

Intel I7/Nvidia vs AMD Ryzen/Radeon: Part II

This project investigates the performance of the lammps leonard/jones mpi package and standard DGEMM processing on CPUs (Intel I7, AMD Ryzen 7 1700) and GPUs (Radeon R9 Fury, Nvidia GTX1050). Updated results for 3DMark and Geekbench are also presented. (<http://davidyoung.com/cmgaamdintelnvidia.pdf> is the original study from 2018).

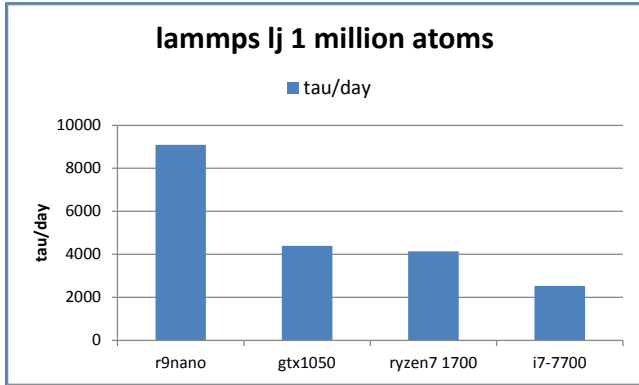


Figure 1 lammps lj 1 million atoms tau/day

	tau/day	tau/day/device
r9nano	9095	9095
gtx1050	4399	4399
ryzen7 1700	4138	259
i7-7700	2535	362

Figure 2 lammps lj 1 million atoms tau/day/device

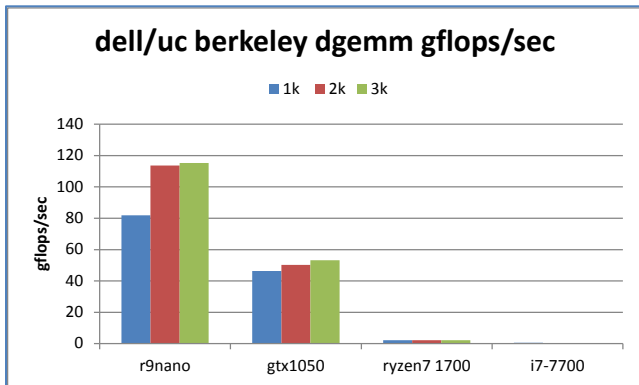


Figure 3 DGEMM gflops per second by device

matrix size	1k	2k	3k
r9nano	81.853	113.69	115.22
gtx1050	46.32	50.19	53.23
ryzen7 1700	2.161	2.2	2.228
i7-7700	0.591	0.314	0.358

Figure 4 <https://github.com/djvgithub/crawdgemm>

Figures 1 and 2 detail tau/day (the higher the better) for the lammps leonard-jones 1 million atom tests on CPUs (8 for the i7, 16 for the ryzen) and GPUs. Figures 3 and 4 detail double precision gflops/second on a single CPU and GPU using the double precision matrix multiplication app (DGEMM).

The R9 Nano shows a 3X speedup in frames per second for 3DMark Timespy and Firestrike (Figures 5 and 6) with similar improvements for Geekbench (Figure 7) vs. rx560.

