

Parallel SAT Simplification on GPU Architectures

Full Appendix for Benchmarks

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Appendix A Complete Benchmarks

A.1 SAT Solving

Minisat

Table 1: MiniSat solving of original formulas and SatElite (*ve*) and GPU (*ve+*) simplified formulas. All running times in seconds. The letter T (with red background) means Timeout (24 hours). Green cells draw a conclusion. Region refers to the count of CNFs solved faster in a particular family. The white cells in the Region column means the corresponding CNFs belong to the same family. The last column (Sat.) denotes the solving result of the CNF whether Satisfiable (S) or Unsatisfiable (U).

CNF	GPU +Minisat	GPU (<i>ve+</i>)	Total	Satelite (<i>ve</i>)	Faster?	Region	Minisat	Faster?	Region	Sat.
26_stack_cas_longest	0.01	0.789	0.80	110.09	1	1	0.91	1	1	S
9dlx_vliw_at_b_iq1	1030.08	0.733	1030.81	692.79	0	0	1065.98	1	1	U
9dlx_vliw_at_b_iq2	4618.86	0.729	4619.59	2707.94	0		2225.15	0		U
9dlx_vliw_at_b_iq3	27647.60	1.418	27649.02	12516.05	0		10801.60	0		U
9dlx_vliw_at_b_iq4-345				T 60890.31	0		T	0		U
9dlx_vliw_at_b_iq4				T 65186.23	0		T	0		U
dated-10-17-u	4552.64	0.429	4553.07	4699.16	1	1	3710.90	0	0	U
podwr001_power.opt	18.13	0.243	18.37	21.83	1	1	14.50	0	0	S
transport-city-35n	1543.74	1.431	1545.17	1399.36	0	0	1040.70	0	1	S
transport-2cities-15n-20	321.17	3.038	324.21	230.34	0		1506.13	1		S
transport-2cities-15n-40	493.51	3.342	496.85	337.43	0		388.06	0		S
valves-gates-1-k617-unsat	1236.11	1.182	1237.29	770.13	0	0	3120.38	1	1	U
dspam_dump_vc1093	0.50	0.263	0.76	6.16	1	6	1.98	1	6	U
dspam_dump_vc1103	16.50	0.629	17.13	14.26	0		6.89	0		U
dspam_dump_vc1104	0.23	0.619	0.85	16.17	1		14.77	1		U
dspam_dump_vc949	0.17	0.189	0.36	44.65	1		253.90	1		U
dspam_dump_vc950	104.82	0.187	105.00	17.32	0		442.15	1		U
dspam_dump_vc962	0.12	0.196	0.32	7.92	1		0.63	1		U
dspam_dump_vc972	1.48	0.391	1.88	16.08	1		1.41	0		U
dspam_dump_vc973	0.79	0.377	1.16	13.69	1		4.01	1		U
ACG-20-10p1	1156.51	0.298	1156.81	1818.71	1	3	4241.83	1	4	S
ACG-20-5p1	282.94	0.252	283.19	523.02	1		618.13	1		S

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Table 1 – continued from previous page

CNF	GPU +Minisat	GPU (<i>ve+</i>)	Total	Satellite (<i>ve</i>)	Faster?	Region	Minisat	Faster?	Region	Sat.
sc16_ACG-20-10p0	1395.65	0.308	1395.96	1231.57	0		2082.03	1		U
sc16_ACG-20-10p1	1303.81	0.309	1304.12	1802.18	1		3203.61	1		S
ak128astepbg1btisc	2.32	0.271	2.59	12.13	1	12	37.37	1	12	S
ak128astepbg2msisc			T	T	0		17203.80	0		S
ak128boothbg1btisc	3.18	0.340	3.52	18.61	1		3.65	1		S
ak128diagobg1btaig	2.09	0.375	2.47	17.19	1		4.21	1		S
ak128modasbg1msisc	0.27	0.239	0.51	17.21	1		2.05	1		S
ak128modasbg1sbisc	2.88	0.267	3.15	19.04	1		8.85	1		S
ak128modbtbg1asaig	2.33	0.307	2.63	13.64	1		4.39	1		S
ak128modbtbg1asisc	0.28	0.232	0.51	12.08	1		1.00	1		S
ak128modbtbg1btaig	15.07	0.387	15.46	25.79	1		37.38	1		S
ak128modbtbg2msisc	84.85	0.277	85.12	T	1		T	1		S
ak128paralbg1sbisc	1.13	0.306	1.43	10.00	1		32.53	1		S
ak128simpbbg1sbisc	0.35	0.310	0.66	28.65	1		17.67	1		S
ak128simpbbg2asaig	33882.10	0.320	33882.42	T	1		T	1		S
hwmcc15deep-6s188-k44	3385.84	0.229	3386.07	4110.49	1	8	14540.70	1	11	U
hwmcc15deep-6s188-k46	10088.70	0.229	10088.93	14810.35	1		12365.80	1		U
hwmcc15deep-6s366r-k72	22979.40	0.238	22979.64	19279.69	0		37006.10	1		U
hwmcc15deep-6s44-k38	5546.35	0.268	5546.62	5638.06	1		9685.79	1		U
hwmcc15deep-6s44-k40	11942.50	0.270	11942.77	22227.23	1		47214.80	1		U
hwmcc15deep-beembkry8b1-k45	12633.80	0.162	12633.96	13135.56	1		14256.40	1		U
hwmcc15deep-beemhanoi4b1-k32	10251.30	0.329	10251.63	17203.71	1		73857.10	1		U
hwmcc15deep-beemhanoi4b1-k37	33843.50	0.376	33843.88	84015.44	1		T	1		U
hwmcc15deep-beemlifts3b1-k29	11671.00	0.716	11671.72	6971.88	0		12285.00	1		U
hwmcc15deep-bobpcihm-k30			T	82850.20	0		T	0		U
hwmcc15deep-oski15a14b04s-k16	223.63	0.634	224.26	4354.22	1		27957.20	1		U
hwmcc15deep-oski15a14b30s-k24	22611.90	0.759	22612.66	20049.60	0		42716.30	1		U
UCG-15-10p1	497.31	0.227	497.54	350.75	0	1	440.30	0	2	S
UCG-20-10p1	1191.83	0.333	1192.16	954.04	0		2243.82	1		S
UCG-20-5p1	140.72	0.313	141.03	162.00	1		364.18	1		S
UR-20-10p1	200.29	0.322	200.61	3137.87	1	2	2416.23	1	3	S
UR-20-5p1	1297.61	0.303	1297.91	624.52	0		1727.38	1		S
sc16_UR-20-10p0	4932.41	0.330	4932.74	8470.18	1		8503.78	1		U
UTI-20-10p1	4191.49	0.272	4191.76	908.88	0	0	4593.88	1	1	S
itox_vc1033	0.53	0.530	1.06	12.47	1	6	1.07	1	3	S
itox_vc1044	0.47	0.541	1.01	12.64	1		0.93	0		S
itox_vc1130	0.88	0.566	1.45	15.01	1		1.97	1		S
itox_vc1216	0.09	0.579	0.67	14.38	1		0.10	0		U
itox_vc909	0.36	0.519	0.88	11.69	1		1.03	1		S
itox_vc979	0.07	0.531	0.60	11.90	1		0.09	0		U
manol-pipe-c10nidw_s	5.77	0.583	6.35	35.09	1	5	5.32	0	7	U
manol-pipe-c6nidw_i	15.69	0.196	15.89	13.13	0		84.70	1		U
manol-pipe-c7bidw_i	27.98	0.250	28.23	29.15	1		400.29	1		U

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Table 1 – continued from previous page

CNF	GPU +Minisat	GPU (<i>ve+</i>)	Total	Satellite (<i>ve</i>)	Faster?	Region	Minisat	Faster?	Region	Sat.
manol-pipe-c7nidw	36.86	0.250	37.11	29.43	0		288.29	1		U
manol-pipe-f10ni	574.98	0.676	575.66	381.86	0		533.84	0		U
manol-pipe-f7idw	90.73	0.367	91.10	1831.54	1		72.41	0		U
manol-pipe-f9b	166.78	0.549	167.33	88.04	0		185.65	1		U
manol-pipe-f9n	215.91	0.533	216.45	138.41	0		228.91	1		U
manol-pipe-g10bidw	72.43	0.411	72.84	1327.07	1		92.26	1		U
manol-pipe-g10nid	27.95	0.381	28.33	35.10	1		85.99	1		U
blockpuzzle_5x12_s6_free3	1161.90	0.064	1161.96	4699.59	1	12	823.44	0	7	U
blockpuzzle_7x10_s10_free4	1289.08	0.086	1289.17	6365.97	1		415.16	0		U
blockpuzzle_7x10_s7_free8	569.79	0.095	569.89	12647.52	1		T	1		S
blockpuzzle_7x10_s9_free6	555.11	0.096	555.21	4827.41	1		999.25	1		U
blockpuzzle_8x8_s1_free4	881.07	0.075	881.15	3076.85	1		1005.64	1		U
blockpuzzle_9x9_s1_free10	1913.35	0.135	1913.49	2081.53	1		151.69	0		S
blockpuzzle_9x9_s1_free7	13058.30	0.126	13058.43	T	1		672.99	0		S
blockpuzzle_9x9_s1_free9	2640.71	0.129	2640.84	11188.39	1		3081.58	1		S
blockpuzzle_9x9_s4_free3	2407.72	0.118	2407.84	21558.79	1		2666.37	1		U
blockpuzzle_9x9_s5_free3	2394.68	0.119	2394.80	26141.59	1		4207.33	1		U
blockpuzzle_9x9_s7_free8	8365.16	0.134	8365.29	2699.26	0		12380.80	1		S
blockpuzzle_9x9_s7_free9	2834.51	0.136	2834.65	185.69	0		594.27	0		S
blockpuzzle_9x9_s8_free3	3847.70	0.122	3847.82	23191.80	1		1772.60	0		U
blockpuzzle_9x9_s8_free7	13329.00	0.126	13329.13	58880.75	1		243.18	0		S
mizh-md5-10	488.30	0.079	488.38	390.10	0	2	561.954	1	4	U
mizh-md5-12	3653.80	0.079	3653.88	2558.91	0		6554.67	1		U
mizh-md5-47-3	40.34	0.119	40.46	24.30	0		27.5802	0		S
mizh-md5-47-5	64.76	0.116	64.88	75.65	1		69.9188	1		S
mizh-md5-48-2	156.82	0.127	156.94	74.30	0		131.184	0		S
mizh-md5-48-5	52.56	0.123	52.68	148.31	1		146.853	1		S
slp-synthesis-aes-top24	756.71	0.053	756.76	4285.68	1	3	T	1	5	S
slp-synthesis-aes-top25	3222.63	0.055	3222.69	703.60	0		6596.3	1		S
slp-synthesis-aes-top26	2237.38	0.058	2237.44	2102.85	0		6919.18	1		S
slp-synthesis-aes-top28	380.54	0.066	380.61	790.82	1		1206.36	1		S
slp-synthesis-aes-top29	657.70	0.070	657.77	2266.86	1		782.765	1		S
slp-synthesis-aes-top30	390.26	0.071	390.33	293.52	0		363.342	0		S
test_v5_r10_vr10_c1_s21502	483.06	0.474	483.53	264.59	0	1	646.673	1	4	U
test_v7_r12_vr10_c1_s18160			T	60707.75	0		T	0		U
test_v7_r12_vr1_c1_s22787	5178.73	0.727	5179.46	2503.38	0		3279.13	0		U
test_v7_r17_vr5_c1_s25451	21920.70	1.042	21921.74	23257.46	1		27048.5	1		U
test_v7_r7_vr10_c1_s32506	1090.63	0.425	1091.05	189.35	0		1225.43	1		S
test_v7_r7_vr5_c1_s14675	42.63	0.447	43.07	32.70	0		77.4771	1		S
cube-11-h13-unsat	317.02	0.622	317.64	323.84	1	1	624.834	1	1	U
esawn_uw3.debugged	546.67	15.977	562.64	T	1	1	224.447	0	0	S
ibm-2002-23r-k90	194.54	0.384	194.92	66.05	0	0	385.006	1	1	S
sin2.c.2	2.48	0.484	2.96	13.97	1	1	3.8801	1	1	S

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Table 2: MiniSat solving of original and SatElite (*all*) and GPU (*all*) simplified formulas. All running times in seconds. The letter T (with red background) means Timeout (24 hours). Green cells draw a conclusion. Region refers to the count of CNFs solved faster in a particular family. The white cells in the Region column means the corresponding CNFs belong to the same family. The last column (Sat.) denotes the solving result of the CNF whether Satisfiable (S) or Unsatisfiable (U).

CNF	GPU +Minisat	GPU (<i>all</i>)	Total	Satelite (<i>all</i>)	Faster?	Region	Minisat	Faster?	Region	Sat.
26_stack_cas_longest	0.01	2.796	2.81	110.42	1	1	0.913393	0	0	S
9dlx_vliw_at_b_iq1	279.72	1.896	281.61	502.48	1	4	1065.98	1	4	U
9dlx_vliw_at_b_iq2	2837.75	5.756	2843.51	4454.47	1		2225.15	0		U
9dlx_vliw_at_b_iq3	6017.30	5.609	6022.91	15966.00	1		10801.6	1		U
9dlx_vliw_at_b_iq4-345	40481.30	15.81	40497.11	56385.83	1		T	1		U
9dlx_vliw_at_b_iq4	63207.60	9.355	63216.95	56549.50	0		T	1		U
dated-10-17-u	3829.09	4.218	3833.31	3710.87	0	0	3710.9	0	0	U
podwr001_power.opt	18.23	4.740	22.97	52.62	1	1	14.4968	0	0	S
transport-city-35n	2554.01	9.415	2563.43	180.91	0	1	1040.7	0	1	S
transport-2cities-15n-20	4738.03	6.959	4744.99	818.25	0		1506.13	0		S
transport-2cities-15n-40	326.73	13.80	340.53	1804.97	1		388.061	1		S
valves-gates-1-k617-unsat	854.33	18.48	872.80	702.12	0	0	3120.38	1	1	U
dspam_dump_vc1093	2.68	1.000	3.68	7.35	1	7	1.97731	0	3	U
dspam_dump_vc1103	9.17	2.792	11.96	16.09	1		6.88813	0		U
dspam_dump_vc1104	0.26	2.886	3.15	15.48	1		14.7709	1		U
dspam_dump_vc949	16.59	1.267	17.86	6.56	0		253.897	1		U
dspam_dump_vc950	0.09	1.178	1.27	6.59	1		442.147	1		U
dspam_dump_vc962	1.45	1.041	2.49	5.98	1		0.630921	0		U
dspam_dump_vc972	2.28	2.794	5.07	14.03	1		1.4056	0		U
dspam_dump_vc973	2.25	2.909	5.16	13.96	1		4.01113	0		U
ACG-20-10p1	686.14	5.943	692.08	972.58	1	1	4241.83	1	4	S
ACG-20-5p1	217.45	4.955	222.40	218.26	0		618.134	1		S
sc16_ACG-20-10p0	1334.04	5.592	1339.63	611.07	0		2082.03	1		U
sc16_ACG-20-10p1	1298.61	5.155	1303.76	1011.25	0		3203.61	1		S
ak128astepbg1btisc	5.14	2.187	7.33	20.36	1	12	37.3739	1	7	S
ak128astepbg2msisc	235.51	1.169	236.68	T	1		17203.8	1		S
ak128boothbg1btisc	7.95	5.036	12.99	33.93	1		3.65421	0		S
ak128boothbg2asisc	4718.42	3.502	4721.92	T	1		T	1		S
ak128diagobg1btaig	14.91	2.684	17.60	27.32	1		4.21069	0		S
ak128modasbg1msisc	0.29	1.401	1.69	27.00	1		2.05081	1		S
ak128modasbg1sbisc	1.61	1.924	3.53	26.68	1		8.8524	1		S
ak128modbtbg1lasaig	2.39	2.405	4.80	21.00	1		4.38505	0		S
ak128modbtbg1lasisc	0.27	3.166	3.43	17.88	1		0.996538	0		S
ak128modbtbg1btaig	8.13	4.098	12.23	36.06	1		37.377	1		S
ak128modbtbg2msisc			T	51909.93	0		T	0		S

