1. Introduction

This page summarizes the results for the 2025 edition of the Model Checking Contest (MCC'2025). This page is divided in three sections:

- ntal conditions of the MCC'2025,
- First, we list the qualified tools for the MCC'2025,
 Then, we provide some informations about the experime
 Then, we present an access to details about results,
- Then, we provide the list of winners of the MCC'2025,
 Finally, we provide an attempt to evaluate tool reliability based on the comparison of the results provided in the contest.

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2. List of Qualified Tools in 2025

5 tools where submitted this year. They all successfully went through a qualification process requiring about 1625 runs (each tool had to answer each examination for the first instance of each «known» model).

Data about these tools are summarized in the table below. For any tool, you can download the disk image that was provided with all its data. You may use these to reproduce measures locally and perform comparison with your own tool on the same benchmark. Please note that one tool (with two variants) was out of competition this year: this was agreed between the tool developer and the organizers and is part of an experiment with precomputed deep-learning.

IMPORTANT: all tool developers agreed to provide the original image disk embedding the tool they submitted his year (see links in the table below). You may operate these tools on your own. To do so, you need the second disk image (mounted by the other one) that contains all models for 2025 together with the produced formulas. This image is mounted with the default configuration, as well as in he default disk image provided in the tool submission kit (see

IMPORTANT: You also have access to the archive containing all models and the corresponding formulas for 2025 here.

IMPORTANT: Note that 2024-gold is an hybrid artificial tool made with the tools that won categories in 2024. It correspond usually to several virtual machines, so the corresponding archive is a bit larger. For the MCC'2025, 2024-gold is composed as follows:

- TINA.tedd for the StateSpace Category
- . ITS-Tools for the UpperBounds category
- GreatSPN+red for the GlobalProperties categories
 Tapaal for Reachability Formulas, CTL Formulas and LTL Formulas categories

The table below presents all participating tools for 2025

	Sumr	nary of the Pa	articipating	Tools	
Tool name	Supported Petri nets	Representative Author	Origin	Type of execution	Link to the submitted disk image
2024-gold	P/T and colored	Fabrice Kordon	Aalborg/Paris/ Toulouse	Collateral Processing	
enPAC	P/T and colored	Cong He & Shuo Li	Tongji University, Shanghai (China)	Sequential Processing	
ITS-Tools	P/T and colored	Yann Thierry-Mieg	Sorbonne Université (France)	Collateral Processing	
smpt	P/T and colored	Nicolas Amat	LAAS-CNRS (France) & IMDEA (Spain)	Collateral Processing	
Tapaal	P/T and colored	Jiri Srba	Aalborg University (Denmark)	Collateral Processing	
TINA.tedd	P/T and colored	Bernard Berthomieu	LAAS-CNRS (France)	Collateral Processing	

The table below lists the techniques reported per examination (and for all the tool variants when applicable).

