Results of the Configurable SAT Solver Challenge 2014

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In this document, we describe the results of the Configurable SAT Solver Challenge (CSSC) 2014.

1 Setup

1.1 Participants

- *clasp-3.0.4-p8* [Gebser et al.(2012)Gebser, Kaufmann and Schaub]
- *cryptominisat* [Soos(2014)]
- *CSCCSat2014* [Luo et al.(2013)Luo, Cai, Wu and Su, Luo et al.(2014a)Luo, Cai, Wu and Su]
- *DCCASat+march-rw* [Luo et al.(2014b)Luo, Cai, Wu and Su]
- *lingeling* [Biere(2014)]
- *minisat-HACK-999ED-CSSC*
- *probSAT* [Balint and Schöning(2012)]
- *Riss-4.27* [Manthey(2014)]
- *SparrowToRiss* [Balint and Manthey(2014)]
- *YalSAT* [Biere(2014)]

1.2 Benchmarks

- *Industrial SAT+UNSAT*:
  - *Bounded Model Checking* : derived by unrolling the HWMCC 2008 circuits into CNF
  - *Circuit Fuzz*: http://fmv.jku.at/cnfuzzdd/
  - *Hardware Verification (IBM)*: BM Formal Verification Benchmark Library (offline)
- *crafted SAT+UNSAT*
  - *Graph Isomorphism* : see 2013 SAT Challenge Proceedings
  - *Low Autocorrelation Binary Sequence*see 2013 SAT Challenge Proceedings
  - *Queens*: submitted by Norbert Manthey and Peter Steinke
- *Random SAT+UNSAT*
  - *3cnf*: generated by Sam Bayless
  - *K3*: N/A
  - *unif-k5*: see 2012 SAT Challenge Proceedings, http://sourceforge.net/projects/ksatgenerator/
- *Random SAT*
  - *3sat1k*: Captain Jack Paper
  - *5sat500*: Captain Jack Paper
  - *7sat90*: Captain Jack Paper

2 Results

For each of the tracks, we list the performance of all of the solvers before and after configuration, for the training instances and unseen test instances. We also list the configurator run that found the best performance. In the tables, configured (/default) performance is shown in boldface if it is significantly better than default (/configured) performance (according to a permutation test with 100 000 permutations and significance level $\alpha = 0.05$).

2.1 *Industrial SAT+UNSAT*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
lingeling	81	81	76.85	76.41	69	69	80.41	**77.16**	paramils-1
minisat-HACK-999ED-CSSC	82	**81**	68.87	**68.01**	70	70	72.91	**72.16**	smac-3
clasp-3.0.4-p8	85	**84**	74.11	**71.11**	71	71	75.59	75.24	smac-0
Riss-4.27	82	82	**72.28**	72.49	72	72	77.32	**76.83**	smac-disc-0
cryptominisat	81	**80**	74.55	75.26	70	**69**	77.48	78.58	smac-1
SparrowToRiss	83	**82**	152.12	**75.93**	72	72	154.35	**80.03**	smac-1

Table 1: Track: *Industrial SAT+UNSAT*; Benchmark: *Hardware Verification (IBM)*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
lingeling	23	**11**	40.43	**26.38**	30	**18**	47.79	**31.96**	paramils-1
minisat-HACK-999ED-CSSC	13	**10**	29.01	**24.97**	21	19	38.45	**34.29**	smac-2
clasp-3.0.4-p8	11	**7**	24.87	**21.32**	18	**12**	32.60	**27.63**	smac-disc-1
Riss-4.27	16	**12**	33.88	**29.16**	20	22	39.31	37.21	smac-disc-1
cryptominisat	25	**14**	39.13	**30.18**	31	**20**	51.26	**36.09**	smac-1
SparrowToRiss	26	**13**	167.24	**32.40**	29	**21**	173.79	**39.67**	smac-disc-2

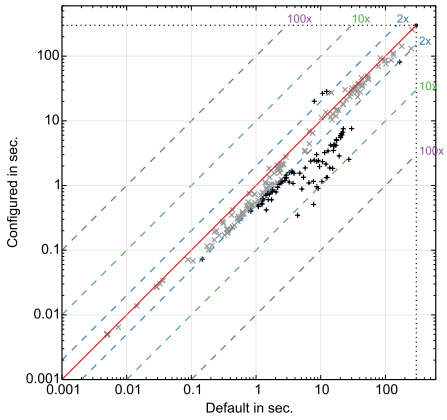
Table 2: Track: *Industrial SAT+UNSAT*; Benchmark: *Circuit Fuzz*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
lingeling	115	**109**	75.40	**73.62**	20	20	43.65	**42.56**	paramils-1
minisat-HACK-999ED-CSSC	108	**100**	62.12	**60.73**	22	22	36.47	**34.87**	gga-disc-1
clasp-3.0.4-p8	151	**134**	79.57	**75.16**	44	**30**	57.75	**47.29**	smac-3
Riss-4.27	172	**91**	107.65	**70.43**	39	**26**	72.79	**52.62**	smac-disc-2
cryptominisat	147	143	**96.32**	103.54	40	37	70.88	74.47	smac-1
SparrowToRiss	217	**145**	204.66	**87.96**	62	**36**	190.12	**60.85**	smac-2

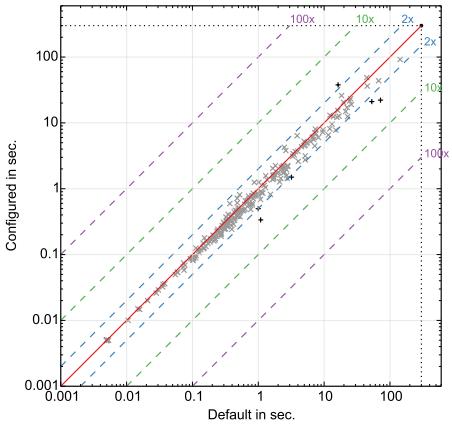
Table 3: Track: *Industrial SAT+UNSAT*; Benchmark: *Bounded Model Checking*

Solver	Training performance				Test performance			
	#Timeouts		PAR1		#Timeouts		PAR1	
	default	config.	default	config.	default	config.	default	config.
lingeling	219	201	64.23	58.80	119	107	57.29	50.56
minisat-HACK-999ED-CSSC	203	191	53.33	51.24	113	111	49.28	47.11
clasp-3.0.4-p8	247	225	59.51	55.86	133	113	55.31	50.05
Riss-4.27	270	185	71.27	57.36	131	120	63.14	55.56
cryptominisat	253	237	70.00	69.66	141	126	66.54	63.05
SparrowToRiss	326	240	174.68	65.43	163	129	172.75	60.18

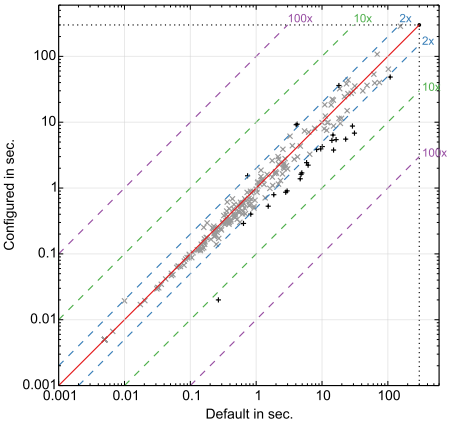
Table 4: Overall results for track: *Industrial SAT+UNSAT*; ranked by number of timeouts of configured solvers on test sets (tie-breaker: PAR1)



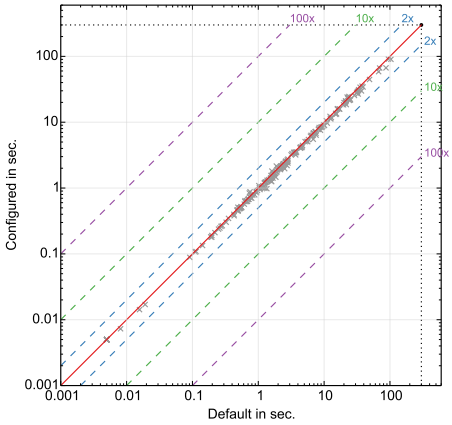
(a) *lingeling*; TOs: 69 → 69



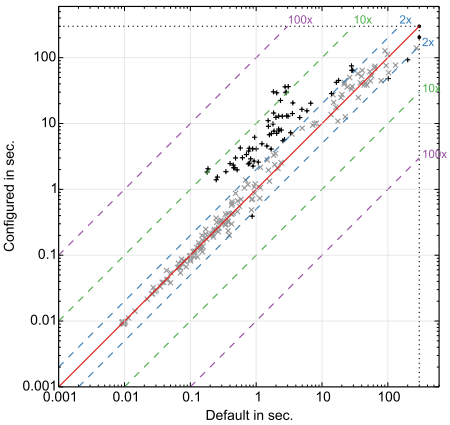
(b) *minisat-HACK-999ED-CSSC*; TOs: 70 → 70



