# SPEC CPU®2017 Integer Speed Result

**Lenovo Global Technology**

**ThinkSystem SR645**

2.00 GHz, AMD EPYC 7713

**SPECspeed®2017_int_base = 12.6**

**SPECspeed®2017_int_peak = 12.6**

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>7.13</td>
<td>7.27</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>13.6</td>
<td></td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>13.6</td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>8.82</td>
<td></td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>14.3</td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>17.2</td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>6.56</td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>5.83</td>
<td></td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>23.6</td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>25.0</td>
<td></td>
</tr>
</tbody>
</table>

## Hardware

<table>
<thead>
<tr>
<th>Item</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>AMD EPYC 7713</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3675</td>
</tr>
<tr>
<td>Nominal</td>
<td>2000</td>
</tr>
<tr>
<td>Enabled</td>
<td>128 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>512 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>256 MB I+D on chip per chip, 32 MB shared / 8 cores</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 960 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

## Software

<table>
<thead>
<tr>
<th>Item</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Red Hat Enterprise Linux 8.3 (Ootpa)</td>
</tr>
<tr>
<td>Compiler</td>
<td>Kernel 4.18.0-240.el8.x86_64</td>
</tr>
<tr>
<td>Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>Firmware</td>
<td>Lenovo BIOS Version D8E115E 2.01 released Mar-2021</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc: jemalloc memory allocator library v5.1.0</td>
</tr>
<tr>
<td>Power Management</td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>
**SPEC CPU®2017 Integer Speed Result**

**Lenovo Global Technology**

ThinkSystem SR645  
2.00 GHz, AMD EPYC 7713

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**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>128</td>
<td>249</td>
<td>7.13</td>
<td>249</td>
<td>7.13</td>
<td>250</td>
<td>7.11</td>
<td>1</td>
<td>250</td>
<td>7.10</td>
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<td>7.28</td>
<td>244</td>
<td>7.27</td>
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<tr>
<td>602.gcc_s</td>
<td>128</td>
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<td>13.6</td>
<td>293</td>
<td>13.6</td>
<td>293</td>
<td>13.6</td>
<td>1</td>
<td>293</td>
<td>13.6</td>
<td>293</td>
<td>13.6</td>
<td>293</td>
<td>13.6</td>
</tr>
<tr>
<td>605.mcf_s</td>
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<td>226</td>
<td>20.9</td>
<td>225</td>
<td>21.0</td>
<td>128</td>
<td>225</td>
<td>21.0</td>
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<td>20.9</td>
<td>225</td>
<td>21.0</td>
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<td>620.omnetpp_s</td>
<td>128</td>
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<td>8.94</td>
<td>186</td>
<td>8.79</td>
<td>185</td>
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<td>184</td>
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<td>8.85</td>
<td>183</td>
<td>8.90</td>
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<td>623.xalanchmk_s</td>
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<td>103</td>
<td>13.7</td>
<td>99.0</td>
<td>14.3</td>
<td>98.0</td>
<td>14.5</td>
<td>128</td>
<td>103</td>
<td>13.7</td>
<td>99.0</td>
<td>14.3</td>
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<td>14.5</td>
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<tr>
<td>625.x264_s</td>
<td>128</td>
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<td>17.2</td>
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<td>17.3</td>
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<td>17.3</td>
<td>102</td>
<td>17.3</td>
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<tr>
<td>631.deepsjeng_s</td>
<td>128</td>
<td>220</td>
<td>6.52</td>
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<td>6.52</td>
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<td>6.58</td>
<td>218</td>
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</tr>
<tr>
<td>641.leela_s</td>
<td>128</td>
<td>293</td>
<td>5.83</td>
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<td>5.83</td>
<td>293</td>
<td>5.82</td>
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<td>5.88</td>
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<tr>
<td>648.exchange2_s</td>
<td>128</td>
<td>125</td>
<td>23.6</td>
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<td>23.6</td>
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<td>657.xz_s</td>
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<td>25.0</td>
<td>246</td>
<td>25.1</td>
<td>128</td>
<td>247</td>
<td>25.1</td>
<td>246</td>
<td>25.1</td>
<td>246</td>
<td>25.1</td>
</tr>
</tbody>
</table>

**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 numacl 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.
To enable Transparent Hugepages (THP) for all allocations, 'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and

(Continued on next page)
## Lenovo Global Technology

**ThinkSystem SR645**  
2.00 GHz, AMD EPYC 7713

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<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
</tr>
<tr>
<td>SPECspeed®2017_int_base =</td>
<td>12.6</td>
</tr>
<tr>
<td>SPECspeed®2017_int_peak =</td>
<td>12.6</td>
</tr>
</tbody>
</table>

