//1, 338  
 zero\_or\_more//2, 337  
 zip/2, 992  
 zip/3, 992  
 zip\_at\_index/4, 1001  
 zipperp, 990  
 zlist, 1000