



# SPEC CPU®2017 Integer Speed Result

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## Lenovo Global Technology ThinkSystem SR645 2.00 GHz, AMD EPYC 7713

SPECSpeed®2017\_int\_base = 11.9  
 SPECSpeed®2017\_int\_energy\_base = 75.0  
 SPECSpeed®2017\_int\_peak = 12.0  
 SPECSpeed®2017\_int\_energy\_peak = 75.3

CPU2017 License: 9017

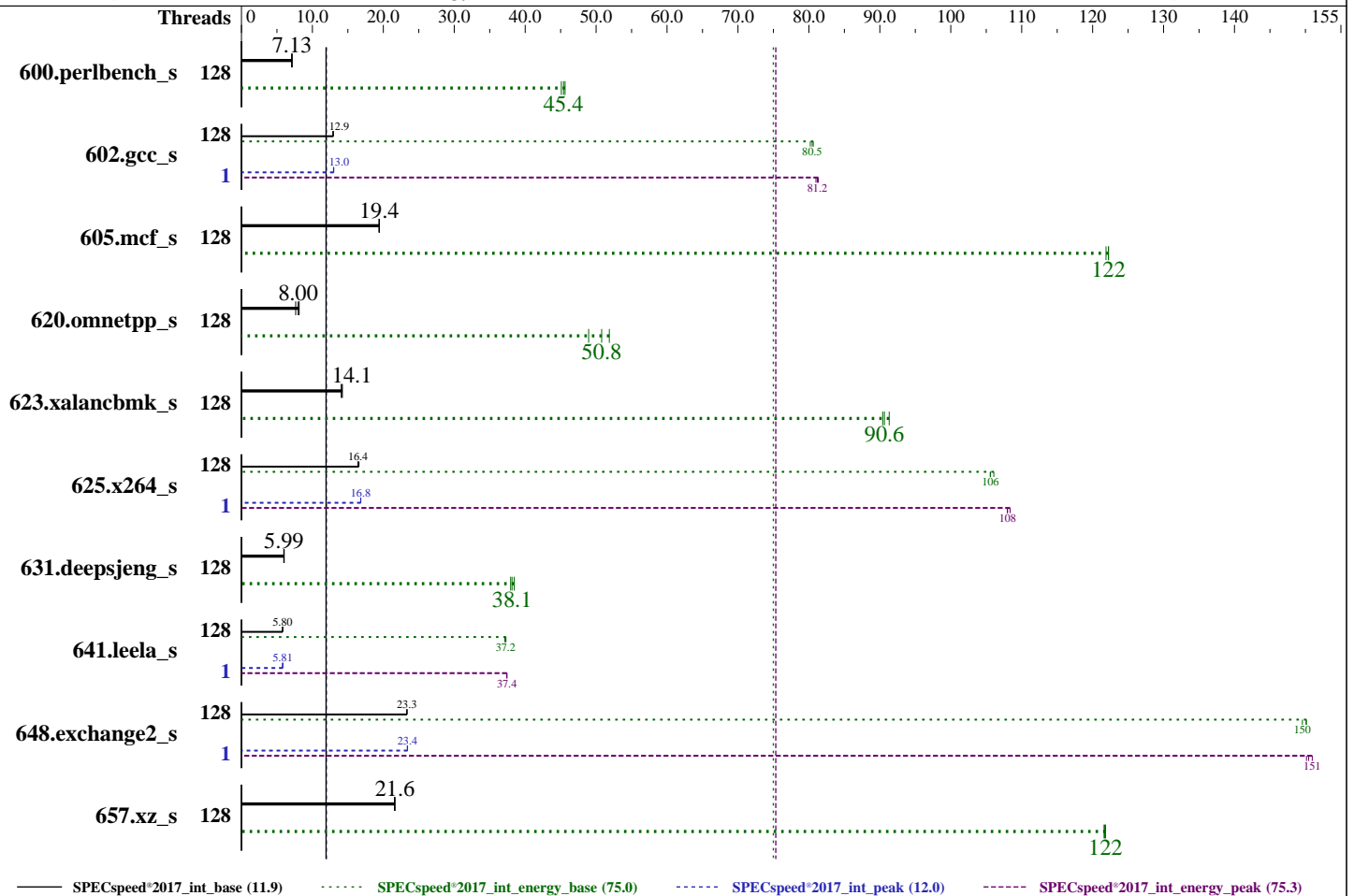
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Mar-2021