### Operating System Notes (Continued)

'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:**

- `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_lib/32:"`
- `MALLOCONF = "retain:true"
- `OMP_DYNAMIC = "false"
- `OMP_SCHEDULE = "static"
- `OMP_STACKSIZE = "128M"
- `OMP_THREADLIMIT = "256"

**Environment variables set by runcpu during the 600.perlbench_s peak run:**

- `GOMP_CPU_AFFINITY = "0"

**Environment variables set by runcpu during the 602.gcc_s peak run:**

- `GOMP_CPU_AFFINITY = "0"

**Environment variables set by runcpu during the 620.omnetpp_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 657.xz_s peak run:**

- `GOMP_CPU_AFFINITY = "0-127"

### 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.

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR645
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SPECspeed®2017_int_base = 12.6
SPECspeed®2017_int_peak = 12.6

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Mar-2021
Hardware Availability: Mar-2021
Tested by: Lenovo Global Technology
Software Availability: Mar-2021

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 configuration:
Operating Mode set to Maximum Performance and then set it to Custom Mode
4-Link xGMI Max Speed set to 16Gbps
SOC P-States set to P0
NUMA nodes per socket set to NPS2

Sysinfo program /home/cpu2017-1.1.5-amd-aocc300-milan-B1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Tue Mar 30 01:16:21 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
CPU(s): 256
On-line CPU(s) list: 0-255
Thread(s) per core: 2
Core(s) per socket: 64
Socket(s): 2
NUMA node(s): 4
Vendor ID: AuthenticAMD

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

SPECspeed®2017_int_base = 12.6
SPECspeed®2017_int_peak = 12.6

Platform Notes (Continued)

CPU family: 25
Model: 1
Model name: AMD EPYC 7713 64-Core Processor
Stepping: 1
CPU MHz: 1857.255
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 mce sse sse2 tm hmm syscall nx mmx ext4 pclmulqdq
Monitor ssse3 fma cx16 pclid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c
rdseed lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch
osw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb
cat_l3 cd_p3 l3 invpcid_single hw_pstate sse ssbd mba sve ibrs lmb stibp vmmcall

/proc/cpuinfo cache data

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: 128752 MB
node 0 free: 128137 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: 128874 MB
node 1 free: 128065 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

(Continued on next page)
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CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

SPECspeed\textsuperscript{®}2017\_int\_base = 12.6
SPECspeed\textsuperscript{®}2017\_int\_peak = 12.6

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

Platform Notes (Continued)

\begin{verbatim}
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: 128898 MB
node 2 free: 128566 MB
node 3 cpus: 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114
115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134
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: 128811 MB
node 3 free: 128536 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:       528171136 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

/sbin/tuned-adm active
  Current active profile: throughput-performance

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

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.3 (Ootpa)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="8.3"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
    ANSI_COLOR="0;31"
  redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
  system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
  Linux localhost.localdomain 4.18.0-240.el8.x86_64 #1 SMP Wed Sep 23 05:13:10 EDT 2020
  x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

(Continued on next page)
\end{verbatim}
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SPECspeed®2017_int_base = 12.6
SPECspeed®2017_int_peak = 12.6

Platform Notes (Continued)

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swaps barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling
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 30 01:14

SPEC is set to: /home/cpu2017-1.1.5-amd-aocc300-milan-B1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 819G 72G 747G 9% /home

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 M393A4K40DB3-CWE 32 GB 2 rank 3200
16x Unknown Unknown

BIOS:
BIOS Vendor: Lenovo
BIOS Version: D8E115E-2.01
BIOS Date: 03/04/2021
BIOS Revision: 2.1
Firmware Revision: 3.1

(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`

C++ benchmarks:
- `clang++`

Fortran benchmarks:
- `f77`
SPEC CPU®2017 Integer Speed Result

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2.00 GHz, AMD EPYC 7713

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Lenovo Global Technology

SPECspeed®2017_int_peak = 12.6
SPECspeed®2017_int_base = 12.6

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.leea_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

(Continued on next page)

Base Optimization Flags

C benchmarks:
- m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
- Wl,-mllvm -Wl,-enable-lcm-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 -fto -fstruct-layout=5
- mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
- freemap-arrays -mllvm -function-specialize -flv-function-specialization
- mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
- mllvm -enable-lcm-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
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
- fveclib=AMDLIBM -ffast-math -fto -mllvm -enable-partial-unswitch
- mllvm -unroll-threshold=100 -finline-aggressive
- flv-function-specialization -mllvm -loop-unswitch-threshold=200000
- mllvm -reroiloops -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
- lflangrti