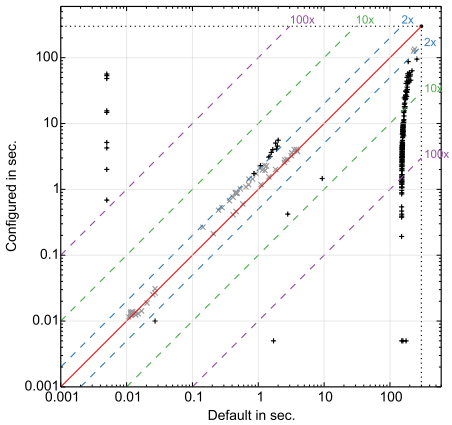
(c) *clasp-3.0.4-p8*; TOs: 71 → 71



(d) *Riss-4.27*; TOs: 72 → 72

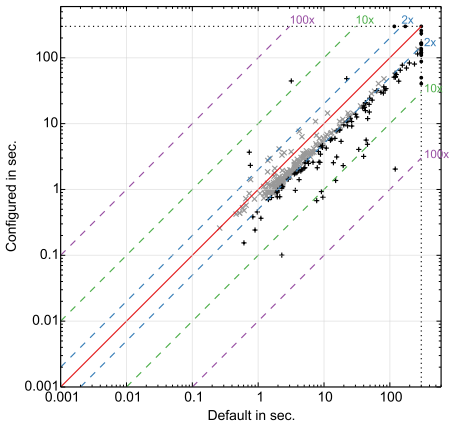


(e) *cryptominisat*; TOs: 70 → 69

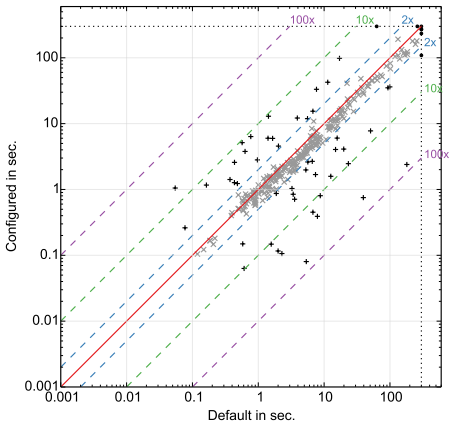


(f) *SparrowToRiss*; TOs: 72 → 72

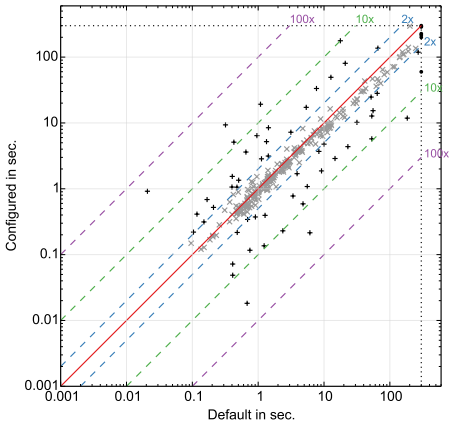
Figure 1: Track: *Industrial SAT+UNSAT*, Benchmarks: *Hardware Verification (IBM)*



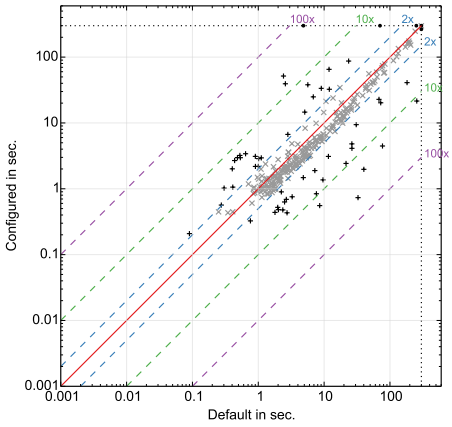
(a) *lingeling*; TOs: 30 → 18



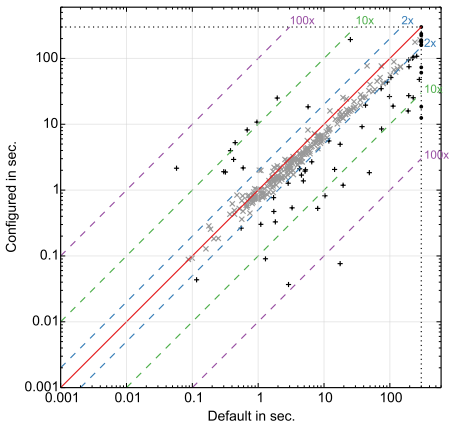
(b) *minisat-HACK-999ED-CSSC*; TOs: 21 → 19



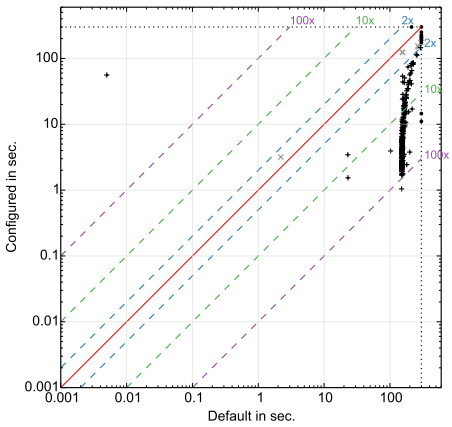
(c) *clasp-3.0.4-p8*; TOs: 18 → 12



(d) *Riss-4.27*; TOs: 20 → 22

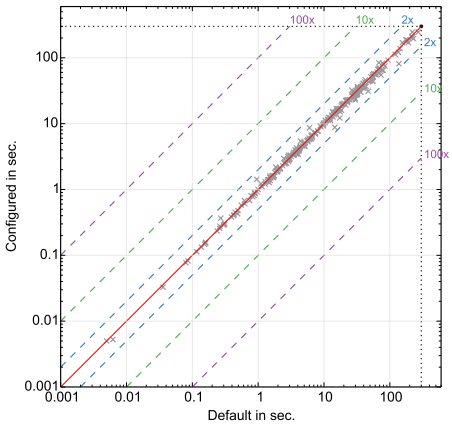


(e) *cryptominisat*; TOs: 31 → 20

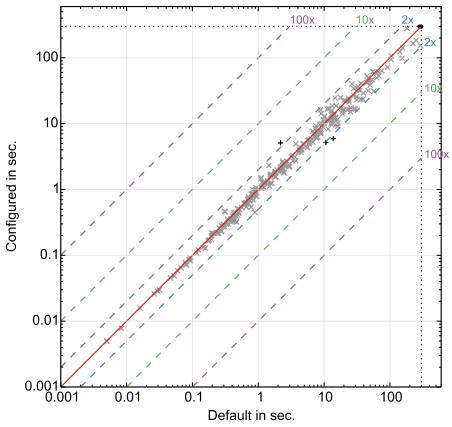


(f) *SparrowToRiss*; TOs: 29 → 21

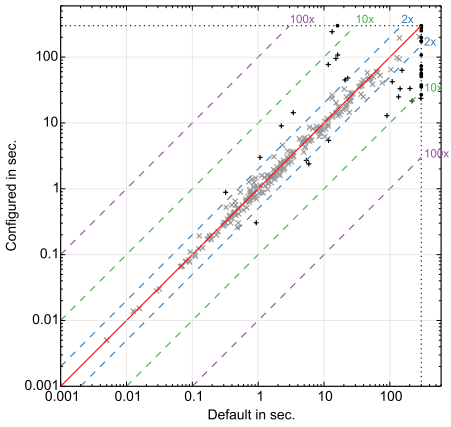
Figure 2: Track: *Industrial SAT+UNSAT*, Benchmarks: *Circuit Fuzz*



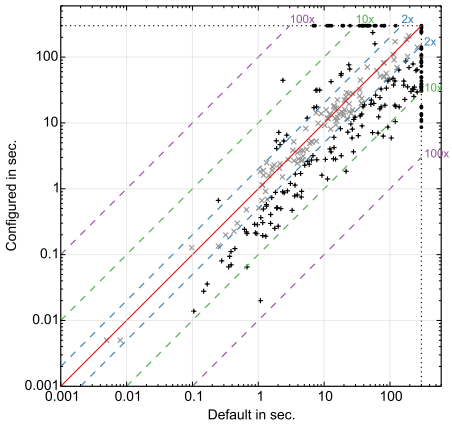
(a) *lingeling*; TOs: 20 → 20



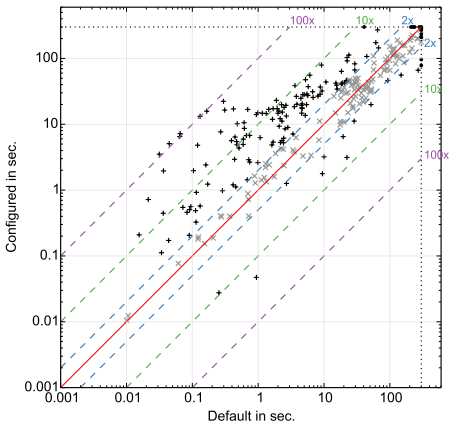
(b) *minisat-HACK-999ED-CSSC*; TOs: 22 → 22



