Dell Inc.

PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)

SPEC CPU® 2017 Integer Speed Result

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>Dell Inc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by</td>
<td>Dell Inc.</td>
</tr>
</tbody>
</table>

CPU2017 License: 55

CPU Name: AMD EPYC 7513

Max MHz: 3650

Nominal: 2600

Enabled: 64 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: 128 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: 252 GB on tmpfs

Other: None

OS: Red Hat Enterprise Linux 8.3 (Ootpa)

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

Parallel: Yes

Firmware: Version 2.1.4 released Feb-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 and OS set to prefer performance at the cost of additional power usage.

---

**SPEC CPU® 2017 Integer Speed Result**

**SPECspeed® 2017_int_base = 12.4**

**SPECspeed® 2017_int_peak = 12.4**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECspeed® 2017_int_base</th>
<th>SPECspeed® 2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>7.28</td>
<td>13.2</td>
</tr>
<tr>
<td>gcc_s</td>
<td>13.3</td>
<td>20.6</td>
</tr>
<tr>
<td>mcf_s</td>
<td>8.22</td>
<td>20.6</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>8.53</td>
<td></td>
</tr>
<tr>
<td>xalanckmk_s</td>
<td>14.0</td>
<td></td>
</tr>
<tr>
<td>x264_s</td>
<td>6.31</td>
<td>17.1</td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>5.78</td>
<td>23.2</td>
</tr>
<tr>
<td>leela_s</td>
<td>23.3</td>
<td>25.2</td>
</tr>
<tr>
<td>exchange2_s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>xz_s</td>
<td></td>
<td></td>
</tr>
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Dell Inc.

PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)

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

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

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>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>64</td>
<td>244</td>
<td>7.28</td>
<td>243</td>
<td>7.30</td>
<td>64</td>
<td>244</td>
<td>7.28</td>
<td>243</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>64</td>
<td>298</td>
<td>13.3</td>
<td><strong>302</strong></td>
<td><strong>13.2</strong></td>
<td>1</td>
<td>299</td>
<td>13.3</td>
<td><strong>299</strong></td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>64</td>
<td><strong>230</strong></td>
<td><strong>20.6</strong></td>
<td>229</td>
<td>20.7</td>
<td>1</td>
<td>229</td>
<td>20.7</td>
<td><strong>229</strong></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>64</td>
<td>198</td>
<td>8.24</td>
<td><strong>199</strong></td>
<td><strong>8.22</strong></td>
<td>64</td>
<td><strong>196</strong></td>
<td><strong>8.33</strong></td>
<td>195</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>64</td>
<td>101</td>
<td><strong>14.0</strong></td>
<td>98.6</td>
<td>14.4</td>
<td>64</td>
<td><strong>101</strong></td>
<td><strong>14.0</strong></td>
<td>98.6</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>64</td>
<td>103</td>
<td>17.1</td>
<td><strong>103</strong></td>
<td><strong>17.1</strong></td>
<td>1</td>
<td><strong>103</strong></td>
<td><strong>17.1</strong></td>
<td>103</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>64</td>
<td>227</td>
<td>6.32</td>
<td><strong>227</strong></td>
<td><strong>6.31</strong></td>
<td>64</td>
<td>227</td>
<td>6.32</td>
<td><strong>227</strong></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>64</td>
<td>295</td>
<td>5.78</td>
<td>294</td>
<td>5.79</td>
<td>64</td>
<td><strong>295</strong></td>
<td><strong>5.78</strong></td>
<td>294</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>64</td>
<td>127</td>
<td><strong>23.2</strong></td>
<td>126</td>
<td>23.4</td>
<td>1</td>
<td><strong>126</strong></td>
<td><strong>23.3</strong></td>
<td>126</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>64</td>
<td><strong>246</strong></td>
<td><strong>25.2</strong></td>
<td>246</td>
<td>25.2</td>
<td>64</td>
<td><strong>246</strong></td>
<td><strong>25.2</strong></td>
<td>246</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_int_base = 12.4**
**SPECspeed®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 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>

'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)
### Dell Inc.

**PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)**

<table>
<thead>
<tr>
<th>SPECspeed&lt;sup&gt;®&lt;/sup&gt;2017_int_base</th>
<th>SPECspeed&lt;sup&gt;®&lt;/sup&gt;2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.4</td>
<td>12.4</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 55  
**Test Date:** Mar-2021  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

---

### Operating System Notes ( Continued )

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:

- `GOMP_CPU_AFFINITY = "0-63"`
- `LD_LIBRARY_PATH = 
  
  
  
  
  
  
  "/dev/shm/cpu2017-1.1.5/amd_speed_aocc300_milan_B_lib/64;/dev/shm/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 = "64"

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 625.x264_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

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

(Continued on next page)
**General Notes (Continued)**

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.

