



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology ThinkSystem SR645 2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468

SPECrate®2017_fp_energy_base = 1380

SPECrate®2017_fp_peak = 460

SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

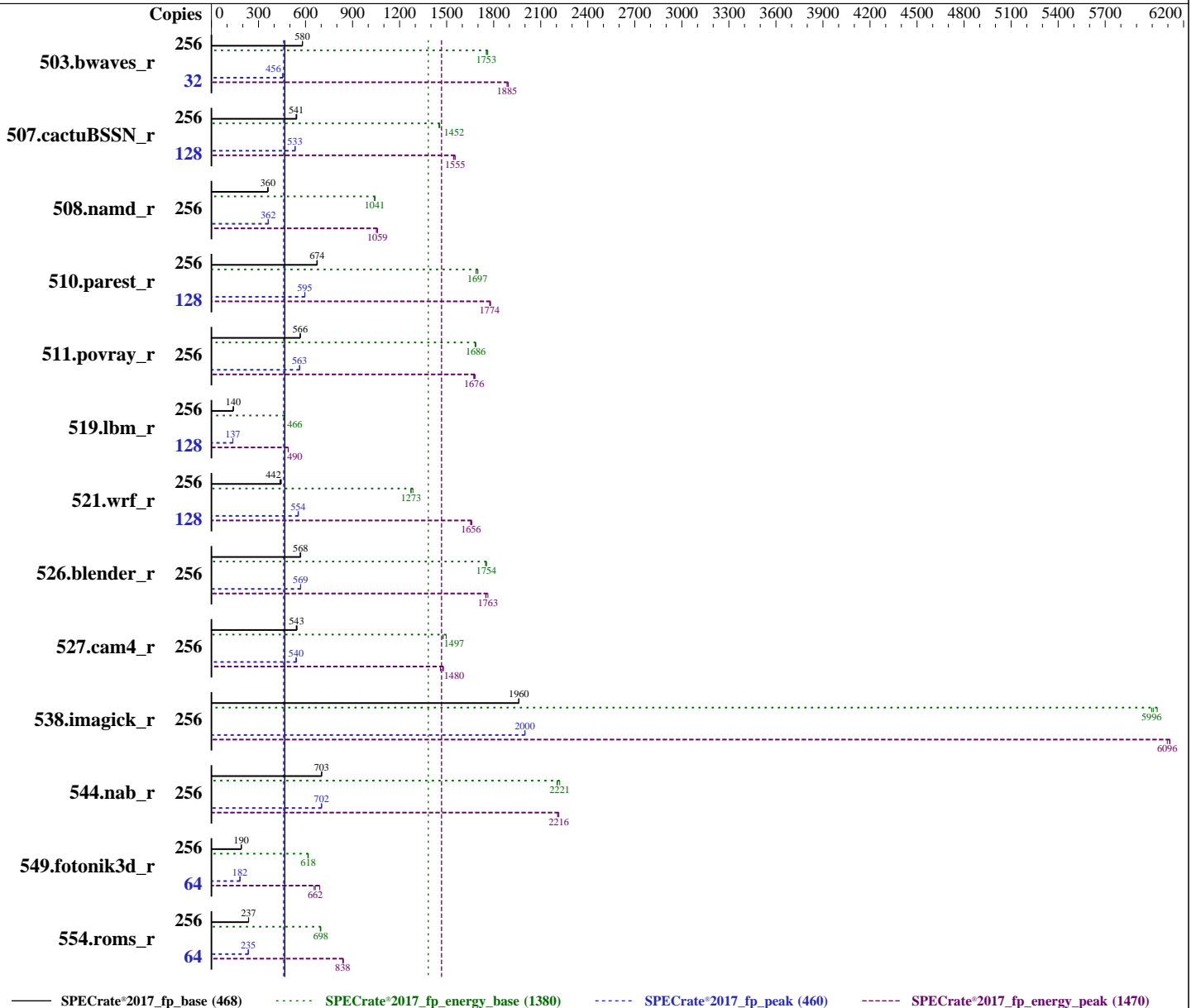
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022



Hardware

CPU Name: AMD EPYC 7773X
 Max MHz: 3500
 Nominal: 2200
 Enabled: 128 cores, 2 chips, 2 threads/core
 Orderable: 1,2 chips

(Continued on next page)