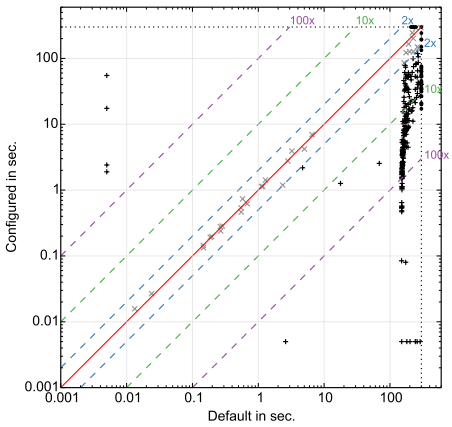
(c) *clasp-3.0.4-p8*; TOs: 44 → 30



(d) *Riss-4.27*; TOs: 39 → 26



(e) *cryptominisat*; TOs: 40 → 37



(f) *SparrowToRiss*; TOs: 62 → 36

Figure 3: Track: *Industrial SAT+UNSAT*, Benchmarks: *Bounded Model Checking*

2.2 *crafted SAT+UNSAT*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
clasp-3.0.4-p8	86	87	80.79	82.49	**87**	93	**85.30**	88.51	paramils-2
lingeling	93	94	90.40	90.88	101	104	96.94	99.05	smac-disc-0
cryptominisat	89	**86**	84.63	85.40	95	**89**	90.04	89.81	smac-disc-1
Riss-4.27	90	**85**	84.02	81.95	91	88	89.03	**85.72**	paramils-1
SparrowToRiss	92	**86**	130.00	**83.70**	98	**94**	132.19	**90.93**	smac-2
minisat-HACK-999ED-CSSC	88	**83**	82.15	81.35	91	91	85.44	84.90	paramils-0
YalSAT	223	**210**	199.87	**188.63**	218	**207**	191.44	**183.74**	smac-0

Table 5: Track: *crafted SAT+UNSAT*; Benchmarks: *Low Autocorrelation Binary Sequence*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
clasp-3.0.4-p8	132	**34**	42.01	**23.08**	43	**9**	39.73	**20.31**	smac-2
lingeling	43	**24**	28.09	**21.89**	11	**5**	27.49	**19.81**	smac-0
cryptominisat	115	**77**	40.16	**36.37**	43	**24**	38.83	**34.79**	smac-disc-0
Riss-4.27	133	**98**	45.02	**40.51**	43	**30**	41.56	**36.55**	smac-1
SparrowToRiss	163	**123**	125.86	**52.31**	55	**42**	115.02	**48.01**	smac-disc-1
minisat-HACK-999ED-CSSC	143	**142**	44.76	**43.70**	50	50	45.07	**44.47**	smac-disc-0
YalSAT	590	590	173.26	**172.08**	186	186	159.96	**159.44**	smac-disc-2

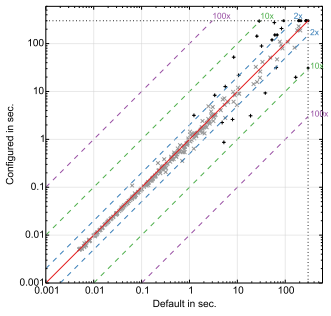
Table 6: Track: *crafted SAT+UNSAT*; Benchmarks: *Graph Isomorphism*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
clasp-3.0.4-p8	90	**0**	71.13	**5.19**	81	**0**	81.84	**4.68**	smac-3
lingeling	3	**0**	26.14	**17.57**	3	**0**	26.92	**17.38**	paramils-2
cryptominisat	4	**0**	19.50	**8.83**	2	**1**	22.55	**9.62**	smac-disc-1
Riss-4.27	3	**0**	16.54	**6.77**	2	**0**	13.68	**7.31**	smac-disc-0
SparrowToRiss	10	**0**	103.80	**7.79**	3	**0**	91.93	**8.52**	smac-disc-0
minisat-HACK-999ED-CSSC	0	0	10.98	**8.18**	0	0	11.49	**8.38**	gga-disc-1
YalSAT	484	484	300.00	300.00	351	351	300.00	300.00	smac-disc-0

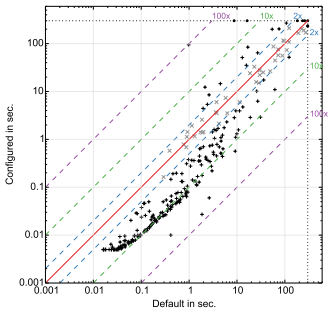
Table 7: Track: *crafted SAT+UNSAT*; Benchmarks: *Queens*

Solver	Training performance				Test performance			
	#Timeouts		PAR1		#Timeouts		PAR1	
	default	config.	default	config.	default	config.	default	config.
clasp-3.0.4-p8	308	121	64.64	36.92	211	102	68.96	37.83
lingeling	139	118	48.21	43.44	115	109	50.45	45.41
cryptominisat	208	163	48.10	43.53	140	114	50.47	44.74
Riss-4.27	226	183	48.53	43.08	136	118	48.09	43.20
minisat-HACK-999ED-CSSC	231	225	45.96	44.41	141	141	47.33	45.92
YalSAT	1297	1284	224.37	220.24	755	744	217.13	214.40
SparrowToRiss(disq.)	265	209	119.89	47.93	156	136	113.05	49.15

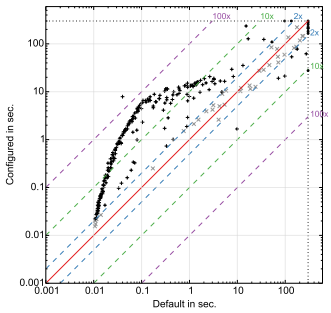
Table 8: Overall results for track: *crafted SAT+UNSAT*; ranked by number of timeouts of configured solvers on test sets (tie-breaker: PAR1)



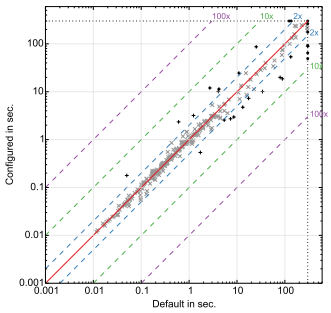
(a) *clasp-3.0.4-p8*; TOs: 87 → 93



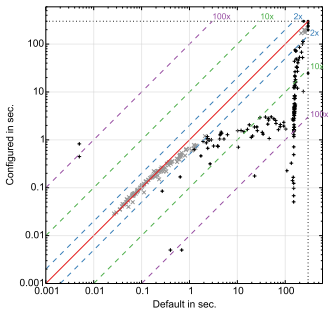
(b) *lingeling*; TOs: 101 → 104



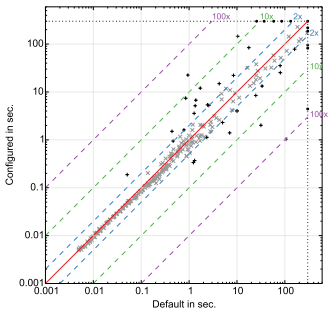
(c) *cryptominisat*; TOs: 95 → 89



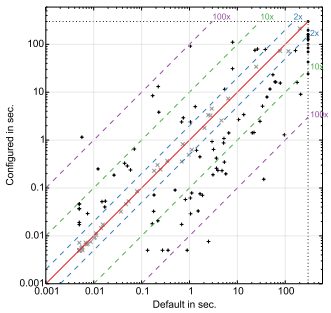
(d) *Riss-4.27*; TOs: 91 → 88



(e) *SparrowToRiss*; TOs: 98 → 94

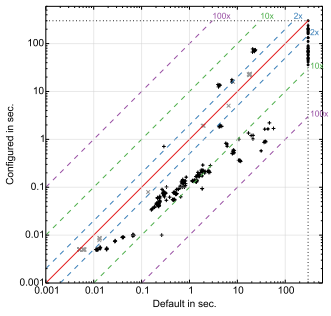


(f) *minisat-HACK-999ED-CSSC*; TOs: 91 → 91

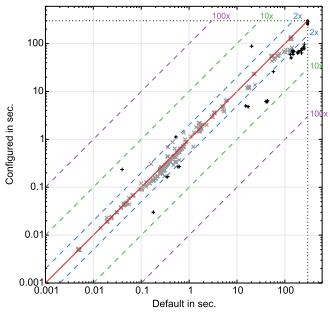


(g) *YalSAT*; TOs: 218 → 207

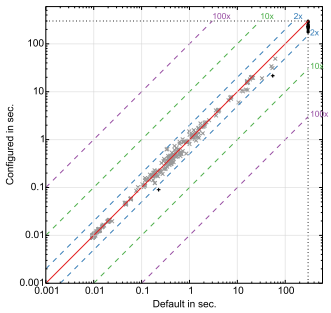
Figure 4: Track: *crafted SAT+UNSAT*, Benchmarks: *Low Autocorrelation Binary Sequence*