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Table 2 – continued from previous page

CNF	GPU +Minisat	GPU (all)	Total	Satellite (all)	Faster?	Region	Minisat	Faster?	Region	Sat.
ak128paralbg1sbisc	0.33	3.871	4.20	18.06	1		32.5268	1		S
ak128simpbbg1sbisc	19.66	2.524	22.19	24.05	1		17.6671	0		S
hwmcc15deep-6s341r-k16			T	45793.72	0	7	T	0	11	U
hwmcc15deep-bobpcihm-k30			T	85320.00	0		T	0		U
hwmcc15deep-6s188-k44	3713.63	1.626	3715.26	3503.69	0		14540.7	1		U
hwmcc15deep-6s188-k46	30111.40	1.708	30113.11	33711.93	1		12365.8	0		U
hwmcc15deep-6s366r-k72	32304.50	1.149	32305.65	18635.02	0		37006.1	1		U
hwmcc15deep-6s44-k38	4982.18	2.719	4984.90	6896.25	1		9685.79	1		U
hwmcc15deep-6s44-k40	24836.90	2.846	24839.75	52495.59	1		47214.8	1		U
hwmcc15deep-beembkry8b1-k45	5146.55	2.258	5148.81	5949.05	1		14256.4	1		U
hwmcc15deep-beemhanoi4b1-k32	12177.80	5.687	12183.49	18345.83	1		73857.1	1		U
hwmcc15deep-beemhanoi4b1-k37	81757.70	6.182	81763.88	83342.92	1		T	1		U
hwmcc15deep-beemlifts3b1-k29	8503.25	6.035	8509.29	7406.53	0		12285	1		U
hwmcc15deep-oski15a10b10s-k20	46257.60	4.216	46261.82	37321.96	0		T	1		U
hwmcc15deep-oski15a14b04s-k16	109.21	5.037	114.25	521.33	1		27957.2	1		U
hwmcc15deep-oski15a14b30s-k24	12588.90	5.502	12594.40	8939.75	0		42716.3	1		U
UCG-15-10p1	201.04	5.953	207.00	278.01	1	3	440.304	1	3	S
UCG-20-10p1	401.12	5.539	406.66	626.68	1		2243.82	1		S
UCG-20-5p1	106.34	4.819	111.16	117.21	1		364.178	1		S
UR-20-10p1	5365.64	10.31	5375.95	930.40	0	0	2416.23	0	1	S
UR-20-5p1	659.61	9.370	668.98	605.72	0		1727.38	1		S
sc16_UR-20-10p0	14184.60	9.733	14194.33	2684.87	0		8503.78	0		U
UTI-20-10p1	1231.90	11.84	1243.74	1907.76	1	1	4593.88	1	1	S
itox_vc1033	0.59	1.429	2.02	20.04	1	6	1.06818	0	0	S
itox_vc1044	0.72	1.383	2.11	20.18	1		0.928978	0		S
itox_vc1130	0.92	1.595	2.52	22.14	1		1.97098	0		S
itox_vc1216	0.08	1.598	1.68	39.19	1		0.104078	0		U
itox_vc909	0.63	1.275	1.90	17.25	1		1.03398	0		S
itox_vc979	0.07	1.337	1.41	31.43	1		0.087958	0		U
manol-pipe-c10nidw_s	52.97	6.487	59.46	22.17	0	5	5.3173	0	7	U
manol-pipe-c6nidw_i	15.54	1.661	17.20	16.57	0		84.7035	1		U
manol-pipe-c7bidw_i	26.88	2.245	29.12	26.18	0		400.285	1		U
manol-pipe-c7nidw	28.04	2.938	30.98	40.93	1		288.291	1		U
manol-pipe-f10ni	555.06	6.103	561.16	256.03	0		533.839	0		U
manol-pipe-f7idw	151.56	4.669	156.22	1095.91	1		72.4126	0		U
manol-pipe-f9b	105.64	2.749	108.39	108.63	1		185.645	1		U
manol-pipe-f9n	138.99	3.030	142.02	100.42	0		228.914	1		U
manol-pipe-g10bidw	46.64	3.701	50.35	1368.54	1		92.2591	1		U
manol-pipe-g10nid	49.29	3.910	53.20	71.01	1		85.9863	1		U
blockpuzzle_5x12_s6_free3	1258.31	4.109	1262.42	4598.98	1	13	823.437	0	5	U
blockpuzzle_7x10_s10_free4	1235.54	6.817	1242.36	5345.13	1		415.161	0		U
blockpuzzle_7x10_s7_free8	2059.15	7.702	2066.85	T	1		T	1		S
blockpuzzle_7x10_s9_free6	447.45	7.796	455.25	3679.48	1		999.246	1		U

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Table 2 – continued from previous page

CNF	GPU +Minisat	GPU (all)	Total	Satellite (all)	Faster?	Region	Minisat	Faster?	Region	Sat.
blockpuzzle_8x8_s1_free4	1342.98	6.825	1349.81	3981.80	1		1005.64	0		U
blockpuzzle_9x9_s1_free10	449.28	13.28	462.56	781.78	1		151.685	0		S
blockpuzzle_9x9_s1_free7	2634.41	12.18	2646.59	T	1		672.985	0		S
blockpuzzle_9x9_s1_free9	7990.68	17.58	8008.26	T	1		3081.58	0		S
blockpuzzle_9x9_s4_free3	1894.62	14.33	1908.95	15255.25	1		2666.37	1		U
blockpuzzle_9x9_s5_free3	1985.88	14.46	2000.34	26990.62	1		4207.33	1		U
blockpuzzle_9x9_s7_free8	22547.10	12.19	22559.29	T	1		12380.8	0		S
blockpuzzle_9x9_s7_free9	94.10	13.25	107.36	8506.92	1		594.273	1		S
blockpuzzle_9x9_s8_free3	2974.06	11.45	2985.51	26920.55	1		1772.6	0		U
blockpuzzle_9x9_s8_free7	8249.10	11.84	8260.94	3508.84	0		243.179	0		S
mizh-md5-10	508.41	0.321	508.73	403.74	0	3	561.954	1	5	U
mizh-md5-12	5178.46	0.318	5178.78	4383.29	0		6554.67	1		U
mizh-md5-47-3	48.57	2.109	50.68	6.81	0		27.5802	0		S
mizh-md5-47-5	27.13	1.953	29.08	42.97	1		69.9188	1		S
mizh-md5-48-2	15.73	2.106	17.84	207.74	1		131.184	1		S
mizh-md5-48-5	17.89	2.046	19.94	46.34	1		146.853	1		S
slp-synthesis-aes-top24	4189.32	1.239	4190.56	48039.15	1	5	T	1	5	S
slp-synthesis-aes-top25	2622.25	1.314	2623.56	2931.08	1		6596.3	1		S
slp-synthesis-aes-top26	902.11	1.552	903.66	341.95	0		6919.18	1		S
slp-synthesis-aes-top28	291.42	1.549	292.96	606.99	1		1206.36	1		S
slp-synthesis-aes-top29	168.00	1.622	169.62	1750.45	1		782.765	1		S
slp-synthesis-aes-top30	615.05	1.714	616.76	678.17	1		363.342	0		S
test_v5_r10_vr10_c1_s21502	501.04	6.355	507.40	288.79	0	2	646.673	1	5	U
test_v7_r12_vr10_c1_s18160	80207.10	10.64	80217.74	T	1		T	1		U
test_v7_r12_vr1_c1_s22787	831.60	10.58	842.17	511.77	0		3279.13	1		U
test_v7_r17_vr5_c1_s25451			T	22535.36	0		27048.5	0		U
test_v7_r7_vr10_c1_s32506	126.05	6.233	132.28	233.50	1		1225.43	1		S
test_v7_r7_vr5_c1_s14675	23.73	3.409	27.14	26.61	0		77.4771	1		S
cube-11-h13-unsat	119.73	2.077	121.81	1173.35	1	1	624.834	1	1	U
esawn_uw3.debugged	277.75	332.5	610.26	T	1	1	224.447	0	0	S
ibm-2002-23r-k90	68.12	5.257	73.38	169.10	1	1	385.006	1	1	S
sin2.c.2	4.70	3.452	8.16	30.01	1	2	3.8801	0	1	S
sin2.c.20	37972.40	35.18	38007.58	39216.22	1		38538.2	1		S
traffic_3_uc_sat	253.15	28.48	281.63	205.97	0	0	134.426	0	0	S
partial-10-15-s			T	605.00	0	0	1697.27	0	0	S
newton.2.2.i	2518.36	4.925	2523.28	1139.61	0	2	3173.11	1	4	U
newton.2.3.i	11232.60	7.119	11239.72	4274.54	0		21723	1		U
newton.5.1.i	0.84	1.167	2.01	9.36	1		8.74729	1		S
newton.8.3.i	10.48	7.950	18.43	40.08	1		21.1965	1		S
safe009_pso.oepc	0.25	2.241	2.49	16.39	1	4	0.201489	0	0	U
safe027_pso.opt	1.29	6.156	7.45	34.78	1		1.30191	0		U
safe028_tso.oepc	0.46	2.895	3.36	24.97	1		0.600495	0		U
safe029_power.opt	3.72	3.012	6.74	26.35	1		3.3796	0		S

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Table 2 – continued from previous page

CNF	GPU +Minisat	GPU (all)	Total	Satelite (all)	Faster?	Region	Minisat	Faster?	Region	Sat.
arcfour_initialPermutation_6_14	163.61	1.211	164.82	1794.19	1	1	216.934	1	3	U
arcfour_initialPermutation_6_15	321.19	1.706	322.89	137.55	0		436.925	1		U
arcfour_initialPermutation_6_16	561.58	1.628	563.21	264.49	0		877.511	1		U
sokoban-p01.sas.ex.17	3.30	5.257	8.55	T	1	13	6.62564	0	11	U
sokoban-p04.sas.ex.13	3.67	4.253	7.92	T	1		4.31241	0		U
sokoban-p09.sas.cr.25	0.04	0.172	0.22	T	1		0.071501	0		U
sokoban-p10.sas.cr.35	1.97	1.489	3.46	T	1		1.92622	0		U
sokoban-p16.sas.cr.37	14619.90	4.076	14623.98	T	1		37568.2	1		U
sokoban-p16.sas.cr.39	28488.10	4.647	28492.75	T	1		T	1		U
sokoban-p16.sas.ex.15	1706.41	387.4	2093.80	T	1		3513.09	1		U
sokoban-p17.sas.ex.11	0.11	2.442	2.55	179.33	1		0.23874	0		U
sokoban-p18.sas.cr.29	0.24	0.783	1.02	3.07	1		0.29447	0		U
sokoban-p19.sas.cr.23	0.17	0.682	0.85	2.21	1		0.365114	0		U
sokoban-p20.sas.cr.21	346.41	2.567	348.98	233.78	0		463.795	1		U
sokoban-p20.sas.cr.23	1333.12	3.171	1336.29	924.91	0		1621.82	1		U
sokoban-p20.sas.cr.25	2828.23	3.454	2831.68	2043.99	0		5357.39	1		U
sokoban-p20.sas.cr.27	13022.90	3.964	13026.86	13814.67	1		59930.4	1		U
sokoban-p20.sas.cr.29	59539.00	4.268	59543.27	44971.22	0		T	1		U
sokoban-p20.sas.ex.11	468.12	392.1	860.17	6121.56	1		1070.58	1		U
sokoban-p20.sas.ex.13	11876.00	522.3	12398.27	15432.82	1		17983.6	1		U
sokoban-sequential-p145.50	11976.90	6.722	11983.62	7827.41	0		T	1		S
#CNF solved faster compared to Satelite and Minisat						97			84	
Percentage to max. solved CNFs						0.683099			0.604317	
Total Processing Time		1686 hours								

Lingeling

Table 3: Lingeling solving of original formulas and GPU simplified formulas (*ve+*). All running times in seconds. The letter T (with red background) means Timeout (24 hours). Green cells draw a conclusion. Region refers to the count of CNFs solved faster in a particular family. The white cells in the Region column means the corresponding CNFs belong to the same family. The last column (Sat.) denotes the solving result of the CNF whether Satisfiable (S) or Unsatisfiable (U).

