



PSP Model Speed Benchmarking in Eldo™.

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I. Coverage

This comparison involves 12 designs. Eight of them are ring oscillators with different topologies. Two are RAM circuits (Circuit_07 and Circuit_11), one is an adders (Circuit_01), and one is a one bit comparator (Cuircuit_02). The size of each circuit (number of nodes and number of MOSFET's) is shown in the below table.

The model cards used for both Bsim4 and PSP are equivalent.

All comparison results are provided for both Linux and Solaris. Linux results are based on RHEL3.0 running on a Dell Precision 470 machine (Xeon Dual processor), where Solaris results are based on Solaris 8 running on Sun Blade 1500 machine.

Circuit	Total Number of nodes	Number of MOSFET's
Cuircit_01	13934	958
Cuircit_02	251	17
Cuircit_03	640	44
Cuircit_04	1916	132
Cuircit_05	640	44
Cuircit_06	1916	132
Cuircit_07	199170	13880
Cuircit_08	959	66
Cuircit_09	611	42
Cuircit_10	552	38
Cuircit_11	14456	1008
ring	525	36

PSP to be releases in AMS2006.1 versus PSP released in AMS2005.3

1. Solaris

a. No parasitic diodes.

Simulation 1: PSP of AMS2005.3

Simulation 2: PSP of AMS2006.1

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	78.180s	223632	1704	210	57.830s	223795	1704	210	26.03%	-0.07%	0.00%	0.00%	1.35X
Circuit_02	35.420s	119212	18892	11291	27.820s	119212	18892	11291	21.46%	0.00%	0.00%	0.00%	1.27X
Circuit_03	31.060s	109128	6669	1727	24.450s	109130	6669	1727	21.28%	-0.00%	0.00%	0.00%	1.27X
Circuit_04	62.430s	182796	6422	1708	49.280s	182805	6422	1708	21.06%	-0.00%	0.00%	0.00%	1.27X
Circuit_05	32.320s	113633	6285	1780	25.830s	113771	6286	1778	20.08%	-0.12%	-0.02%	0.11%	1.25X
Circuit_06	182.730s	554982	18487	5053	149.780s	555461	18558	5058	18.03%	-0.09%	-0.38%	-0.10%	1.22X
Circuit_07	3849.990s	9446840	6291	1339	3020.630s	9431917	6271	1332	21.54%	0.16%	0.32%	0.52%	1.27X
Circuit_08	31.540s	99426	5218	1410	24.440s	99442	5219	1410	22.51%	-0.02%	-0.02%	0.00%	1.29X
Circuit_09	112.240s	330160	33892	8955	85.580s	330198	33905	8954	23.75%	-0.01%	-0.04%	0.01%	1.31X
Circuit_10	87.550s	290738	24216	7123	63.190s	290744	24217	7123	27.82%	-0.00%	-0.00%	0.00%	1.39X
Circuit_11	2503.430s	8423087	27862	8323	1871.720s	8448586	27846	8316	25.23%	-0.30%	0.06%	0.08%	1.34X
MIX/ring	102.570s	313232	39397	11342	74.330s	313228	39397	11342	27.53%	0.00%	0.00%	0.00%	1.38X
Total figures	7109.46s	20206866	195335	60261	5474.88s	20218289	195386	60249	22.99%	-0.06%	-0.03%	0.02%	1.30X
Averages									23.03%	-0.04%	-0.01%	0.05%	1.30X

b. JUNCAP2 parasitic diodes.