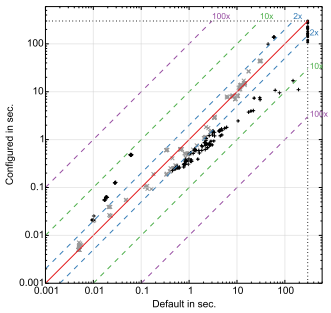
(a) *clasp-3.0.4-p8*; TOs: 43 → 9



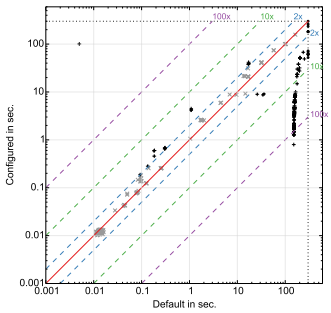
(b) *lingeling*; TOs: 11 → 5



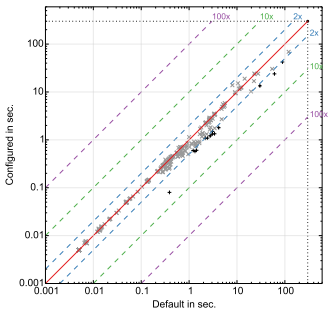
(c) *cryptominisat*; TOs: 43 → 24



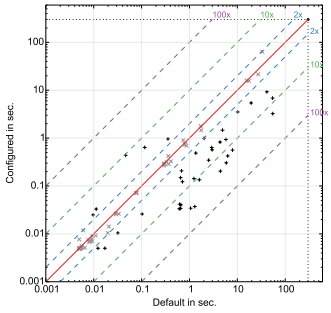
(d) *Riss-4.27*; TOs: 43 → 30



(e) *SparrowToRiss*; TOs: 55 → 42

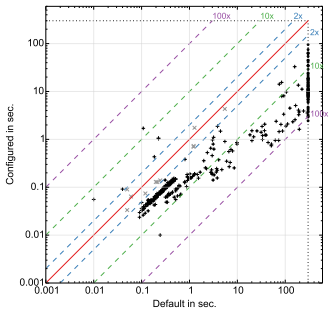


(f) *minisat-HACK-999ED-CSSC*; TOs: 50 → 50

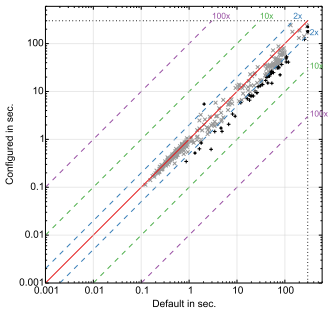


(g) *YalSAT*; TOs: 186 → 186

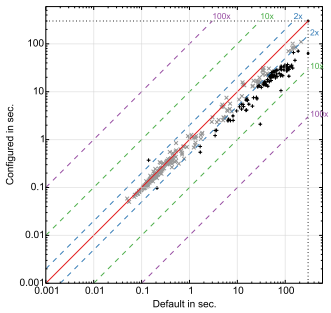
Figure 5: Track: *crafted SAT+UNSAT*, Benchmarks: *Graph Isomorphism*



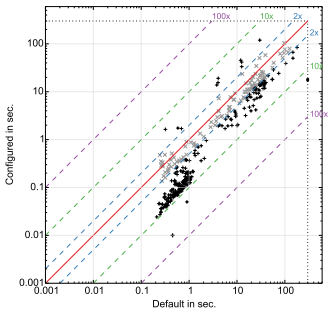
(a) *clasp-3.0.4-p8*; TOs: 81 → 0



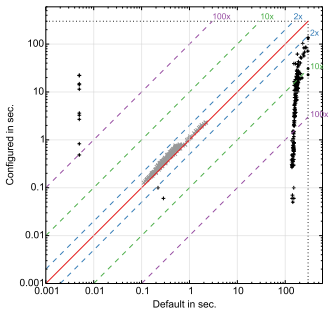
(b) *lingeling*; TOs: 3 → 0



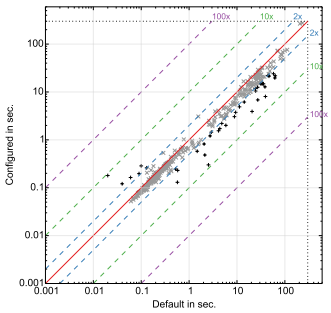
(c) *cryptominisat*; TOs: 2 → 1



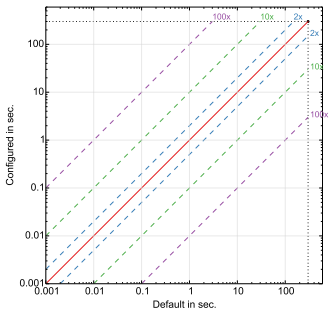
(d) *Riss-4.27*; TOs: 2 → 0



(e) *SparrowToRiss*; TOs: 3 → 0



(f) *minisat-HACK-999ED-CSSC*; TOs: 0 → 0



(g) *YalSAT*; TOs: 351 → 351

Figure 6: Track: *crafted SAT+UNSAT*, Benchmarks: *Queens*

2.3 *Random SAT+UNSAT*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
clasp-3.0.4-p8	0	0	11.36	**4.11**	0	0	7.91	**2.66**	smac-3
DCCASat+march-rw	0	0	81.07	**16.44**	0	0	74.75	**15.01**	gga-1
minisat-HACK-999ED-CSSC	7	**0**	35.36	**22.19**	5	**1**	30.77	**14.86**	paramils-1
Riss-4.27	7	**2**	38.34	**26.64**	2	2	27.95	**20.42**	smac-disc-2
SparrowToRiss	24	**3**	104.32	**28.89**	8	**1**	89.67	**20.99**	smac-2

Table 9: Track: *Random SAT+UNSAT*; Benchmarks: *K3*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
clasp-3.0.4-p8	0	0	0.74	**0.30**	0	0	0.74	**0.30**	paramils-3
DCCASat+march-rw	0	0	149.65	**29.64**	1	**0**	150.73	**29.90**	paramils-2
minisat-HACK-999ED-CSSC	0	0	1.86	**0.84**	0	0	1.83	**0.81**	smac-disc-3
Riss-4.27	0	0	2.55	**1.32**	1	**0**	3.72	**1.31**	paramils-2
SparrowToRiss	0	0	152.06	**1.44**	0	0	149.46	**1.45**	paramils-3

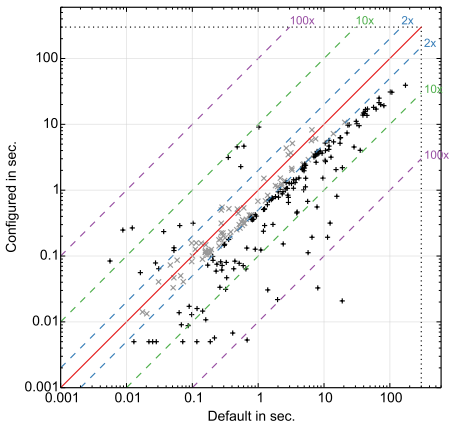
Table 10: Track: *Random SAT+UNSAT*; Benchmarks: *unif-k5*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
clasp-3.0.4-p8	41	**0**	114.52	**35.83**	18	**0**	115.05	**35.03**	smac-2
DCCASat+march-rw	0	0	84.58	**19.35**	1	**0**	80.53	**18.94**	smac-1
minisat-HACK-999ED-CSSC	301	**171**	236.85	**178.96**	166	**99**	246.70	**190.03**	paramils-3
Riss-4.27	295	**221**	233.84	**207.40**	160	**113**	241.02	**210.81**	smac-3
SparrowToRiss	253	242	**162.00**	213.78	126	126	**156.64**	219.49	paramils-2

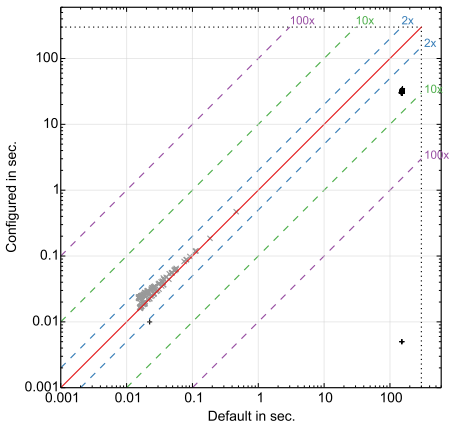
Table 11: Track: *Random SAT+UNSAT*; Benchmarks: *3cnf*

Solver	Training performance				Test performance				
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
clasp-3.0.4-p8	41	0	42.20	13.42	18	0	41.23	12.66	
DCCASat+march-rw	0	0	105.10	21.81	2	0	102.00	21.28	
minisat-HACK-999ED-CSSC	308	171	91.36	67.33	171	100	93.10	68.57	
Riss-4.27	302	223	91.58	78.45	163	115	90.89	77.51	
SparrowToRiss	277	245	139.46	81.37	134	127	131.93	80.64	

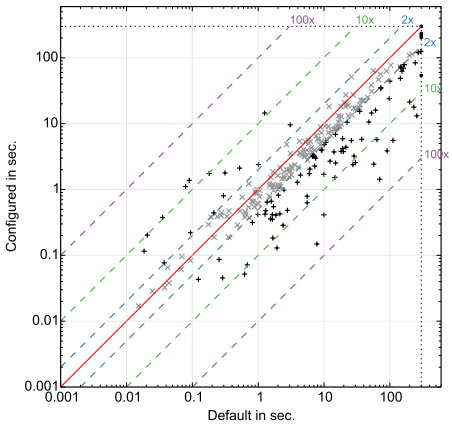
Table 12: Overall results for track: *Random SAT+UNSAT*; ranked by number of timeouts of configured solvers on test sets (tie-breaker: PAR1)