Software

OS: SUSE Linux Enterprise Server 15 SP3 (x86_64)
 Kernel 5.3.18-57-default
 Compiler: C/C++/Fortran: Version 3.2.0 of AOCC
 Parallel: No
 Firmware: Lenovo BIOS Version D8E125A 2.40 released Jan-2022

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology ThinkSystem SR645 2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

Hardware (Continued)

Cache L1: 32 KB I + 32 KB D on chip per core
L2: 512 KB I+D on chip per core
L3: 768 MB I+D on chip per chip,
96 MB shared / 8 cores
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)
Storage: 1 x 960 GB SATA SSD
Other: None

Software (Continued)

File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc: jemalloc memory allocator library v5.1.0
Power Management: BIOS set to balance power and performance

Power

Max. Power (W): 479.77
Idle Power (W): 93.05
Min. Temperature (C): 20.75
Elevation (m): 43
Line Standard: 220 V / 50 Hz / 1 phase / 3 wires
Provisioning: Line-powered

Power Settings

Management FW: Version 3.80 of D8BT31P
Memory Mode: Normal

Power-Relevant Hardware

Power Supply: 1 x 750 W (non-redundant)
Details: ThinkSystem 750W Titanium Power Supply
4P57A26292
Backplane: 10 x 2.5-inch HDD back plane
Other Storage: None
Storage Model #s: 4XB7A17089
NICs Installed: 1 x ThinkSystem Ethernet 4-port Adaptor @ 1 Gb
NICs Enabled (FW/OS): 4 / 1
NICs Connected/Speed: 1 @ 1 Gb
Other HW Model #s: 8 x Standard fans

Power Analyzer

Power Analyzer: WIN:9888
Hardware Vendor: YOKOGAWA, Inc.
Model: YokogawaWT310E
Serial Number: C3UD17024E
Input Connection: Default
Metrology Institute: CNAS
Calibration By: GRG METROLOGY & TEST (BEIJING) CO., LTD.
Calibration Label: J202110137471A-0002
Calibration Date: 21-Oct-2021
PTDaemon® Version: 1.9.2 (3976349f; 2020-12-08)
Setup Description: Connected to PSU1
Current Ranges Used: 2.5A
Voltage Range Used: 300V

Temperature Meter

Temperature Meter: WIN:9889
Hardware Vendor: Digi International, Inc.
Model: DigiWATCHPORT_H
Serial Number: W62330963
Input Connection: USB
PTDaemon Version: 1.9.2 (3976349f; 2020-12-08)
Setup Description: 50 mm in front of the main airflow inlet

Base Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
-----------	--------	---------	-------	-------------	--------------	---------------	---------------	---------	-------	-------------	--------------	---------------	---------------	---------	-------	-------------	--------------	---------------	---------------

Table continues on next page. Results appear in the order in which they were run. Bold underlined text indicates a median measurement.



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468

SPECrate®2017_fp_energy_base = 1380

SPECrate®2017_fp_peak = 460

SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Base Results Table (Continued)

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
503.bwaves_r	256	4424	580	1590	1760	359	363	4424	580	1600	1750	361	365	4425	580	1590	1760	360	365
507.cactuBSSN_r	256	595	544	245	1460	411	422	599	541	245	1450	410	424	600	540	245	1450	409	424
508.namd_r	256	675	360	255	1040	377	390	676	360	255	1040	377	391	674	361	254	1040	377	389
510.parest_r	256	993	674	429	1700	432	476	997	672	432	1690	433	480	992	675	429	1700	432	476
511.povray_r	256	1055	567	385	1680	365	371	1055	566	385	1690	365	370	1056	566	386	1680	365	371
519.lbm_r	256	1940	139	662	463	341	363	1929	140	660	464	342	360	1932	140	658	466	341	363
521.wrf_r	256	1288	445	487	1290	378	400	1296	442	492	1270	379	411	1312	437	492	1270	375	407
526.blender_r	256	685	569	241	1750	352	373	690	565	242	1750	350	372	686	568	241	1750	351	375
527.cam4_r	256	824	543	326	1500	395	425	828	541	330	1480	399	435	820	546	330	1480	403	437
538.imagick_r	256	325	1960	114	6030	352	417	325	1960	115	6010	354	407	325	1960	115	6000	354	420
544.nab_r	256	614	702	212	2200	345	357	613	703	212	2210	345	357	613	703	210	2220	343	355
549.fotonik3d_r	256	5236	191	1810	615	345	348	5242	190	1800	617	344	347	5238	190	1800	618	343	347
554.roms_r	256	1714	237	646	694	377	388	1721	236	645	696	375	384	1718	237	643	698	374	385