Simulation 1: PSP of AMS2005.3

Simulation 2: PSP of AMS2006.1

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	104.920s	192290	1558	187	65.340s	192169	1558	187	37.72%	0.06%	0.00%	0.00%	1.61X
Circuit_02	61.870s	111135	17277	10829	37.160s	111080	17307	10829	39.94%	0.05%	-0.17%	0.00%	1.66X
Circuit_03	41.530s	78416	5341	1379	25.420s	78331	5335	1377	38.79%	0.11%	0.11%	0.15%	1.63X
Circuit_04	82.890s	145986	4516	1419	53.370s	145790	4513	1416	35.61%	0.13%	0.07%	0.21%	1.55X
Circuit_05	43.080s	82081	4729	1365	26.410s	82103	4758	1375	38.70%	-0.03%	-0.61%	-0.73%	1.63X
Circuit_06	253.560s	451313	13513	4039	162.450s	449729	13475	4034	35.93%	0.35%	0.28%	0.12%	1.56X
Circuit_07	4496.480s	7189818	5257	1191	3020.030s	7149604	5243	1184	32.84%	0.56%	0.27%	0.59%	1.49X
Circuit_08	39.300s	68524	3684	1098	23.600s	68402	3673	1096	39.95%	0.18%	0.30%	0.18%	1.67X
Circuit_09	149.720s	251354	27520	7439	93.530s	250632	27682	7432	37.53%	0.29%	-0.59%	0.09%	1.60X
Circuit_10	150.410s	288894	24064	7078	90.760s	288886	24064	7078	39.66%	0.00%	0.00%	0.00%	1.66X
Circuit_11	3135.690s	6048806	21705	7274	1973.890s	6505065	21745	7280	37.05%	-7.54%	-0.18%	-0.08%	1.59X
MIX/ring	162.620s	294031	37924	10799	99.680s	294258	37912	10796	38.70%	-0.08%	0.03%	0.03%	1.63X
Total figures	8722.07s	15202648	167088	54097	5671.64s	15616049	167265	54084	34.97%	-2.72%	-0.11%	0.02%	1.54X
Averages									37.70%	-0.49%	-0.04%	0.05%	1.61X

2. Linux

a. No parasitic diodes.

Simulation 1: PSP of AMS2005.3

Simulation 2: PSP of AMS2006.1

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	13.540s	223632	1704	210	12.760s	223795	1704	210	5.76%	-0.07%	0.00%	0.00%	1.06X
Circuit_02	6.750s	119212	18892	11291	6.290s	119212	18892	11291	6.81%	0.00%	0.00%	0.00%	1.07X
Circuit_03	5.280s	109128	6669	1727	4.820s	109130	6669	1727	8.71%	-0.00%	0.00%	0.00%	1.10X
Circuit_04	11.260s	182796	6422	1708	10.760s	182805	6422	1708	4.44%	-0.00%	0.00%	0.00%	1.05X
Circuit_05	5.640s	113682	6290	1778	5.220s	113759	6291	1778	7.45%	-0.07%	-0.02%	0.00%	1.08X
Circuit_06	33.490s	554823	18475	5053	31.660s	554310	18482	5050	5.46%	0.09%	-0.04%	0.06%	1.06X
Circuit_07	957.470s	9446840	6291	1339	913.180s	9431917	6271	1332	4.63%	0.16%	0.32%	0.52%	1.05X
Circuit_08	5.750s	99426	5218	1410	6.450s	99442	5219	1410	-12.17%	-0.02%	-0.02%	0.00%	0.89X
Circuit_09	24.300s	330220	33904	8952	20.790s	330146	33899	8953	14.44%	0.02%	0.01%	-0.01%	1.17X
Circuit_10	16.960s	290738	24216	7123	15.770s	290744	24217	7123	7.02%	-0.00%	-0.00%	0.00%	1.08X
Circuit_11	548.080s	8423095	27862	8323	497.530s	8448655	27846	8316	9.22%	-0.30%	0.06%	0.08%	1.10X
MIX/ring	20.880s	313232	39397	11342	17.850s	313228	39397	11342	14.51%	0.00%	0.00%	0.00%	1.17X
Total figures	1649.4s	20206824	195340	60256	1543.08s	20217143	195309	60240	6.45%	-0.05%	0.02%	0.03%	1.07X
Averages									6.36%	-0.02%	0.03%	0.05%	1.07X

b. JUNCAP2 parasitic diodes.