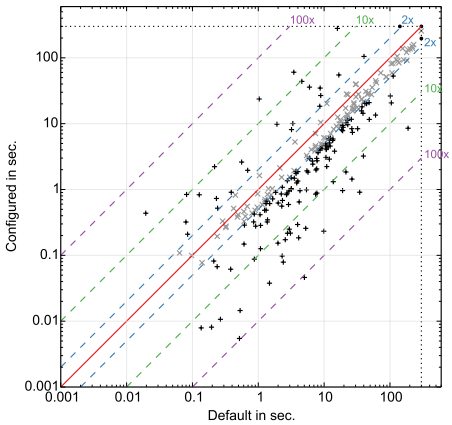
(a) *clasp-3.0.4-p8*; TOs: $0 \rightarrow 0$



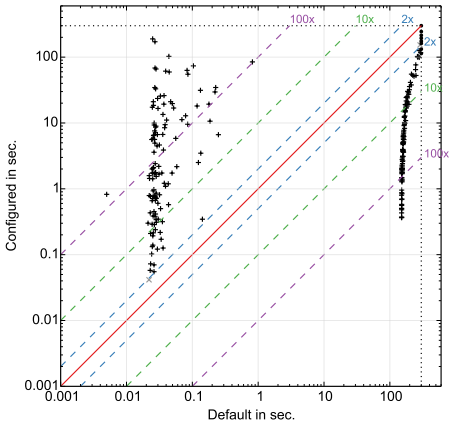
(b) *DCCASat+march-rw*; TOs: $0 \rightarrow 0$



(c) *minisat-HACK-999ED-CSSC*; TOs: $5 \rightarrow 1$

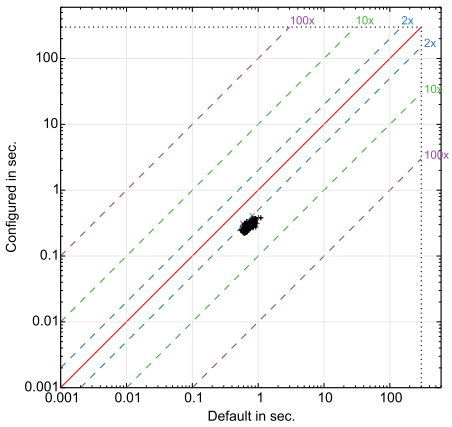


(d) *Riss-4.27*; TOs: $2 \rightarrow 2$

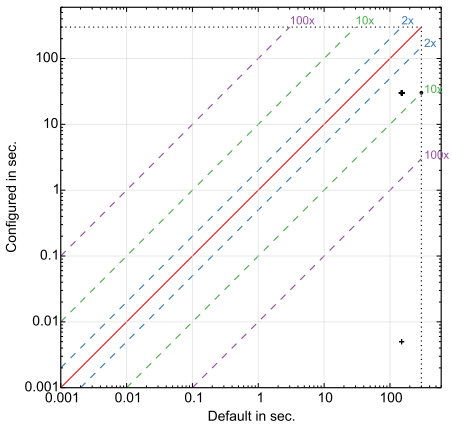


(e) *SparrowToRiss*; TOs: $8 \rightarrow 1$

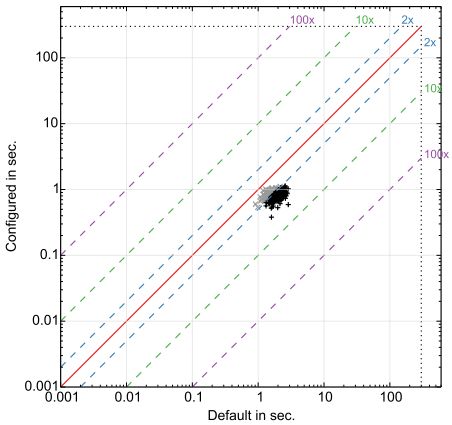
Figure 7: Track: *Random SAT+UNSAT*, Benchmarks: *K3*



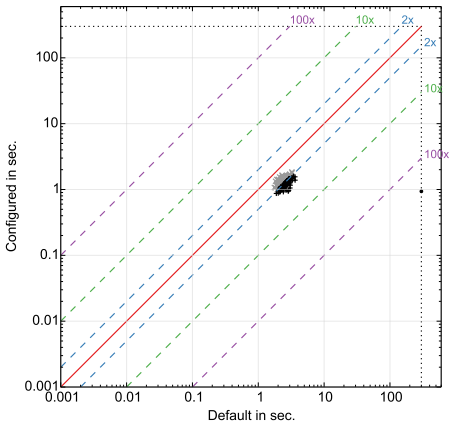
(a) *clasp-3.0.4-p8*; TOs: $0 \rightarrow 0$



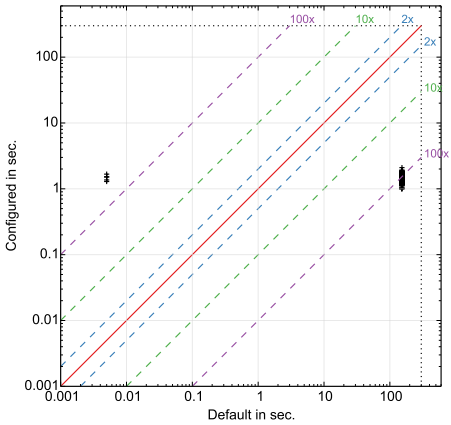
(b) *DCCASat+march-rw*; TOs: $1 \rightarrow 0$



(c) *minisat-HACK-999ED-CSSC*; TOs: $0 \rightarrow 0$

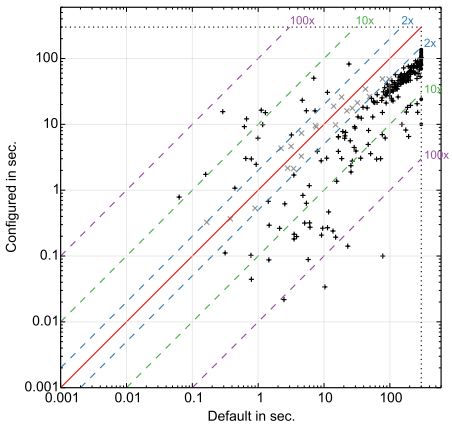


(d) *Riss-4.27*; TOs: $1 \rightarrow 0$

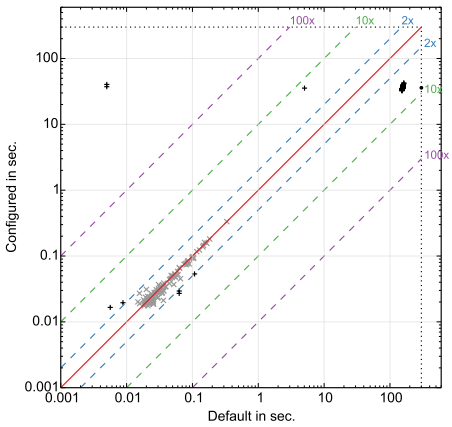


(e) *SparrowToRiss*; TOs: $0 \rightarrow 0$

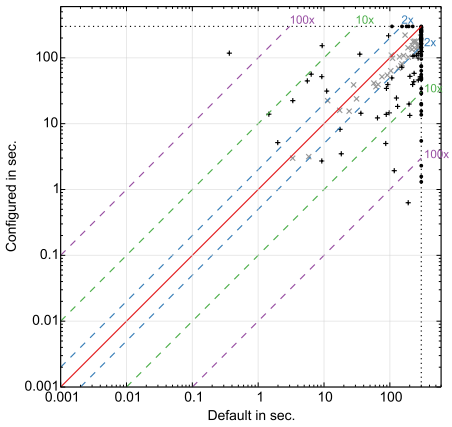
Figure 8: Track: *Random SAT+UNSAT*, Benchmarks: *unif-k5*



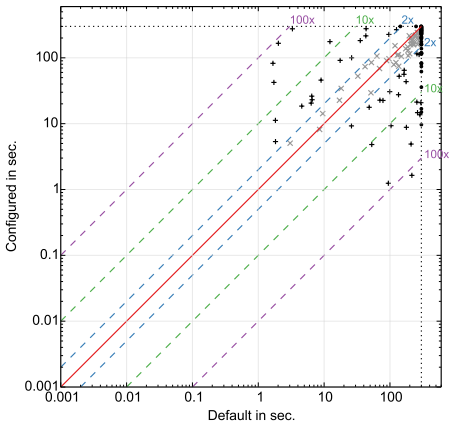
(a) *clasp-3.0.4-p8*; TOs: 18 → 0



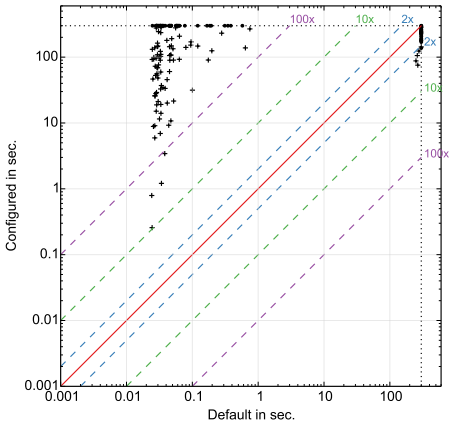
(b) *DCCASat+march-rw*; TOs: 1 → 0



(c) *minisat-HACK-999ED-CSSC*; TOs: 166 → 99



(d) *Riss-4.27*; TOs: 160 → 113



(e) *SparrowToRiss*; TOs: 126 → 126

Figure 9: Track: *Random SAT+UNSAT*, Benchmarks: *3cnf*

2.4 *Random SAT*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
probSAT	11	**2**	19.42	**5.94**	10	**4**	24.22	**9.33**	smac-disc-0
SparrowToRiss	11	**3**	18.54	**7.38**	9	**5**	18.61	**9.62**	smac-2
CSCCSat2014	2	**1**	6.47	5.76	2	2	5.64	6.01	smac-2
YalSAT	9	**3**	16.97	**12.72**	**6**	7	13.27	14.22	paramils-2
clasp-3.0.4-p8	250	250	300.00	300.00	250	250	300.00	300.00	smac-disc-0
minisat-HACK-999ED-CSSC	250	250	300.00	300.00	250	250	300.00	300.00	smac-disc-2

