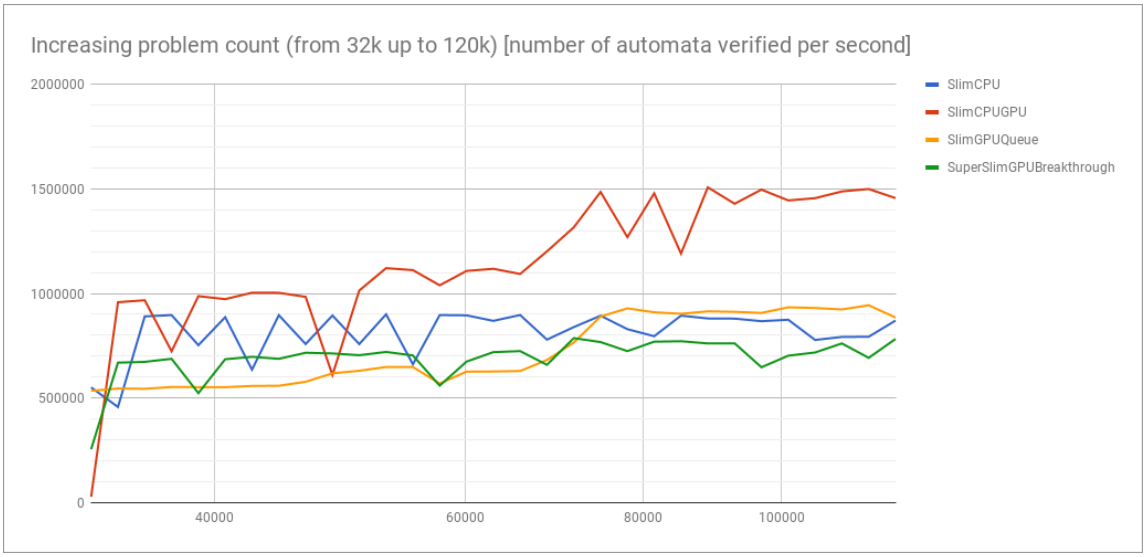
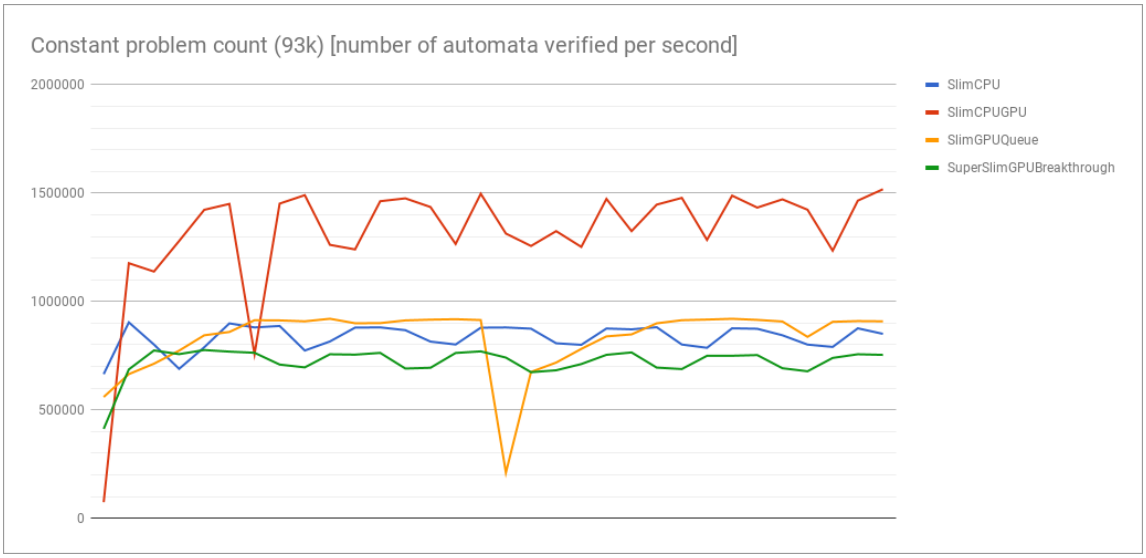


