Scalable SAT Solving in the Cloud

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Supplementary Material

Table 1. Solved instances (SAT/UNSAT) and PAR-2 scores (lower is better) of further experiments. Parameters: number of compute nodes m, clause buffer discount factor α and half life X, clause length limit, initial and final LBD limit. *This configuration used 4 PEs à 5 threads instead of 5 PEs à 4 threads.

Solver	m	α	X	CL	LBD	#	(+,	-)	PAR-2
Mallob	128	7/8	10	–	$2 \to \infty$	64	31	33	153.4
Mallob	128	7/8	30	–	$2 \to \infty$	63	31	32	155.8
Mallob	128	7/8	90	–	$2 \to \infty$	66	32	34	144.6
Mallob	128	7/8	–	–	$2 \to \infty$	63	31	32	154.0
Mallob	128	7/8	–	–	$2 \to 8$	63	31	32	156.3
Mallob	128	7/8	–	–	–	65	31	34	142.7
Mallob	128	7/8	–	5	–	65	32	33	144.8
Mallob	128	7/8	–	10	–	66	32	34	138.6
Mallob	128	7/8	90	–	–	65	31	34	142.3
Mallob	128	7/8	90	10	–	65	31	34	143.0
Mallob	8	7/8	–	–	–	52	23	29	240.1
Mallob	8*	7/8	–	–	–	53	24	29	236.0
HordeSat (new, 400 inst.)	128	–	–	–	$2 \to \infty$	276	150	126	220.3
Mallob (400 inst.)	128	7/8	–	–	–	305	163	142	171.9

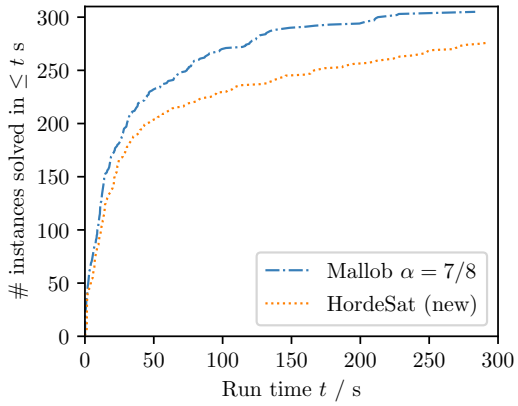

Fig. 1. Performance of Mallob ($\alpha = 7/8$, no LBD limits) and updated Hordesat on the entire benchmark set of the SAT Competition 2020