Hardware Availability: Mar-2021

Software Availability: Mar-2021



### Hardware

CPU Name: AMD EPYC 7713  
 Max MHz: 3675  
 Nominal: 2000  
 Enabled: 128 cores, 2 chips, 2 threads/core  
 Orderable: 1,2 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 512 KB I+D on chip per core  
 L3: 256 MB I+D on chip per chip,  
 32 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

OS: SUSE Linux Enterprise Server 15 SP2 (x86\_64)  
 Kernel 5.3.18-22-default  
 Compiler: C/C++/Fortran: Version 3.0.0 of AOCC  
 Parallel: Yes  
 Firmware: Lenovo BIOS Version D8E115B 2.00 released Feb-2021  
 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



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### Power

Max. Power (W): 546.91  
Idle Power (W): 90.7  
Min. Temperature (C): 23.13  
Elevation (m): 43  
Line Standard: 220 V / 50 Hz / 1 phase / 3 wires  
Provisioning: Line-powered

### Power Settings

Management FW: Version 3.00 of D8BT15H  
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 #: 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 #: 8 x High Performance fans

### Power Analyzer

Power Analyzer: WIN:9888  
Hardware Vendor: YOKOGAWA, Inc.  
Model: YokogawaWT310E  
Serial Number: C3UD17023E  
Input Connection: Default  
Metrology Institute: CNAS  
Calibration By: GUANG ZHOU GRG METROLOGY & TEST CO.,LTD.  
Calibration Label: J202009040176A-0001  
Calibration Date: 25-Sep-2020  
PTDaemon™ Version: 1.9.1 (a2d19f26; 2019-07-17)  
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: W62330940  
Input Connection: USB  
PTDaemon Version: 1.9.1 (a2d19f26; 2019-07-17)  
Setup Description: 50 mm in front of SUT main intake

## Base Results Table

| Benchmark       | Threads | 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 |
|-----------------|---------|------------|-------------|-------------|--------------|---------------|---------------|------------|-------------|-------------|--------------|---------------|---------------|------------|-------------|-------------|--------------|---------------|---------------|
| 600.perlbench_s | 128     | 251        | 7.07        | 42.7        | 45.1         | 170           | 171           | <b>249</b> | <b>7.13</b> | <b>42.4</b> | <b>45.4</b>  | <b>170</b>    | <b>171</b>    | 249        | 7.14        | 42.2        | 45.6         | 170           | 171           |
| 602.gcc_s       | 128     | 309        | 12.9        | 54.0        | 80.2         | 175           | 201           | <b>308</b> | <b>12.9</b> | <b>53.8</b> | <b>80.5</b>  | <b>174</b>    | <b>201</b>    | 307        | 13.0        | 53.7        | 80.6         | 175           | 201           |
| 605.mcf_s       | 128     | <b>243</b> | <b>19.4</b> | <b>42.1</b> | <b>122</b>   | <b>174</b>    | <b>197</b>    | 243        | 19.4        | 42.1        | 122          | 174           | 195           | 244        | 19.4        | 42.3        | 122          | 173           | 195           |
| 620.omnetpp_s   | 128     | 201        | 8.13        | 34.2        | 51.9         | 171           | 171           | <b>204</b> | <b>8.00</b> | <b>34.9</b> | <b>50.8</b>  | <b>171</b>    | <b>172</b>    | 213        | 7.65        | 36.3        | 48.9         | 170           | 171           |
| 623.xalancbmk_s | 128     | 101        | 14.1        | 17.0        | 90.4         | 169           | 172           | 99.6       | 14.2        | 16.9        | 91.3         | 169           | 171           | <b>100</b> | <b>14.1</b> | <b>17.0</b> | <b>90.6</b>  | <b>169</b>    | <b>171</b>    |
| 625.x264_s      | 128     | 106        | 16.6        | 18.1        | 106          | 170           | 172           | 107        | 16.4        | 18.2        | 106          | 169           | 171           | <b>107</b> | <b>16.4</b> | <b>18.2</b> | <b>106</b>   | <b>169</b>    | <b>171</b>    |
| 631.deepsjeng_s | 128     | <b>239</b> | <b>5.99</b> | <b>40.8</b> | <b>38.1</b>  | <b>171</b>    | <b>182</b>    | 238        | 6.03        | 40.5        | 38.4         | 170           | 182           | 240        | 5.97        | 41.0        | 37.9         | 171           | 183           |
| 641.leela_s     | 128     | 294        | 5.81        | 49.5        | 37.3         | 169           | 169           | 294        | 5.80        | 49.8        | 37.1         | 169           | 170           | <b>294</b> | <b>5.80</b> | <b>49.6</b> | <b>37.2</b>  | <b>169</b>    | <b>170</b>    |
| 648.exchange2_s | 128     | 126        | 23.3        | 21.3        | 150          | 169           | 170           | <b>126</b> | <b>23.3</b> | <b>21.4</b> | <b>150</b>   | <b>170</b>    | <b>171</b>    | 126        | 23.3        | 21.3        | 150          | 169           | 170           |
| 657.xz_s        | 128     | 287        | 21.6        | 55.4        | 122          | 193           | 536           | 286        | 21.6        | 55.3        | 122          | 194           | 538           | <b>286</b> | <b>21.6</b> | <b>55.3</b> | <b>122</b>   | <b>193</b>    | <b>547</b>    |