Table 13: Track: *Random SAT*; Benchmarks: *3sat1k*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
probSAT	30	**2**	93.53	**24.16**	24	**0**	78.10	**14.72**	smac-disc-2
SparrowToRiss	13	**1**	32.80	**11.33**	3	3	19.75	**11.04**	smac-disc-0
CSCCSat2014	9	7	25.30	23.32	**3**	6	17.69	20.11	gga-disc-1
YalSAT	7	**4**	27.82	28.08	5	5	24.49	21.70	paramils-1
clasp-3.0.4-p8	250	**249**	300.00	**299.13**	250	250	300.00	300.00	smac-disc-0
minisat-HACK-999ED-CSSC	250	250	300.00	300.00	250	250	300.00	300.00	smac-disc-0

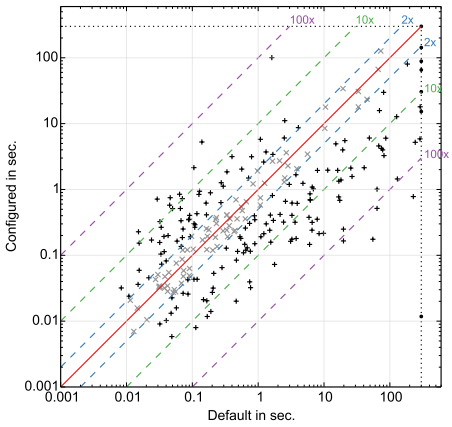
Table 14: Track: *Random SAT*; Benchmarks: *7sat90*

Solver	Training performance				Test performance				Configurator
	#Timeouts		PAR1		#Timeouts		PAR1		
	default	config.	default	config.	default	config.	default	config.	
probSAT	250	**0**	300.00	**1.88**	250	**0**	300.00	**1.97**	smac-3
SparrowToRiss	250	**0**	300.00	**6.57**	250	**0**	300.00	**6.23**	smac-disc-2
CSCCSat2014	0	0	7.08	7.07	0	0	**6.77**	6.80	paramils-1
YalSAT	0	0	6.80	**4.44**	0	0	4.89	4.60	smac-disc-0
clasp-3.0.4-p8	250	250	300.00	300.00	250	250	300.00	300.00	smac-disc-0
minisat-HACK-999ED-CSSC	250	250	300.00	300.00	250	250	300.00	300.00	smac-disc-0

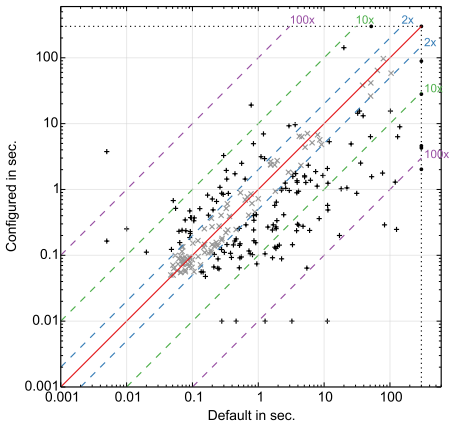
Table 15: Track: *Random SAT*; Benchmarks: *5sat500*

Solver	Training performance				Test performance			
	#Timeouts		PAR1		#Timeouts		PAR1	
	default	config.	default	config.	default	config.	default	config.
probSAT	291	4	137.65	10.66	284	4	134.11	8.67
SparrowToRiss	274	4	117.11	8.43	262	8	112.78	8.96
CSCCSat2014	11	8	12.95	12.05	5	8	10.03	10.97
YalSAT	16	7	17.20	15.08	11	12	14.22	13.51
clasp-3.0.4-p8	750	749	300.00	299.71	750	750	300.00	300.00
minisat-HACK-999ED-CSSC	750	750	300.00	300.00	750	750	300.00	300.00

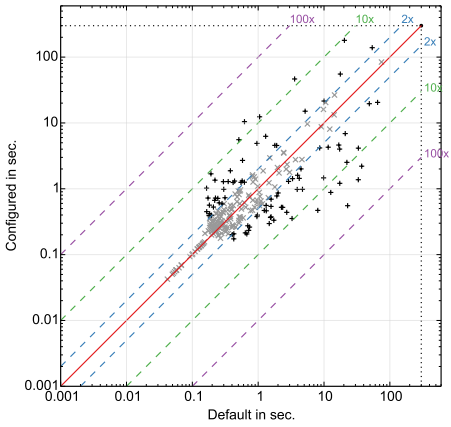
Table 16: Overall results for track: *Random SAT*; ranked by number of timeouts of configured solvers on test sets (tie-breaker: PAR1)



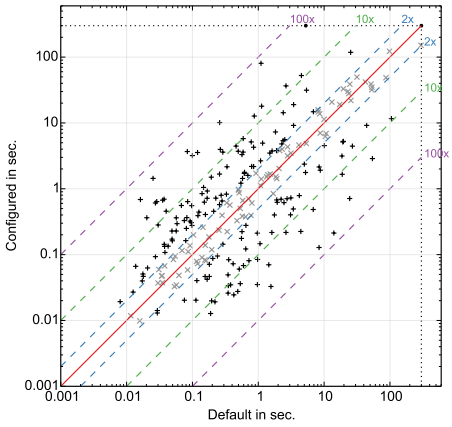
(a) *probSAT*; TOs: 10 → 4



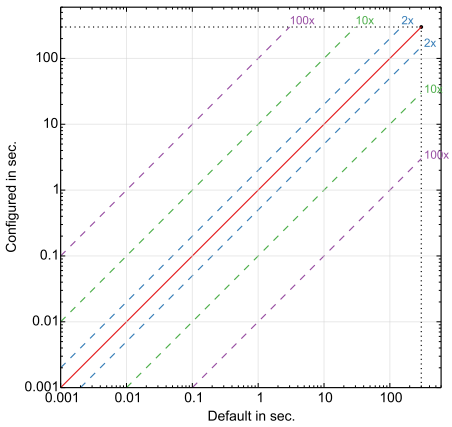
(b) *SparrowToRiss*; TOs: 9 → 5



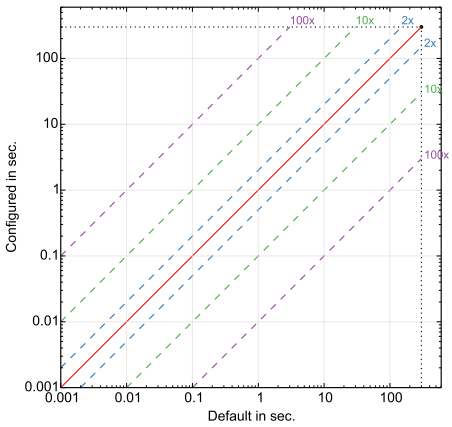
(c) *CSCCSat2014*; TOs: 2 → 2



(d) *YalSAT*; TOs: 6 → 7

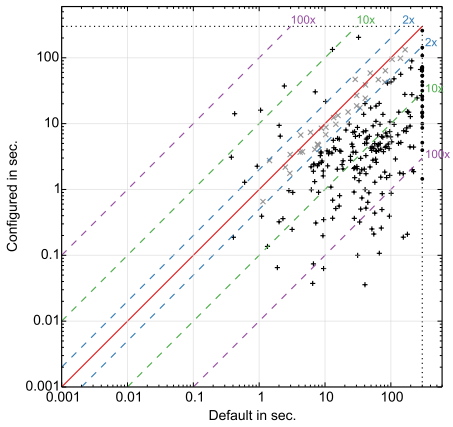


(e) *clasp-3.0.4-p8*; TOs: 250 → 250

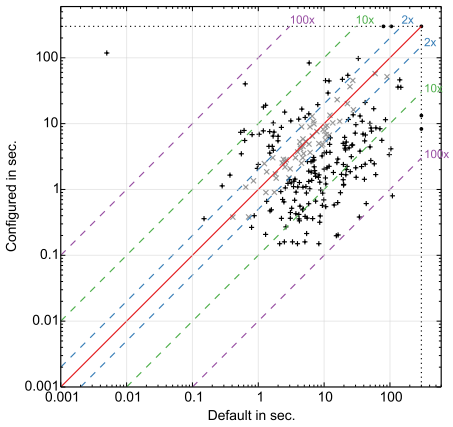


(f) *minisat-HACK-999ED-CSSC*; TOs: 250 → 250

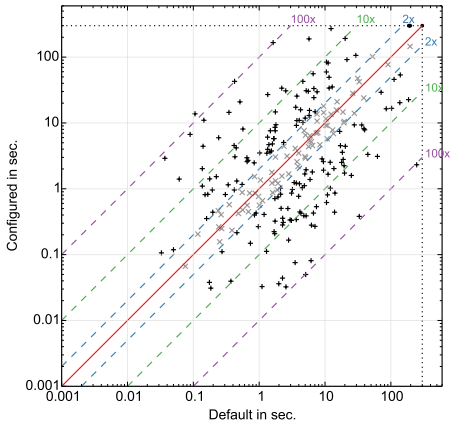
Figure 10: Track: *Random SAT*, Benchmarks: *3sat1k*