		1	echniques Reported by	the Participating Tools ((per examination)		
Tool name	StateSpace	GlobalProperties	UpperBounds	Reachability	CTL	LTL	All together
2024- gold	COLLATERAL PROCESSING DECISION DIAGRAMS DECISION DIAGRAMS LATTICE POINTS COUNTING LINEAR ECOLATIONS STRUCTURAL REDUCTION TOPOLOGICAL UNFOLDING, TO, PT USE_NUPN	PARIKH_WALK	BESTFIRST MALK COVER, WALK CPN, APPROX DECISION, DIAGRAMS INITIAL, STATE PARIKH, WALK RANDOM, WALK REACHABILITY, MAX REACHABILITY, MAX TEACHABILITY, MIN SAT. SMT TOPOLOGICAL USE, NUPN	QUERY_REDUCTION SAT_SMT STATE_COMPRESSION STRUCTURAL_REDUCTION STUBBORN_SETS	COLLATERAL_PROCESSING CPN_APPROX CTL_CZERO EXPLICIT LP_APPROX QUERY_REDUCTION STNUCTURAL_REDUCTION STRUCTURAL_REDUCTION STRUCTURAL_REDUCTION TRACE_ABSTRACTION_REFINEMENT UNFOLDING_TO_PT		AUT_STUB AUTOMATON_HELD BESTFIRST WALK COLLATERAL_PROCESSING CONSTANT_TEST COVER WALL CON_APPROX CTI_CZERO DEADLOCK_TEST DECISION_DIAGRAMS DIST_HEL EXHAUSTIVE WALK EXPLICIT HEURISTIC INITIAL_STATE LATTICE_POINTS_COUNTING LINEAR_EQUATIONS LOGFIRECOUNT_HEURISONO) LP_APPROX MARKED_SUFFIX_TE NDFS OPTIM-1 PARALLEL_PROCESSING PARICH_WALK PROBABILISTIC_WALK PROBABILISTIC_WALK COUS_LIVE_REVERSIBLE OUASILIVE_REVERSIBLE OUASILIVE_REVERSIBLE OUASILIVE_REVERSIBLE STRUCTURE_TEST_STAT_BEFINEME STATE_COMPRESSION_STRUCTURE_TEST_STAT_BEFINEME STATE_COMPRESSION_STRUCTURE_TEST_STAT_BEFINEME STATE_COMPRESSION_STRUCTURE_TEST_STAT_BEFINEME STATE_COMPRESSION_STRUCTURE_TEST_STAT_BEFINEME STATE_COMPRESSION_STRUCTURE_TEST_TEST_STAT_BEFINEME STATE_COMPRESSION_STRUCTURE_TEST_TEST_AND_AND_TEST_STAT_BEFINEME STATE_COMPRESSION_STRUCTURE_TEST_TEST_AND_TOPLOGICAL TRACE_ABSTRACTION_LEFT_INEME TRIVIAL_UNIA_TEST_SCC_TEST_UNIP- UNIFOLDING TO TEST_UNIP- UNIFOLD TO TEST_UNIP- UNIFOLD TO TEST_UNIP- UNIFOLD TO TEST_UNIP-
enPAC	_	_	_	_	-	STATE_COMPRESSION USE_NUPN	COLLATERAL_PROCESSING STATE_COMPRESSION USE_NUP
TS-Tools	; DECISION_DIAGRAMS TOPOLOGICAL USE_NUPN	BESTEIRST WALK COLLATERAL, PROCESSING CONSTANT, TEST CPN, APPROX DEADLOCK, TEST DECISION, DIAGRAMS EXHALISTIVE WALK EXPLICIT INITIAL, STATE INVARIANTS LTSMN MARKED, SUFFIX, TEST PARINKI, WALK PARTIAL, ORDER PROCEABLISTIVE WISH OLUSILIVENESS, TEST RANDOM, WALK SAT, SMM SCC, TEST SIPHON, TEST SKELETON, TEST SMT PERFINEMENT STRUCTURAL, STRUCTURAL, SEDUCTION	BESTFIRST, WALK COVER, WALK CPM, APPROX DECISION, DIAGRAMS INTIAL, STATE PARIKH, WALK RANDOM, WALK REACHABILITY, MAX REACHABILITY, MAX TEACHABILITY, MIN SAT: SMT TOPOLOGICAL USE, NUPN	BESTEIRST_WALK COLLATERAL_PROCESSING CPN_APPROX DECISION DIAGRAMS EXHALISTIVE WALK EXPLICIT INITIAL_STATE_LISMIN OVER_APPROXIMATION PARIKH_WALK PARTIAL_ORDER PROBABILISTIC_WALK RANDOM_WALK SAT_SMT SITE_PROMEMENT STRUCTURE.	BESTFIRST WALK COLLATERIAL, PROCESSING DECISION, DIAGRAMS EXHAUSTIVE WALK INITIAL, STATE OVER_APPROXIMATION PARING! WALK PROCESSING! WALK RANDOM WALK SMT AER-IRMENT TOPOLOGICAL USE_NUPN	SAT_SMT SHORTENING_INSENSITIVE	BESTFIRST WALK COLLATERAL PROCESSING CONSTANT TEST COVER WALK PEN APPROX DEADLOCK TEST DECISION_DIAGRAMS EXHAUSTIVE. WALK EXPLICIT HC INITIAL_STATE INVARIANTS MARKED SUFFIX. TEST PROMEDIAGRAM AND SUFFIX. TEST PROMEDIAGRAM GRANDOM WALK REACHABILITY. KNOWLEDGE