Simulation 1: PSP of AMS2005.3

Simulation 2: PSP of AMS2006.1

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	24.880s	192290	1558	187	18.440s	192169	1558	187	25.88%	0.06%	0.00%	0.00%	1.35X
Circuit_02	13.490s	111135	17277	10829	9.290s	111080	17307	10829	31.13%	0.05%	-0.17%	0.00%	1.45X
Circuit_03	9.200s	78416	5341	1379	6.230s	78331	5335	1377	32.28%	0.11%	0.11%	0.15%	1.48X
Circuit_04	19.250s	145898	4514	1419	13.550s	145757	4508	1415	29.61%	0.10%	0.13%	0.28%	1.42X
Circuit_05	9.140s	82081	4729	1365	6.410s	82102	4758	1375	29.87%	-0.03%	-0.61%	-0.73%	1.43X
Circuit_06	59.030s	451281	13512	4040	43.450s	449625	13476	4035	26.39%	0.37%	0.27%	0.12%	1.36X
Circuit_07	1156.810s	7189818	5257	1191	892.810s	7149604	5243	1184	22.82%	0.56%	0.27%	0.59%	1.30X
Circuit_08	7.940s	68538	3683	1098	5.440s	68402	3673	1096	31.49%	0.20%	0.27%	0.18%	1.46X
Circuit_09	33.360s	251340	27502	7438	23.500s	250632	27676	7430	29.56%	0.28%	-0.63%	0.11%	1.42X
Circuit_10	34.380s	288894	24064	7078	23.070s	288886	24064	7078	32.90%	0.00%	0.00%	0.00%	1.49X
Circuit_11	728.470s	6048806	21705	7274	528.490s	6505066	21745	7280	27.45%	-7.54%	-0.18%	-0.08%	1.38X
MIX/ring	37.750s	294031	37924	10799	25.010s	294258	37912	10796	33.75%	-0.08%	0.03%	0.03%	1.51X
Total figures	2133.7s	15202528	167066	54097	1595.69s	15615912	167255	54082	25.21%	-2.72%	-0.11%	0.03%	1.34X
Averages									29.43%	-0.49%	-0.04%	0.05%	1.42X

II. PSP versus Bsim4

1. Solaris

a. No parasitic diodes.

Simulation 1: Bsim4

Simulation 2: PSP

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	39.800s	217947	1605	211	58.500s	223795	1704	210	-46.98%	-2.68%	-6.17%	0.47%	0.68X
Circuit_02	15.120s	111487	18091	11026	28.460s	119212	18892	11291	-88.23%	-6.93%	-4.43%	-2.40%	0.53X
Circuit_03	11.880s	89367	5725	1529	24.940s	109130	6669	1727	-109.93%	-22.11%	-16.49%	-12.95%	0.48X
Circuit_04	26.030s	162087	5657	1580	50.110s	182805	6422	1708	-92.51%	-12.78%	-13.52%	-8.10%	0.52X
Circuit_05	12.630s	98079	5530	1572	25.770s	113771	6286	1778	-104.04%	-16.00%	-13.67%	-13.10%	0.49X
Circuit_06	78.740s	489738	15427	4523	151.200s	555461	18558	5058	-92.02%	-13.42%	-20.30%	-11.83%	0.52X
Circuit_07	2110.010s	9155464	5944	1312	3050.170s	9431917	6271	1332	-44.56%	-3.02%	-5.50%	-1.52%	0.69X
Circuit_08	12.530s	88140	5095	1377	24.740s	99442	5219	1410	-97.45%	-12.82%	-2.43%	-2.40%	0.51X
Circuit_09	45.600s	295334	30438	8272	88.240s	330198	33905	8954	-93.51%	-11.80%	-11.39%	-8.24%	0.52X
Circuit_10	34.540s	294994	23064	6989	64.150s	290744	24217	7123	-85.73%	1.44%	-5.00%	-1.92%	0.54X
Circuit_11	1015.830s	7262083	25842	7984	1875.940s	8448586	27846	8316	-84.67%	-16.34%	-7.75%	-4.16%	0.54X
MIX/ring	50.340s	380540	48106	13693	74.260s	313228	39397	11342	-47.52%	17.69%	18.10%	17.17%	0.68X
Total figures	3453.05s	18645260	190524	60068	5516.48s	20218289	195386	60249	-59.76%	-8.44%	-2.55%	-0.30%	0.63X
Averages									-64.43%	-8.23%	-7.38%	-4.08%	0.56X

b. JUNCAP2 parasitic diodes.