CNF	GPU	GPU	Total	Lingeling	Faster?	Region	Sat.
	+Lingeling (<i>ve+</i>)						
26_stack_cas_longest	0.3	0.789	1.09	7	1	1	S
9dlx_vliw_at_b.iq1	15.5	0.733	16.23	21.9	1	3	U
9dlx_vliw_at_b.iq2	48.5	0.729	49.23	44.9	0		U
9dlx_vliw_at_b.iq3	125.3	1.418	126.72	119.1	0		U
9dlx_vliw_at_b.iq4-345	204.3	2.512	206.81	194.8	0		U
9dlx_vliw_at_b.iq4	237.8	2.497	240.30	198.8	0		U
9dlx_vliw_at_b.iq5	405.1	1.533	406.63	339.6	0		U
9dlx_vliw_at_b.iq6	507.8	2.597	510.40	526.4	1		U
9dlx_vliw_at_b.iq7	746.5	3.352	749.85	855.9	1		U
9dlx_vliw_at_b.iq8-718	1118.7	5.762	1124.46	993.2	0		U
9dlx_vliw_at_b.iq8	1141.5	5.769	1147.27	992.2	0		U
dated-10-17-u	750.6	0.429	751.03	800.2	1	1	U
podwr001_power.opt	171.2	0.243	171.44	111.1	0	0	S
transport-city-35n	289.8	1.431	291.23	515.8	1	2	S
transport-2cities-15n-20	317.8	3.038	320.84	198.4	0		S
transport-2cities-15n-40	396.1	3.342	399.44	1811.7	1		S
valves-gates-1-k617-unsat	1286.9	1.182	1288.08	1536	1	1	U
velev-pipe-oun-1.1-05	10384	11.48	10395.48	11379.5	1	2	U
velev-vliw-uns-2.0-ug5	298.3	1.535	299.84	337.4	1		U
dspam_dump_vc1093	5.3	0.263	5.56	2.7	0	1	U
dspam_dump_vc1103	4.8	0.629	5.43	5.3	0		U
dspam_dump_vc1104	33.2	0.619	33.82	5.1	0		U
dspam_dump_vc949	7.2	0.189	7.39	1.9	0		U
dspam_dump_vc950	7.2	0.187	7.39	4	0		U
dspam_dump_vc962	7.3	0.196	7.50	3.7	0		U
dspam_dump_vc972	6.2	0.391	6.59	7	1		U
dspam_dump_vc973	5	0.377	5.38	5.3	0		U
ACG-20-10p1	407.4	0.298	407.70	417.6	1	3	S
ACG-20-5p1	162.1	0.252	162.35	189.2	1		S
sc16_ACG-20-10p0	353.4	0.308	353.71	403.3	1		U
sc16_ACG-20-10p1	534	0.309	534.31	415.2	0		S
ak128astepbg1btisc	3.9	0.271	4.17	5.9	1	15	S
ak128astepbg2msaig	3.1	0.299	3.40	5.8	1		S
ak128astepbg2msisc	38797.3	0.255	38797.56	T	1		S
ak128boothbg1btisc	3.7	0.340	4.04	6.6	1		S

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Table 3 – continued from previous page

CNF	GPU	GPU	Total	Lingeling	Faster?	Region	Sat.
	+Lingeling (<i>ve+</i>)						
ak128boothbg2msaig	3.1	0.399	3.50	T	1		S
ak128diagobg1btaig	3.7	0.375	4.07	7.2	1		S
ak128diagobg2asaig	12.6	0.267	12.87	10.3	0		S
ak128modasbg1msisc	2.4	0.239	2.64	3.7	1		S
ak128modasbg1sbisc	2.7	0.267	2.97	4.5	1		S
ak128modbtbg1asaig	3.2	0.307	3.51	7	1		S
ak128modbtbg1asisc	3.2	0.232	3.43	4.8	1		S
ak128modbtbg1btaig	3.1	0.387	3.49	7.6	1		S
ak128modbtbg2msisc			T	32734.3	0		S
ak128paralbg1sbisc	3.4	0.306	3.71	5.6	1		S
ak128paralbg2asaig	12.8	0.280	13.08	10.5	0		S
ak128paralparalisc	2404.5	0.242	2404.74	2866.6	1		U
ak128simpbbg1sbisc	3.5	0.310	3.81	5	1		S
ak128simpbbg2asaig	3.3	0.320	3.62	7	1		S
hwmcc15deep-6s188-k44	1729.8	0.229	1730.03	1172.9	0	18	U
hwmcc15deep-6s188-k46	2373.2	0.229	2373.43	2098.4	0		U
hwmcc15deep-6s340rb63-k22	361.6	0.405	362.00	1964.7	1		U
hwmcc15deep-6s341r-k16	112.6	0.673	113.27	133.4	1		U
hwmcc15deep-6s341r-k19	247	0.825	247.82	232.2	0		U
hwmcc15deep-6s366r-k72	3231.3	0.238	3231.54	3707.6	1		U
hwmcc15deep-6s44-k38	612.4	0.268	612.67	678.6	1		U
hwmcc15deep-6s44-k40	1713.8	0.270	1714.07	1225.9	0		U
hwmcc15deep-beembkry8b1-k45	1332.3	0.162	1332.46	2219.9	1		U
hwmcc15deep-beemfwt4b1-k48	17929.2	1.536	17930.74	20329.6	1		U
hwmcc15deep-beemhanoi4b1-k32	5285.6	0.329	5285.93	4304.5	0		U
hwmcc15deep-beemhanoi4b1-k37	13750.5	0.376	13750.88	20672.5	1		U
hwmcc15deep-beemlifts3b1-k29	1703.5	0.716	1704.22	1555.2	0		U
hwmcc15deep-bobpcihm-k30	2027.5	0.208	2027.71	2401	1		U
hwmcc15deep-bobpcihm-k31	3105.5	0.350	3105.85	5024.8	1		U
hwmcc15deep-bobpcihm-k32	2622.5	0.222	2622.72	5360.1	1		U
hwmcc15deep-bobpcihm-k33	3741.2	0.245	3741.45	7194.3	1		U
hwmcc15deep-intel032-k84	1277.7	0.308	1278.01	1920.3	1		U
hwmcc15deep-intel065-k11	2030.9	0.297	2031.20	2698.7	1		U
hwmcc15deep-oski15a10b06s-k24	8513.3	0.828	8514.13	7663.8	0		U
hwmcc15deep-oski15a10b08s-k23	2890.9	0.790	2891.69	2964.7	1		U
hwmcc15deep-oski15a10b10s-k20	5281.3	0.661	5281.96	5170.4	0		U
hwmcc15deep-oski15a10b10s-k22	12251.2	0.749	12251.95	12649.9	1		U
hwmcc15deep-oski15a14b04s-k16	264.9	0.634	265.53	360.4	1		U
hwmcc15deep-oski15a14b30s-k24	1349.9	0.759	1350.66	1440.5	1		U
hwmcc10-timeframe-expansion-k45	209.1	0.472	209.57	193.8	0		U
hwmcc10-timeframe-expansion-k50	367.2	0.490	367.69	632	1		U
UCG-15-10p1	197.6	0.227	197.83	183.4	0	0	S
UCG-20-10p1	397.2	0.333	397.53	282.6	0		S

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Table 3 – continued from previous page

CNF	GPU +Lingeling	GPU (<i>ve+</i>)	Total	Lingeling	Faster?	Region	Sat.
UCG-20-5p1	166	0.313	166.31	138.6	0		S
UR-20-10p1	1571	0.322	1571.32	1108.4	0	1	S
UR-20-5p1	222.3	0.303	222.60	230.7	1		S
sc16_UR-20-10p0	915.2	0.330	915.53	690.1	0		U
UTI-20-10p1	401.5	0.272	401.77	468.7	1	1	S
itox_vc1033	1.4	0.530	1.93	54.3	1	3	S
itox_vc1044	32.6	0.541	33.14	39.7	1		S
itox_vc1130	3.5	0.566	4.07	56.9	1		S
itox_vc1216	0.4	0.579	0.98	0.5	0		U
itox_vc909	50.3	0.519	50.82	43.3	0		S
itox_vc979	0.1	0.531	0.63	0.2	0		U
manol-pipe-c10nidw_s	131.2	0.583	131.78	107.1	0	1	U
manol-pipe-c6nidw_i	37.2	0.196	37.40	29.2	0		U
manol-pipe-c7bidw_i	55.2	0.250	55.45	48.9	0		U
manol-pipe-c7nidw	73.1	0.250	73.35	67.8	0		U
manol-pipe-f10ni	129.7	0.676	130.38	123.3	0		U
manol-pipe-f7idw	69.1	0.367	69.47	50.7	0		U
manol-pipe-f9b	42.2	0.549	42.75	48.7	1		U
manol-pipe-f9n	41.5	0.533	42.03	38.9	0		U
manol-pipe-g10bidw	70.5	0.411	70.91	67.4	0		U
manol-pipe-g10nid	59.2	0.381	59.58	49.4	0		U
blockpuzzle_5x12_s6_free3	273.7	0.064	273.76	282.5	1	7	U
blockpuzzle_7x10_s10_free4	422.7	0.086	422.79	491.7	1		U
blockpuzzle_7x10_s7_free8	30186.5	0.095	30186.59	19510.3	0		S
blockpuzzle_7x10_s9_free6	320.6	0.096	320.70	279.6	0		U
blockpuzzle_8x8_s1_free4	415.9	0.075	415.98	385.8	0		U
blockpuzzle_9x9_s1_free10	32.4	0.135	32.54	57	1		S
blockpuzzle_9x9_s1_free7	1076.9	0.126	1077.03	238.1	0		S
blockpuzzle_9x9_s1_free9	3252.4	0.129	3252.53	5598.8	1		S
blockpuzzle_9x9_s4_free3	446.4	0.118	446.52	657.1	1		U
blockpuzzle_9x9_s5_free3	965.2	0.119	965.32	677	0		U
blockpuzzle_9x9_s7_free8	18304.1	0.134	18304.23	315.6	0		S
blockpuzzle_9x9_s7_free9	812.8	0.136	812.94	350.2	0		S
blockpuzzle_9x9_s8_free3	899.7	0.122	899.82	947.4	1		U
blockpuzzle_9x9_s8_free7	484.1	0.126	484.23	599.5	1		S
mizh-md5-10	1302.1	0.079	1302.18	1280.5	0	3	U
mizh-md5-12	18300.9	0.079	18300.98	18196	0		U
mizh-md5-47-3	2681	0.119	2681.12	2923	1		S
mizh-md5-47-5	925.2	0.116	925.32	5777.2	1		S
mizh-md5-48-2	1610.7	0.127	1610.83	2286.9	1		S
mizh-md5-48-5	7769	0.123	7769.12	3640	0		S
slp-synthesis-aes-top24	6184.2	0.053	6184.25	13630.9	1	3	S
slp-synthesis-aes-top25	2623.2	0.055	2623.26	21349.7	1		S

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Table 3 – continued from previous page

CNF	GPU +Lingeling	GPU (<i>ve+</i>)	Total	Lingeling	Faster?	Region	Sat.
slp-synthesis-aes-top26	8627.1	0.058	8627.16	1520	0		S
slp-synthesis-aes-top28	6326	0.066	6326.07	4156.1	0		S
slp-synthesis-aes-top29	6666.6	0.070	6666.67	3490.1	0		S
slp-synthesis-aes-top30	1499.6	0.071	1499.67	5532.1	1		S
test_v5_r10_vr10_c1_s21502	1078.1	0.474	1078.57	409.8	0	3	U
test_v7_r12_vr10_c1_s18160			T	48385.3	0		U
test_v7_r12_vr1_c1_s22787	4639.6	0.727	4640.33	2201.5	0		U
test_v7_r17_vr5_c1_s25451	10735.7	1.042	10736.74	32462.5	1		U
test_v7_r7_vr10_c1_s32506	477.5	0.425	477.92	975.1	1		S
test_v7_r7_vr5_c1_s14675	353	0.447	353.45	373	1		S
cube-11-h13-unsat	1216.5	0.622	1217.12	1495.2	1	1	U
esawn_uw3.debugged	238.5	15.98	254.48	107.1	0	0	S
ibm-2002-23r-k90	129.4	0.384	129.78	149.6	1	1	S
sin2.c.2	4.2	0.484	4.68	3.6	0	0	S
traffic_3_uc_sat	505.1	1.053	506.15	354.6	0	0	S
partial-10-15-s	231.5	0.395	231.90	273.8	1	2	S
partial-10-19-s	1044.9	0.564	1045.46	4417.2	1		S
newton.2.2.i	181.6	0.450	182.05	184.9	1	2	U
newton.2.3.i	390	0.743	390.74	373.7	0		U
newton.5.1.i	32.5	0.225	32.72	36.7	1		S
newton.8.3.i	303.7	0.756	304.46	229.8	0		S
safe009_pso.oepc	5.2	0.108	5.31	3.1	0	1	U
safe027_pso.opt	9.2	0.167	9.37	14.2	1		U
safe028_tso.oepc	4.4	0.113	4.51	1.8	0		U
safe029_power.opt	32.2	0.272	32.47	29.5	0		S
snCF_model_ixl_bmc_depth_07			T	4217.7	0	0	U
snCF_model_ixl_bmc_depth_08			T	8363	0		U
snCF_model_ixl_bmc_depth_09			T	17326.3	0		U
snCF_model_ixl_bmc_depth_10			T	43782.9	0		U
arcfour_initialPermutation_6_14	193.2	0.094	193.29	191.2	0	0	U
arcfour_initialPermutation_6_15	362.1	0.091	362.19	342.6	0		U
arcfour_initialPermutation_6_16	763.4	0.088	763.49	758.7	0		U
sokoban-p01.sas.ex.17	8.7	0.787	9.49	9.6	1	14	U
sokoban-p04.sas.ex.13	9.6	0.596	10.20	7.5	0		U
sokoban-p09.sas.cr.25	0.6	0.032	0.63	0.4	0		U
sokoban-p10.sas.cr.35	1.8	0.103	1.90	2.4	1		U
sokoban-p16.sas.cr.37	2103.8	0.274	2104.07	2240.5	1		U
sokoban-p16.sas.cr.39	5012.4	0.291	5012.69	5003.5	0		U
sokoban-p16.sas.ex.15	1043.4	11.94	1055.34	1071.3	1		U
sokoban-p16.sas.ex.17	3473.8	13.15	3486.95	3361.2	0		U
sokoban-p16.sas.ex.19	50616.7	13.24	50629.94	27764.2	0		U
sokoban-p16.sas.ex.21			T	79281	0		S
sokoban-p16.sas.ex.23			T	45911.3	0		S

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Table 3 – continued from previous page

CNF	GPU +Lingeling	GPU (<i>ve+</i>)	Total	Lingeling	Faster?	Region Sat.
sokoban-p17.sas.ex.11	1.3	0.531	1.83	3.9	1	U
sokoban-p18.sas.cr.29	1	0.071	1.07	1	0	U
sokoban-p19.sas.cr.23	0.7	0.066	0.77	1.1	1	U
sokoban-p20.sas.cr.21	158	0.215	158.22	179.9	1	U
sokoban-p20.sas.cr.23	349.5	0.211	349.71	351.2	1	U
sokoban-p20.sas.cr.25	838.3	0.234	838.53	878.7	1	U
sokoban-p20.sas.cr.27	2679.6	0.265	2679.87	2370.6	0	U
sokoban-p20.sas.cr.29	8903.1	0.253	8903.35	13267.6	1	U
sokoban-p20.sas.cr.31	30453.9	0.285	30454.18	30611.5	1	U
sokoban-p20.sas.cr.33	79187.4	0.286	79187.69	86018.9	1	U
sokoban-p20.sas.ex.11	598.1	12.36	610.46	749.5	1	U
sokoban-p20.sas.ex.13	2580.9	14.72	2595.62	2499.9	0	U
sokoban-p20.sas.ex.15	25559.3	17.48	25576.78	28588.1	1	U
sokoban-sequential-p145.50	23742.8	0.131	23742.93	5939	0	S
sokoban-sequential-p145.70	11026.7	0.181	11026.88	3122.5	0	S
#CNF solved faster compared to Lingeling						90
Percentage to max. solved CNFs						0.502793
Total Processing Time	771 hours					

Table 4: Lingeling solving of original formulas and GPU simplified formulas (*all*). All running times in seconds. The letter T (with red background) means Timeout (24 hours). Green cells draw a conclusion. Region refers to the count of CNFs solved faster in a particular family. The white cells in the Region column means the corresponding CNFs belong to the same family. The last column (Sat.) denotes the solving result of the CNF whether Satisfiable (S) or Unsatisfiable (U).