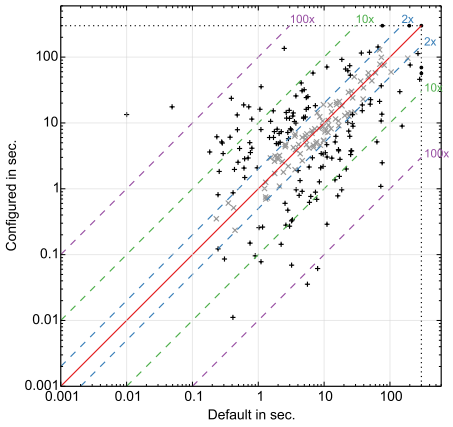
(a) *probSAT*; TOs: 24 → 0



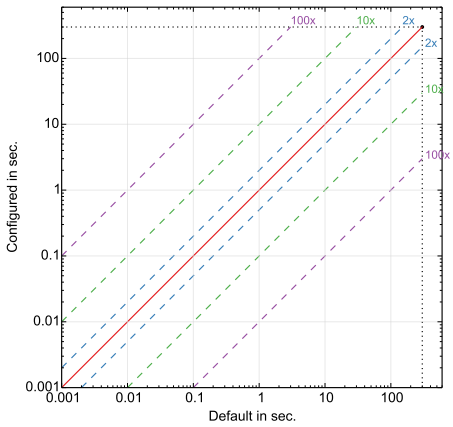
(b) *SparrowToRiss*; TOs: 3 → 3



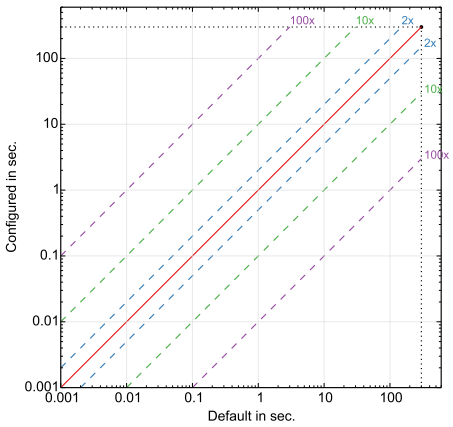
(c) *CSCCSat2014*; TOs: 3 → 6



(d) *YalSAT*; TOs: 5 → 5

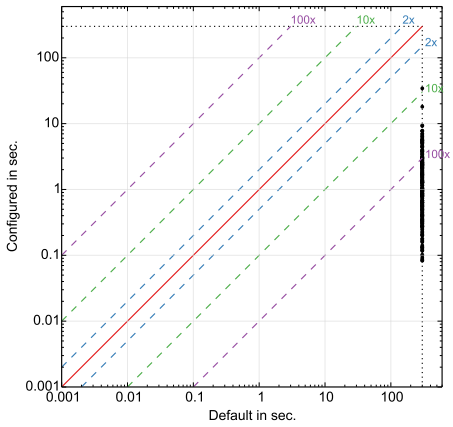


(e) *clasp-3.0.4-p8*; TOs: 250 → 250

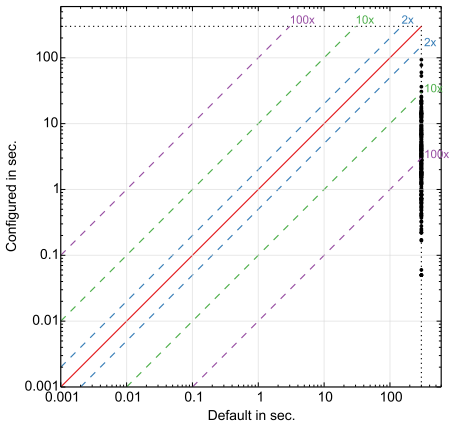


(f) *minisat-HACK-999ED-CSSC*; TOs: 250 → 250

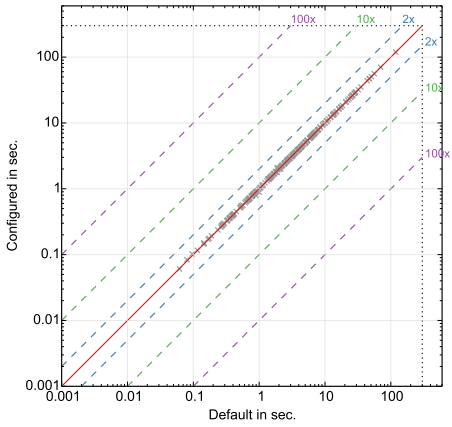
Figure 11: Track: *Random SAT*, Benchmarks: *7sat90*



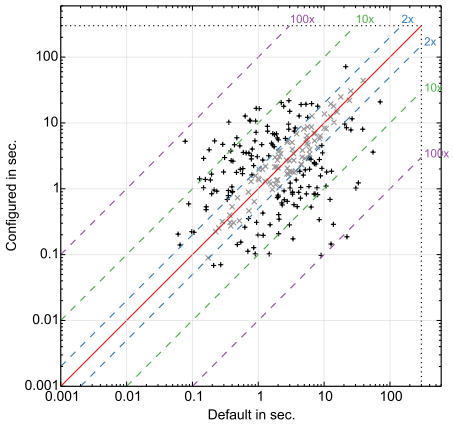
(a) *probSAT*; TOs: 250 → 0



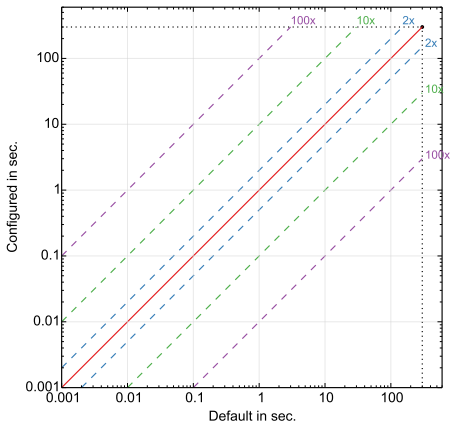
(b) *SparrowToRiss*; TOs: 250 → 0



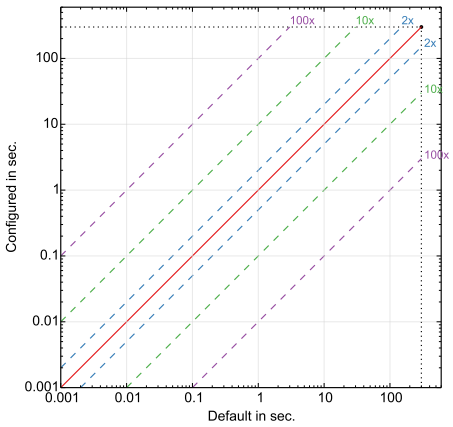
(c) *CSCCSat2014*; TOs: 0 → 0



(d) *YalSAT*; TOs: 0 → 0



(e) *clasp-3.0.4-p8*; TOs: 250 → 250



(f) *minisat-HACK-999ED-CSSC*; TOs: 250 → 250

Figure 12: Track: *Random SAT*, Benchmarks: *5sat500*

3 Detailed configuration results

Tables 17 – 20 detail the performance of each configurator on each configuration scenario in the CSSC 2014. For each solver, benchmark, and configurator, we list the PAR10 speedup factor: the PAR10 achieved with the solver's default parameter settings divided by the PAR10 achieved with the solver's parameter setting identified by the respective configurator. Larger values are better, e.g., 10.0 means a 10-fold speedup; values below 1.0 mean that performance degraded compared to the default parameters setting.

