## Dell Inc.

**PowerEdge R6525 (AMD EPYC 7713 64-Core Processor)**

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>Dell Inc.</th>
<th>Tested by</th>
<th>Dell Inc.</th>
<th>CPU2017 License:</th>
<th>55</th>
<th>Test Date:</th>
<th>Feb-2021</th>
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<tbody>
<tr>
<td>Hardware</td>
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<td>Dell Inc.</td>
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<td>Hardware Availability:</td>
<td>Mar-2021</td>
<td>Software Availability:</td>
<td>Mar-2021</td>
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</table>

### SPEC CPU®2017 Integer Speed Result

**SPECspeed®2017_int_base = 12.4**

**SPECspeed®2017_int_peak = 12.4**

<table>
<thead>
<tr>
<th>Test Date:</th>
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<td>Mar-2021</td>
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</table>

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_int_base (12.4)</th>
<th>SPECspeed®2017_int_peak (12.4)</th>
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<tbody>
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<td>0</td>
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<td>22.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24.0</td>
<td></td>
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</tbody>
</table>

### Software

**OS:** Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.el8.x86_64

**Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC

**Parallel:** Yes

**Firmware:** Version 2.0.3 released Jan-2021

**File System:** tmpfs

**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 prefer performance at the cost of additional power usage

### Hardware

**CPU Name:** AMD EPYC 7713

**Max MHz:** 3675

**Nominal:** 2000

**Enabled:** 128 cores, 2 chips

**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:** 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)

**Storage:** 128 GB on tmpfs

**Other:** None

---

**Thread Count:**

- **600.perlbench_s:**
  - 1 thread: 7.29
  - 128 threads: 7.31

- **602.gcc_s:**
  - 1 thread: 7.29
  - 128 threads: 7.31

- **605.mcf_s:**
  - 1 thread: 8.23
  - 128 threads: 8.32

- **620.omnetpp_s:**
  - 1 thread: 8.23
  - 128 threads: 8.32

- **623.xalancbmk_s:**
  - 1 thread: 13.6
  - 128 threads: 14.0

- **625.x264_s:**
  - 1 thread: 6.34
  - 128 threads: 6.34

- **631.deepsjeng_s:**
  - 1 thread: 6.31
  - 128 threads: 6.31

- **641.leela_s:**
  - 1 thread: 5.83
  - 128 threads: 5.83

- **648.exchange2_s:**
  - 1 thread: 23.5
  - 128 threads: 23.5

- **657.xz_s:**
  - 1 thread: 24.9
  - 128 threads: 24.9

---

**Other Thread Counts:**

- **600.perlbench_s:**
  - 2 threads: 7.29
  - 4 threads: 7.29
  - 8 threads: 7.29
  - 16 threads: 7.29
  - 32 threads: 7.29
  - 64 threads: 7.29

- **602.gcc_s:**
  - 2 threads: 7.31
  - 4 threads: 7.31
  - 8 threads: 7.31
  - 16 threads: 7.31
  - 32 threads: 7.31
  - 64 threads: 7.31

- **605.mcf_s:**
  - 2 threads: 8.32
  - 4 threads: 8.32
  - 8 threads: 8.32
  - 16 threads: 8.32
  - 32 threads: 8.32
  - 64 threads: 8.32

- **620.omnetpp_s:**
  - 2 threads: 8.32
  - 4 threads: 8.32
  - 8 threads: 8.32
  - 16 threads: 8.32
  - 32 threads: 8.32
  - 64 threads: 8.32

- **623.xalancbmk_s:**
  - 2 threads: 13.6
  - 4 threads: 13.6
  - 8 threads: 13.6
  - 16 threads: 13.6
  - 32 threads: 13.6
  - 64 threads: 13.6

- **625.x264_s:**
  - 2 threads: 8.32
  - 4 threads: 8.32
  - 8 threads: 8.32
  - 16 threads: 8.32
  - 32 threads: 8.32
  - 64 threads: 8.32