Simulation 1: Bsim4

Simulation 2: PSP

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	46.590s	193999	1516	193	65.940s	192169	1558	187	-41.53%	0.94%	-2.77%	3.11%	0.71X
Circuit_02	20.950s	109335	17416	10865	37.540s	111080	17307	10829	-79.19%	-1.60%	0.63%	0.33%	0.56X
Circuit_03	15.350s	78918	5355	1387	25.580s	78331	5335	1377	-66.64%	0.74%	0.37%	0.72%	0.60X
Circuit_04	32.970s	150648	5074	1483	53.540s	145790	4513	1416	-62.39%	3.22%	11.06%	4.52%	0.62X
Circuit_05	16.050s	85151	5084	1416	26.280s	82103	4758	1375	-63.74%	3.58%	6.41%	2.90%	0.61X
Circuit_06	100.900s	458815	13791	4195	161.190s	449729	13475	4034	-59.75%	1.98%	2.29%	3.84%	0.63X
Circuit_07	2283.310s	7712593	5440	1255	3033.970s	7149604	5243	1184	-32.88%	7.30%	3.62%	5.66%	0.75X
Circuit_08	13.130s	66670	3644	1084	23.310s	68402	3673	1096	-77.53%	-2.60%	-0.80%	-1.11%	0.56X
Circuit_09	52.350s	242392	24986	7050	93.490s	250632	27682	7432	-78.59%	-3.40%	-10.79%	-5.42%	0.56X
Circuit_10	49.800s	284660	23825	6809	90.460s	288886	24064	7078	-81.65%	-1.48%	-1.00%	-3.95%	0.55X
Circuit_11	1297.700s	6838440	22877	7662	1948.660s	6505065	21745	7280	-50.16%	4.88%	4.95%	4.99%	0.67X
MIX/ring	69.360s	365172	46360	13293	99.290s	294258	37912	10796	-43.15%	19.42%	18.22%	18.78%	0.70X
Total figures	3998.46s	16586793	175368	56692	5659.25s	15616049	167265	54084	-41.54%	5.85%	4.62%	4.60%	0.71X
Averages									-61.43%	2.75%	2.68%	2.86%	0.63X

c. JUNCAP1 parasitic diodes.

Simulation 1: Bsim4

Simulation 2: PSP

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	31.450s	193580	1515	195	52.660s	195665	1577	190	-67.44%	-1.08%	-4.09%	2.56%	0.60X
Circuit_02	11.970s	109390	17472	10894	27.860s	110762	17494	10873	-132.75%	-1.25%	-0.13%	0.19%	0.43X
Circuit_03	8.250s	72618	5041	1306	20.370s	82559	5402	1442	-146.91%	-13.69%	-7.16%	-10.41%	0.41X
Circuit_04	19.640s	143664	4686	1409	43.630s	154235	5032	1463	-122.15%	-7.36%	-7.38%	-3.83%	0.45X
Circuit_05	8.720s	81155	4948	1363	21.760s	88545	5109	1446	-149.54%	-9.11%	-3.25%	-6.09%	0.40X
Circuit_06	61.120s	445737	13342	4050	130.980s	463291	14116	4211	-114.30%	-3.94%	-5.80%	-3.98%	0.47X
Circuit_07	1615.490s	7778023	5222	1198	2606.450s	7409615	5412	1241	-61.34%	4.74%	-3.64%	-3.59%	0.62X
Circuit_08	7.880s	66986	3737	1110	18.490s	70250	3812	1121	-134.64%	-4.87%	-2.01%	-0.99%	0.43X
Circuit_09	33.520s	250878	25351	7251	74.740s	263786	28734	7742	-122.97%	-5.15%	-13.34%	-6.77%	0.45X
Circuit_10	27.150s	289468	23890	6827	67.390s	289070	24079	7082	-148.21%	0.14%	-0.79%	-3.74%	0.40X
Circuit_11	726.430s	6334727	21906	7391	1558.250s	6143168	22522	7469	-114.51%	3.02%	-2.81%	-1.06%	0.47X
MIX/ring	39.950s	370474	46909	13390	74.710s	297097	38181	10896	-87.01%	19.81%	18.61%	18.63%	0.53X
Total figures	2591.57s	16136700	174019	56384	4697.29s	15568043	171470	55176	-81.25%	3.52%	1.46%	2.14%	0.55X
Averages									-17.98%	-1.56%	-2.65%	-1.59%	0.47X

2. Linux

a. No parasitic diodes.