SPECrate®2017_fp_base = 468

SPECrate®2017_fp_energy_base = 1380

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Peak Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
503.bwaves_r	32	703	456	185	1890	263	266	704	456	186	1890	264	268	705	455	185	1890	262	266
507.cactuBSSN_r	128	303	534	115	1550	380	386	304	533	115	1550	377	383	304	533	115	1540	379	385
508.namd_r	256	671	362	250	1060	373	388	671	362	251	1060	373	387	670	363	252	1050	376	389
510.parest_r	128	563	595	205	1780	364	389	562	596	205	1780	365	390	562	595	205	1770	365	392
511.povray_r	256	1063	563	387	1680	364	375	1062	563	386	1680	363	372	1064	562	388	1670	364	372
519.lbm_r	128	988	137	313	490	317	322	986	137	313	489	318	323	988	137	313	490	317	321
521.wrf_r	128	518	554	189	1660	365	373	517	555	189	1660	365	372	519	552	189	1650	365	374
526.blender_r	256	685	569	241	1750	352	377	686	569	239	1760	349	371	686	568	241	1750	352	373
527.cam4_r	256	829	540	330	1480	398	434	825	543	331	1480	401	436	830	539	334	1460	402	444
538.imagick_r	256	318	2000	113	6110	354	408	318	2000	113	6100	355	404	319	2000	113	6110	354	414
544.nab_r	256	613	702	211	2210	344	354	614	702	212	2210	345	354	614	702	211	2220	344	354
549.fotonik3d_r	64	1365	183	402	691	295	312	1371	182	420	662	306	312	1372	182	424	655	309	313
554.roms_r	64	432	236	134	840	309	319	433	235	133	841	308	318	433	235	134	838	309	319

SPECrate®2017_fp_peak = 460

SPECrate®2017_fp_energy_peak = 1470

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at <http://developer.amd.com/amd-aocc/>

Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage,
'sysctl -w vm.zone_reclaim_mode=1' run as root.
To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

echo 0 > /proc/sys/kernel/numa_balancing
To enable Transparent Hugepages (THP) for all allocations,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =  
    "/home/cpu2017-1.1.8-amd-milanx-aocc320-A1/amd_rate_aocc320_milanx_A_lib  
    /lib;/home/cpu2017-1.1.8-amd-milanx-aocc320-A1/amd_rate_aocc320_milanx_A  
    _lib/lib32:"  
MALLOC_CONF = "retain:true"
```

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using OpenSUSE 15.2

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base =	468
SPECrate®2017_fp_energy_base =	1380
SPECrate®2017_fp_peak =	460
SPECrate®2017_fp_energy_peak =	1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

General Notes (Continued)

<https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2>

Platform Notes

BIOS settings:

Operating Mode set to Custom Mode
Core Performance Boost set to Disable
Memory Speed set to 3200MHz
SOC P-States set to P3
NUMA Nodes per Socket set to NPS4
ACPI SRAT L3 Cache as NUMA Domain set to Enable
L2 Stream HW Prefetcher set to Disable
Memory interleaving set to Disabled

Sysinfo program /home/cpu2017-1.1.8-amd-milanx-aocc320-A1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Mon Feb 28 17:09:31 2022

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

```
From /proc/cpuinfo
model name : AMD EPYC 7773X 64-Core Processor
 2 "physical id"s (chips)
256 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 64
siblings  : 128
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
53 54 55 56 57 58 59 60 61 62 63
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
53 54 55 56 57 58 59 60 61 62 63
```