- **631.deepsjeng_s:**
  - 2 threads: 6.83
  - 4 threads: 6.83
  - 8 threads: 6.83
  - 16 threads: 6.83
  - 32 threads: 6.83
  - 64 threads: 6.83

- **641.leela_s:**
  - 2 threads: 23.6
  - 4 threads: 23.6
  - 8 threads: 23.6
  - 16 threads: 23.6
  - 32 threads: 23.6
  - 64 threads: 23.6

- **648.exchange2_s:**
  - 2 threads: 24.9
  - 4 threads: 24.9
  - 8 threads: 24.9
  - 16 threads: 24.9
  - 32 threads: 24.9
  - 64 threads: 24.9

- **657.xz_s:**
  - 2 threads: 24.9
  - 4 threads: 24.9
  - 8 threads: 24.9
  - 16 threads: 24.9
  - 32 threads: 24.9
  - 64 threads: 24.9
Results Table

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<th>Ratio</th>
<th>Seconds</th>
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<td>24.9</td>
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<td>128</td>
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</tr>
</tbody>
</table>

SPECspeed\textsuperscript{2017\_int\_base} = 12.4
SPECspeed\textsuperscript{2017\_int\_peak} = 12.4

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.

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.

(Continued on next page)
### 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 = "0-127"**
- **LD_LIBRARY_PATH =**
  
  "/mnt/ramdisk/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/64;/mnt/ramdisk/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/32;"
- **MALLOC_CONF = "retain:true"**
- **OMP_DYNAMIC = "false"**
- **OMP_SCHEDULE = "static"**
- **OMP_STACKSIZE = "128M"**
- **OMP_THREAD_LIMIT = "128"**

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 605.mcf_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 623.xalancbmk_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 631.deepsjeng_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"**

(Continued on next page)
### Dell Inc.

**PowerEdge R6525 (AMD EPYC 7713 64-Core Processor)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base</th>
<th>12.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_int_peak</td>
<td>12.4</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

### Environment Variables Notes (Continued)

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.

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:**

- Logical processor: Disabled
- L3 Cache as NUMA Domain: Enabled
- Virtualization Technology: Disabled
- DRAM Refresh Delay: Performance
- System Profile: Custom
  - CPU Power Management: Maximum Performance
  - Memory Patrol Scrub: Disabled
  - PCI ASPM L1 Link: Disabled
  - Power Management: Disabled

**Sysinfo program /mnt/ramdisk/cpu2017-1.1.5/bin/sysinfo**

```
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on rhel-8-3-amd Fri Feb 26 09:46:30 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)
 128 "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 : 64
```

(Continued on next page)
## SPEC CPU®2017 Integer Speed Result

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**PowerEdge R6525 (AMD EPYC 7713 64-Core Processor)**

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**CPU2017 License:** 55  
**Test Date:** Feb-2021  
**Test Sponsor:** Dell Inc.  
**Hardware Availability:** Mar-2021  
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**Software Availability:** Mar-2021