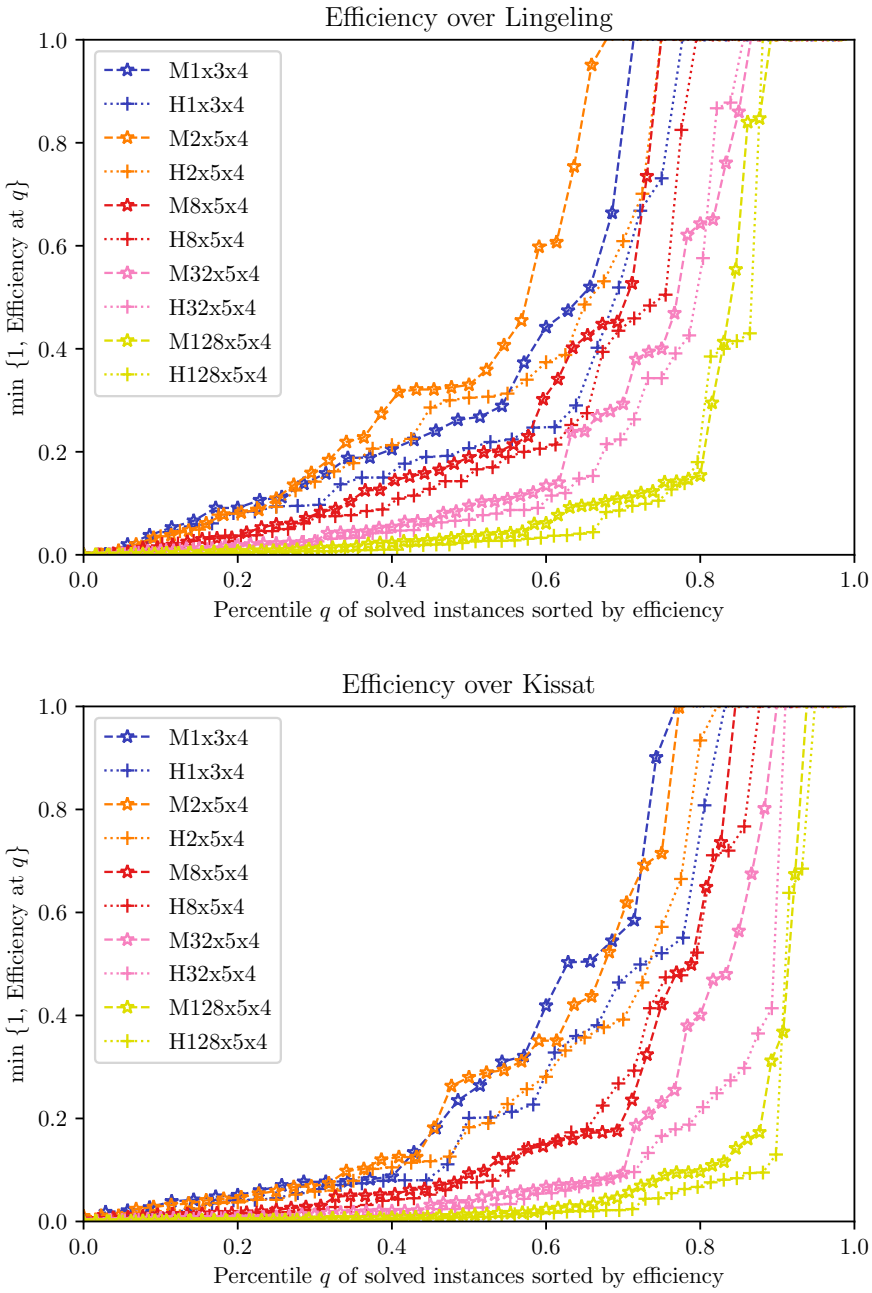

Fig. 2. Efficiency of Mallob-mono ("M") and Hordesat-new ("H") over Lingeling (top) and Kissat (bottom). The efficiency of a parallel approach with p cores and runtime τ_p over a sequential approach with runtime τ_s is defined as $\sigma := \tau_s/(\tau_p \cdot p)$ (i.e., the parallel speedup divided by the number of cores). For each configuration, the instances solved by this configuration are sorted in increasing order by achieved efficiency. An approach which always scales perfectly would correspond to a straight line $y = 1$; the higher the integral of a curve, the better the overall efficiency. Efficiencies are capped at 1, i.e., superlinear speedups are not shown.

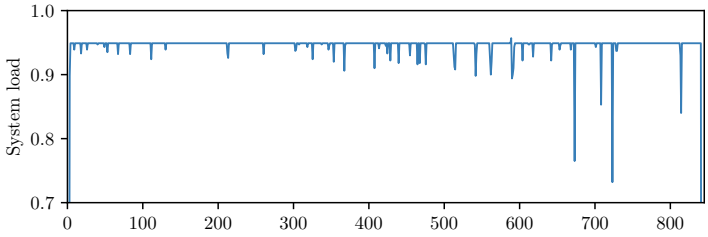

Fig. 3. Ratio of busy PEs of Mallob with $J = 16$, measured every second.

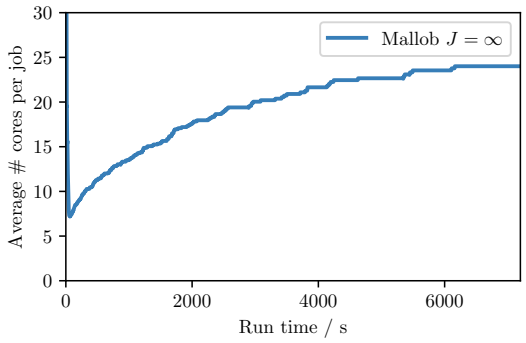

Fig. 4. Active cores per job of Mallob processing 400 jobs at once

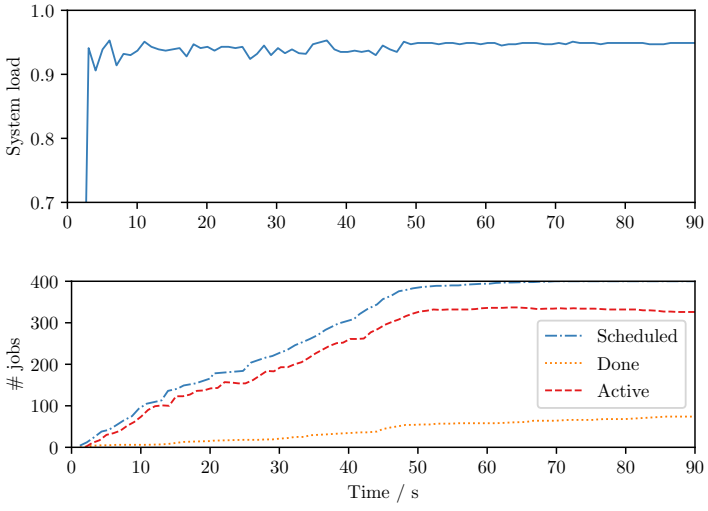

Fig. 5. System load and job distribution in the first 90 seconds execution time of Mallob processing 400 jobs at once.