Simulation 1: Bsim4

Simulation 2: PSP

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	17.580s	217947	1605	211	15.900s	223795	1704	210	9.56%	-2.68%	-6.17%	0.47%	1.11X
Circuit_02	7.000s	111487	18091	11026	7.190s	119212	18892	11291	-2.71%	-6.93%	-4.43%	-2.40%	0.97X
Circuit_03	5.410s	89367	5725	1529	5.960s	109130	6669	1727	-10.17%	-22.11%	-16.49%	-12.95%	0.91X
Circuit_04	11.900s	162033	5642	1578	13.230s	182805	6422	1708	-11.18%	-12.82%	-13.82%	-8.24%	0.90X
Circuit_05	6.060s	98002	5537	1571	5.750s	113759	6291	1778	5.12%	-16.08%	-13.62%	-13.18%	1.05X
Circuit_06	34.600s	489748	15434	4523	39.290s	554310	18482	5050	-13.55%	-13.18%	-19.75%	-11.65%	0.88X
Circuit_07	890.040s	9155464	5944	1312	918.610s	9431917	6271	1332	-3.21%	-3.02%	-5.50%	-1.52%	0.97X
Circuit_08	5.850s	88140	5095	1377	5.960s	99442	5219	1410	-1.88%	-12.82%	-2.43%	-2.40%	0.98X
Circuit_09	20.250s	295334	30438	8272	21.330s	330146	33899	8953	-5.33%	-11.79%	-11.37%	-8.23%	0.95X
Circuit_10	16.250s	294994	23064	6989	15.820s	290744	24217	7123	2.65%	1.44%	-5.00%	-1.92%	1.03X
Circuit_11	454.760s	7262083	25842	7984	490.070s	8448655	27846	8316	-7.76%	-16.34%	-7.75%	-4.16%	0.93X
MIX/ring	22.250s	380542	48106	13693	18.710s	313228	39397	11342	15.91%	17.69%	18.10%	17.17%	1.19X
Total figures	1491.95s	18645141	190523	60065	1557.82s	20217143	195309	60240	-4.42%	-8.43%	-2.51%	-0.29%	0.96X
Averages									-1.88%	-8.22%	-7.35%	-4.08%	0.99X

b. JUNCAP2 parasitic diodes.

Simulation 1: Bsim4

Simulation 2: PSP

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	22.680s	193999	1516	193	18.360s	192169	1558	187	19.05%	0.94%	-2.77%	3.11%	1.24X
Circuit_02	10.490s	109335	17416	10865	9.660s	111080	17307	10829	7.91%	-1.60%	0.63%	0.33%	1.09X
Circuit_03	7.350s	78918	5355	1387	6.490s	78331	5335	1377	11.70%	0.74%	0.37%	0.72%	1.13X
Circuit_04	16.070s	150648	5074	1483	13.410s	145757	4508	1415	16.55%	3.25%	11.15%	4.59%	1.20X
Circuit_05	8.590s	85151	5084	1416	6.640s	82102	4758	1375	22.70%	3.58%	6.41%	2.90%	1.29X
Circuit_06	49.550s	459128	13804	4197	42.540s	449625	13476	4035	14.15%	2.07%	2.38%	3.86%	1.16X
Circuit_07	1052.240s	7712593	5440	1255	895.250s	7149604	5243	1184	14.92%	7.30%	3.62%	5.66%	1.18X
Circuit_08	6.930s	66670	3644	1084	5.910s	68402	3673	1096	14.72%	-2.60%	-0.80%	-1.11%	1.17X
Circuit_09	26.090s	242320	24962	7044	23.670s	250632	27676	7430	9.28%	-3.43%	-10.87%	-5.48%	1.10X
Circuit_10	26.140s	284660	23825	6809	23.140s	288886	24064	7078	11.48%	-1.48%	-1.00%	-3.95%	1.13X
Circuit_11	680.100s	6727878	22876	7662	559.910s	6505066	21745	7280	17.67%	3.31%	4.94%	4.99%	1.21X
MIX/ring	38.590s	365172	46360	13293	27.160s	294258	37912	10796	29.62%	19.42%	18.22%	18.78%	1.42X
Total figures	1944.82s	16476472	175356	56688	1632.14s	15615912	167255	54082	16.08%	5.22%	4.62%	4.60%	1.19X
Averages									15.81%	2.63%	2.69%	2.87%	1.19X

c. JUNCAP1 parasitic diodes.