	Training					Test				
	SMAC-d	*SMAC-c*	*PILS*	*GGA-d*	*GGA-c*	*SMAC-d*	*SMAC-c*	*PILS*	*GGA-d*	*GGA-c*
CSSC-CircuitFuzz-300s-2day										
minisat-HACK-999ED-CSSC	2.9	3.1	1.9	0.8	–	2.3	1.6	4.1	4.3	–
Riss-4.27	3.4	2.1	2.9	0.6	0.5	0.7	1.1	1.5	0.6	0.4
clasp-3.0.4-p8	3.8	3.1	2.2	–	–	4.7	1.8	1.3	–	–
cryptominisat	7.3	7.7	4.2	3.1	7.0	7.2	8.0	4.2	2.7	4.0
lingeling	6.0	2.7	9.0	–	0.0	5.0	2.0	4.6	–	0.0
SparrowToRiss	9.6	14.9	9.8	–	–	8.2	6.8	6.6	–	–
CSSC-IBM-300s-2day										
minisat-HACK-999ED-CSSC	1.1	2.8	1.1	0.9	2.7	3.0	1.3	1.1	0.9	0.1
Riss-4.27	1.0	1.0	0.5	0.5	0.1	1.1	2.6	1.1	2.3	2.5
clasp-3.0.4-p8	2.5	3.0	2.7	–	–	0.4	1.1	1.3	–	–
cryptominisat	1.0	1.5	1.1	0.2	0.6	1.1	1.8	1.7	0.4	1.0
lingeling	1.0	0.9	1.0	–	0.0	1.1	1.0	1.4	–	0.0
SparrowToRiss	4.1	8.2	1.0	–	–	8.8	9.7	0.9	–	–
CSSC-BMC08-300s-2day										
minisat-HACK-999ED-CSSC	2.0	2.1	2.0	3.0	0.5	0.6	1.8	0.7	1.1	1.8
Riss-4.27	2.3	2.5	1.3	0.6	–	1.6	1.3	1.0	0.5	–
clasp-3.0.4-p8	4.2	5.4	1.2	–	–	4.8	5.9	1.5	–	–
cryptominisat	1.0	1.1	0.6	0.3	0.7	1.9	1.3	1.9	0.4	0.0
lingeling	1.7	1.7	2.0	–	0.1	1.1	1.0	1.0	–	0.1
SparrowToRiss	8.9	8.3	4.9	–	–	8.0	5.3	4.0	–	–

Table 17: PAR10 speedup factors achieved by each configuration approach for the *Industrial SAT+UNSAT* track of CSSC 2014.

	Training					Test				
	SMAC-d	*SMAC-c*	*PILS*	*GGA-d*	*GGA-c*	*SMAC-d*	*SMAC-c*	*PILS*	*GGA-d*	*GGA-c*
CSSC-LABS-300s-2day										
minisat-HACK-999ED-CSSC	1.2	1.6	2.4	1.2	–	1.1	1.3	1.0	0.8	–
Riss-4.27	1.1	1.9	2.5	0.0	0.5	0.4	1.1	2.0	0.1	0.3
YalSAT	2.4	3.6	1.0	–	0.0	1.8	14.5	1.0	–	0.0
clasp-3.0.4-p8	0.3	0.2	0.8	–	–	0.3	2.6	0.3	–	–
cryptominisat	2.1	0.9	1.3	0.5	0.6	2.5	1.3	0.6	0.2	0.7
lingeling	0.8	0.6	0.5	–	0.0	0.5	1.9	0.4	–	0.6
SparrowToRiss	3.2	4.4	3.1	–	–	1.9	4.8	4.7	–	–
CSSC-GI-300s-2day										
minisat-HACK-999ED-CSSC	2.5	2.4	2.4	–	1.3	1.3	1.4	1.4	–	1.3
Riss-4.27	9.1	7.4	2.9	0.2	0.5	9.0	10.6	3.2	0.3	0.0
lingeling	0.9	4.1	1.0	–	0.0	0.8	4.5	1.0	–	0.0
clasp-3.0.4-p8	18.5	18.1	7.5	–	–	20.5	23.3	12.0	–	–
cryptominisat	5.5	4.8	5.8	2.1	0.0	11.5	11.3	11.1	8.5	1.6
YalSAT	3.1	0.2	0.2	0.1	0.0	2.1	6.2	0.8	0.1	0.0
SparrowToRiss	11.8	11.7	11.4	–	–	14.8	15.4	15.4	–	–
CSSC-Queens-300s-2day										
minisat-HACK-999ED-CSSC	1.2	1.2	1.3	1.3	1.1	1.4	1.3	1.4	1.4	1.1
Riss-4.27	4.9	4.0	2.4	0.4	0.2	4.0	3.4	2.1	0.4	0.2
lingeling	1.9	1.1	2.4	–	0.0	2.8	2.4	2.9	–	0.0
clasp-3.0.4-p8	100.7	110.4	48.0	–	–	144.3	150.5	61.4	–	–
cryptominisat	4.7	4.3	3.5	2.0	2.9	3.4	1.6	2.3	1.3	1.8
YalSAT	1.0	1.0	1.0	–	–	1.0	1.0	1.0	–	–
SparrowToRiss	20.5	19.6	5.7	–	–	13.5	11.9	5.2	–	–

Table 18: PAR10 speedup factors achieved by each configuration approach for the *crafted SAT+UNSAT* track of CSSC 2014.

	Training					Test				
	SMAC-d	*SMAC-c*	*PILS*	*GGA-d*	*GGA-c*	*SMAC-d*	*SMAC-c*	*PILS*	*GGA-d*	*GGA-c*
CSSC-K3-300s-2day										
clasp-3.0.4-p8	2.7	2.8	2.5	–	–	2.5	3.0	2.4	–	–
DCCASat+march-rw	4.8	4.9	4.8	–	4.9	4.9	4.9	4.9	–	5.0
Riss-4.27	3.3	3.0	2.9	0.2	0.3	1.3	2.2	1.9	0.2	0.4
minisat-HACK-999ED-CSSC	4.4	4.0	4.4	2.2	0.9	5.2	5.2	5.3	2.8	1.7
SparrowToRiss	11.6	11.2	7.9	–	–	5.4	8.3	6.7	–	–
CSSC-3cnf-v350-300s-2day										
minisat-HACK-999ED-CSSC	7.2	7.1	10.2	–	0.8	9.8	6.8	6.9	–	1.1
DCCASat+march-rw	4.4	4.4	4.4	4.3	4.3	4.9	4.8	4.9	4.8	4.8
Riss-4.27	3.6	4.0	3.4	0.1	0.1	6.1	5.8	4.7	0.1	0.1
clasp-3.0.4-p8	8.1	9.4	7.0	–	–	7.9	8.8	6.5	–	–
SparrowToRiss	0.7	0.7	1.0	–	–	2.7	0.3	0.9	–	–
CSSC-unsat-unif-k5-300s-2day										
clasp-3.0.4-p8	2.3	2.4	2.5	–	–	2.3	2.4	2.5	–	–
SparrowToRiss	96.2	96.6	105.6	–	–	94.1	95.8	103.3	–	–
Riss-4.27	1.9	1.9	1.9	1.3	1.5	10.6	10.9	11.1	7.4	8.6
minisat-HACK-999ED-CSSC	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.1	2.2
DCCASat+march-rw	5.0	5.0	5.0	5.0	5.0	5.4	5.4	5.4	5.4	5.4

Table 19: PAR10 speedup factors achieved by each configuration approach for the *Random SAT+UNSAT* track of CSSC 2014.

	Training					Test				
	SMAC-d	*SMAC-c*	*PILS*	*GGA-d*	*GGA-c*	*SMAC-d*	*SMAC-c*	*PILS*	*GGA-d*	*GGA-c*
CSSC-3SAT1k-sat-300s-2day										
minisat-HACK-999ED-CSSC	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
probSAT	32.3	24.5	32.2	–	–	18.6	5.7	18.6	–	–
clasp-3.0.4-p8	1.0	1.0	1.0	–	–	1.0	1.0	1.0	–	–
CSCCSat2014	3.5	3.5	3.5	1.0	1.0	0.9	0.9	0.9	1.0	1.0
YalSAT	6.5	1.7	8.6	0.0	0.7	1.0	0.6	0.3	0.0	0.3
SparrowToRiss	5.6	26.8	14.2	–	–	1.8	4.3	1.2	–	–
CSSC-7SAT90-sat-300s-2day										
minisat-HACK-999ED-CSSC	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
probSAT	18.1	13.3	13.6	–	–	22.9	20.2	21.0	–	–
clasp-3.0.4-p8	36.7	1.0	1.0	–	–	1.0	1.0	1.0	–	–
CSCCSat2014	1.6	1.6	1.6	1.6	1.6	0.3	0.3	0.3	0.3	0.3
YalSAT	1.0	1.3	1.9	1.0	0.6	1.6	4.3	1.1	1.0	1.8
SparrowToRiss	15.9	7.3	2.5	–	–	1.3	5.5	0.9	–	–
CSSC-5SAT500-sat-300s-2day										
minisat-HACK-999ED-CSSC	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
probSAT	1506.8	1597.3	1499.7	–	–	1380.8	1526.2	1374.8	–	–
clasp-3.0.4-p8	1.0	1.0	1.0	–	–	1.0	1.0	1.0	–	–
CSCCSat2014	1.0	1.0	1.0	0.1	1.0	1.0	1.0	1.0	0.2	1.0
YalSAT	1.5	1.5	1.2	1.3	1.1	1.1	1.1	1.0	1.0	0.7
SparrowToRiss	456.6	358.2	104.1	–	–	481.3	323.9	100.3	–	–

Table 20: PAR10 speedup factors achieved by each configuration approach for the *Random SAT* track of CSSC 2014.

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