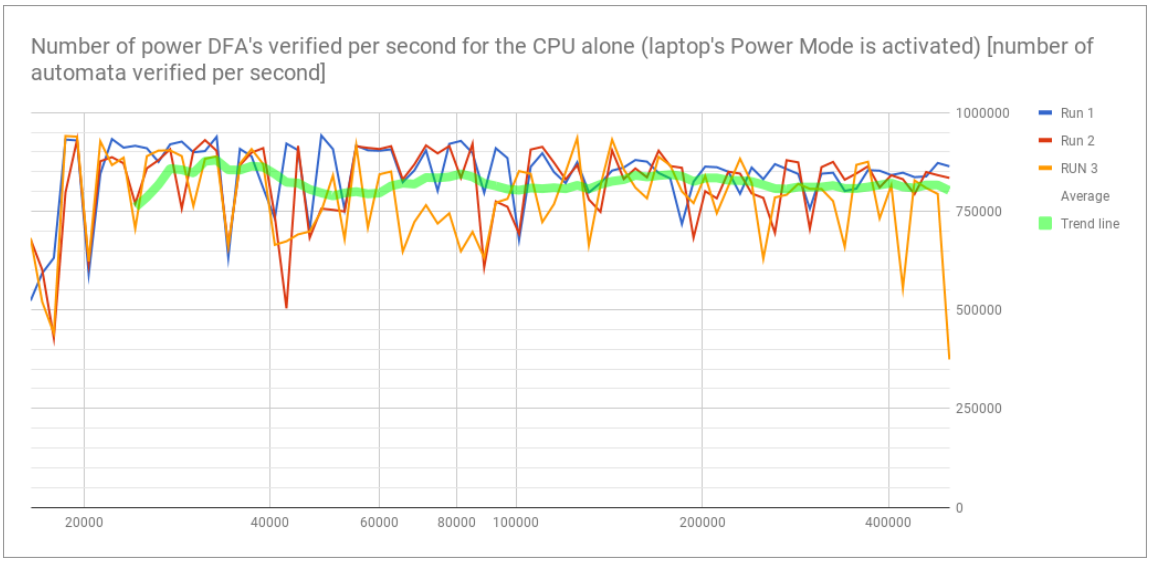


Ultimately the cooperation between the CPU and the GPU processors is the most efficient method since while waiting for memory transfer to complete the CPU performs its work.
The CPU's algorithm performance is greatly improved because all graphs are partitioned into groups and accessed by all threads instead of frequently polling for a next problem.

All threads allocate the least amount of memory possible and allocate it only (!) once. Then on almost only computations reuse existing arrays to the maximum possible extent.
Both winning algorithms were improved by limiting LINQ usage and reverting to the good old arrays and indices (thus limiting unnecessary array creation operations).

Now each virtual processor accesses its own part of the whole array (actually it accesses the original large array only within the appropriate range).
All in all the best GPU algorithm turns out to be a smartly scaled up and highly parallelized CPU algorithm (smart BFS queue)
Previous generations of CPU algorithms were poor at being computed in parallel. PLINQ was used, along with AsOrdered command which dramatically slowed down execution time.

This technique allows for full processor utilization thus outperforming the GPU.
Initial poor GPU performance is the effect of lazy PTX instructions compiling (JIT compiling)
The computations were performed on an Intel i7 8-th generation processor and the GPU part was done on an NVIDIA Pascal architecture GeForce mobile GPU (mx150).



ProblemSize	ProblemCount	SlimCPU	SlimCPUGPU	SlimGPUQueue	SlimGPUBreakthrough
13	92682	665118	74223	559483	412424
13	92682	903869	1176733	665000	686730
13	92682	801392	1138180	713025	774220
13	92682	689375	1279110	773319	757204
13	92682	788853	1423011	844144	776106
13	92682	899064	1450314	859496	768815
13	92682	880491	757179	913722	763443
13	92682	887150	1451738	912797	709102
13	92682	773801	1490675	908574	696092
13	92682	815692	1261434	920449	756572
13	92682	879576	1240304	899710	754842
13	92682	880650	1462726	900268	762962
13	92682	867740	1475884	912834	690743
13	92682	815053	1435955	916304	694160
13	92682	801634	1265420	918390	762595
13	92682	879251	1497148	914510	769984
13	92682	880285	1313563	210172	741250
13	92682	874716	1256223	675140	673826
13	92682	807273	1324691	718286	682731
13	92682	800197	1251913	781319	711438
13	92682	875426	1473414	839119	753984
13	92682	871616	1324611	848306	764998
13	92682	881473	1446960	899369	694976
13	92682	801470	1478076	913745	688477
13	92682	786393	1284277	916714	749474
13	92682	876408	1488459	920302	749710
13	92682	874283	1433226	915248	752894
13	92682	844238	1471297	907769	692143
13	92682	801189	1423416	836942	678083
13	92682	790451	1234521	906349	739714
13	92682	876302	1465365	909711	756588
13	92682	850780	1518036	908602	753754