SPECSpeed®2017\_int\_base = 11.9

SPECSpeed®2017\_int\_energy\_base = 75.0

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



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SPECSpeed®2017\_int\_energy\_base = 75.0  
SPECSpeed®2017\_int\_peak = 12.0  
SPECSpeed®2017\_int\_energy\_peak = 75.3

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**Tested by:** Lenovo Global Technology

**Test Date:** Mar-2021  
**Hardware Availability:** Mar-2021  
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## Peak Results Table

| Benchmark       | Threads | 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 |
|-----------------|---------|------------|-------------|-------------|--------------|---------------|---------------|------------|-------------|-------------|--------------|---------------|---------------|------------|-------------|-------------|--------------|---------------|---------------|
| 600.perlbench_s | 128     | 251        | 7.07        | 42.7        | 45.1         | 170           | 171           | <b>249</b> | <b>7.13</b> | <b>42.4</b> | <b>45.4</b>  | <b>170</b>    | <b>171</b>    | 249        | 7.14        | 42.2        | 45.6         | 170           | 171           |
| 602.gcc_s       | 1       | 307        | 13.0        | 53.4        | 81.0         | 174           | 200           | <b>306</b> | <b>13.0</b> | <b>53.3</b> | <b>81.2</b>  | <b>174</b>    | <b>201</b>    | 306        | 13.0        | 53.2        | 81.3         | 174           | 201           |
| 605.mcf_s       | 128     | <b>243</b> | <b>19.4</b> | <b>42.1</b> | <b>122</b>   | <b>174</b>    | <b>197</b>    | 243        | 19.4        | 42.1        | 122          | 174           | 195           | 244        | 19.4        | 42.3        | 122          | 173           | 195           |
| 620.omnetpp_s   | 128     | 201        | 8.13        | 34.2        | 51.9         | 171           | 171           | <b>204</b> | <b>8.00</b> | <b>34.9</b> | <b>50.8</b>  | <b>171</b>    | <b>172</b>    | 213        | 7.65        | 36.3        | 48.9         | 170           | 171           |
| 623.xalanbmk_s  | 128     | 101        | 14.1        | 17.0        | 90.4         | 169           | 172           | 99.6       | 14.2        | 16.9        | 91.3         | 169           | 171           | <b>100</b> | <b>14.1</b> | <b>17.0</b> | <b>90.6</b>  | <b>169</b>    | <b>171</b>    |
| 625.x264_s      | 1       | <b>105</b> | <b>16.8</b> | <b>17.8</b> | <b>108</b>   | <b>169</b>    | <b>171</b>    | 105        | 16.8        | 17.8        | 108          | 169           | 171           | 105        | 16.8        | 17.7        | 108          | 169           | 170           |
| 631.deepsjeng_s | 128     | <b>239</b> | <b>5.99</b> | <b>40.8</b> | <b>38.1</b>  | <b>171</b>    | <b>182</b>    | 238        | 6.03        | 40.5        | 38.4         | 170           | 182           | 240        | 5.97        | 41.0        | 37.9         | 171           | 183           |
| 641.leela_s     | 1       | 293        | 5.82        | 49.4        | 37.4         | 169           | 170           | 294        | 5.81        | 49.4        | 37.4         | 168           | 169           | <b>293</b> | <b>5.81</b> | <b>49.4</b> | <b>37.4</b>  | <b>168</b>    | <b>169</b>    |
| 648.exchange2_s | 1       | 126        | 23.4        | 21.3        | 150          | 169           | 171           | <b>126</b> | <b>23.4</b> | <b>21.2</b> | <b>151</b>   | <b>169</b>    | <b>170</b>    | 126        | 23.4        | 21.3        | 150          | 169           | 170           |
| 657.xz_s        | 128     | 287        | 21.6        | 55.4        | 122          | 193           | 536           | 286        | 21.6        | 55.3        | 122          | 194           | 538           | <b>286</b> | <b>21.6</b> | <b>55.3</b> | <b>122</b>   | <b>193</b>    | <b>547</b>    |