CNF	GPU +Lingeling	GPU (<i>all</i>)	Total	Lingeling	Faster?	Region	Sat.
26_stack_cas_longest	0.2	2.796	3.00	7	1	1	S
9dlx_vliw_at_b.iq1	17.9	1.896	19.80	21.9	1	4	U
9dlx_vliw_at_b.iq2	62.2	3.248	65.45	44.9	0		U
9dlx_vliw_at_b.iq3	101.9	5.609	107.51	119.1	1		U
9dlx_vliw_at_b.iq4-345	201.9	9.246	211.15	194.8	0		U
9dlx_vliw_at_b.iq4	175.6	9.355	184.95	198.8	1		U
9dlx_vliw_at_b.iq5	322	11.051	333.05	339.6	1		U
9dlx_vliw_at_b.iq6	521.3	16.980	538.28	526.4	0		U
9dlx_vliw_at_b.iq7	836.7	26.957	863.66	855.9	0		U
9dlx_vliw_at_b.iq8-718	1215.3	45.261	1260.56	993.2	0		U
9dlx_vliw_at_b.iq8	1157.7	48.793	1206.49	992.2	0		U
dated-10-17-u	652.9	4.218	657.12	800.2	1	1	U
podwr001_power.opt	88.5	4.740	93.24	111.1	1	1	S
transport-city-35n	1343.6	9.415	1353.02	515.8	0	1	S
transport-2cities-15n-20	201.9	6.959	208.86	198.4	0		S
transport-2cities-15n-40	448.9	13.799	462.70	1811.7	1		S
valves-gates-1-k617-unsat	1436.7	18.475	1455.18	1536	1	1	U
velev-pipe-oun-1.1-05	8935.2	109.181	9044.38	11379.5	1	2	U
velev-vliw-uns-2.0-ug5	316.1	20.263	336.36	337.4	1		U
dspam_dump_vc1093	5.7	1.000	6.70	2.7	0	0	U
dspam_dump_vc1103	5	2.792	7.79	5.3	0		U
dspam_dump_vc1104	4.8	2.886	7.69	5.1	0		U
dspam_dump_vc949	7.3	1.267	8.57	1.9	0		U
dspam_dump_vc950	7.2	1.178	8.38	4	0		U
dspam_dump_vc962	7.4	1.041	8.44	3.7	0		U
dspam_dump_vc972	6.5	2.794	9.29	7	0		U
dspam_dump_vc973	5.1	2.909	8.01	5.3	0		U
ACG-20-10p1	404.2	5.943	410.14	417.6	1	3	S
ACG-20-5p1	213.7	4.955	218.66	189.2	0		S
sc16_ACG-20-10p0	368.2	2.934	371.13	403.3	1		U
sc16_ACG-20-10p1	389.3	3.060	392.36	415.2	1		S
ak128astepbg1btisc	3.6	2.187	5.79	5.9	1	8	S
ak128astepbg2msaig	3.1	1.513	4.61	5.8	1		S
ak128boothbg1btisc	3.8	5.036	8.84	6.6	0		S
ak128boothbg2msaig	3.1	1.731	4.83	T	1		S

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Table 4 – continued from previous page

CNF	GPU +Lingeling	GPU (all)	Total	Lingeling	Faster?	Region	Sat.
ak128diagobg1btaig	3.6	2.684	6.28	7.2	1		S
ak128diagobg2asaig	12.6	0.824	13.42	10.3	0		S
ak128modasbg1msisc	2.4	1.401	3.80	3.7	0		S
ak128modasbg1sbisc	2.7	1.924	4.62	4.5	0		S
ak128modbtbg1asaig	3.1	2.405	5.51	7	1		S
ak128modbtbg1asisc	3.2	3.166	6.37	4.8	0		S
ak128modbtbg1btaig	3.1	4.098	7.20	7.6	1		S
ak128modbtbg2msisc			T	32734.3	0		S
ak128paralbg1sbisc	3.7	3.871	7.57	5.6	0		S
ak128paralbg2asaig	12.6	0.965	13.57	10.5	0		S
ak128paralparalisc	2539.6	1.504	2541.10	2866.6	1		U
ak128simpbbg1sbisc	3.6	4.524	8.12	5	0		S
ak128simpbbg2asaig	3.3	3.585	6.88	7	1		S
hwmcc15deep-6s188-k44	1996.4	1.626	1998.03	1172.9	0	16	U
hwmcc15deep-6s188-k46	3288.4	1.708	3290.11	2098.4	0		U
hwmcc15deep-6s340rb63-k22	439.7	2.768	442.47	1964.7	1		U
hwmcc15deep-6s341r-k16	139.7	3.890	143.59	133.4	0		U
hwmcc15deep-6s341r-k19	230.5	5.195	235.69	232.2	0		U
hwmcc15deep-6s366r-k72	2027.1	1.149	2028.25	3707.6	1		U
hwmcc15deep-6s44-k38	571.9	2.719	574.62	678.6	1		U
hwmcc15deep-6s44-k40	1180.3	2.846	1183.15	1225.9	1		U
hwmcc15deep-beembkry8b1-k45	2599	2.258	2601.26	2219.9	0		U
hwmcc15deep-beemfwt4b1-k48	22446.7	14.047	22460.75	20329.6	0		U
hwmcc15deep-beemhanoi4b1-k32	9410.2	5.687	9415.89	4304.5	0		U
hwmcc15deep-beemhanoi4b1-k37	17371.1	6.182	17377.28	20672.5	1		U
hwmcc15deep-beemlifts3b1-k29	1581.8	6.035	1587.84	1555.2	0		U
hwmcc15deep-bobpcihm-k30	1683.4	1.919	1685.32	2401	1		U
hwmcc15deep-bobpcihm-k31	1874.6	2.066	1876.67	5024.8	1		U
hwmcc15deep-bobpcihm-k32	3948.6	2.345	3950.95	5360.1	1		U
hwmcc15deep-bobpcihm-k33	6226.9	2.422	6229.32	7194.3	1		U
hwmcc15deep-intel032-k84	1364.4	1.369	1365.77	1920.3	1		U
hwmcc15deep-intel065-k11	1878	1.165	1879.17	2698.7	1		U
hwmcc15deep-oski15a10b06s-k24	10352.1	4.796	10356.90	7663.8	0		U
hwmcc15deep-oski15a10b08s-k23	3149.8	5.005	3154.81	2964.7	0		U
hwmcc15deep-oski15a10b10s-k20	4159.9	4.216	4164.12	5170.4	1		U
hwmcc15deep-oski15a10b10s-k22	9416.8	4.838	9421.64	12649.9	1		U
hwmcc15deep-oski15a14b04s-k16	305.6	5.037	310.64	360.4	1		U
hwmcc15deep-oski15a14b30s-k24	1341.2	5.502	1346.70	1440.5	1		U
hwmcc10-timeframe-expansion-k45	284.5	2.691	287.19	193.8	0		U
hwmcc10-timeframe-expansion-k50	554.5	2.806	557.31	632	1		U
UCG-15-10p1	192.5	3.500	196.00	183.4	0	1	S
UCG-20-10p1	356.8	5.539	362.34	282.6	0		S
UCG-20-5p1	128.1	4.819	132.92	138.6	1		S

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Table 4 – continued from previous page

CNF	GPU +Lingeling	GPU (all)	Total	Lingeling	Faster?	Region	Sat.
UR-20-10p1	858	10.306	868.31	1108.4	1	2	S
UR-20-5p1	260.4	9.370	269.77	230.7	0		S
sc16_UR-20-10p0	595.7	5.137	600.84	690.1	1		U
UTI-20-10p1	349.8	11.835	361.64	468.7	1	1	S
itox_vc1033	48.1	1.208	49.31	54.3	1	3	S
itox_vc1044	43.7	1.060	44.76	39.7	0		S
itox_vc1130	3.1	1.130	4.23	56.9	1		S
itox_vc1216	0.3	1.200	1.50	0.5	0		U
itox_vc909	3.7	0.982	4.68	43.3	1		S
itox_vc979	0.3	1.178	1.48	0.2	0		U
manol-pipe-c10nidw_s	66.4	6.487	72.89	107.1	1	2	U
manol-pipe-c6nidw_i	30.1	1.661	31.76	29.2	0		U
manol-pipe-c7bidw_i	54.4	2.245	56.64	48.9	0		U
manol-pipe-c7nidw	75.6	2.938	78.54	67.8	0		U
manol-pipe-f10ni	119.7	6.103	125.80	123.3	0		U
manol-pipe-f7idw	65	4.669	69.67	50.7	0		U
manol-pipe-f9b	41.6	2.749	44.35	48.7	1		U
manol-pipe-f9n	40.5	3.030	43.53	38.9	0		U
manol-pipe-g10bidw	66.2	3.701	69.90	67.4	0		U
manol-pipe-g10nid	62	3.910	65.91	49.4	0		U
blockpuzzle_5x12_s6_free3	247.8	4.109	251.91	282.5	1	7	U
blockpuzzle_7x10_s10_free4	422.5	6.817	429.32	491.7	1		U
blockpuzzle_7x10_s7_free8	4177.6	7.702	4185.30	19510.3	1		S
blockpuzzle_7x10_s9_free6	279	5.142	284.14	279.6	0		U
blockpuzzle_8x8_s1_free4	420.5	6.825	427.33	385.8	0		U
blockpuzzle_9x9_s1_free10	396.4	13.279	409.68	57	0		S
blockpuzzle_9x9_s1_free7	675.3	6.184	681.48	238.1	0		S
blockpuzzle_9x9_s1_free9	1009.3	17.581	1026.88	5598.8	1		S
blockpuzzle_9x9_s4_free3	567.9	5.427	573.33	657.1	1		U
blockpuzzle_9x9_s5_free3	755.6	14.460	770.06	677	0		U
blockpuzzle_9x9_s7_free8	4563.1	12.191	4575.29	315.6	0		S
blockpuzzle_9x9_s7_free9	244.5	13.252	257.75	350.2	1		S
blockpuzzle_9x9_s8_free3	820.4	11.453	831.85	947.4	1		U
blockpuzzle_9x9_s8_free7	611.5	11.838	623.34	599.5	0		S
mizh-md5-10	1346.4	0.321	1346.72	1280.5	0	5	U
mizh-md5-12	17934.1	0.318	17934.42	18196	1		U
mizh-md5-47-3	2684.8	2.109	2686.91	2923	1		S
mizh-md5-47-5	91.7	1.953	93.65	5777.2	1		S
mizh-md5-48-2	102.8	2.106	104.91	2286.9	1		S
mizh-md5-48-5	936.6	2.046	938.65	3640	1		S
slp-synthesis-aes-top24	2824.7	1.239	2825.94	13630.9	1	6	S
slp-synthesis-aes-top25	5104.7	1.314	5106.01	21349.7	1		S
slp-synthesis-aes-top26	717.6	1.552	719.15	1520	1		S

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Table 4 – continued from previous page

CNF	GPU +Lingeling	GPU (all)	Total	Lingeling	Faster?	Region	Sat.
slp-synthesis-aes-top28	1670.3	1.549	1671.85	4156.1	1		S
slp-synthesis-aes-top29	3414.6	1.622	3416.22	3490.1	1		S
slp-synthesis-aes-top30	2418.8	1.714	2420.51	5532.1	1		S
test_v5_r10_vr10_c1_s21502	453.1	6.355	459.46	409.8	0	2	U
test_v7_r12_vr10_c1_s18160			T	48385.3	0		U
test_v7_r12_vr1_c1_s22787	2799.2	10.577	2809.78	2201.5	0		U
test_v7_r17_vr5_c1_s25451			T	32462.5	0		U
test_v7_r7_vr10_c1_s32506	868.9	6.233	875.13	975.1	1		S
test_v7_r7_vr5_c1_s14675	328.7	5.768	334.47	373	1		S
cube-11-h13-unsat	811.1	2.077	813.18	1495.2	1	1	U
esawn_uw3.debugged	130	332.504	462.50	107.1	0	0	S
ibm-2002-23r-k90	189	5.257	194.26	149.6	0	0	S
sin2.c.2	16.5	3.452	19.95	3.6	0	0	S
traffic_3_uc.sat	841	28.479	869.48	354.6	0	0	S
partial-10-15-s	245.5	3.891	249.39	273.8	1	1	S
partial-10-19-s	6489.1	7.638	6496.74	4417.2	0		S
newton.2.2.i	165.1	4.925	170.02	184.9	1	2	U
newton.2.3.i	429	7.119	436.12	373.7	0		U
newton.5.1.i	32.5	1.869	34.37	36.7	1		S
newton.8.3.i	233.9	7.950	241.85	229.8	0		S
safe009_pso.oepc	3.7	2.241	5.94	3.1	0	0	U
safe027_pso.opt	9.1	6.156	15.26	14.2	0		U
safe028_tso.oepc	21	2.895	23.89	1.8	0		U
safe029_power.opt	28.8	3.012	31.81	29.5	0		S
sncl_model_ixl_bmc_depth_07	4623.4	7.818	4631.22	4217.7	0	4	U
sncl_model_ixl_bmc_depth_08	7487.5	8.413	7495.91	8363	1		U
sncl_model_ixl_bmc_depth_09	16894.5	9.802	16904.30	17326.3	1		U
sncl_model_ixl_bmc_depth_10	32242.6	10.759	32253.36	43782.9	1		U
sncl_model_ixl_bmc_depth_11	70053.2	11.663	70064.86	T	1		U
arcfour_initialPermutation_6_14	190.5	0.094	190.59	191.2	1	1	U
arcfour_initialPermutation_6_15	494.3	0.091	494.39	342.6	0		U
arcfour_initialPermutation_6_16	765.9	0.088	765.99	758.7	0		U
sokoban-p01.sas.ex.17	8.4	0.787	9.19	9.6	1	17	U
sokoban-p04.sas.ex.13	2.7	0.596	3.30	7.5	1		U
sokoban-p09.sas.cr.25	0.6	0.032	0.63	0.4	0		U
sokoban-p10.sas.cr.35	1.8	0.103	1.90	2.4	1		U
sokoban-p16.sas.cr.37	2483.4	0.274	2483.67	2240.5	0		U
sokoban-p16.sas.cr.39	5041.6	0.291	5041.89	5003.5	0		U
sokoban-p16.sas.ex.15	927	11.942	938.94	1071.3	1		U
sokoban-p16.sas.ex.17	4065.5	13.146	4078.65	3361.2	0		U
sokoban-p16.sas.ex.19	61367.7	13.235	61380.94	27764.2	0		U
sokoban-p16.sas.ex.21			T	79281	0		S
sokoban-p16.sas.ex.23	1703.1	750.647	2453.75	45911.3	1		S

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Table 4 – continued from previous page

CNF	GPU +Lingeling	GPU (all)	Total	Lingeling	Faster?	Region Sat.
sokoban-p17.sas.ex.11	1.3	0.531	1.83	3.9	1	U
sokoban-p18.sas.cr.29	0.9	0.071	0.97	1	1	U
sokoban-p19.sas.cr.23	0.8	0.066	0.87	1.1	1	U
sokoban-p20.sas.cr.21	174.7	0.215	174.92	179.9	1	U
sokoban-p20.sas.cr.23	312.2	0.211	312.41	351.2	1	U
sokoban-p20.sas.cr.25	759.8	0.234	760.03	878.7	1	U
sokoban-p20.sas.cr.27	2614.5	0.265	2614.77	2370.6	0	U
sokoban-p20.sas.cr.29	9889.3	0.253	9889.55	13267.6	1	U
sokoban-p20.sas.cr.31	26605	0.285	26605.28	30611.5	1	U
sokoban-p20.sas.cr.33			T	86018.9	0	U
sokoban-p20.sas.ex.11	558.6	12.356	570.96	749.5	1	U
sokoban-p20.sas.ex.13	2240.8	14.718	2255.52	2499.9	1	U
sokoban-p20.sas.ex.15	27711.8	17.484	27729.28	28588.1	1	U
sokoban-sequential-p145.50	4561.2	0.131	4561.33	5939	1	S
sokoban-sequential-p145.70	14671.3	0.181	14671.48	3122.5	0	S
#CNF solved faster compared to Lingeling						93
Percentage to max. solved CNFs						0.51955
Total Processing Time		670 hours				

A.2 SAT Simplifications

Table 5: GPU simplification performance evaluation (original and directly ported sequential CPU version). All running times in seconds. *VO* refers to *Variable Ordering* executed by *A-construction* algorithm. *OT* refers to the *Occurrence Table* creation. $t_c(s)$ denotes the transfer time between the host and device. Green cells draw a conclusion.