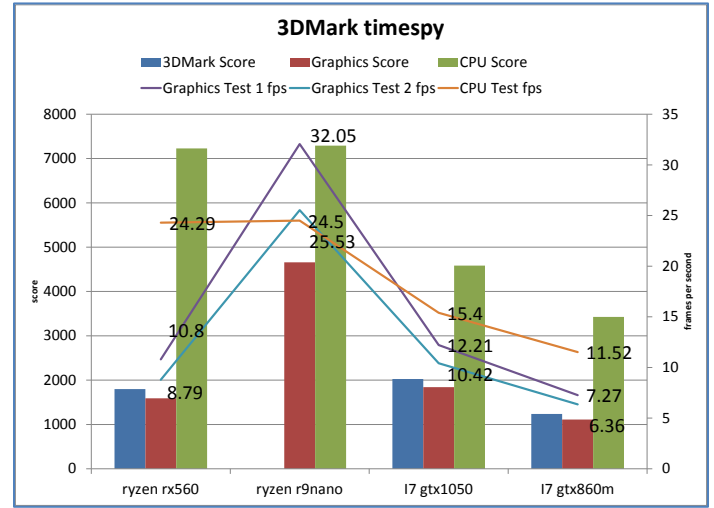


Figure 5 3DMark timespy

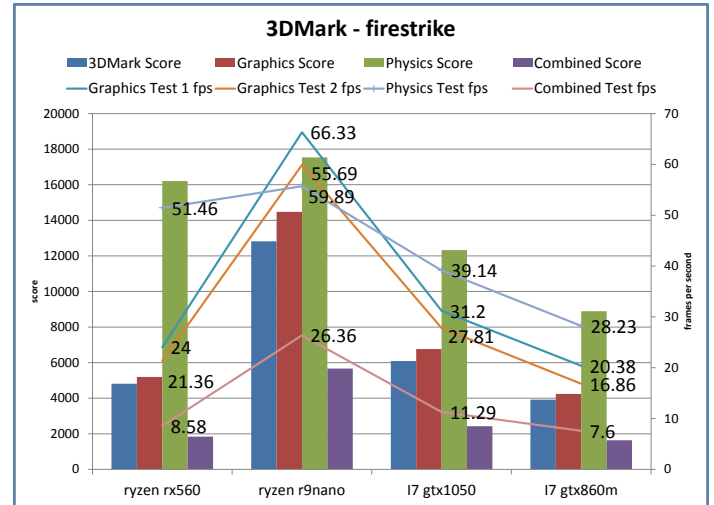


Figure 6 3DMark firestrike

platform	ipad	droid turbo	mac mini	asus luggable	asus luggable	asus luggable	asus desktop	asus desktop	asus desktop	lenovo desktop	lenovo desktop
CPU model	A7	snapdragon 805	i7-3615QM	i7-4700	i7-4700	i7-4700	i7-7700	i7-7700	i7-7700	Ryzen 7 1700	Ryzen 7 1700
OS	iOS 10.3.2	Android 6.0.1	OSX 10.12.5	Win 8.1	Win 8.1	Win 8.1	Win 10	Win 10	Win 10	Win 10	Win 10
CPU single core	1297	1061	3968	3620	3620	3620	5091	5091	5091	4069	3860
CPU multiple core	2198	2959	10632	11722	11722	11722	17224	17224	17224	20281	20315
GPU vendor	apple	qualcomm	intel	intel	nvidia	nvidia	nvidia	nvidia	nvidia	amd	amd
GPU model	adreno 420	4000	4600	GT720M4	GT720M4	GT720M4	M1000	GTX1050	GTX1050	Radeon R9 M40	Radeon R9 Nano
geekbench workload	OpenCL	OpenCL	OpenCL	OpenCL	OpenCL	CUDA	OpenCL	OpenCL	CUDA	OpenCL	OpenCL
overall result	543	3860	6167	13809	45547	46903	22639	76263	82509	66849	141892
Sobel	317	3412	3056	17219	92620	85011	29143	139705	134272	142531	312192
SPFT	0.014	0.15	0.13	0.75	4.08	3.77	1.28	6.16	5.92	6.82	14.4
Histogram Equalization	326	4901	2409	13699	68766	54343	26091	106619	101866	86690	107729
Gpixels/sec	0.01	0.153	0.075	0.43	2.15	1.7	0.82	3.33	3.18	2.71	3.37
SPFT	36	743	2324	2530	8658	8689	3664	12589	12763	11158	42884
Gflops	0.09	1.85	5.8	6.28	21.6	21.7	9.13	31.4	31.8	27.8	106.7
Gaussian Blur	249	13391	4271	15721	42874	64346	35318	76858	117422	131492	418234
Gpixels/sec	0.004	0.234	0.074	0.275	0.751	1.13	0.618	1.35	2.06	2.3	7.33
Face Detection	949	2820	2247	8030	19988	13937	13888	24830	23248	15165	20484
Misbehindows/sec	0.189	0.823	0.656	2.34	3.21	4.07	4.06	7.02	6.75	4.43	5.96
RAW	1726	4463	26458	48823	268237	160936	441642	274802	371827	1207137	1207137
Gpixels/sec	0.037	0.043	0.256	0.47	2.6	1.56	0.877	4.27	2.66	3.6	11.7
Depth of Field	2172	11453	24064	24801	121874	99008	36113	203635	146756	194802	617318
Mpixels/sec	6.11	33.3	69.9	72.2	354	289	104.9	586	426	565.9	1790
Particle Physics	3391	2059	20017	14539	21810	40308	15248	37103	111741	20029	16869
FPS	536	326	3164	2298	3448	6372	2439	5865	17664	3166.4	2666.8

Figure 7 <https://browser.geekbench.com/v4/compute/4125399>

<http://davidyoung.com/cmgaamdintelnvidia.pdf> page 3.

lammps	LAMMPS (21 Jul 2020)
r9nano	Fiji [Radeon R9 FURY / NANO Series], 64 CUs, 3.7/4 GB, 1 GHZ (Double Precision)
gtx1050	GeForce GTX 1050, 5 CUs, 1.9/2 GB, 1.5 GHZ (Double Precision)
r9nano	amdgpu, 3.5-30.e17, 3.10.0-1127.18.2.e17.x86_64,
gtx1050	Driver Version: 418.67 CUDA Version: 10.1
ryzen7 1700	CentOS Linux release 7.8.2003 (Core)
i7-7700	CentOS Linux release 7.7.1908 (Core)

Figure 8 lammps, DGEMM software configuration