```
From lscpu from util-linux 2.36.2:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
Address sizes:          48 bits physical, 48 bits virtual
CPU(s):                 256
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Platform Notes (Continued)

```

On-line CPU(s) list:          0-255
Thread(s) per core:         2
Core(s) per socket:        64
Socket(s):                   2
NUMA node(s):               16
Vendor ID:                   AuthenticAMD
CPU family:                  25
Model:                       1
Model name:                  AMD EPYC 7773X 64-Core Processor
Stepping:                    2
Frequency boost:             disabled
CPU MHz:                     1486.050
CPU max MHz:                 2200.0000
CPU min MHz:                 1500.0000
BogoMIPS:                    4391.97
Virtualization:              AMD-V
L1d cache:                   4 MiB
L1i cache:                   4 MiB
L2 cache:                    64 MiB
L3 cache:                    1.5 GiB
NUMA node0 CPU(s):          0-7,128-135
NUMA node1 CPU(s):          8-15,136-143
NUMA node2 CPU(s):          16-23,144-151
NUMA node3 CPU(s):          24-31,152-159
NUMA node4 CPU(s):          32-39,160-167
NUMA node5 CPU(s):          40-47,168-175
NUMA node6 CPU(s):          48-55,176-183
NUMA node7 CPU(s):          56-63,184-191
NUMA node8 CPU(s):          64-71,192-199
NUMA node9 CPU(s):          72-79,200-207
NUMA node10 CPU(s):         80-87,208-215
NUMA node11 CPU(s):         88-95,216-223
NUMA node12 CPU(s):         96-103,224-231
NUMA node13 CPU(s):         104-111,232-239
NUMA node14 CPU(s):         112-119,240-247
NUMA node15 CPU(s):         120-127,248-255
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:          Not affected
Vulnerability Mds:           Not affected
Vulnerability Meltdown:      Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1:     Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2:     Mitigation; Full AMD retpoline, IBPB conditional,

```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

Platform Notes (Continued)

IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
aperfmpperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb
bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 invpcid cqm rdt_a rdseed adx smap
clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsavec cqm_llc cqm_occup_llc
cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr wbnoinvd amd_ppin arat npt lbrv
svm_lock nrrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter
pfthreshold v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recov
succor smca

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	32K	4M	8	Data	1	64	1	64
L1i	32K	4M	8	Instruction	1	64	1	64
L2	512K	64M	8	Unified	2	1024	1	64
L3	96M	1.5G	16	Unified	3	98304	1	64

/proc/cpuinfo cache data
cache size : 512 KB

From numactl --hardware

WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 16 nodes (0-15)
node 0 cpus: 0 1 2 3 4 5 6 7 128 129 130 131 132 133 134 135
node 0 size: 32004 MB
node 0 free: 31690 MB
node 1 cpus: 8 9 10 11 12 13 14 15 136 137 138 139 140 141 142 143
node 1 size: 32250 MB
node 1 free: 32072 MB
node 2 cpus: 16 17 18 19 20 21 22 23 144 145 146 147 148 149 150 151
node 2 size: 32252 MB
node 2 free: 32038 MB
node 3 cpus: 24 25 26 27 28 29 30 31 152 153 154 155 156 157 158 159
node 3 size: 32250 MB
node 3 free: 32082 MB
node 4 cpus: 32 33 34 35 36 37 38 39 160 161 162 163 164 165 166 167
node 4 size: 32252 MB
node 4 free: 32056 MB

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Platform Notes (Continued)

```

node 5 cpus: 40 41 42 43 44 45 46 47 168 169 170 171 172 173 174 175
node 5 size: 32250 MB
node 5 free: 32057 MB
node 6 cpus: 48 49 50 51 52 53 54 55 176 177 178 179 180 181 182 183
node 6 size: 32252 MB
node 6 free: 32066 MB
node 7 cpus: 56 57 58 59 60 61 62 63 184 185 186 187 188 189 190 191
node 7 size: 32238 MB
node 7 free: 32057 MB
node 8 cpus: 64 65 66 67 68 69 70 71 192 193 194 195 196 197 198 199
node 8 size: 32252 MB
node 8 free: 32060 MB
node 9 cpus: 72 73 74 75 76 77 78 79 200 201 202 203 204 205 206 207
node 9 size: 32250 MB
node 9 free: 32026 MB
node 10 cpus: 80 81 82 83 84 85 86 87 208 209 210 211 212 213 214 215
node 10 size: 32252 MB
node 10 free: 31878 MB
node 11 cpus: 88 89 90 91 92 93 94 95 216 217 218 219 220 221 222 223
node 11 size: 32250 MB
node 11 free: 32069 MB
node 12 cpus: 96 97 98 99 100 101 102 103 224 225 226 227 228 229 230 231
node 12 size: 32252 MB
node 12 free: 32045 MB
node 13 cpus: 104 105 106 107 108 109 110 111 232 233 234 235 236 237 238 239
node 13 size: 32216 MB
node 13 free: 32036 MB
node 14 cpus: 112 113 114 115 116 117 118 119 240 241 242 243 244 245 246 247
node 14 size: 32252 MB
node 14 free: 32062 MB
node 15 cpus: 120 121 122 123 124 125 126 127 248 249 250 251 252 253 254 255
node 15 size: 32248 MB
node 15 free: 32063 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
  0: 10 11 12 12 12 12 12 12 32 32 32 32 32 32 32 32
  1: 11 10 12 12 12 12 12 12 32 32 32 32 32 32 32 32
  2: 12 12 10 11 12 12 12 12 32 32 32 32 32 32 32 32
  3: 12 12 11 10 12 12 12 12 32 32 32 32 32 32 32 32
  4: 12 12 12 12 10 11 12 12 32 32 32 32 32 32 32 32
  5: 12 12 12 12 11 10 12 12 32 32 32 32 32 32 32 32
  6: 12 12 12 12 12 12 10 11 32 32 32 32 32 32 32 32
  7: 12 12 12 12 12 12 11 10 32 32 32 32 32 32 32 32
  8: 32 32 32 32 32 32 32 32 10 11 12 12 12 12 12 12
  9: 32 32 32 32 32 32 32 32 11 10 12 12 12 12 12 12