CNF	CPU					GPU					
	VO	OT	BVE	HSE	SE	VO	OT	BVIPE	PHSE	PSE	$t_c(s)$
26_stack_cas_longest	0.965	0.328	0.304	0.002	132	0.019	0.083	0.006	0.000	1.91	0.103
9dlx_vliw_at_b_iq1	0.045	0.045	0.023	0.005	11	0.001	0.006	0.032	0.030	1.01	0.008
9dlx_vliw_at_b_iq2	0.102	0.098	0.047	0.010	39	0.002	0.011	0.019	0.014	2.36	0.014
9dlx_vliw_at_b_iq3	0.171	0.132	0.080	0.019	104	0.004	0.017	0.048	0.025	5.47	0.024
9dlx_vliw_at_b_iq4-345	0.262	0.214	0.106	0.023	257	0.006	0.026	0.055	0.034	6.73	0.039
9dlx_vliw_at_b_iq4	0.247	0.191	0.102	0.024	261	0.006	0.026	0.056	0.033	7.09	0.040
9dlx_vliw_at_b_iq5	0.378	0.375	0.165	0.037	563	0.009	0.044	0.139	0.081	12.7	0.058
9dlx_vliw_at_b_iq6	0.471	0.440	0.221	0.051	1123	0.011	0.054	0.217	0.151	13.9	0.078
9dlx_vliw_at_b_iq7	0.800	0.765	0.453	0.065	2956	0.027	0.084	0.105	0.080	29.0	0.142
9dlx_vliw_at_b_iq8-718	1.018	0.837	0.440	0.084	4194	0.034	0.106	0.255	0.213	32.7	0.146
9dlx_vliw_at_b_iq8	0.951	0.830	0.440	0.083	4190	0.034	0.107	0.259	0.214	41.6	0.158
arcfour_initialPermut_5_32	0.029	0.025	0.027	0.008	0.091	0.001	0.003	0.001	0.001	0.21	0.003
arcfour_initialPermut_6_14	0.125	0.089	0.227	0.113	0.618	0.003	0.009	0.006	0.002	1.16	0.013
arcfour_initialPermut_6_15	0.119	0.086	0.228	0.114	0.616	0.002	0.009	0.006	0.002	1.18	0.014
arcfour_initialPermut_6_16	0.094	0.074	0.173	0.085	0.617	0.003	0.009	0.006	0.002	1.09	0.014
arcfour_initialPermut_6_24	0.111	0.085	0.227	0.113	0.614	0.002	0.009	0.006	0.002	1.10	0.014
arcfour_initialPermut_6_40	0.112	0.085	0.227	0.113	0.613	0.002	0.009	0.007	0.003	1.58	0.014
arcfour_initialPermut_6_56	0.118	0.086	0.227	0.113	0.612	0.003	0.010	0.006	0.002	1.18	0.015
arcfour_initialPermut_6_64	0.135	0.116	0.234	0.111	0.619	0.002	0.009	0.007	0.002	1.64	0.014
cube-11-h13-unsat	0.371	0.269	0.336	0.003	24.79	0.005	0.030	0.073	0.010	0.63	0.040
dated-10-17-u	0.151	0.131	0.170	0.075	0.110	0.004	0.015	0.013	0.003	1.79	0.022
dspam_dump_vc1093	0.091	0.066	0.102	0.033	0.785	0.002	0.008	0.008	0.011	0.42	0.012
dspam_dump_vc1103	0.229	0.162	0.231	0.078	0.885	0.003	0.020	0.011	0.013	1.16	0.030
dspam_dump_vc1104	0.231	0.161	0.266	0.078	0.888	0.004	0.023	0.012	0.013	1.09	0.032
dspam_dump_vc949	0.096	0.071	0.108	0.037	0.551	0.002	0.009	0.004	0.007	0.37	0.013
dspam_dump_vc950	0.094	0.071	0.108	0.037	0.554	0.002	0.009	0.005	0.007	0.49	0.012
dspam_dump_vc962	0.085	0.063	0.097	0.032	0.579	0.002	0.007	0.004	0.007	0.40	0.011
dspam_dump_vc972	0.197	0.140	0.220	0.077	0.693	0.004	0.019	0.006	0.009	1.03	0.031
dspam_dump_vc973	0.242	0.175	0.246	0.079	0.704	0.005	0.019	0.007	0.008	1.15	0.031
esawn_uw3_debugged	11.243	6.327	6.625	0.639	640.7	0.204	0.862	0.133	0.029	183	1.263
ACG-20-10p1	0.244	0.200	0.197	0.129	0.248	0.004	0.035	0.006	0.003	2.79	0.036
ACG-20-5p1	0.220	0.166	0.171	0.112	0.218	0.004	0.022	0.005	0.002	2.43	0.035
ak128astepbg1btisc	0.282	0.207	0.282	0.051	3.413	0.004	0.029	0.005	0.001	0.85	0.039
ak128astepbg2asisc	0.190	0.154	0.207	0.050	0.189	0.003	0.020	0.003	0.001	0.48	0.031
ak128astepbg2msaig	0.310	0.222	0.299	0.000	2.451	0.006	0.027	0.005	0.000	0.50	0.036

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Table 5 – continued from previous page

CNF	CPU					GPU					$t_c(s)$
	VO	OT	BVE	HSE	SE	VO	OT	BVIPE	PHSE	PSE	
ak128astepbg2msisc	0.207	0.157	0.234	0.051	2.141	0.004	0.021	0.003	0.001	0.35	0.034
ak128astepmodasaig	0.339	0.247	0.300	0.000	2.426	0.006	0.027	0.004	0.000	0.94	0.037
ak128astepmodbtisc	0.242	0.178	0.257	0.054	2.174	0.004	0.020	0.003	0.001	0.82	0.036
ak128boothbg1btisc	0.319	0.210	0.361	0.052	5.658	0.007	0.030	0.005	0.001	1.25	0.047
ak128boothbg2asisc	0.254	0.174	0.283	0.051	3.527	0.004	0.027	0.004	0.001	1.59	0.040
ak128boothbg2msaig	0.477	0.327	0.420	0.000	5.993	0.008	0.041	0.007	0.000	0.54	0.053
ak128boothbg2msisc	0.311	0.206	0.316	0.052	3.644	0.006	0.027	0.005	0.001	0.71	0.042
ak128boothboothisc	0.368	0.234	0.386	0.057	5.701	0.007	0.031	0.005	0.001	1.20	0.049
ak128boothdiagoaig	0.494	0.302	0.380	0.000	2.890	0.007	0.034	0.005	0.000	1.11	0.048
ak128boothmodasaig	0.521	0.324	0.421	0.000	5.953	0.007	0.037	0.006	0.000	0.53	0.053
ak128diagobg1btaig	0.511	0.389	0.403	0.000	2.844	0.007	0.035	0.005	0.000	1.11	0.047
ak128diagobg2asaig	0.280	0.216	0.255	0.000	0.047	0.004	0.024	0.004	0.000	0.29	0.029
ak128diagodiagoisc	0.197	0.169	0.230	0.050	0.186	0.004	0.022	0.004	0.001	0.35	0.029
ak128modasbg1msisc	0.234	0.164	0.265	0.052	4.270	0.005	0.024	0.004	0.001	0.46	0.037
ak128modasbg1sbisc	0.248	0.167	0.291	0.051	3.050	0.004	0.029	0.004	0.001	0.73	0.041
ak128modasmodasisc	0.266	0.189	0.286	0.052	4.271	0.006	0.024	0.005	0.001	0.45	0.038
ak128modbtbg1asaig	0.344	0.229	0.262	0.000	0.598	0.006	0.027	0.004	0.000	1.23	0.035
ak128modbtbg1asisc	0.234	0.157	0.251	0.050	2.206	0.004	0.020	0.003	0.001	0.82	0.034
ak128modbtbg1btaig	0.494	0.325	0.382	0.000	2.929	0.007	0.037	0.005	0.000	2.45	0.052
ak128modbtbg2msisc	0.257	0.169	0.264	0.051	4.196	0.005	0.023	0.004	0.001	0.67	0.037
ak128modbtsimpbaig	0.443	0.297	0.331	0.000	2.376	0.007	0.039	0.006	0.000	1.59	0.042
ak128paralbg1sbisc	0.228	0.179	0.257	0.049	1.921	0.004	0.025	0.004	0.001	0.68	0.038
ak128paralbg2asaig	0.309	0.248	0.257	0.000	0.048	0.004	0.028	0.006	0.000	0.26	0.031
ak128paralparalisc	0.212	0.173	0.218	0.052	0.201	0.004	0.021	0.004	0.001	0.34	0.029
ak128paralsimpbaig	0.384	0.285	0.329	0.000	2.546	0.007	0.036	0.006	0.000	1.41	0.040
ak128simpbbg1sbisc	0.251	0.181	0.315	0.050	3.102	0.004	0.031	0.005	0.001	0.99	0.045
ak128simpbbg2asaig	0.358	0.269	0.327	0.000	2.560	0.006	0.032	0.005	0.000	1.41	0.040
hwmcc15deep-6s188-k44	0.173	0.145	0.199	0.005	0.146	0.002	0.015	0.004	0.001	0.56	0.023
hwmcc15deep-6s188-k46	0.184	0.154	0.212	0.006	0.155	0.004	0.016	0.004	0.001	0.58	0.023
hwmcc15deep-6s340rb63-k22	0.247	0.180	0.254	0.004	3.889	0.004	0.019	0.014	0.007	0.93	0.028
hwmcc15deep-6s341r-k16	0.234	0.175	0.238	0.007	0.414	0.004	0.022	0.021	0.008	1.09	0.032
hwmcc15deep-6s341r-k19	0.316	0.248	0.331	0.010	0.568	0.006	0.027	0.025	0.008	1.61	0.042
hwmcc15deep-6s366r-k72	0.190	0.142	0.206	0.001	1.553	0.004	0.015	0.004	0.000	0.52	0.020
hwmcc15deep-6s44-k38	0.223	0.205	0.244	0.004	0.367	0.003	0.017	0.004	0.001	0.84	0.024
hwmcc15deep-6s44-k40	0.191	0.162	0.195	0.004	0.390	0.003	0.017	0.004	0.001	0.94	0.026
hwmcc15deep-beembkry8b1-k45	0.209	0.113	0.159	0.001	0.096	0.003	0.014	0.003	0.000	0.89	0.020
hwmcc15deep-beemfwt4b1-k48	2.350	1.307	1.259	0.079	0.421	0.021	0.115	0.022	0.002	4.94	0.191
hwmcc15deep-beemhanoi4b1-k32	0.324	0.197	0.261	0.035	0.220	0.004	0.024	0.017	0.003	2.52	0.035
hwmcc15deep-beemhanoi4b1-k37	0.366	0.229	0.296	0.040	0.259	0.006	0.027	0.016	0.002	2.77	0.040
hwmcc15deep-beemlifts3b1-k29	1.064	0.779	0.844	0.034	0.490	0.014	0.073	0.028	0.005	2.03	0.113
hwmcc15deep-bobpcihm-k30	0.171	0.130	0.177	0.003	0.200	0.003	0.014	0.003	0.000	0.68	0.019
hwmcc15deep-bobpcihm-k31	0.179	0.138	0.184	0.003	0.210	0.002	0.013	0.003	0.000	0.80	0.020
hwmcc15deep-bobpcihm-k32	0.194	0.151	0.193	0.004	0.220	0.003	0.015	0.004	0.001	0.92	0.022

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Table 5 – continued from previous page

CNF	CPU					GPU					$t_c(s)$
	VO	OT	BVE	HSE	SE	VO	OT	BVIPE	PHSE	PSE	
hwmcc15deep-bobpcihm-k33	0.182	0.153	0.203	0.004	0.230	0.003	0.015	0.003	0.001	0.92	0.022
hwmcc15deep-intel032-k84	0.356	0.229	0.243	0.005	0.091	0.005	0.022	0.005	0.000	0.41	0.037
hwmcc15deep-intel065-k11	0.139	0.084	0.122	0.004	0.147	0.002	0.011	0.003	0.004	0.24	0.016
hwmcc15deep-oski15a10b06s-k24	0.568	0.358	0.410	0.003	0.545	0.007	0.036	0.008	0.002	1.97	0.057
hwmcc15deep-oski15a10b08s-k23	0.518	0.331	0.392	0.003	0.524	0.007	0.034	0.007	0.002	1.94	0.053
hwmcc15deep-oski15a10b10s-k20	0.428	0.275	0.331	0.002	0.430	0.006	0.029	0.006	0.002	1.40	0.045
hwmcc15deep-oski15a10b10s-k22	0.506	0.310	0.370	0.003	0.493	0.007	0.034	0.007	0.002	1.82	0.052
hwmcc15deep-oski15a14b04s-k16	0.427	0.237	0.326	0.003	0.481	0.006	0.029	0.007	0.006	1.58	0.041
hwmcc15deep-oski15a14b30s-k24	0.732	0.461	0.486	0.006	0.550	0.008	0.039	0.010	0.009	2.09	0.059
mizh-md5-10	0.071	0.047	0.058	0.019	0.000	0.002	0.006	0.001	0.000	0.01	0.008
mizh-md5-12	0.072	0.046	0.058	0.019	0.000	0.002	0.006	0.001	0.000	0.01	0.008
mizh-md5-47-3	0.061	0.047	0.043	0.002	0.110	0.002	0.007	0.002	0.001	0.92	0.009
mizh-md5-47-5	0.061	0.047	0.043	0.002	0.121	0.002	0.007	0.002	0.000	0.91	0.008
mizh-md5-48-2	0.061	0.044	0.042	0.002	0.113	0.001	0.006	0.002	0.000	0.95	0.008
mizh-md5-48-5	0.062	0.048	0.044	0.002	0.114	0.002	0.007	0.002	0.000	0.94	0.008
slp-synthesis-aes-top24	0.064	0.034	0.056	0.000	0.210	0.002	0.006	0.002	0.000	0.57	0.006
slp-synthesis-aes-top25	0.065	0.037	0.060	0.000	0.238	0.002	0.007	0.002	0.000	0.63	0.007
slp-synthesis-aes-top26	0.069	0.040	0.065	0.000	0.260	0.001	0.006	0.002	0.000	0.62	0.007
slp-synthesis-aes-top28	0.082	0.055	0.077	0.000	0.327	0.001	0.007	0.003	0.000	0.69	0.009
slp-synthesis-aes-top29	0.087	0.058	0.083	0.000	0.356	0.002	0.007	0.002	0.000	0.85	0.010
slp-synthesis-aes-top30	0.091	0.065	0.089	0.000	0.372	0.002	0.007	0.003	0.000	0.90	0.010
UCG-15-10p1	0.170	0.127	0.120	0.085	0.265	0.004	0.016	0.010	0.002	3.23	0.020
UCG-20-10p1	0.200	0.168	0.205	0.123	0.454	0.003	0.021	0.017	0.004	5.03	0.028
UCG-20-5p1	0.163	0.135	0.169	0.108	0.397	0.004	0.017	0.026	0.005	4.62	0.024
UR-20-10p1	0.197	0.158	0.186	0.118	0.456	0.003	0.018	0.014	0.004	4.62	0.029
UR-20-5p1	0.185	0.163	0.179	0.111	0.405	0.004	0.016	0.012	0.004	4.01	0.024
UTI-20-10p1	0.194	0.170	0.167	0.097	0.448	0.003	0.019	0.011	0.004	5.07	0.031
hwmcc10-timeframe-expansion-k45	0.143	0.112	0.166	0.001	0.428	0.003	0.012	0.003	0.001	0.95	0.016
hwmcc10-timeframe-expansion-k50	0.164	0.117	0.187	0.001	0.470	0.003	0.013	0.003	0.000	1.14	0.018
ibm-2002-23r-k90	0.174	0.178	0.186	0.014	1.406	0.003	0.019	0.006	0.001	2.50	0.033
itox_vc1033	0.100	0.068	0.114	0.018	3.971	0.002	0.009	0.013	0.013	0.35	0.011
itox_vc1044	0.102	0.071	0.117	0.018	4.073	0.002	0.009	0.012	0.013	0.37	0.011
itox_vc1130	0.095	0.059	0.108	0.015	4.090	0.003	0.010	0.010	0.013	0.49	0.015
itox_vc1216	0.094	0.060	0.108	0.016	4.052	0.002	0.010	0.015	0.013	0.54	0.015
itox_vc909	0.090	0.061	0.103	0.017	3.544	0.002	0.008	0.007	0.012	0.40	0.011
itox_vc979	0.092	0.063	0.106	0.017	3.663	0.002	0.008	0.011	0.013	0.47	0.012
manol-pipe-c10nidw_s	0.300	0.220	0.298	0.002	1.626	0.006	0.028	0.007	0.000	2.62	0.038
manol-pipe-c6nidw_i	0.067	0.047	0.069	0.000	0.157	0.001	0.006	0.002	0.000	0.65	0.010
manol-pipe-c7bidw_i	0.124	0.086	0.122	0.000	0.304	0.002	0.009	0.003	0.000	0.83	0.013
manol-pipe-c7nidw	0.153	0.103	0.158	0.000	0.396	0.002	0.012	0.003	0.000	0.98	0.016
manol-pipe-f10ni	0.275	0.193	0.270	0.001	1.078	0.005	0.023	0.011	0.010	2.27	0.033
manol-pipe-f7idw	0.200	0.152	0.197	0.000	0.555	0.003	0.018	0.004	0.000	1.51	0.024
manol-pipe-f9b	0.128	0.096	0.133	0.000	0.476	0.002	0.012	0.005	0.006	1.05	0.017