### Platform Notes (Continued)

```
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):** 128
- **On-line CPU(s) list:** 0-127
- **Thread(s) per core:** 1
- **Core(s) per socket:** 64
- **Socket(s):** 2
- **NUMA node(s):** 16
- **Vendor ID:** AuthenticAMD
- **CPU family:** 25
- **Model:** 1
- **Model name:** AMD EPYC 7713 64-Core Processor
- **Stepping:** 1
- **CPU MHz:** 1795.858
- **BogoMIPS:** 3992.04
- **Virtualization:** AMD-V
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 512K
- **L3 cache:** 32768K
- **NUMA node0 CPU(s):** 0-7
- **NUMA node1 CPU(s):** 8-15
- **NUMA node2 CPU(s):** 16-23
- **NUMA node3 CPU(s):** 24-31
- **NUMA node4 CPU(s):** 32-39
- **NUMA node5 CPU(s):** 40-47
- **NUMA node6 CPU(s):** 48-55
- **NUMA node7 CPU(s):** 56-63
- **NUMA node8 CPU(s):** 64-71
- **NUMA node9 CPU(s):** 72-79
- **NUMA node10 CPU(s):** 80-87
- **NUMA node11 CPU(s):** 88-95
- **NUMA node12 CPU(s):** 96-103
- **NUMA node13 CPU(s):** 104-111
- **NUMA node14 CPU(s):** 112-119
- **NUMA node15 CPU(s):** 120-127

**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

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CPU2017 License:  55  
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Platform Notes (Continued)

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 sme ssbd mba sev ibrs ibpb stibp vmmcall  
fsqsbse bni avx2 smep bmi2 invpcid cmq rdt_a rdseed adx smap clflushopt clwb  
sha ni xsaveopt xsavc xgetbv1 xsaves cmq_llc cmq_occup_llc cmq_mbm_total  
cmq_mbm_local clzero  irds xsavesrptr wbnoinvd amd_pfin arat lnt lbrv svm_lock  
nrip_save tsc_scale vmcb_clean decodeassists pausefilter pfthreshold  
v_vmsave_vmload vgif umip pkv ospe 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:  16 nodes (0-15)  
node 0 cpus:  0 1 2 3 4 5 6 7  
node 0 size:  64074 MB  
node 0 free:  63951 MB  
node 1 cpus:  8 9 10 11 12 13 14 15  
node 1 size:  64507 MB  
node 1 free:  64320 MB  
node 2 cpus:  16 17 18 19 20 21 22 23  
node 2 size:  64509 MB  
node 2 free:  64143 MB  
node 3 cpus:  24 25 26 27 28 29 30 31  
node 3 size:  64509 MB  
node 3 free:  64351 MB  
node 4 cpus:  32 33 34 35 36 37 38 39  
node 4 size:  64503 MB  
node 4 free:  64341 MB  
node 5 cpus:  40 41 42 43 44 45 46 47  
node 5 size:  64509 MB  
node 5 free:  64189 MB  
node 6 cpus:  48 49 50 51 52 53 54 55  
node 6 size:  64505 MB  
node 6 free:  65924 MB  
node 7 cpus:  56 57 58 59 60 61 62 63  
node 7 size:  64491 MB  
node 7 free:  64404 MB  
node 8 cpus:  64 65 66 67 68 69 70 71  
node 8 size:  64503 MB  
node 8 free:  64446 MB  
node 9 cpus:  72 73 74 75 76 77 78 79  
node 9 size:  64507 MB  
node 9 free:  64449 MB

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SPECspeed®2017_int_peak = 12.4

CPU2017 License: 55
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Test Date: Feb-2021
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Platform Notes (Continued)

node 10 cpus: 80 81 82 83 84 85 86 87
node 10 size: 64472 MB
node 10 free: 64412 MB
node 11 cpus: 88 89 90 91 92 93 94 95
node 11 size: 64509 MB
node 11 free: 64450 MB
node 12 cpus: 96 97 98 99 100 101 102 103
node 12 size: 64509 MB
node 12 free: 64451 MB
node 13 cpus: 104 105 106 107 108 109 110 111
node 13 size: 64507 MB
node 13 free: 64450 MB
node 14 cpus: 112 113 114 115 116 117 118 119
node 14 size: 64505 MB
node 14 free: 64450 MB
node 15 cpus: 120 121 122 123 124 125 126 127
node 15 size: 64503 MB
node 15 free: 64442 MB

node distances:

0: 10 11 11 11 11 11 11 11 32 32 32 32 32 32 32 32

From /proc/meminfo
MemTotal: 1056423412 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
/sbin/tuned-adm active
  Current active profile: throughput-performance

From /etc/*release* /etc/*version*
  os-release:

(Continued on next page)
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CPU2017 License: 55
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Platform Notes (Continued)

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 rhel-8-3-amd 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:

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-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs barriers and __user pointer sanitation
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected
run-level 3 Nov 25 11:39

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 128G 5.0G 124G 4% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R6525
Product Family: PowerEdge
Serial: C3JVPX2

Additional information from dmidecode follows. WARNING: Use caution when you interpret
**SPEC CPU®2017 Integer Speed Result**

**Dell Inc.**

PowerEdge R6525 (AMD EPYC 7713 64-Core Processor)  

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**Platform Notes (Continued)**

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 802C8632802C 36ASF8G72PZ-3G2E1 64 GB 2 rank 3200
- 16x Not Specified Not Specified

BIOS:
- BIOS Vendor: Dell Inc.
- BIOS Version: 2.0.3
- BIOS Date: 01/15/2021
- BIOS Revision: 2.0

(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.xalanchmk_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

(Continued on next page)
Dell Inc.
PowerEdge R6525 (AMD EPYC 7713 64-Core Processor)

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**Compiler Version Notes (Continued)**

Installed Dir: /opt/AMD/aocc-compiler-3.0.0/bin

---

**Base Compiler Invocation**

C benchmarks:
clang

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,-mlllvm -Wl,-enable-lcm-vrp -Wl,-mlllvm -Wl,-region-vectorize  
-Wl,-mlllvm -Wl,-function-specialize  
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3  
-fvecclib=AMDLIBM -ffast-math -flto -fstruct-layout=5  
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000  
-fremap-arrays -mlllvm -function-specialize -flv-function-specialization  
-mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true  
-mlllvm -enable-lcm-vrp -mlllvm -reduce-array-computations=3 -z muldefs  
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc

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## SPEC CPU®2017 Integer Speed Result

### Dell Inc.

**PowerEdge R6525 (AMD EPYC 7713 64-Core Processor)**

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### Base Optimization Flags (Continued)

C benchmarks (continued):
- `lfang -lfangrti`

C++ benchmarks:
- `-m64 -std=c++98 -mno-adx -mno-sse4a`
- `-Wl,-mlllvm -Wl,-do-block-reorder=aggressive`
- `-Wl,-mlllvm -Wl,-region-vectorize -Wl,-mlllvm -Wl,-function-specialize`
- `-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3`
- `-fveclib=AMDLIBM -ffast-math -flto -mlllvm -enable-partial-unswitch`
- `-mlllvm -unroll-threshold=100 -finline-aggressive`
- `-flv-function-specialization -mlllvm -loop-unswitch-threshold=200000`
- `-mlllvm -reroll-loops -mlllvm -aggressive-loop-unswitch`
- `-mlllvm -extra-vectorizer-passes -mlllvm -reduce-array-computations=3`
- `-mlllvm -global-vectorize-slp=true -mlllvm -convert-pow-exp-to-int=false`
- `-z muldefs -mlllvm -do-block-reorder=aggressive`
- `-fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP`
- `-fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lfang -lfangrti`

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

### 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`
# SPEC CPU®2017 Integer Speed Result

## Dell Inc.

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### 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:**
- `-m64` `-mno-adx` `-mno-sse4a` `-W1,-allow-multiple-definition`
- `-W1,-mlllvm -Wl,-enable-licm-vrp `-Wl,-mlllvm `-Wl,-function-specialize`
- `-W1,-mlllvm `-Wl,-align-all-nofallthru-blocks=6`
- `-W1,-mlllvm `-Wl,-reduce-array-computations=3` `-Ofast` `-march=znver3`
- `-fveclib=AMDLIBM` `-ffast-math` `-flto` `-fstruct-layout=5`
- `-mlllvm `-unroll-threshold=50` `-fremap-arrays` `-flv-function-specialization`
- `-mlllvm `-inline-threshold=1000` `-mlllvm `-enable-gvn-hoist`
- `-mlllvm `-global-vectorize-slp=true` `-mlllvm `-function-specialize`
- `-mlllvm `-enable-licm-vrp` `-mlllvm `-reduce-array-computations=3`
- `-DSPEC_OPENMP` `-fopenmp` `-fopenmp=libomp` `-lomp` `-lamdlibm` `-ljemalloc` `-lflang`

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

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Peak Optimization Flags (Continued)

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

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

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

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