SPECSpeed®2017\_int\_peak = 12.0

SPECSpeed®2017\_int\_energy\_peak = 75.3

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## 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.

## Operating System Notes

'ulimit -s unlimited' was used to set environment stack size  
'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>  
  
'echo 8 > /proc/sys/vm/dirty\_ratio' run as root to limit dirty cache to 8% of memory.  
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum necessary.  
'echo 1 > /proc/sys/vm/zone\_reclaim\_mode' run as root to free node-local memory and avoid remote memory usage.  
'sync; echo 3 > /proc/sys/vm/drop\_caches' run as root to reset filesystem caches.  
'sysctl -w kernel.randomize\_va\_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.

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## Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent\_hugepage/enabled' and  
'echo always > /sys/kernel/mm/transparent\_hugepage/defrag' run as root to enable  
Transparent Hugepages (THP) for this run.  
'echo madvise > /sys/kernel/mm/transparent\_hugepage/enabled' run as root for peak  
runs of 628.pop2\_s and 638.imagick\_s to enable THP only on request.

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
GOMP\_CPU\_AFFINITY = "0-255"  
LD\_LIBRARY\_PATH =  
"/home/cpu2017-1.1.5-amd-aocc300-milan-B1/amd\_speed\_aocc300\_milan\_B\_lib/  
64;/home/cpu2017-1.1.5-amd-aocc300-milan-B1/amd\_speed\_aocc300\_milan\_B\_li  
b/32:"  
MALLOC\_CONF = "retain:true"  
OMP\_DYNAMIC = "false"  
OMP\_SCHEDULE = "static"  
OMP\_STACKSIZE = "128M"  
OMP\_THREAD\_LIMIT = "256"

Environment variables set by runcpu during the 602.gcc\_s peak run:  
GOMP\_CPU\_AFFINITY = "0"

Environment variables set by runcpu during the 625.x264\_s peak run:  
GOMP\_CPU\_AFFINITY = "0"

Environment variables set by runcpu during the 641.leela\_s peak run:  
GOMP\_CPU\_AFFINITY = "0"

Environment variables set by runcpu during the 648.exchange2\_s peak run:  
GOMP\_CPU\_AFFINITY = "0"

## 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.

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## General Notes (Continued)

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)  
jemalloc 5.1.0 is available here:  
<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  
Memory Speed set to 3200MHz  
NUMA nodes per socket set to NPS2  
DRAM Scrub Time set to Disable