		TOPOLOGICAL TRIVIAL_UNIMARKED_SCC_TEST USE_NUPN					REACHABILITY MAX REACHABILITY MIN SAT SMT SCC_TEST SHORTENING INSENSITIVE SIPHON_TEST SKELETON_TEST SMT_REFINEMENT STACK_TEST STRUCTURAL_REDUCTION STUTTER_TEST TOPOLOGICAL TRIVIAL_UNMARKED_SCC_TEST USE_NUPN
smpt	-	-	-	BMC BULK COLLATERAL, PROCESSING COLORED, WALK COMPOUND DUPLICATE IMPLICIT INITIAL, MARKING NET, LURFOLDING PARIKH POR, PEACH, SATURATED PROJECTION SAT, SMT SKELETON STRUCTURAL, REDUCTION STRUCTURAL, REDUCTION TAUTOLOGY TOPOLOGICAL UNFOLDING, TO, PT USE, NUPN WALK	-	_	BMC BULK COLLATERAL PROCESSING COLORED, WALK COMPOUND DUPLICATE IMPLICIT INITIAL, MARKING NET LUNFOLDING PARIKH POPR, REACH, SATURATED PROJECTION SAT, SMT SKELETON SLICING STATE ECULATION STRUCTURAL, REDUCTION TAUTOLOGY TOPOLOGICAL UNFOLDING, TO, PT USE, NUPN WALK
Tapaal	_	COLLATERAL PROCESSING CPM_APPROX CTL_CZERO EXPLICIT LP_APPROX OLERY_REDUCTION SAT_SMT STATE_COMPRESSION STRUCTURAL_REDUCTION STUBBORN_SETS TRACE_ABSTRACTION_REFINEMENT_ UNFOLDING_TO_PT	COLLATERAL_PROCESSING CPN_APPROX EXPLICIT QUERY_REDUCTION SAT_SMT STATE_COMPRESSION STRUCTUBEOIN.SETS TRACE_ABSTRACTION_REFINEMEN	COLLATERAL_PROCESSING COLOR_IGNORANT CPN_APPROX CON_EXPLICIT EXPLICIT IF_APPROX QUERY_REDUCTION SAT_SMT STATE_COMPRESSION STITUBOON_SETS TUBBOON_SETS T TRACE_ABSTRACTION_REFINEMENT UNFOLDING_TO_PT	COLLATERAL PROCESSING CPN APPROX CTL CZERO EXPLICIT P. APPROX OLETY PEDUCTION SAT SMT STATE COMPRESSION STRUCTURAL REDUCTION STUBBORN SETS TRACE ABSTRACTION REFINEMENT UNFOLDING_TO_PT	AUT_STUB AUTOMATION HEUR COLLATERAL_PROCESSING DIST_HEUR EXPLICIT HEURISTIC LOGFIRECOUNT_HEUR(5000) LP_APPROX NOTES OUMERY_ENDUCTION STATE_COMPRESSION STRUCTURAL_REDUCTION STUBBORN SETS TARJAN UNFOLDING_TO_PT WEAK_SKIP	AUT. STUB AUTOMATON. HEUR COLLATERAL PROCESSING COLOR (ENORANT CPN. APPROX CPN. EXPLICIT CTL. CZERO DIST. HEUR EXPLICIT HEURISTIC LOGRIRECOUNT. HEURISGOO) LP. APPROX NOFS OPTIM-1 OUR PR. PEDUCTION STUBLED FROM THE STUBLED STORM STRUCTURAL, REDUCTION STUBLED STUB
TINA.tedo	COLLATERAL_PROCESSING DECISION_DIAGRAMS EXPLICIT LATTICE_POINTS_COUNTING LINEAR_EQUATIONS STRUCTURAL_ANALYSIS STRUCTURAL_ANALYSIS STRUCTURAL_FEDUCTION TOPOLOGICAL UNFOLDING_TO_PT USE_NUPN	-	-	-	-	-	COLLATERAL_PROCESSING DECISION_DIAGRAMS EXPLICIT LATTICE_POINTS_COUNTING LINEAR_EQUATIONS STRUCTURAL_ANALYSIS STRUCTURAL_REDUCTION TOPOLOGICAL UNFOLDING_TO_PT USE_NUPN

3. Experimental Conditions of the MCC'2025

Each tool was submitted to 24 115 executions in various conditions (1 855 model/instances and 13 examinations per model/instance) for which it could report: DNC (do not compete), CC (cannot compute) or the result of the query. These executions were handled by **BenchKit**, that was developed in the context of the MCC for massive testing of software. Then, from the raw data provided by **BenchKit**, some post-analysis scripts consolidated these and computed a ranking.

16 GB of memory were allocated to each virtual machine (both parallel and sequential tools) and a confinement of one hour was considered (execution aborted after one hour). So, a total of 281 112 runs (execution of one examination by the virtual machine) generated 84 GB of raw data (essentially log files and CSV of sampled data).