Simulation 1: Bsim4

Simulation 2: PSP

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	14.310s	193580	1515	195	14.600s	195665	1577	190	-2.03%	-1.08%	-4.09%	2.56%	0.98X
Circuit_02	5.210s	109390	17472	10894	7.910s	110762	17494	10873	-51.82%	-1.25%	-0.13%	0.19%	0.66X
Circuit_03	3.810s	72618	5041	1306	5.760s	82559	5402	1442	-51.18%	-13.69%	-7.16%	-10.41%	0.66X
Circuit_04	9.770s	143664	4686	1409	13.280s	154228	5028	1463	-35.93%	-7.35%	-7.30%	-3.83%	0.74X
Circuit_05	4.350s	81155	4948	1363	6.760s	88555	5109	1446	-55.40%	-9.12%	-3.25%	-6.09%	0.64X
Circuit_06	29.520s	445771	13343	4050	39.520s	463203	14108	4210	-33.88%	-3.91%	-5.73%	-3.95%	0.75X
Circuit_07	735.890s	7778023	5222	1198	858.070s	7409615	5412	1241	-16.60%	4.74%	-3.64%	-3.59%	0.86X
Circuit_08	3.920s	67046	3736	1110	5.460s	70250	3812	1121	-39.29%	-4.78%	-2.03%	-0.99%	0.72X
Circuit_09	15.910s	250908	25344	7251	22.250s	263814	28739	7743	-39.85%	-5.14%	-13.40%	-6.79%	0.72X
Circuit_10	13.250s	289468	23890	6827	19.150s	289070	24079	7082	-44.53%	0.14%	-0.79%	-3.74%	0.69X
Circuit_11	328.420s	6333887	21906	7391	452.720s	6143168	22522	7469	-37.85%	3.01%	-2.81%	-1.06%	0.73X
MIX/ring	19.470s	370474	46909	13390	21.310s	297097	38181	10896	-9.45%	19.81%	18.61%	18.63%	0.91X
Total figures	1183.83s	16135984	174012	56384	1466.79s	15567986	171463	55176	-23.90%	3.52%	1.46%	2.14%	0.81X
Averages									-34.82%	-1.55%	-2.64%	-1.59%	0.76X

III. Effect of JUNCAP parasitic diodes.

1. Solaris

a. JUNCAP2 parasitic diodes (ams2006.1).

Simulation 1: PSP with no parasitic diodes

Simulation 2: PSP with JUNCAP2 parasitic diodes

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	58.480s	223795	1704	210	65.050s	192169	1558	187	-11.23%	14.13%	8.57%	10.95%	0.90X
Circuit_02	28.090s	119212	18892	11291	37.190s	111080	17307	10829	-32.40%	6.82%	8.39%	4.09%	0.76X
Circuit_03	24.650s	109130	6669	1727	24.890s	78331	5335	1377	-0.97%	28.22%	20.00%	20.27%	0.99X
Circuit_04	49.650s	182805	6422	1708	52.010s	145790	4513	1416	-4.75%	20.25%	29.73%	17.10%	0.95X
Circuit_05	25.640s	113771	6286	1778	25.910s	82103	4758	1375	-1.05%	27.83%	24.31%	22.67%	0.99X
Circuit_06	149.600s	555461	18558	5058	159.360s	449729	13475	4034	-6.52%	19.03%	27.39%	20.25%	0.94X
Circuit_07	3024.020s	9431917	6271	1332	2986.830s	7149604	5243	1184	1.23%	24.20%	16.39%	11.11%	1.01X
Circuit_08	24.770s	99442	5219	1410	23.080s	68402	3673	1096	6.82%	31.21%	29.62%	22.27%	1.07X
Circuit_09	85.650s	330198	33905	8954	92.430s	250632	27682	7432	-7.92%	24.10%	18.35%	17.00%	0.93X
Circuit_10	64.350s	290744	24217	7123	89.200s	288886	24064	7078	-38.62%	0.64%	0.63%	0.63%	0.72X
Circuit_11	1859.080s	8448586	27846	8316	1986.870s	6505065	21745	7280	-6.87%	23.00%	21.91%	12.46%	0.94X
MIX/ring	74.240s	313228	39397	11342	100.610s	294258	37912	10796	-35.52%	6.06%	3.77%	4.81%	0.74X
Total figures	5468.22s	20218289	195386	60249	5643.43s	15616049	167265	54084	-3.20%	22.76%	14.39%	10.23%	0.97X
Averages									-11.48%	18.79%	17.42%	13.63%	0.91X

b. JUNCAP1 parasitic diodes (ams2006.1).