Sysinfo program /home/cpu2017-1.1.5-amd-aocc300-milan-B1/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on localhost Mon Mar 1 23:24:16 2021

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 7713 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:

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  
On-line CPU(s) list: 0-255

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## Platform Notes (Continued)

```
Thread(s) per core: 2
Core(s) per socket: 64
Socket(s): 2
NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7713 64-Core Processor
Stepping: 1
CPU MHz: 1496.431
CPU max MHz: 2000.0000
CPU min MHz: 1500.0000
BogoMIPS: 3992.55
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 32768K
NUMA node0 CPU(s): 0-31,128-159
NUMA node1 CPU(s): 32-63,160-191
NUMA node2 CPU(s): 64-95,192-223
NUMA node3 CPU(s): 96-127,224-255
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 aperfmperf 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 erms invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha_ni
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock nrip_save tsc_scale
vmcb_clean flushbyasid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif
umip pku ospke vaes vpclmulqdq rdpid overflow_recov succor smca
```

```
/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: 4 nodes (0-3)
node 0 cpus: 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 31 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146
147 148 149 150 151 152 153 154 155 156 157 158 159
node 0 size: 128819 MB
```

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## Platform Notes (Continued)

```
node 0 free: 127778 MB
node 1 cpus: 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 63 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175
176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191
node 1 size: 128995 MB
node 1 free: 128352 MB
node 2 cpus: 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
89 90 91 92 93 94 95 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207
208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223
node 2 size: 129007 MB
node 2 free: 128556 MB
node 3 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114
115 116 117 118 119 120 121 122 123 124 125 126 127 224 225 226 227 228 229 230 231 232
233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254
255
node 3 size: 128971 MB
node 3 free: 128540 MB
node distances:
node  0  1  2  3
  0:  10  12  32  32
  1:  12  10  32  32
  2:  32  32  10  12
  3:  32  32  12  10
```

```
From /proc/meminfo
MemTotal:      528173176 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
ondemand
```

```
From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP2"
VERSION_ID="15.2"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp2"
```

```
uname -a:
Linux localhost 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aeba) x86_64
```

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SPECspeed®2017\_int\_peak = 12.0  
SPECspeed®2017\_int\_energy\_peak = 75.3

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

**Test Date:** Mar-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

## Platform Notes (Continued)

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/swapgs barriers and __user pointer sanitization                      |
| CVE-2017-5715 (Spectre variant 2):                     | Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling |
| CVE-2020-0543 (Special Register Buffer Data Sampling): | Not affected  |
| CVE-2019-11135 (TSX Asynchronous Abort):               | Not affected  |

run-level 3 Mar 1 23:21

SPEC is set to: /home/cpu2017-1.1.5-amd-aocc300-milan-B1  
Filesystem Type Size Used Avail Use% Mounted on  
/dev/sdc3 xfs 889G 185G 704G 21% /

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

Additional information from dmidecode 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  
16x Unknown Unknown

BIOS:  
BIOS Vendor: Lenovo  
BIOS Version: D8E115B-2.00  
BIOS Date: 02/02/2021  
BIOS Revision: 2.0

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# SPEC CPU®2017 Integer Speed Result

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**Lenovo Global Technology**  
**ThinkSystem SR645**  
**2.00 GHz, AMD EPYC 7713**

SPECSpeed®2017\_int\_base = 11.9  
SPECSpeed®2017\_int\_energy\_base = 75.0  
SPECSpeed®2017\_int\_peak = 12.0  
SPECSpeed®2017\_int\_energy\_peak = 75.3

**CPU2017 License:** 9017  
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**Test Date:** Mar-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

## Platform Notes (Continued)

Firmware Revision: 3.0

(End of data from sysinfo program)

## Compiler Version Notes

```
=====  
C      | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base,  
      | peak) 625.x264_s(base, peak) 657.xz_s(base, peak)  
-----
```