The table below shows some data about the involved machines and their contribution to the computation of these results. This year, we affected only physical cores to the virtual machines (discarding logical cores obtained from hyper-threading) so the balance between the various machine we used is quite different from he one of past years.

IMPORTANT: due to a configuration problem on one of the submitted tool, information concerning time and memory could not be retrieved, thus making comparisons useless. This is why in 2025, some comparison data are missing.

Involved Machines an	d Executio	n of the Be	nchmarks
	tall	Small	Total
Physical Cores	15×32 @ 2.1GHz	23×12 @ 2.4GHz	_
Memory (GB)	15×384	23×64	_
Used Cores (sequential tools)	15×31, 12×31 VM in //	23×3, 9×3 VM in //	_
Used Cores (parallel tools)	15×28 (4 per VM), 11×7 VM in //	23×8 (4 per VM), 9×2 VM in //	_
Number of runs	94 380	50 310	144 690

We are pleased to thanks those who helped in the execution of tools:

• Tall (we used 14 nodes) and small (we used 23 nodes) are clusters at LIP6 Sorbonne Université & CNRS

4. The Results of the MCC'2025

This table below presents detailed results about the MCC'2025.

Details about the Examinations in the MCC: **Details about Results and Scoring** Details about Resu and Scoring StateSpace ReachabilityDeadlock (GlobalProperties) QuasiLiveness (GlobalProperties) StableMarking (GlobalProperties) Liveness (GlobalProperties) OneSafe (GlobalProperties) UpperBounds ReachabilityCardinality ReachabilityFireability CTLCardinality CTLFireability LTLCardinality

You can download the full archive (5.3 GB compressed and 24 GB uncompressed) of the 144 690 runs processed to compute the results of the MCC'2025. This archive contains execution traces, execution logs and sampling, as well as a large CSV files that summarizes all the executions. You may get separately the two mostly interesting CSV files:

- GlobalSummary.csv that summarizes all results from all runs in the contest (34 MB when expanded),
- raw-result-analysis.csv that contains the same data as the previous one but enriched with scoring information and the expected results (computed as a majority of tools pondered by their confidence rate, 39 MB when expanded).

Note that from the two CSV file, you can identify the unique run identifier that allows you to find the traces and any information in the archive (they are also available on the web site when the too did participated).

5. The Winners for the MCC'2025

This section presents the results for the main examinations that are:

- State Space generation
- UpperBounds computation,
- GlobalProperties computation (ReachabilityDeadlock , QuasiLiveness, StableMarking, Liveness, OneSafe),
- Reachability Formulas (ReachabilityCardinality, ReachabilityFireability),
- CTL Formulas (CTLCardinality, CTLFireability),
- LTL Formulas (LTLCardinality, LTLFireability),

To avoid a too large disparity between models with numerous instances and those with only one, a normalization was applied so that the score, for an examination and a model, varies between 102 and 221 points. Therefore, providing a correct value may brings a different number of points according to the considered model. A multiplier was applied depending to the model category:

- x13 for «Surprise» models (computed from rule E-4.4 that states «the total score for all "surprise" models instances weight approximatively half the score for all the instances of "known" models»).

Let us remind two «special» tools:

- 2024-gold is an hybrid tool made of the gold-medal for the 2023 edition for each examination. It is a way to evaluate the progress of participants since the last edition of the MCC.
 BVT-2025 (Best Virtual Tool) computes the union of all the values computed by all other tools. It is very often the fastest and the tool having the
- smallest memory footprint, based on what the participating tool performed. It is a way to evaluate the complementarity between tools by comparing it to the gold medal

WRNING: due to a mistake in one submitted VM, no memory and CPU information this year (crashes our analysis tools + not relevant).

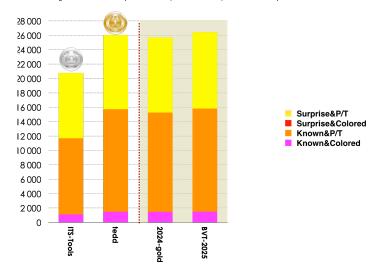
WRNING: due to a lack of time from the execution board, the computation rate (number of total values computed by each tool) could not be computed.

5.1. Winners in the StateSpace Category

5 tools out of 11 participated in this examination (plus 4 reference). Results based on the scoring shown below is:

- tedd ranked first (26 048 pts),
- GreatSPN+red ranked second (20 777 pts),

The the 2024-gold collected 25 697 pts. BVT-2025 (Best Virtual Tool) collected 26 430 pts.