Simulation 1: PSP with no parasitic diodes

Simulation 2: PSP with JUNCAP1 parasitic diodes

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	58.070s	223795	1704	210	52.090s	195665	1577	190	10.30%	12.57%	7.45%	9.52%	1.11X
Circuit_02	28.130s	119212	18892	11291	27.530s	110762	17494	10873	2.13%	7.09%	7.40%	3.70%	1.02X
Circuit_03	24.910s	109130	6669	1727	20.050s	82559	5402	1442	19.51%	24.35%	19.00%	16.50%	1.24X
Circuit_04	49.570s	182805	6422	1708	43.190s	154235	5032	1463	12.87%	15.63%	21.64%	14.34%	1.15X
Circuit_05	25.930s	113771	6286	1778	21.220s	88545	5109	1446	18.16%	22.17%	18.72%	18.67%	1.22X
Circuit_06	149.480s	555461	18558	5058	129.820s	463291	14116	4211	13.15%	16.59%	23.94%	16.75%	1.15X
Circuit_07	3023.250s	9431917	6271	1332	2576.600s	7409615	5412	1241	14.77%	21.44%	13.70%	6.83%	1.17X
Circuit_08	24.810s	99442	5219	1410	18.690s	70250	3812	1121	24.67%	29.36%	26.96%	20.50%	1.33X
Circuit_09	86.490s	330198	33905	8954	74.970s	263786	28734	7742	13.32%	20.11%	15.25%	13.54%	1.15X
Circuit_10	63.770s	290744	24217	7123	67.480s	289070	24079	7082	-5.82%	0.58%	0.57%	0.58%	0.95X
Circuit_11	1866.660s	8448586	27846	8316	1530.820s	6143168	22522	7469	17.99%	27.29%	19.12%	10.19%	1.22X
MIX/ring	74.380s	313228	39397	11342	74.320s	297097	38181	10896	0.08%	5.15%	3.09%	3.93%	1.00X
Total figures	5475.45s	20218289	195386	60249	4636.78s	15568043	171470	55176	15.32%	23.00%	12.24%	8.42%	1.18X
Averages									11.76%	16.86%	14.74%	11.25%	1.14X

2. Linux

a. JUNCAP2 parasitic diodes (ams2006.1).

Simulation 1: PSP with no parasitic diodes

Simulation 2: PSP with JUNCAP2 parasitic diodes

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	16.010s	223795	1704	210	18.740s	192169	1558	187	-17.05%	14.13%	8.57%	10.95%	0.85X
Circuit_02	7.320s	119212	18892	11291	9.530s	111080	17307	10829	-30.19%	6.82%	8.39%	4.09%	0.77X
Circuit_03	5.830s	109130	6669	1727	6.290s	78331	5335	1377	-7.89%	28.22%	20.00%	20.27%	0.93X
Circuit_04	13.220s	182805	6422	1708	14.540s	145757	4508	1415	-9.98%	20.27%	29.80%	17.15%	0.91X
Circuit_05	6.090s	113759	6291	1778	6.770s	82102	4758	1375	-11.17%	27.83%	24.37%	22.67%	0.90X
Circuit_06	37.390s	554310	18482	5050	41.490s	449625	13476	4035	-10.97%	18.89%	27.09%	20.10%	0.90X
Circuit_07	901.240s	9431917	6271	1332	896.020s	7149604	5243	1184	0.58%	24.20%	16.39%	11.11%	1.01X
Circuit_08	5.970s	99442	5219	1410	6.350s	68402	3673	1096	-6.37%	31.21%	29.62%	22.27%	0.94X
Circuit_09	20.390s	330146	33899	8953	23.380s	250632	27676	7430	-14.66%	24.08%	18.36%	17.01%	0.87X
Circuit_10	15.410s	290744	24217	7123	22.560s	288886	24064	7078	-46.40%	0.64%	0.63%	0.63%	0.68X
Circuit_11	486.020s	8448655	27846	8316	524.480s	6505066	21745	7280	-7.91%	23.00%	21.91%	12.46%	0.93X
MIX/ring	18.400s	313228	39397	11342	26.050s	294258	37912	10796	-41.58%	6.06%	3.77%	4.81%	0.71X
Total figures	1533.29s	20217143	195309	60240	1596.2s	15615912	167255	54082	-4.10%	22.76%	14.36%	10.22%	0.96X
Averages									-16.97%	18.78%	17.41%	13.63%	0.87X