AMD clang version 12.0.0 (CLANG: AOCC\_3.0.0-Build#78 2020\_12\_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86\_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin  
-----

```
=====  
C++    | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)  
      | 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)  
-----
```

AMD clang version 12.0.0 (CLANG: AOCC\_3.0.0-Build#78 2020\_12\_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86\_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin  
-----

```
=====  
Fortran | 648.exchange2_s(base, peak)  
-----
```

AMD clang version 12.0.0 (CLANG: AOCC\_3.0.0-Build#78 2020\_12\_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86\_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin  
-----

## Base Compiler Invocation

C benchmarks:  
clang

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**Tested by:** Lenovo Global Technology

**Test Date:** Mar-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

## Base Compiler Invocation (Continued)

C++ benchmarks:  
clang++

Fortran benchmarks:  
flang

## Base Portability Flags

```
600.perlbench_s: -DSPEC_LINUX_X64 -DSPEC_LP64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LINUX -DSPEC_LP64
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
```

## Base Optimization Flags

C benchmarks:  
-m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition  
-Wl,-mllvm -Wl,-enable-licm-vrp -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 -O3 -march=znver3  
-fveclib=AMDLIBM -ffast-math -flto -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 -z muldefs  
-DSPEC\_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc  
-lflang -lflangrti

C++ benchmarks:  
-m64 -std=c++98 -mno-adx -mno-sse4a  
-Wl,-mllvm -Wl,-do-block-reorder=aggressive  
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize

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SPECspeed®2017\_int\_energy\_peak = 75.3

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Mar-2021

**Hardware Availability:** Mar-2021

**Software Availability:** Mar-2021

## Base Optimization Flags (Continued)

C++ benchmarks (continued):

```
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -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
-z muldefs -mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
-lflangrtd
```

Fortran benchmarks:

```
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-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 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -z muldefs
-mllvm -unroll-aggressive -mllvm -unroll-threshold=150 -DSPEC_OPENMP
-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
-lflangrtd
```

## Base Other Flags

C benchmarks:

```
-Wno-unused-command-line-argument -Wno-return-type
```

C++ benchmarks:

```
-Wno-unused-command-line-argument -Wno-return-type
```

Fortran benchmarks:

```
-Wno-return-type
```



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SPECspeed®2017\_int\_energy\_peak = 75.3

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

**Test Date:** Mar-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

## Peak Compiler Invocation

C benchmarks:  
clang

C++ benchmarks:  
clang++

Fortran benchmarks:  
flang

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

600.perlbench\_s: basepeak = yes

```
602.gcc_s: -m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp
-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 -flto
-fstruct-layout=5 -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 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang
```

605.mcf\_s: basepeak = yes

625.x264\_s: Same as 602.gcc\_s

657.xz\_s: basepeak = yes

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**Tested by:** Lenovo Global Technology

**Test Date:** Mar-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

## Peak Optimization Flags (Continued)

C++ benchmarks:

620.omnetpp\_s: basepeak = yes

623.xalancbmk\_s: basepeak = yes

631.deepsjeng\_s: basepeak = yes

```
641.leela_s: -m64 -std=c++98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-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 -flto
-inline-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
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm
-ljemalloc -lflang
```

Fortran benchmarks:

```
-m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -mllvm -unroll-aggressive
-mllvm -unroll-threshold=150 -DSPEC_OPENMP -fopenmp -fopenmp=libomp
-lomp -lamdlibm -ljemalloc -lflang
```

## Peak Other Flags

C benchmarks:

```
-Wno-unused-command-line-argument -Wno-return-type
```

C++ benchmarks:

```
-Wno-unused-command-line-argument -Wno-return-type
```

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SPECspeed®2017\_int\_energy\_peak = 75.3

**CPU2017 License:** 9017  
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**Test Date:** Mar-2021  
**Hardware Availability:** Mar-2021  
**Software Availability:** Mar-2021

## Peak Other Flags (Continued)

Fortran benchmarks:  
-Wno-return-type

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-Milan-C.html>  
<http://www.spec.org/cpu2017/flags/aocc300-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-Milan-C.xml>  
<http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml>

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