Benchmark run from a 252 GB ramdisk created with the cmd: "mount -t tmpfs -o size=252G tmpfs /mnt/ramdisk"

**Platform Notes**

<table>
<thead>
<tr>
<th>BIOS settings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Logical processor : Disabled</td>
</tr>
<tr>
<td>L3 Cache as NUMA Domain : Enabled</td>
</tr>
<tr>
<td>Virtualization Technology : Disabled</td>
</tr>
<tr>
<td>DRAM Refresh Delay : Performance</td>
</tr>
<tr>
<td>System Profile : Custom</td>
</tr>
<tr>
<td>CPU Power Management : Maximum Performance</td>
</tr>
<tr>
<td>Memory Patrol Scrub : Disabled</td>
</tr>
<tr>
<td>PCI ASPM L1 Link</td>
</tr>
<tr>
<td>Power Management : Disabled</td>
</tr>
</tbody>
</table>

Sysinfo program /dev/shm/cpu2017-1.1.5/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on rhel-8-3-amd Thu Mar 11 15:39:43 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 7513 32-Core Processor
- 2 "physical id"s (chips)
- 64 "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 : 32
- siblings : 32
- 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
- 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

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
Dell Inc. PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)

SPECspeed®2017_int_peak = 12.4
SPECspeed®2017_int_base = 12.4

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

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

Platform Notes (Continued)

Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 8
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7513 32-Core Processor
Stepping: 1
CPU MHz: 2717.430
BogoMIPS: 5190.12
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
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 nop1 nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq
monitor ssse3 fma cx16 pclid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c
rdrdrr lahf_lm cmp_legacy svm extapic cr8 Legacy abm sse4a misalignssse 3dnowprefetch
oswv vbs 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
fsgsbase bm1 avx2 smep bmi2 invpcid cqm rdt_a rseed adx smap clflushopt clwb
sha_ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occucp_llc cqm_mbb_total
cqm_mbb_local clzero irperf xsaveerptr wbnoinvd amd_ppm arat npt lbrv svm_lock
nrip_save tsc_scale vmbc_clean flushbyasid decodeassist psfthreshold pfthreshold
v_vmsave_vmload vgif umip pku ospke vaes vpclmulqdq rdpid overflow_recover succor smca

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 4 5 6 7

(Continued on next page)
Dell Inc.

PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)

spec

SPEC CPU®2017 Integer Speed Result

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SPECspeed®2017_int_base = 12.4
SPECspeed®2017_int_peak = 12.4

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PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)

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

SPECspeed®2017_int_base = 12.4
SPECspeed®2017_int_peak = 12.4

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

Platform Notes (Continued)

node 0 size: 64074 MB
node 0 free: 63992 MB
node 1 cpus: 8 9 10 11 12 13 14 15
node 1 size: 64507 MB
node 1 free: 64419 MB
node 2 cpus: 16 17 18 19 20 21 22 23
node 2 size: 64503 MB
node 2 free: 64403 MB
node 3 cpus: 24 25 26 27 28 29 30 31
node 3 size: 64491 MB
node 3 free: 64270 MB
node 4 cpus: 32 33 34 35 36 37 38 39
node 4 size: 64501 MB
node 4 free: 58501 MB
node 5 cpus: 40 41 42 43 44 45 46 47
node 5 size: 64507 MB
node 5 free: 64393 MB
node 6 cpus: 48 49 50 51 52 53 54 55
node 6 size: 64509 MB
node 6 free: 64313 MB
node 7 cpus: 56 57 58 59 60 61 62 63
node 7 size: 64463 MB
node 7 free: 64323 MB

node distances:
node 0 1 2 3 4 5 6 7
0:  10 11 11 11 32 32 32 32
1:  11 10 11 11 32 32 32 32
2:  11 11 10 11 32 32 32 32
3:  11 11 11 10 32 32 32 32
4:  32 32 32 32 10 11 11 11
5:  32 32 32 32 11 10 11 11
6:  32 32 32 32 11 11 10 11
7:  32 32 32 32 11 11 11 10

From /proc/meminfo
MemTotal:       527961868 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

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

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

os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.3 (Ootpa)"
ID="rhel"

(Continued on next page)
Dell Inc.

PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)

SPECspeed®2017_int_base = 12.4
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Platform Notes (Continued)

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-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: disabled, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Nov 26 07:58

SPEC is set to: /dev/shm/cpu2017-1.1.5
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 252G 5.7G 247G 3% /dev/shm

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge C6525
Product Family: PowerEdge

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:
**SPEC CPU®2017 Integer Speed Result**

**Dell Inc.**

PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)

---

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

**Platform Notes (Continued)**

8x 80AD863280AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200  
8x 80AD863280AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200

**BIOS:**

- **BIOS Vendor:** Dell Inc.  
- **BIOS Version:** 2.1.4  
- **BIOS Date:** 02/17/2021  
- **BIOS Revision:** 2.1

(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
Dell Inc. PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)

SPECspeed®2017_int_base = 12.4
SPECspeed®2017_int_peak = 12.4

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,-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=cpp98 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-do-block-reorder=aggressive
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize

(Continued on next page)
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
  -fllvm-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 -dow-block-reorder=aggressive
  -fvirtual-function-elimination -fvisibility=hidden -DSPEC_OPENMP
  -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflangrti
  -lflangrti

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 -lflangrti
  -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
```

Peek Compiler Invocation

```
C benchmarks:
  clang
```

(Continued on next page)
Peak Compiler Invocation (Continued)

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
-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 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -landlibm -ljemalloc -lflang

605.mcf_s: Same as 602.gcc_s

625.x264_s: Same as 602.gcc_s

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_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

(Continued on next page)
## Peak Optimization Flags (Continued)

620.omnetpp_s (continued):
- Wl, -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 -reorder-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 -lamlb
- ljemalloc -lflang

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

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 -lamlb -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

Fortran benchmarks:
- Wno-return-type

The flags files that were used to format this result can be browsed at:
### SPEC CPU®2017 Integer Speed Result

**Dell Inc.**  
PowerEdge C6525 (AMD EPYC 7513 32-Core Processor)  

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**SPECspeed®2017_int_base** = 12.4  
**SPECspeed®2017_int_peak** = 12.4

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


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