Estimated Tool Cor		teSpace (based on the «sigi see section 6. for details	nificant values» computed by tools)
Tool name	Reliability	Correct Values	«significant values»
		Tools competing in 2025	
ITS-Tools	100.000%	3 253	3 253
tedd	100.000%	3 253	3 253
		2024-gold and BVT-2025	
2024-gold	100.000%	3 253	3 253
BVT-2025	100.000%	3 253	3 253

Remarks about the StateSpace examination

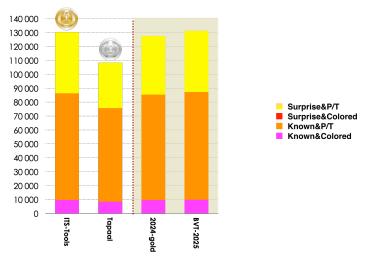
Some detailed results state that marking ins infinite (use of the value "+Inf******"»). There are some infinite models in our benchmark but our analysis tools have a constrains in the representation of very large state spaces which is the one of the Long_Long_Float Ada type (maximum value of 1.0E+4932). When watching the execution report of some tools, you can check weather "+Inf******** really means infinite or not.

5.2. Winners in the GlobalProperties Category

6 tools out of 11 participated in these examinations (ReachabilityDeadlock , QuasiLiveness, StableMarking, Liveness, OneSafe). Results based on the scoring shown below is:

- ITS-Tools ranked first (130 285 pts).
- Tapaal ranked second (108 355 pts).

2024-gold collected 127 565 pts. BVT-2025 (Best Virtual Tool) collected 131 276 pts.



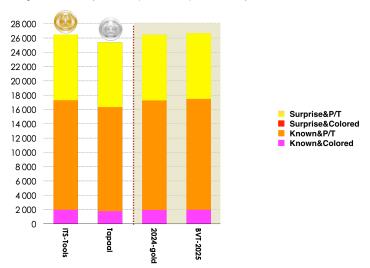
1		Tools competing in 2024	
ITS-Tools	100,000%	7 564	7 564
Tapaal	99,986%	7 564	7 564
		2024-gold and BVT-2025	
2024-gold	100,000%	7 564	7 564
BVT-2025	100,000%	7 564	7 564

5.3. Winners in the UpperBounds Category

6 tools out of 11 participated in this examination. Results based on the scoring shown below is:

- ITS-Tools ranked first (26 479 pts),
- Tapaal ranked second (25 395 pts),

2024-gold collected 26 458 pts. BVT-2025 (Best Virtual Tool) collected 26 660 pts.



Estimated Tool Cor		erBound (based on the «sig see section 6. for details	nificant values» computed by tools)
Tool name	Reliability	Correct Values	«significant values»
		Tools competing in 2024	
ITS-Tools	100.000%	26 567	26 567
Tapaal	100.000%	26 567	26 567
		2024-gold and BVT-2025	
2024-gold	100.000%	26 567	26 567
BVT-2025	100.000%	26 567	26 567

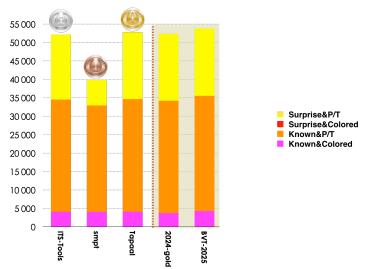
5.4. Winners in the Reachability Formulas Category

8 tools out of 11 participated in these examinations (ReachabilityCardinality and ReachabilityFireability). Results based on the scoring shown below is:

- Tapaal ranked first (52 819 pts),
 ITS-Tools ranked second (52 174 pts),
 smtp ranked third (39 841 pts).

2024-gold collected 52 345 pts. BVT-2025 (Best Virtual Tool) collected 53 796 pts.