```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Platform Notes (Continued)

10:	32	32	32	32	32	32	32	32	12	12	10	11	12	12	12
11:	32	32	32	32	32	32	32	32	12	12	11	10	12	12	12
12:	32	32	32	32	32	32	32	32	12	12	12	12	10	11	12
13:	32	32	32	32	32	32	32	32	12	12	12	12	11	10	12
14:	32	32	32	32	32	32	32	32	12	12	12	12	12	10	11
15:	32	32	32	32	32	32	32	32	12	12	12	12	12	11	10

From /proc/meminfo

MemTotal: 528100156 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has powersave

From /etc/*release* /etc/*version*

os-release:

NAME="SLES"

VERSION="15-SP3"

VERSION_ID="15.3"

PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"

ID="sles"

ID_LIKE="suse"

ANSI_COLOR="0;32"

CPE_NAME="cpe:/o:suse:sles:15:sp3"

uname -a:

Linux localhost 5.3.18-57-default #1 SMP Wed Apr 28 10:54:41 UTC 2021 (ba3c2e9) x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):

Not affected

CVE-2018-3620 (L1 Terminal Fault):

Not affected

Microarchitectural Data Sampling:

Not affected

CVE-2017-5754 (Meltdown):

Not affected

CVE-2018-3639 (Speculative Store Bypass):

Mitigation: Speculative Store Bypass disabled via prctl and seccomp

CVE-2017-5753 (Spectre variant 1):

Mitigation: usercopy/swaps barriers and __user pointer sanitization

CVE-2017-5715 (Spectre variant 2):

Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

Platform Notes (Continued)

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Feb 28 17:03

SPEC is set to: /home/cpu2017-1.1.8-amd-milanx-aocc320-A1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 892G 105G 788G 12% /

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR645 MB
Product Family: ThinkSystem
Serial: 1234567890

Additional information from dmidecode 3.2 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:
16x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200

BIOS:
BIOS Vendor: Lenovo
BIOS Version: D8E125A-2.40
BIOS Date: 01/12/2022
BIOS Revision: 2.40
Firmware Revision: 3.80

(End of data from sysinfo program)
This testing installed 8 DIMMs per processor, total 16 DIMMS.
16 DIMMs populated with 1 DIMM per channel configuration (slots:
1, 3, 5, 7, 10, 12, 14, 16, 17, 19, 21, 23, 26, 28, 30 and 32).

Compiler Version Notes

=====
C | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
| 544.nab_r(base, peak)
=====

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on
LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base =	468
SPECrate®2017_fp_energy_base =	1380
SPECrate®2017_fp_peak =	460
SPECrate®2017_fp_energy_peak =	1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

Compiler Version Notes (Continued)