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Table 5 – continued from previous page

CNF	CPU					GPU					$t_c(s)$
	VO	OT	BVE	HSE	SE	VO	OT	BVIPE	PHSE	PSE	
manol-pipe-f9n	0.169	0.126	0.174	0.000	0.484	0.003	0.013	0.005	0.006	1.12	0.017
manol-pipe-g10bidw	0.186	0.143	0.215	0.000	0.522	0.004	0.017	0.005	0.000	1.51	0.023
manol-pipe-g10nid	0.149	0.116	0.159	0.001	0.470	0.004	0.015	0.004	0.000	1.42	0.021
blockpuzzle_5x12_s6_free3	0.025	0.014	0.009	0.003	0.636	0.001	0.004	0.008	0.040	2.69	0.005
blockpuzzle_7x10_s10_free4	0.045	0.025	0.015	0.005	1.067	0.002	0.006	0.011	0.051	3.55	0.007
blockpuzzle_7x10_s7_free8	0.041	0.029	0.017	0.005	1.223	0.002	0.007	0.012	0.055	3.85	0.009
blockpuzzle_7x10_s9_free6	0.036	0.023	0.016	0.005	1.157	0.002	0.007	0.012	0.052	4.02	0.008
blockpuzzle_8x8_s1_free4	0.031	0.018	0.012	0.004	0.758	0.002	0.005	0.010	0.047	2.75	0.006
blockpuzzle_9x9_s1_free10	0.067	0.053	0.027	0.008	2.300	0.002	0.010	0.012	0.069	6.60	0.013
blockpuzzle_9x9_s1_free7	0.055	0.040	0.023	0.008	1.975	0.002	0.010	0.015	0.067	6.26	0.012
blockpuzzle_9x9_s1_free9	0.066	0.052	0.026	0.008	2.145	0.003	0.010	0.016	0.069	6.81	0.011
blockpuzzle_9x9_s4_free3	0.049	0.035	0.021	0.008	1.703	0.002	0.009	0.015	0.067	5.15	0.011
blockpuzzle_9x9_s5_free3	0.049	0.035	0.021	0.008	1.660	0.002	0.009	0.014	0.065	5.31	0.011
blockpuzzle_9x9_s7_free8	0.057	0.042	0.024	0.008	2.152	0.002	0.010	0.017	0.071	8.67	0.013
blockpuzzle_9x9_s7_free9	0.058	0.043	0.025	0.008	2.194	0.002	0.010	0.017	0.072	6.48	0.013
blockpuzzle_9x9_s8_free3	0.056	0.044	0.022	0.008	1.696	0.002	0.009	0.014	0.067	5.35	0.011
blockpuzzle_9x9_s8_free7	0.055	0.040	0.023	0.008	1.986	0.002	0.009	0.016	0.068	5.72	0.013
newton.2.2.i	0.183	0.174	0.236	0.067	4.234	0.003	0.017	0.004	0.003	2.53	0.033
newton.2.3.i	0.285	0.209	0.326	0.100	7.487	0.006	0.025	0.007	0.008	3.55	0.050
newton.5.1.i	0.102	0.087	0.126	0.037	0.967	0.002	0.009	0.003	0.002	0.85	0.015
newton.8.3.i	0.282	0.209	0.325	0.100	7.538	0.007	0.026	0.008	0.008	4.19	0.051
partial-10-13-u	0.155	0.142	0.154	0.066	0.000	0.003	0.017	0.009	0.002	0.00	0.022
partial-10-15-s	0.174	0.152	0.193	0.081	0.105	0.003	0.019	0.015	0.003	1.95	0.027
partial-10-19-s	0.271	0.210	0.223	0.122	0.219	0.006	0.025	0.019	0.004	3.27	0.034
partial-10-19-u	0.274	0.186	0.220	0.121	0.201	0.004	0.025	0.021	0.004	3.24	0.034
partial-5-11-u	0.119	0.103	0.108	0.051	0.000	0.003	0.012	0.005	0.001	0.00	0.014
partial-5-15-u	0.147	0.134	0.161	0.085	0.079	0.002	0.017	0.011	0.002	1.61	0.020
partial-5-17-u	0.177	0.155	0.201	0.087	0.122	0.003	0.018	0.014	0.003	1.87	0.026
partial-5-19-u	0.187	0.164	0.204	0.096	0.157	0.004	0.020	0.016	0.003	2.45	0.028
podwr001_power.opt	0.142	0.111	0.118	0.059	132.4	0.003	0.011	0.008	0.002	2.89	0.022
safe009_pso.oepc	0.055	0.046	0.043	0.021	44.9	0.001	0.006	0.004	0.002	0.96	0.010
safe027_pso.opt	0.101	0.072	0.077	0.037	137.6	0.003	0.009	0.005	0.002	1.76	0.016
safe028_tso.oepc	0.059	0.046	0.049	0.023	77.9	0.002	0.007	0.004	0.002	1.95	0.012
safe029_power.opt	0.078	0.074	0.067	0.033	27.2	0.002	0.007	0.004	0.001	2.55	0.014
sc16_ACG-20-10p0	0.291	0.256	0.213	0.130	0.281	0.005	0.024	0.005	0.002	2.57	0.039
sc16_ACG-20-10p1	0.305	0.251	0.211	0.133	0.254	0.004	0.027	0.007	0.003	2.69	0.038
sc16_UR-20-10p0	0.188	0.159	0.177	0.111	0.430	0.003	0.019	0.017	0.004	4.87	0.027
sin2.c.2	0.171	0.142	0.231	0.032	3.865	0.003	0.018	0.018	0.009	1.56	0.027
sin2.c.20	1.940	1.282	1.969	0.336	62.34	0.030	0.145	0.054	0.016	25.1	0.253
sncf_model_ixl_bmc_depth_07	0.734	0.544	0.650	0.128	11.54	0.033	0.097	0.035	0.009	3.08	0.112
sncf_model_ixl_bmc_depth_08	0.872	0.680	0.798	0.125	13.49	0.034	0.106	0.037	0.010	3.10	0.128
sncf_model_ixl_bmc_depth_09	1.002	0.725	0.894	0.143	15.31	0.036	0.117	0.036	0.008	3.59	0.146
sncf_model_ixl_bmc_depth_10	1.409	0.922	1.052	0.169	17.19	0.038	0.121	0.042	0.010	4.47	0.163

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Table 5 – continued from previous page

CNF	CPU					GPU					
	VO	OT	BVE	HSE	SE	VO	OT	BVIPE	PHSE	PSE	$t_c(s)$
sncf_model_ixl_bmc_depth_11	1.417	0.908	1.103	0.174	19.07	0.042	0.141	0.047	0.012	4.97	0.179
sncf_model_ixl_bmc_depth_12	1.601	1.030	1.188	0.192	20.99	0.039	0.141	0.043	0.011	4.76	0.189
sncf_model_ixl_bmc_depth_13	1.768	1.116	1.292	0.208	22.86	0.041	0.143	0.045	0.010	4.89	0.213
sncf_model_ixl_bmc_depth_15	2.228	1.290	1.485	0.241	26.57	0.045	0.160	0.047	0.011	6.17	0.247
sokoban-p01.sas.ex.17	0.522	0.149	0.148	0.024	214.6	0.009	0.031	0.073	0.038	4.17	0.037
sokoban-p04.sas.ex.13	0.324	0.133	0.117	0.023	173.9	0.005	0.024	0.048	0.030	3.28	0.027
sokoban-p09.sas.cr.25	0.023	0.011	0.009	0.001	0.013	0.001	0.003	0.001	0.000	0.17	0.003
sokoban-p10.sas.cr.35	0.053	0.042	0.018	0.003	0.117	0.001	0.007	0.001	0.000	1.43	0.006
sokoban-p16.sas.cr.37	0.215	0.158	0.074	0.011	0.519	0.003	0.019	0.002	0.001	4.81	0.024
sokoban-p16.sas.cr.39	0.197	0.157	0.074	0.009	0.556	0.003	0.020	0.002	0.001	5.17	0.026
sokoban-p16.sas.ex.15	2.603	0.905	0.674	0.272	24051	0.041	0.150	2.145	1.222	306	0.151
sokoban-p16.sas.ex.17	2.894	1.038	0.778	0.329	29288	0.046	0.162	2.516	1.300	382	0.172
sokoban-p16.sas.ex.19	3.128	1.197	0.887	0.390	34502	0.050	0.185	2.399	1.395	461	0.203
sokoban-p17.sas.ex.11	0.511	0.135	0.137	0.008	74.00	0.007	0.028	0.059	0.055	1.92	0.032
sokoban-p18.sas.cr.29	0.040	0.026	0.013	0.002	0.058	0.001	0.005	0.001	0.000	0.77	0.004
sokoban-p19.sas.cr.23	0.029	0.021	0.009	0.002	0.037	0.001	0.004	0.001	0.000	0.54	0.004
sokoban-p20.sas.cr.21	0.115	0.080	0.034	0.004	0.300	0.002	0.011	0.001	0.001	2.39	0.014
sokoban-p20.sas.cr.23	0.126	0.092	0.038	0.005	0.324	0.003	0.012	0.001	0.001	2.80	0.015
sokoban-p20.sas.cr.25	0.139	0.103	0.044	0.005	0.306	0.002	0.013	0.001	0.001	3.03	0.015
sokoban-p20.sas.cr.27	0.152	0.115	0.048	0.006	0.358	0.002	0.016	0.002	0.001	3.57	0.018
sokoban-p20.sas.cr.29	0.164	0.126	0.053	0.007	0.396	0.004	0.016	0.001	0.001	4.26	0.019
sokoban-p20.sas.cr.31	0.172	0.123	0.058	0.008	0.415	0.003	0.018	0.002	0.001	4.53	0.019
sokoban-p20.sas.cr.33	0.211	0.157	0.067	0.008	0.458	0.003	0.019	0.002	0.001	4.96	0.022
sokoban-p20.sas.cr.35	0.215	0.170	0.072	0.008	0.496	0.005	0.018	0.002	0.001	5.36	0.025
sokoban-p20.sas.cr.37	0.192	0.146	0.061	0.007	0.530	0.003	0.022	0.001	0.001	5.67	0.027
sokoban-p20.sas.cr.39	0.174	0.140	0.064	0.008	0.567	0.004	0.024	0.001	0.001	6.22	0.028
sokoban-p20.sas.ex.11	2.031	0.719	0.570	0.239	24033	0.032	0.111	1.818	1.056	308	0.119
sokoban-p20.sas.ex.13	2.295	0.903	0.624	0.312	31477	0.039	0.138	2.874	1.189	406	0.141
sokoban-sequential-p145.50	0.069	0.125	0.024	0.027	0.847	0.003	0.016	0.011	0.011	6.06	0.019
sokoban-sequential-p145.70	0.095	0.147	0.028	0.033	1.271	0.004	0.025	0.010	0.009	9.49	0.029
test_v5_r10_vr10_c1_s21502	0.235	0.247	0.288	0.140	1.114	0.006	0.023	0.008	0.011	3.17	0.049
test_v7_r12_vr10_c1_s18160	0.409	0.401	0.488	0.236	2.008	0.010	0.039	0.011	0.016	5.50	0.082
test_v7_r12_vr1_c1_s22787	0.359	0.413	0.486	0.239	1.928	0.009	0.038	0.009	0.011	5.00	0.082
test_v7_r17_vr5_c1_s25451	0.539	0.536	0.667	0.346	2.834	0.011	0.046	0.017	0.020	7.38	0.112
test_v7_r7_vr10_c1_s32506	0.231	0.249	0.299	0.138	1.034	0.004	0.025	0.006	0.005	2.85	0.048
test_v7_r7_vr5_c1_s14675	0.233	0.257	0.294	0.139	1.039	0.004	0.023	0.005	0.005	3.02	0.048
traffic_3_uc_sat	0.218	0.252	0.258	0.207	2.767	0.004	0.027	0.051	0.011	16	0.039
transport-city-35nodes	0.434	0.320	0.187	0.091	8.894	0.013	0.052	0.036	0.120	4.02	0.047
transport-2cities-15nodes	0.193	0.133	0.094	0.047	2.100	0.004	0.022	0.046	0.252	1.99	0.020
transport-2cities-15nodes	0.440	0.335	0.186	0.095	6.102	0.010	0.046	0.048	0.253	4.95	0.054
valves-gates-1-k617-unsat	0.845	0.740	0.801	0.020	1.003	0.013	0.064	0.014	0.002	7.83	0.117
velev-pipe-oun-1.1-05	0.867	0.788	0.527	0.062	4877	0.037	0.106	0.243	0.368	43	0.148
velev-vliw-uns-2.0-ug5	0.324	0.288	0.153	0.035	562	0.009	0.045	0.144	0.084	13	0.066

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Table 5 – continued from previous page

CNF	CPU					GPU					$t_c(s)$
	VO	OT	BVE	HSE	SE	VO	OT	BVIPE	PHSE	PSE	
Average Speedup	52x	8x	32x	15x	9x						
Total processing Time	47 hours										

Table 6: GPU and SatElite performance analysis. All running times in seconds. T: Timeout (5000 seconds), M: Out of Memory. Green cells draw a conclusion.