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## Lenovo Global Technology

**ThinkSystem SR645**  
2.00 GHz, AMD EPYC 7713

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<td>SPECspeed®2017_int_peak</td>
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<tr>
<td>Software Availability:</td>
<td>Mar-2021</td>
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</tbody>
</table>

### Base Optimization Flags (Continued)

- Fortran benchmarks:
  - `-m64`  
  - `-mno-adx`  
  - `-mno-sse4a`  
  - `-Wl,-mllvm`  
  - `-Wl,-inline-recursion=4`  
  - `-Wl,-mllvm`  
  - `-Wl,-lrs-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`  
  - `-Wl,-march=znver3`  
  - `-Wl,-fveclib=AMDLIBM`  
  - `-Wl,-ffast-math`  
  - `-Wl,-flto`  
  - `-Wl,-z muldefs`  
  - `-Wl,-mllvm -unroll-aggressive`  
  - `-Wl,-mllvm`  
  - `-Wl,-unroll-threshold=150`  
  - `-Wl,-DSPEC_OPENMP`  
  - `-Wl,-fopenmp`  
  - `-Wl,-fopenmp=libomp`  
  - `-Wl,-lomp`  
  - `-Wl,-lamdlibm`  
  - `-Wl,-ljemalloc`  
  - `-Wl,-lflang`  
  - `-Wl,-lflangrti`  

### 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`  

### Peak Compiler Invocation

- C benchmarks:
  - `clang`  

- C++ benchmarks:
  - `clang++`  

- Fortran benchmarks:
  - `flang`  

### Peak Portability Flags

Same as Base Portability Flags
Lenovo Global Technology

ThinkSystem SR645
2.00 GHz, AMD EPYC 7713

SPEC®2017_int_base = 12.6
SPEC®2017_int_peak = 12.6

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Test Date: Mar-2021
Tested by: Lenovo Global Technology
Hardware Availability: Mar-2021
Software Availability: Mar-2021

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -m64 -mno-adx -mno-sse4a -Wl,-allow-multiple-definition
-\( W1, -mllvm -Wl,-enable-licm-vrp \)
-\( W1, -mllvm -Wl,-function-specialize \)
-\( W1, -mllvm -Wl,-align-all-nofallthru-blocks=6 \)
-\( W1, -mllvm -Wl,-reduce-array-computations=3 -Ofast \)
-\( march=znver3 -fveclib=AMDLIBM -ffast-math -flto \)
-\( fstructure-layout=5 -mllvm -unroll-threshold=50 \)
-\( -fremap-arrays -flv-function-specialization \)
-\( -mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist \)
-\( -mllvm -global-vectorize-slp=true \)
-\( -mllvm -function-specialize -mllvm -enable-lcvm-vrp \)
-\( -mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp \)
-\( -fopenmp=libomp -lomp -ljemalloc -lflang \)

602.gcc_s: Same as 600.perlbench_s
605.mcf_s: basepeak = yes
625.x264_s: Same as 600.perlbench_s
657.xz_s: Same as 600.perlbench_s

C++ benchmarks:

620.omnetpp_s: -m64 -std=c++98 -mno-adx -mno-sse4a
-\( W1, -mllvm -Wl,-do-block-reorder=aggressive \)
-\( W1, -mllvm -Wl,-function-specialize \)
-\( W1, -mllvm -Wl,-align-all-nofallthru-blocks=6 \)
-\( W1, -mllvm -Wl,-reduce-array-computations=3 -Ofast \)
-\( march=znver3 -fveclib=AMDLIBM -ffast-math -flto \)
-\( -finline-aggressive -mllvm -unroll-threshold=100 \)
-\( -flv-function-specialization -mllvm -enable-lcvm-vrp \)
-\( -mllvm -reroll-loops -mllvm -aggressive-loop-unswitch \)
-\( -mllvm -reduce-array-computations=3 \)
-\( -mllvm -global-vectorize-slp=true \)
-\( -mllvm -do-block-reorder=aggressive \)
-\( -fvirtual-function-elimination -fvisibility=hidden \)
-\( -DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -ljemalloc -lflang \)

623.xalancbmk_s: basepeak = yes
631.deepsjeng_s: basepeak = yes

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Peak Optimization Flags (Continued)

641.leela_s: Same as 620.omnetpp_s

Fortran benchmarks:
648.exchange2_s: basepeak = yes

Peak 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

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-D.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-D.xml

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