b. JUNCAP1 parasitic diodes (ams2006.1).

Simulation 1: PSP with no parasitic diodes

Simulation 2: PSP with JUNCAP1 parasitic diodes

Circuit	Simulation 1				Simulation 2				Time gain	devcall gain	iter. gain	steps gain	Speed Up
	time	devcall	iter.	steps	time	devcall	iter.	steps					
Circuit_01	15.930s	223795	1704	210	14.910s	195665	1577	190	6.40%	12.57%	7.45%	9.52%	1.07X
Circuit_02	6.590s	119212	18892	11291	6.330s	110762	17494	10873	3.95%	7.09%	7.40%	3.70%	1.04X
Circuit_03	5.810s	109130	6669	1727	5.380s	82559	5402	1442	7.40%	24.35%	19.00%	16.50%	1.08X
Circuit_04	13.150s	182805	6422	1708	12.150s	154228	5028	1463	7.60%	15.63%	21.71%	14.34%	1.08X
Circuit_05	6.420s	113759	6291	1778	5.510s	88555	5109	1446	14.17%	22.16%	18.79%	18.67%	1.17X
Circuit_06	38.860s	554310	18482	5050	36.300s	463203	14108	4210	6.59%	16.44%	23.67%	16.63%	1.07X
Circuit_07	907.910s	9431917	6271	1332	795.350s	7409615	5412	1241	12.40%	21.44%	13.70%	6.83%	1.14X
Circuit_08	6.380s	99442	5219	1410	5.000s	70250	3812	1121	21.63%	29.36%	26.96%	20.50%	1.28X
Circuit_09	22.310s	330146	33899	8953	20.230s	263814	28739	7743	9.32%	20.09%	15.22%	13.52%	1.10X
Circuit_10	15.620s	290744	24217	7123	17.900s	289070	24079	7082	-14.60%	0.58%	0.57%	0.58%	0.87X
Circuit_11	487.110s	8448655	27846	8316	420.460s	6143168	22522	7469	13.68%	27.29%	19.12%	10.19%	1.16X
MIX/ring	18.520s	313228	39397	11342	19.340s	297097	38181	10896	-4.43%	5.15%	3.09%	3.93%	0.96X
Total figures	1544.61s	20217143	195309	60240	1358.86s	15567986	171463	55176	12.03%	23.00%	12.21%	8.41%	1.14X
Averages									7.01%	16.85%	14.72%	11.24%	1.08X

IV. Conclusions

- Significant PSP speed enhancement is achieved in AMS2006.1 when compared to AMS2005.3, especially when JUNCAP2 parasitic diodes are used.
- Speed enhancement achieved on Solaris is more than that on Linux. The reason behind the difference in speed behavior between Linux and Solaris is not quite clear to us. We were not able to use Quantify tool with Eldo on Linux, which made us unable to locate the source of difference, as we were not able to compare Quantify results of Eldo on Linux versus that on Solaris.
- The Speed comparison with JUNCAP parasitic diodes and without any parasitic diodes also shows acceptable performance on both Linux and Solaris (for both JUNCAP1 and JUNCAP2 models). On the average, as the number of time steps performed when using JUNCAP diodes drops by about 10% and also the number of device calls drops by about 15% to 20%, the run time almost doesn't change, which means that the added overhead from JUNCAP is less than 20%. For the worst case in the results above, the slowdown is still less than 1.5X.
- When compared to Bsim4, PSP speed is quite close to that of Bsim4 on Linux, however on Solaris there is almost a 2X speed difference in favor of Bsim4! Again, the reason for this difference in behavior between Linux and Solaris is not clear to us.