CNF	SatElite		GPU		Speedup	
	<i>ve</i>	<i>all</i>	<i>ve+</i>	<i>all</i>	<i>ve+</i>	<i>all</i>
dspam_dump_vc1093	6.002	7.355	0.317	1.086	18.91	6.77
dspam_dump_vc1103	12.864	15.529	0.689	3.518	18.68	4.41
dspam_dump_vc1104	12.863	15.480	0.688	3.393	18.69	4.56
dspam_dump_vc949	5.547	6.565	0.218	1.069	25.43	6.14
dspam_dump_vc950	5.562	6.586	0.223	1.192	24.99	5.53
dspam_dump_vc962	5.095	5.979	0.218	1.052	23.37	5.68
dspam_dump_vc972	11.981	14.029	0.465	2.532	25.74	5.54
dspam_dump_vc973	11.978	13.956	0.471	2.796	25.42	4.99
ACG-20-10p1	10.410	20.949	0.317	5.943	32.80	3.53
ACG-20-5p1	9.001	18.872	0.284	4.955	31.65	3.81
ak128astepbg1btisc	10.132	18.185	0.340	3.520	29.77	5.17
ak128astepbg2asisc	4.950	11.325	0.319	1.120	15.51	10.11
ak128astepbg2msaig	12.841	21.775	0.402	1.404	31.93	15.51
ak128astepbg2msisc	9.070	16.920	0.346	1.214	26.23	13.94
ak128astepmodasaig	12.278	21.227	0.670	1.792	18.33	11.84
ak128astepmodbtisc	8.154	16.808	0.293	1.997	27.86	8.42
ak128boothbg1btisc	17.859	28.383	0.423	2.999	42.19	9.47
ak128boothbg2asisc	10.569	18.802	0.405	2.159	26.07	8.71
ak128boothbg2msaig	28.547	41.713	0.559	3.476	51.10	12.00
ak128boothbg2msisc	16.459	27.184	0.439	3.716	37.52	7.31
ak128boothboothisc	17.777	28.580	0.409	5.188	43.44	5.51
ak128boothdiagoaig	17.013	25.990	0.516	2.652	32.95	9.80
ak128boothmodasaig	27.939	40.710	0.544	1.767	51.33	23.04
ak128diagobg1btaig	16.921	25.793	0.514	3.946	32.89	6.54
ak128diagobg2asaig	6.943	11.188	0.360	0.935	19.31	11.96
ak128diagodiagoisc	4.586	11.042	0.269	1.647	17.05	6.70
ak128modasbg1msisc	14.727	26.060	0.317	2.788	46.48	9.35
ak128modasbg1sbisc	14.550	24.844	0.340	1.769	42.76	14.04
ak128modasmodasisc	14.901	26.679	0.308	2.523	48.39	10.57
ak128modbtbg1asaig	10.783	19.729	0.374	2.508	28.83	7.87
ak128modbtbg1asisc	8.153	16.857	0.291	1.818	28.03	9.27
ak128modbtbg1btaig	22.491	35.369	0.487	4.030	46.18	8.78
ak128modbtbg2msisc	12.972	23.334	0.381	3.562	34.04	6.55
ak128modbtsimpbaig	19.768	32.377	0.451	5.753	43.88	5.63
ak128paralbg1sbisc	9.044	16.373	0.398	3.580	22.74	4.57
ak128paralbg2asaig	7.151	11.464	0.377	0.953	18.94	12.03
ak128paralparalisc	4.751	11.536	0.325	1.579	14.60	7.30
ak128paralsimpbaig	14.968	23.729	0.409	2.337	36.59	10.15

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Table 6 – continued from previous page

CNF	SatElite		GPU		Speedup	
	<i>ve</i>	<i>all</i>	<i>ve+</i>	<i>all</i>	<i>ve+</i>	<i>all</i>
ak128simpbbg1sbisc	15.008	23.325	0.369	4.800	40.68	4.86
ak128simpbbg2asaig	15.274	23.980	0.402	3.555	37.95	6.75
hwmcc15deep-6s188-k44	7.189	9.324	0.281	1.805	25.55	5.17
hwmcc15deep-6s188-k46	7.749	9.635	0.302	1.676	25.69	5.75
hwmcc15deep-6s340rb63-k22	31.475	34.438	0.510	2.573	61.77	13.38
hwmcc15deep-6s341r-k16	11.237	14.420	0.764	3.625	14.70	3.98
hwmcc15deep-6s341r-k19	15.220	19.188	0.953	5.202	15.97	3.69
hwmcc15deep-6s366r-k72	9.591	11.219	0.286	1.910	33.59	5.87
hwmcc15deep-6s44-k38	8.708	10.967	0.335	2.361	26.00	4.65
hwmcc15deep-6s44-k40	9.134	11.692	0.355	2.772	25.76	4.22
hwmcc15deep-beembkry8b1-k45	168.857	150.229	0.211	2.275	799.22	66.03
hwmcc15deep-beemfwt4b1-k48	1024.260	1219.070	2.120	14.467	483.25	84.27
hwmcc15deep-beemhanoi4b1-k32	21.506	25.129	0.417	5.607	51.52	4.48
hwmcc15deep-beemhanoi4b1-k37	25.638	29.518	0.487	6.294	52.69	4.69
hwmcc15deep-beemlifts3b1-k29	276.769	275.065	0.871	5.279	317.78	52.10
hwmcc15deep-bobpcihm-k30	132.095	246.603	0.258	1.912	511.62	128.97
hwmcc15deep-bobpcihm-k31	144.724	270.059	0.269	2.149	537.42	125.64
hwmcc15deep-bobpcihm-k32	158.098	295.237	0.289	2.218	546.26	133.09
hwmcc15deep-bobpcihm-k33	171.894	321.146	0.303	2.398	567.91	133.95
hwmcc15deep-intel032-k84	88.083	114.839	0.470	1.506	187.41	76.24
hwmcc15deep-intel065-k11	35.896	46.275	0.327	1.184	109.83	39.09
hwmcc15deep-oski15a10b06s-k24	42.653	56.672	0.956	4.870	44.63	11.64
hwmcc15deep-oski15a10b08s-k23	40.701	53.948	0.933	4.520	43.63	11.93
hwmcc15deep-oski15a10b10s-k20	34.322	45.358	0.792	4.360	43.36	10.40
hwmcc15deep-oski15a10b10s-k22	38.589	50.493	0.874	4.613	44.13	10.95
hwmcc15deep-oski15a14b04s-k16	61.262	79.034	0.753	4.954	81.35	15.95
hwmcc15deep-oski15a14b30s-k24	74.996	96.411	0.928	5.756	80.81	16.75
UCG-15-10p1	5.776	13.513	0.230	3.500	25.16	3.86
UCG-20-10p1	7.763	17.945	0.363	5.539	21.38	3.24
UCG-20-5p1	6.914	15.912	0.335	4.819	20.65	3.30
UR-20-10p1	7.737	18.185	0.347	10.306	22.28	1.76
UR-20-5p1	6.835	15.973	0.317	9.370	21.55	1.70
UTI-20-10p1	7.741	18.173	0.294	11.759	26.34	1.55
itox_vc1033	12.154	19.916	0.560	1.422	21.69	14.01
itox_vc1044	12.363	20.056	0.566	1.575	21.86	12.73
itox_vc1130	14.550	21.903	0.606	1.904	24.02	11.50
itox_vc1216	14.314	19.597	0.612	1.647	23.40	11.90
itox_vc909	11.434	17.034	0.539	1.320	21.23	12.91
itox_vc979	11.838	15.714	0.556	1.341	21.29	11.72
manol-pipe-c10nidw_s	16.854	20.093	0.659	6.373	25.59	3.15
manol-pipe-c6nidw_i	3.627	4.335	0.211	1.762	17.21	2.46
manol-pipe-c7bidw_i	4.838	5.807	0.292	2.162	16.59	2.69
manol-pipe-c7nidw	6.671	7.910	0.273	2.509	24.41	3.15

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Table 6 – continued from previous page

CNF	SatElite		GPU		Speedup	
	<i>ve</i>	<i>all</i>	<i>ve+</i>	<i>all</i>	<i>ve+</i>	<i>all</i>
manol-pipe-f10ni	15.181	17.940	0.746	5.686	20.34	3.15
manol-pipe-f7idw	10.184	12.257	0.417	4.201	24.41	2.92
manol-pipe-f9b	7.382	8.739	0.587	2.991	12.57	2.92
manol-pipe-f9n	7.491	8.822	0.574	3.260	13.05	2.71
manol-pipe-g10bidw	9.117	10.937	0.470	4.221	19.42	2.59
manol-pipe-g10nid	8.434	9.902	0.429	3.383	19.66	2.93
blockpuzzle_5x12_s6_free3	0.776	2.597	0.063	4.109	12.24	0.63
blockpuzzle_7x10_s10_free4	1.115	4.566	0.088	6.817	12.69	0.67
blockpuzzle_7x10_s7_free8	1.221	5.070	0.091	7.702	13.40	0.66
blockpuzzle_7x10_s9_free6	1.190	4.845	0.094	5.142	12.59	0.94
blockpuzzle_8x8_s1_free4	0.905	3.420	0.076	6.825	11.88	0.50
blockpuzzle_9x9_s1_free10	1.907	9.260	0.125	13.279	15.24	0.70
blockpuzzle_9x9_s1_free7	1.844	8.529	0.126	6.184	14.58	1.38
blockpuzzle_9x9_s1_free9	1.892	9.016	0.132	17.581	14.38	0.51
blockpuzzle_9x9_s4_free3	1.687	7.848	0.119	5.427	14.19	1.45
blockpuzzle_9x9_s5_free3	1.686	7.817	0.117	14.460	14.47	0.54
blockpuzzle_9x9_s7_free8	1.869	8.980	0.131	12.191	14.29	0.74
blockpuzzle_9x9_s7_free9	1.912	9.306	0.134	13.252	14.25	0.70
blockpuzzle_9x9_s8_free3	1.703	7.752	0.119	11.453	14.25	0.68
blockpuzzle_9x9_s8_free7	1.854	8.566	0.127	11.838	14.58	0.72
26_stack_cas_longest	110.082	110.415	0.838	2.796	131.38	39.48
9dlx_vliw_at_b.iq1	4.237	7.110	0.741	1.896	5.72	3.75
9dlx_vliw_at_b.iq2	9.240	13.971	0.735	3.248	12.58	4.30
9dlx_vliw_at_b.iq3	16.253	26.901	1.441	5.609	11.28	4.80
9dlx_vliw_at_b.iq4-345	26.608	52.735	2.494	9.246	10.67	5.70
9dlx_vliw_at_b.iq4	26.731	52.801	2.523	9.355	10.60	5.64
9dlx_vliw_at_b.iq5	41.301	99.585	1.534	11.051	26.93	9.01
9dlx_vliw_at_b.iq6	62.590	185.115	2.582	16.980	24.24	10.90
9dlx_vliw_at_b.iq7	76.855	312.791	3.387	26.957	22.69	11.60
9dlx_vliw_at_b.iq8-718	136.594	613.575	5.733	45.261	23.83	13.56
9dlx_vliw_at_b.iq8	136.319	607.831	5.797	48.793	23.52	12.46
sc16_ACG-20-10p0	10.226	20.971	0.312	2.934	32.82	7.15
sc16_ACG-20-10p1	10.474	20.971	0.312	3.060	33.54	6.85
dated-10-17-u	8.487	15.965	0.433	4.218	19.61	3.78
hwmcc10-timeframe-expansion-k40	8.629	11.811	0.475	2.691	18.15	4.39
hwmcc10-timeframe-expansion-k50	9.672	13.250	0.494	2.806	19.59	4.72
podwr001_power.opt	13.429	48.023	0.246	4.740	54.66	10.13
transport-city-35nodes	5.641	8.285	1.441	9.415	3.92	0.88
transport-2cities-15nodes	2.591	4.109	2.977	6.959	0.87	0.59
transport-2cities-15nodes	5.622	9.199	3.269	13.799	1.72	0.67
sc16_UR-20-10p0	7.585	13.764	0.334	5.137	22.73	2.68
valves-gates-1-k617-unsat	30.850	52.399	1.210	18.475	25.51	2.84
velev-pipe-oun-1.1-05	45.001	84.850	11.466	109.181	3.92	0.78

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Table 6 – continued from previous page

CNF	SatElite		GPU		Speedup	
	<i>ve</i>	<i>all</i>	<i>ve+</i>	<i>all</i>	<i>ve+</i>	<i>all</i>
velev-vliw-uns-2.0-ug5	41.203	99.169	1.552	20.263	26.54	4.89
cube-11-h13-unsat	62.142	80.383	0.661	2.077	94.00	38.70
esawn_uw3.debugged	M	M	15.965	332.504	0.00	0.00
mizh-md5-10	1.555	2.149	0.080	0.321	19.54	6.69
mizh-md5-12	1.531	2.169	0.074	0.318	20.58	6.81
mizh-md5-47-3	1.357	2.242	0.123	2.109	10.99	1.06
mizh-md5-47-5	1.194	2.231	0.123	1.953	9.73	1.14
mizh-md5-48-2	1.386	2.298	0.122	2.106	11.35	1.09
mizh-md5-48-5	1.359	2.313	0.122	2.046	11.15	1.13
slp-synthesis-aes-top24	22.124	46.954	0.051	1.239	436.84	37.91
slp-synthesis-aes-top25	24.718	52.918	0.057	1.314	435.07	40.28
slp-synthesis-aes-top26	27.816	59.095	0.059	1.552	474.57	38.07
slp-synthesis-aes-top28	34.411	73.436	0.062	1.549	553.93	47.40
slp-synthesis-aes-top29	38.079	81.337	0.068	1.622	560.48	50.13
slp-synthesis-aes-top30	41.889	90.039	0.074	1.714	569.55	52.52
ibm-2002-23r-k90	9.927	17.737	0.377	5.257	26.35	3.37
newton.2.2.i	11.982	18.655	0.456	4.925	26.29	3.79
newton.2.3.i	19.466	29.786	0.765	7.119	25.44	4.18
newton.5.1.i	5.659	8.634	0.229	1.869	24.72	4.62
newton.8.3.i	19.494	29.628	0.772	7.950	25.24	3.73
partial-10-15-s	9.540	18.908	0.397	3.891	24.01	4.86
partial-10-19-s	13.040	25.586	0.560	7.638	23.29	3.35
safe009_pso.oepc	4.294	16.252	0.096	2.241	44.71	7.25
safe027_pso.opt	7.775	34.229	0.154	6.156	50.63	5.56
safe028_tso.oepc	5.041	24.472	0.113	2.895	44.78	8.45
safe029_power.opt	7.915	23.659	0.269	3.012	29.48	7.85
sin2.c.2	13.563	29.711	0.494	3.452	27.47	8.61
sin2.c.20	135.913	305.515	3.238	35.184	41.98	8.68
sncf_model_ixl_bmc_depth_07	T	T	1.969	7.818	0.00	0.00
sncf_model_ixl_bmc_depth_08	T	T	2.183	8.413	0.00	0.00
sncf_model_ixl_bmc_depth_09	T	T	2.313	9.802	0.00	0.00
sncf_model_ixl_bmc_depth_10	T	T	2.483	10.759	0.00	0.00
sncf_model_ixl_bmc_depth_11	T	T	2.659	11.663	0.00	0.00
sncf_model_ixl_bmc_depth_12	T	T	2.892	12.749	0.00	0.00
sncf_model_ixl_bmc_depth_13	T	T	3.008	13.482	0.00	0.00
sncf_model_ixl_bmc_depth_15	T	T	3.404	15.413	0.00	0.00
test_v5_r10_vr10_c1_s21502	13.710	19.663	0.475	6.355	28.86	3.09
test_v7_r12_vr10_c1_s18160	22.953	30.210	0.746	10.641	30.78	2.84
test_v7_r12_vr1_c1_s22787	22.814	33.225	0.728	10.577	31.33	3.14
test_v7_r17_vr5_c1_s25451	31.458	45.856	1.039	13.172	30.27	3.48
test_v7_r7_vr10_c1_s32506	13.436	19.368	0.427	6.233	31.46	3.11
test_v7_r7_vr5_c1_s14675	13.486	19.500	0.441	5.768	30.61	3.38
traffic_3_uc.sat	3.150	3.221	1.056	28.479	2.98	0.11