ProblemSize	ProblemCount	SlimCPU	SlimCPUGPU	SlimGPUQueue	uperSlimGPUBreakthrough
13	32768	550666	26773	534049	254685
13	34219	456803	958499	545258	669053
13	35734	890518	967648	543816	672782
13	37316	896754	723404	552462	687470
13	38968	752609	987354	551995	522941
13	40693	886786	973040	551546	685356
13	42495	635415	1003912	557598	696940
13	44376	896318	1003433	558353	687380
13	46341	758131	983965	577545	716312
13	48393	894795	610041	617811	713152
13	50535	757859	1014284	630141	704716
13	52773	900519	1121393	648287	720340
13	55109	661062	1112066	648011	703565
13	57549	896769	1039286	569041	559061
13	60097	895569	1108034	625954	674020
13	62757	869078	1118512	626740	719357
13	65536	897064	1093530	629012	724303
13	68438	779173	1201750	681495	658692
13	71468	839225	1316562	765310	786449
13	74632	893745	1486098	890003	767537
13	77936	829340	1269777	928983	724194
13	81386	795484	1479638	910149	769461
13	84990	894224	1191137	903055	771589
13	88752	880560	1508259	914676	761027
13	92682	879800	1429647	912261	761560
13	96785	867557	1497402	907203	646963
13	101070	874387	1445513	933899	702425
13	105545	777696	1456446	930624	717702
13	110218	792169	1488618	923828	761073
13	115098	793027	1500229	943737	692029
13	120194	870541	1456701	885023	782500

ProblemSize	ProblemCount	Run 1	Run 2	Run 3	Average
13	16384	523273	679011	682192	628158.6667
13	17109	592795	601840	520427	571687.3333
13	17867	631519	428807	440988	500438
13	18658	931424	797006	940523	889651
13	19484	929372	931473	938812	933219
13	20347	590343	618236	622545	610374.6667
13	21247	844566	876646	927124	882778.6667
13	22188	932802	886825	866878	895501.6667
13	23170	911082	871295	885642	889339.6667
13	24196	915721	769375	705933	797009.6667
13	25268	909454	858769	889427	885883.3333
13	26386	874818	879314	903664	885932
13	27554	919450	906898	903991	910113
13	28774	926377	756679	889572	857542.6667
13	30048	899315	902649	762814	854926
13	31379	902281	930151	882774	905068.6667
13	32768	938629	902956	889089	910224.6667
13	34219	632650	662679	661473	652267.3333
13	35734	907906	866466	870349	881573.6667
13	37316	888817	898531	907393	898247
13	38968	808716	909762	869303	862593.6667
13	40693	731161	737551	664747	711153
13	42495	921277	503834	673670	699593.6667
13	44376	904431	915481	691260	837057.3333
13	46341	702304	682529	698415	694416
13	48393	941764	756433	750367	816188
13	50535	907271	753410	840614	833765
13	52773	754193	749322	679022	727512.3333
13	55109	916159	914385	917335	915959.6667
13	57549	904398	910437	708232	841022.3333
13	60097	903179	907485	843416	884693.3333
13	62757	906669	914617	850503	890596.3333
13	65536	823599	830352	647493	767148
13	68438	853359	868547	722636	814847.3333
13	71468	904004	916682	765335	862007
13	74632	801694	896500	718716	805636.6667
13	77936	920545	915133	744635	860104.3333
13	81386	928108	834311	648358	803592.3333
13	84990	897214	921086	697637	838645.6667
13	88752	796373	607787	631550	678570
13	92682	909495	774642	771612	818583
13	96785	884616	761186	781207	809003
13	101070	677179	692877	851672	740576
13	105545	862507	906190	844763	871153.3333
13	110218	896871	913038	722316	844075
13	115098	849148	873194	767739	830027
13	120194	821205	830687	849202	833698
13	125515	874032	866667	935333	892010.6667
13	131072	797528	779634	663797	746986.3333
13	136875	821265	748195	814649	794703
13	142935	852891	904053	931377	896107
13	149263	860606	831360	856127	849364.3333
13	155872	879691	858287	809837	849271.6667
13	162773	875579	835760	782540	831293
13	169979	846860	903284	887794	879312.6667
13	177505	832874	864331	865985	854396.6667
13	185364	717356	859994	800085	792478.3333
13	193571	824550	682684	770361	759198.3333
13	202141	862998	800644	839625	834422.3333
13	211090	861384	782452	744806	796214
13	220436	849871	850063	814059	837997.6667
13	230195	794147	845307	882874	840776
13	240387	860594	794997	821455	825682
13	251030	831065	783715	629628	748136
13	262144	869312	694962	784850	783041.3333
13	273750	856895	879133	791524	842517.3333
13	285870	844344	873689	819206	845746.3333
13	298527	756204	705178	806605	755995.6667
13	311744	845026	861591	806256	837624.3333
13	325546	847434	874862	775565	832620.3333
13	339959	801284	829718	659757	763586.3333
13	355010	807089	845545	867365	839999.6667
13	370728	854064	863792	875275	864377
13	387141	852593	810215	731633	798147
13	404281	841485	841036	815161	832560.6667
13	422180	847456	831032	554556	744348
13	440872	836289	793167	828028	819161.3333
13	460391	838043	849221	808838	832034
13	480774	872216	841273	793625	835704.6667
13	502060	863729	834363	374377	690823