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

```
=====  

C++          | 508.namd_r(base, peak) 510.parest_r(base, peak)  

-----
```

```
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on  

  LLVM Mirror.Version.13.0.0)  

Target: x86_64-unknown-linux-gnu  

Thread model: posix  

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

-----
```

```
=====  

C++, C       | 511.povray_r(base, peak) 526.blender_r(base, peak)  

-----
```

```
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on  

  LLVM Mirror.Version.13.0.0)  

Target: x86_64-unknown-linux-gnu  

Thread model: posix  

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on  

  LLVM Mirror.Version.13.0.0)  

Target: x86_64-unknown-linux-gnu  

Thread model: posix  

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

-----
```

```
=====  

C++, C, Fortran | 507.cactuBSSN_r(base, peak)  

-----
```

```
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on  

  LLVM Mirror.Version.13.0.0)  

Target: x86_64-unknown-linux-gnu  

Thread model: posix  

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on  

  LLVM Mirror.Version.13.0.0)  

Target: x86_64-unknown-linux-gnu  

Thread model: posix  

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on  

  LLVM Mirror.Version.13.0.0)  

Target: x86_64-unknown-linux-gnu  

Thread model: posix
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

Compiler Version Notes (Continued)

InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

=====
Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
554.roms_r(base, peak)

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

=====
Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

Base Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

Base Compiler Invocation (Continued)

Benchmarks using both C and C++:
clang++ clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -D__BOOL_DEFINED -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:

-m64 -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang

C++ benchmarks:

-m64 -std=c++98 -mno-adx -mno-sse4a

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-mllvm -enable-loop-fusion -z muldefs -lamdlibm -ljemalloc -lflang
```

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -Hz,1,0x1 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-loop-fusion
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order
-z muldefs -lamdlibm -ljemalloc -lflang
```

Benchmarks using both Fortran and C:

```
-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50
-mllvm -inline-threshold=1000 -fremap-arrays
-mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-loop-fusion -Hz,1,0x1 -Kieee -Mrecursive
-mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order  
-z muldefs -lamdlibm -ljemalloc -lflang
```

Benchmarks using both C and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a  
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM  
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50  
-mllvm -inline-threshold=1000 -fremap-arrays  
-mllvm -function-specialize -flv-function-specialization  
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true  
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3  
-mllvm -enable-loop-fusion -mllvm -enable-partial-unswitch  
-mllvm -unroll-threshold=100 -finline-aggressive  
-mllvm -loop-unswitch-threshold=200000 -mllvm -reroll-loops  
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes  
-mllvm -convert-pow-exp-to-int=false -z muldefs -lamdlibm -ljemalloc  
-lflang
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a  
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -flto  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3  
-Wl,-mllvm -Wl,-enable-loop-fusion -O3 -march=znver3 -fveclib=AMDLIBM  
-ffast-math -fstruct-layout=5 -mllvm -unroll-threshold=50  
-mllvm -inline-threshold=1000 -fremap-arrays  
-mllvm -function-specialize -flv-function-specialization  
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true  
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3  
-mllvm -enable-loop-fusion -mllvm -enable-partial-unswitch  
-mllvm -unroll-threshold=100 -finline-aggressive  
-mllvm -loop-unswitch-threshold=200000 -mllvm -reroll-loops  
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes  
-mllvm -convert-pow-exp-to-int=false -Hz,1,0x1 -Kieee -Mrecursive  
-mllvm -fuse-tile-inner-loop -funroll-loops -mllvm -lsr-in-nested-loop  
-mllvm -enable-loopinterchange -mllvm -compute-interchange-order  
-z muldefs -lamdlibm -ljemalloc -lflang
```



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base =	468
SPECrate®2017_fp_energy_base =	1380
SPECrate®2017_fp_peak =	460
SPECrate®2017_fp_energy_peak =	1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

Base Other Flags

C benchmarks:

-Wno-unused-command-line-argument

C++ benchmarks:

-Wno-unused-command-line-argument

Fortran benchmarks:

-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:

-Wno-unused-command-line-argument

Benchmarks using both C and C++:

-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:

-Wno-unused-command-line-argument

Peak Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

flang

Benchmarks using both Fortran and C:

flang clang

Benchmarks using both C and C++:

clang++ clang

Benchmarks using Fortran, C, and C++:

clang++ clang flang



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base =	468
SPECrate®2017_fp_energy_base =	1380
SPECrate®2017_fp_peak =	460
SPECrate®2017_fp_energy_peak =	1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -m64 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-freemap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc
```

538.imagick_r: Same as 519.lbm_r

```
544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -freemap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc
```

C++ benchmarks:

```
508.namd_r: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-flv-function-specialization -mllvm -enable-licm-vrp
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -lamdlibm -ljemalloc
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base =	468
SPECrate®2017_fp_energy_base =	1380
SPECrate®2017_fp_peak =	460
SPECrate®2017_fp_energy_peak =	1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Peak Optimization Flags (Continued)

```
510.parest_r: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -finline-aggressive
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-licm-vrp -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -lamdlibm -ljemalloc
```

Fortran benchmarks:

```
503.bwaves_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-lamdlibm -ljemalloc -lflang
```

```
549.fotonik3d_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Kieee
-Mrecursive -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
-lamdlibm -ljemalloc -lflang
```

```
554.roms_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Peak Optimization Flags (Continued)

554.roms_r (continued):

```
-Hz,1,0x1 -mllvm -fuse-tile-inner-loop -lamdlibm  
-ljemalloc -lflang
```

Benchmarks using both Fortran and C:

```
521.wrf_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching  
-Wl,-mllvm -Wl,-enable-licm-vrp -flto  
-Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math  
-fstruct-layout=7 -mllvm -unroll-threshold=50  
-fremap-arrays -flv-function-specialization  
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist  
-mllvm -global-vectorize-slp=true  
-mllvm -function-specialize -mllvm -enable-licm-vrp  
-mllvm -reduce-array-computations=3 -Mrecursive -lamdlibm  
-ljemalloc -lflang
```

```
527.cam4_r: -m64 -Wl,-mllvm -Wl,-enable-X86-prefetching  
-Wl,-mllvm -Wl,-enable-licm-vrp -flto  
-Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-force-vector-interleave=1 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math  
-fstruct-layout=7 -mllvm -unroll-threshold=50  
-fremap-arrays -flv-function-specialization  
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist  
-mllvm -global-vectorize-slp=true  
-mllvm -function-specialize -mllvm -enable-licm-vrp  
-mllvm -reduce-array-computations=3 -O3 -funroll-loops  
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop  
-Mrecursive -Hz,1,0x1 -mllvm -enable-loopinterchange  
-mllvm -compute-interchange-order -lamdlibm -ljemalloc  
-lflang
```

Benchmarks using both C and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a  
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-enable-licm-vrp  
-flto -Wl,-mllvm -Wl,-function-specialize  
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3  
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7  
-mllvm -unroll-threshold=50 -fremap-arrays -flv-function-specialization
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base = 468
SPECrate®2017_fp_energy_base = 1380
SPECrate®2017_fp_peak = 460
SPECrate®2017_fp_energy_peak = 1470

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Feb-2022

Hardware Availability: May-2022

Software Availability: Feb-2022

Peak Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):

```
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true -mllvm -function-specialize
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-finline-aggressive -mllvm -unroll-threshold=100 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -lamdlibm -ljemalloc
```

Benchmarks using Fortran, C, and C++:

```
-m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-enable-licm-vrp
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true -mllvm -function-specialize
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-finline-aggressive -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -mllvm -extra-vectorizer-passes
-mllvm -convert-pow-exp-to-int=false -Mrecursive -lamdlibm -ljemalloc
-lflang
```

Peak Other Flags

C benchmarks:

```
-Wno-unused-command-line-argument
```

C++ benchmarks:

```
-Wno-unused-command-line-argument
```

Fortran benchmarks:

```
-Wno-unused-command-line-argument
```

Benchmarks using both Fortran and C:

```
-Wno-unused-command-line-argument
```

Benchmarks using both C and C++:

```
-Wno-unused-command-line-argument
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR645
2.20 GHz, AMD EPYC 7773X

SPECrate®2017_fp_base =	468
SPECrate®2017_fp_energy_base =	1380
SPECrate®2017_fp_peak =	460
SPECrate®2017_fp_energy_peak =	1470

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Feb-2022
Hardware Availability: May-2022
Software Availability: Feb-2022

Peak Other Flags (Continued)

Benchmarks using Fortran, C, and C++:
 -Wno-unused-command-line-argument

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-MilanX-J.html>
<http://www.spec.org/cpu2017/flags/aocc320-flags-A1.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-MilanX-J.xml>
<http://www.spec.org/cpu2017/flags/aocc320-flags-A1.xml>

PTDaemon, SPEC CPU, and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.8 on 2022-02-28 04:09:30-0500.
 Report generated on 2022-03-21 13:23:25 by CPU2017 PDF formatter v6442.
 Originally published on 2022-03-21.