Note that SVSKit only computes Fireability formulas.



stimated Tool Confidence rat	e for Reachability (based on see section 6. for de		» computed by tools)
	Tools competing in 20)24	
ITS-Tools	99,998%	54 760	54 761
smpt	100,000%	50 860	50 860
Tapaal	100,000%	55 241	55 241
	2024-gold and BVT-20	025	
2024-gold	99,989%	54 898	54 898
BVT-2025	100,000%	55 257	55 257

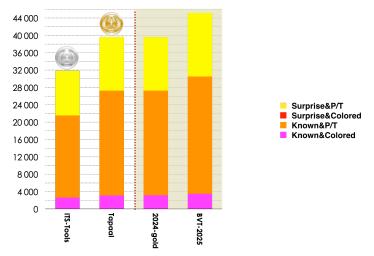
5.5. Winners in the CTL Formulas Category

7 tools out of 11 participated in these examinations (CTLCardinality and CTLFireability). Results based on the scoring shown below is:

• ITS-Tools ranked second (31 851 pts),

2024-gold collected 39 619 pts. BVT-2025 (Best Virtual Tool) collected 45 143 pts.

Note that SVSKit only computes Fireability formulas.



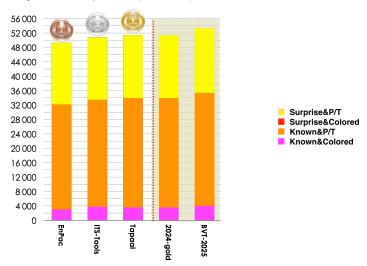
Estimated Tool Co		CTL (based on the «signifi see section 6. for details	cant values» computed by tools)
Tool name	Reliability	Correct Values	«significant values»
		Tools competing in 2024	
ITS-Tools	100,000%	29 026	29 026
Tapaal	100,000%	29 026	29 026
		2024-gold and BVT-2025	
2024-gold	100,000%	29 026	29 026
BVT-2025	100,000%	29 026	29 026

5.6. Winners in the LTL Formulas Category

7 tools out of 11 participated in these examinations (LTLCardinality and LTLFireability). Results based on the scoring shown below is:

- Tapaal ranked first (51 422 pts).
- ITS-Tools ranked second (50 818 pts),
 EnPac ranked third (49 333 pts).

2024-gold collected 51 386 pts. BVT-2025 (Best Virtual Tool) collected 53 282.





6. Estimation of the Global Tool Confidence

A confidence analysis enforces the computation of «right results» based on the answers of participating tools. To do so, we considered each value provided in the contest (a value is a partial result such as the result of a formula or a number provided for state space, bound computation, etc.). To do so, we processed as follows:

- For each «line» (all tools for a given examination for a given instance), we selected all «significant values» where at least 3 tools do agree.
 Based on this subset of values, we computed the ratio between the selected values for the tool and the number of good answers hey provide for such values. This ratio gave us a tool confidence rate that is provided in the table below.
 This tool confidence rate rate was then applied to compute the scores presented in the dedicated section.

The table below provides, in first column, the computed confidence rates (that are naturally lower for tools where a bug was detected). Then, the table provides the number of correct results (column 2) out of the number of «significant values» selected for the tool (column 3). The last column shows the number of examinations (and their type) the tool was involved in.

Estimated Tool Confidence rate (based on the «significant values» computed by tools)					
Tool name	Reliability	Correct Values	«significant values»	Involved Examinations	
				Tools competing in 2025	
EnPac	99.948%	51 733	51 760	2LTLCardinality, LTLFireability	

ITS-Tools	99.998%	173 562	173 565	13 StateSpace, UpperBounds, CTLCardinality, CTLFireability, LTLCardinality, LTLFireability, ReachabilityCardinality, ReachabilityFireability, PeachabilityDeadlock, QuasiLiveness, StableMarking, Liveness, OneSafe
smpt	100.000%	50 860	50 860	2 ReachabilityCardinality, ReachabilityFireability
Tapaal	100.000%	172 596	172 596	12 UpperBounds, CTLCardinality, CTLFireability, LTLCardinality, LTLFireability, ReachabilityCardinality, ReachabilityFireability, ReachabilityDeadlock, QuasiLiveness, StableMarking, Liveness, OneSafe
tedd	100.000%	3 253	3 253	1 StateSpace
				2024-gold and BVT-2025
2024-gold	100.000%	175 503	175 503	13 StateSpace, UpperBounds, CTLCardinality, CTLFireability, LTLCardinality, LTLFireability, ReachabilityCardinality, ReachabilityFireability, ReachabilityDeadlock, QuasiLiveness, StableMarking, Liveness, OneSafe
BVT-2025	100.000%	175 830	175 830	13 StateSpace, UpperBounds, CTLCardinality, CTLFireability, LTLCardinality, LTLFireability, ReachabilityCardinality, ReachabilityFireability, ReachabilityDeadlock, QuasiLiveness, StableMarking, Liveness, OneSafe