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Table 6 – continued from previous page

CNF	SatElite		GPU		Speedup	
	<i>ve</i>	<i>all</i>	<i>ve+</i>	<i>all</i>	<i>ve+</i>	<i>all</i>
arcfour_initialPermutation_6_14	4.990	6.132	0.094	1.211	53.21	5.07
arcfour_initialPermutation_6_15	5.032	6.123	0.091	1.706	55.56	3.59
arcfour_initialPermutation_6_16	4.992	6.132	0.088	1.628	56.61	3.77
sokoban-p01.sas.ex.17	56.450	T	0.787	5.257	71.74	0.00
sokoban-p04.sas.ex.13	43.668	T	0.596	4.253	73.21	0.00
sokoban-p09.sas.cr.25	0.731	T	0.032	0.172	22.64	0.00
sokoban-p10.sas.cr.35	2.312	T	0.103	1.489	22.34	0.00
sokoban-p16.sas.cr.37	7.432	T	0.274	4.076	27.13	0.00
sokoban-p16.sas.cr.39	8.312	T	0.291	4.647	28.58	0.00
sokoban-p16.sas.ex.15	816.333	T	11.942	387.388	68.36	0.00
sokoban-p16.sas.ex.17	964.993	T	13.146	479.575	73.40	0.00
sokoban-p16.sas.ex.19	1115.140	T	13.235	574.975	84.25	0.00
sokoban-p16.sas.ex.21	1269.290	T	13.179	661.775	96.31	0.00
sokoban-p16.sas.ex.23	1414.590	T	14.594	750.647	96.93	0.00
sokoban-p17.sas.ex.11	49.146	179.302	0.531	2.442	92.62	73.41
sokoban-p18.sas.cr.29	1.525	2.911	0.071	0.783	21.39	3.72
sokoban-p19.sas.cr.23	1.047	2.043	0.066	0.682	15.83	3.00
sokoban-p20.sas.cr.21	4.347	8.886	0.215	2.567	20.17	3.46
sokoban-p20.sas.cr.23	5.040	10.215	0.211	3.171	23.86	3.22
sokoban-p20.sas.cr.25	5.716	11.571	0.234	3.454	24.41	3.35
sokoban-p20.sas.cr.27	6.348	12.966	0.265	3.964	23.93	3.27
sokoban-p20.sas.cr.29	7.140	14.324	0.253	4.268	28.27	3.36
sokoban-p20.sas.cr.33	8.514	17.248	0.286	4.557	29.74	3.78
sokoban-p20.sas.cr.35	9.348	18.646	0.311	5.040	30.07	3.70
sokoban-p20.sas.cr.37	10.077	20.282	0.336	5.966	29.99	3.40
sokoban-p20.sas.cr.39	10.964	21.762	0.337	5.957	32.54	3.65
sokoban-p20.sas.ex.11	533.91	T	12.36	392	43.21	0.00
sokoban-p20.sas.ex.13	666.75	T	14.72	522	45.30	0.00
sokoban-p20.sas.ex.15	798.77	T	17.48	664	45.69	0.00
sokoban-p20.sas.ex.17	932.09	T	17.81	795	52.34	0.00
sokoban-p20.sas.ex.19	1064.53	T	19.09	932	55.76	0.00
sokoban-p20.sas.ex.21	1198.12	T	23.20	1060	51.65	0.00
sokoban-p20.sas.ex.23	1329.39	T	22.77	1197	58.39	0.00
sokoban-sequential-p145.50	13.194	13.164	0.131	6.722	100.63	1.96
sokoban-sequential-p145.70	19.897	19.976	0.181	9.973	109.79	2.00
Average Speedup					66.16	12.30

Table 7 – continued from previous page

Name	CNF (Original)			SatElite									GPU		
	V	C	L	ve			all			ve+			all		
				V	C	L	V	C	L	V	C	L	V	C	L
newton.8.3.i	302735	1309690	3625730	193336	1116736	3669530	183698	1025793	3320129	215051	1079888	3193414	215051	1074818	3160340
partial-10-15-s	202120	921005	2155005	154017	838962	2330321	124744	708771	1938071	145780	772639	1997673	145780	772639	1997673
partial-10-19-s	269167	1282426	3033888	207512	1175534	3293722	168516	995601	2750800	198952	1089733	2845534	198952	1089733	2845534
safe009-pto.oepc	41295	221509	793129	26221	189783	867824	25597	181054	764949	34667	201063	748440	34667	200523	686040
safe027-pto.opt	69422	382196	1393599	46398	332713	1528541	45478	319159	1369219	61231	361481	1356669	61231	360769	1249870
safe028-pto.oepc	46392	251711	922903	29469	216279	1009860	28811	206726	890331	38942	228727	873623	38942	228149	800624
safe029-power.opt	62349	305351	1048475	41882	261650	1204162	40999	251289	1095757	56201	291475	1025664	56340	290882	932598
sin2.c.2	196412	789256	2139378	103955	659724	2225116	84349	554988	1922937	118254	598298	1789072	118254	596695	1777985
sin2.c.20	1962963	7954731	21638633	1063399	6684115	22579207	867927	5647374	19591979	1196829	6072774	18167538	1196829	6056872	18057191
snfc_model.ixl.bmc.depth.07	814836	2641524	6565638	n/a	n/a	n/a	n/a	n/a	n/a	n/a	423494	1778310	5089941	424726	1778966
snfc_model.ixl.bmc.depth.08	938188	3050572	7578672	n/a	n/a	n/a	n/a	n/a	n/a	n/a	486374	2055284	5885107	487703	2056055
snfc_model.ixl.bmc.depth.09	1061540	3459620	8591706	n/a	n/a	n/a	n/a	n/a	n/a	n/a	549971	2333961	6682285	551299	2334637
snfc_model.ixl.bmc.depth.10	1184892	3868668	9604740	n/a	n/a	n/a	n/a	n/a	n/a	n/a	612830	2610033	7473994	614255	2610805
snfc_model.ixl.bmc.depth.11	1308244	4277716	10617774	n/a	n/a	n/a	n/a	n/a	n/a	n/a	676516	2882425	8272848	677940	2889902
snfc_model.ixl.bmc.depth.12	1431596	4686764	11638088	n/a	n/a	n/a	n/a	n/a	n/a	n/a	739480	3166306	9067949	741001	3167079
snfc_model.ixl.bmc.depth.13	1554948	5095812	12643842	n/a	n/a	n/a	n/a	n/a	n/a	n/a	803114	3445130	9865494	804634	3445808
snfc_model.ixl.bmc.depth.15	1801652	5913908	14669910	n/a	n/a	n/a	n/a	n/a	n/a	n/a	929551	4000250	11455922	931167	4000909
test_v5.r10.vr10.c1.s21502	245249	1089831	3037201	158995	949573	3070515	153543	890475	2873587	182049	956362	2839048	182049	951257	2816125
test_v7.r12.vr10.c1.s18160	411769	1831331	5104587	266972	1595656	5170032	266727	1595399	5102553	306103	1607862	4770211	306103	1599240	4731546
test_v7.r12.vr1.c1.s22787	409870	1824967	5088086	265932	1590328	5155337	256907	1491743	4827172	305032	1602897	4753884	305032	1599406	4714598
test_v7.r17.vr5.c1.s25451	560348	2509155	7002826	363902	2187296	7103783	351208	2049599	6645855	419082	2207149	6550488	419082	2195007	6496179
test_v7.r7.vr10.c1.s32506	242294	1076123	2998820	157063	937410	3037160	151737	879456	2843316	179925	9445130	2865494	179925	939466	2778477
test_v7.r7.v5.c1.s14675	244193	1082414	3015438	158152	942371	3056153	152832	884451	2862563	181081	949641	2815423	181081	944518	2792394
traffic_3_uc_sat	142205	1312352	4558898	141466	1311258	4556627	141410	1311252	4556370	141890	1311864	4557780	141890	1310936	4554064
arcfour_initialPermutation_6_14	105357	404197	1172533	60087	316915	1365635	60087	316915	1364871	72355	341463	1114347	72355	341463	1114169
arcfour_initialPermutation_6_15	105358	404197	1172533	60088	316915	1365635	60088	316915	1364871	72356	341463	1114347	72356	341463	1114169
arcfour_initialPermutation_6_16	105359	404197	1172533	60089	316915	1365635	60089	316915	1364871	72357	341463	1114347	72357	341463	1114169
sokoban-p01.sas.ex.17	557370	986941	3310897	15408	308456	2312105	n/a	n/a	n/a	39898	429497	2297216	39898	428098	2043147
sokoban-p04.sas.ex.13	384798	738053	2673058	13245	262086	2126149	n/a	n/a	n/a	31096	351521	2013123	31094	350304	1762220
sokoban-p09.sas.cr.25	20369	57581	121858	3098	22562	55938	n/a	n/a	n/a	4567	31665	69809	4567	31662	69797
sokoban-p10.sas.cr.35	42916	267207	581456	21147	233425	591955	n/a	n/a	n/a	22719	223752	494593	22719	223746	494569
sokoban-p16.sas.cr.37	129906	1142613	2480267	72279	1059245	2936531	n/a	n/a	n/a	67794	1004222	2203057	67794	1004221	2203053
sokoban-p16.sas.cr.39	139106	1226637	2662667	77489	1138745	3157299	n/a	n/a	n/a	72644	1079618	2368349	72644	1079616	2368341
sokoban-p16.sas.ex.15	2331369	4360901	23599047	56909	1518967	18885877	n/a	n/a	n/a	162417	2073204	19286187	162417	2070874	17482954
sokoban-p16.sas.ex.17	2623855	4992953	27736559	67150	1797940	22449038	n/a	n/a	n/a	185345	2416008	22885089	185345	2413671	20846781
sokoban-p16.sas.ex.19	2916341	5625005	31874071	77391	2076913	26012199	n/a	n/a	n/a	208273	2758812	26483991	208273	2756493	24258576
sokoban-p16.sas.ex.21	3208827	6257057	36011583	87632	2635886	29575360	n/a	n/a	n/a	231201	3101616	30082893	231201	3099277	27622210
sokoban-p16.sas.ex.23	3501313	6889109	40149095	97873	2634859	33138521	n/a	n/a	n/a	254129	3444420	33681795	254129	3442070	30990077
sokoban-p17.sas.ex.11	606533	876007	2312016	6980	151920	1023945	6445	134432	718831	34179	283532	1180210	34179	282217	1026599
sokoban-p18.sas.cr.29	31843	184907	403767	15238	158951	411226	14764	156244	397143	16330	151723	337215	16330	151723	337215
sokoban-p19.sas.cr.23	23946	137973	302911	11818	118496	313416	11555	116868	303123	12567	112804	252363	12567	112804	252363
sokoban-p20.sas.cr.21	72582	601247	1315209	41791	552327	1590396	41786	551299	1538911	37980	518896	1149794	37980	518884	1149746
sokoban-p20.sas.cr.23	82166	685007	1498521	47463	631879	1820554	47458	630733	1761687	43065	593723	1315161	43065	593715	1315129
sokoban-p20.sas.cr.25	91750	768767	1681833	53135	711431	2050760	53130	710169	1984629	48108	668468	1480468	48108	668455	1480416
sokoban-p20.sas.cr.27	101334	852527	1865145	58807	790983	2281014	58802	789601	2207383	53211	743341	1646267	53211	743329	1646219
sokoban-p20.sas.cr.29	110918	936287	2048457	64479	870535	2511316	64474	869035	2430303	58296	818168	1811634	58296	818160	1811602
sokoban-p20.sas.cr.33	130086	1103807	2415081	75823	1029639	2972064	75818	1027899	2876019	68442	967786	2142740	68442	967774	2142692
sokoban-p20.sas.cr.35	139670	1187567	2598393	81495	1109191	3202510	81490	1107330	3099051	73527	1042613	2308107	73527	1042605	2308075
sokoban-p20.sas.cr.37	149254	1271327	2781705	87167	1188743	3433004	87162	1186754	3321940	78570	1117358	2473414	78570	1117345	2473362
sokoban-p20.sas.cr.39	158838	1355087	2965017	92839	1268295	3663546	92834	1266188	3454206	83673	1192231	2639213	83673	1192219	2639165
sokoban-p20.sas.ex.11	1813022	3352874	19480661	44639	1157412	15665986	n/a	n/a	n/a	129233	1589648	16185532	129233	1589678	14411397
sokoban-p20.sas.ex.13	2116344	4003850	24253729	55776	1452681	19852888	n/a	n/a	n/a	153769	1944148	20410542	153769	1941450	18341563
sokoban-p20.sas.ex.15	2419666	4654826	29026797	66913	1747950	24039790	n/a	n/a	n/a	178309	2298656	24635674	178309	2295984	22343848
sokoban-p20.sas.ex.17	2722988	5305802	33799865	78050	2043219	28226692	n/a	n/a	n/a	202849	2653164	28860806	202849	2650519	26313276
sokoban-p20.sas.ex.19	3026310	5956778	38572933	89187	2338488	32413594	n/a	n/a	n/a	227389	3007672	33085938	227389	3005021	30283709
sokoban-p20.sas.ex.21	3329632	6607754	43346001	100324	2633757	36600496	n/a	n/a	n/a	251929	3362180	37311070	251929	3359483	34211444
sokoban-p20.sas.ex.23	3632954	7258730	48119069	111461	2929026	40787398	n/a	n/a	n/a	276469	3716688	41536202	276469	3714033	38205109
sokoban-sequential-p145.50	71819	995932	2319367	71800	995932	2319381	71796	995897	2319315	71787	995868	2319239	71787	995868	2319239
sokoban-sequential-p145.70	107739	1504732	3503687	107720	1504732	3503701	107716	1504697	3503635	107707	1504668	3503559	107707	1504668	3503559