Dell Inc.

PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz) SPECspeed®2017_fp_base = 185

SPECspeed®2017_fp_peak = 171

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

Test Date: Dec-2019
Hardware Availability: Feb-2019
Software Availability: Aug-2019

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>128</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<tr>
<td>619.lbm_s</td>
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</tr>
<tr>
<td>621.wrf_s</td>
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</tr>
<tr>
<td>627.cam4_s</td>
<td>128</td>
</tr>
<tr>
<td>628.pop2_s</td>
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</tr>
<tr>
<td>638.imagick_s</td>
<td>128</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>128</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>128</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>128</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base (185)**

**SPECspeed®2017_fp_peak (171)**

### Hardware

- **CPU Name:** AMD EPYC 7662
- **Max MHz:** 3300
- **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, 16 MB shared / 4 cores
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)
- **Storage:** 1 x 960 GB SATA SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP1
  - kernel 4.12.14-195-default
- **Compiler:** C/C++/Fortran: Version 2.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 1.2.4 released Nov-2019
- **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 prefer performance at the cost of additional power usage.
## Dell Inc.

### PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

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

### Results Table

<table>
<thead>
<tr>
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<th>Ratio</th>
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</table>

**SPECspeed**\(^{®}\)\(2017\) \_fp\_base = 185  
**SPECspeed**\(^{®}\)\(2017\) \_fp\_peak = 171

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>

Set dirty\_ratio=8 to limit dirty cache to 8% of memory  
Set swappiness=1 to swap only if necessary  
Set zone\_reclaim\_mode=1 to free local node memory and avoid remote memory sync then drop\_caches=3 to reset caches before invoking runcpu  
dirty\_ratio, swappiness, zone\_reclaim\_mode and drop\_caches were all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).

Transparent huge pages set to 'always' for this run (OS default)
Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-127"
LD_LIBRARY_PATH = "/root/cpu2017-1.1.0/amd_speed_aocc200_rome_C_lib/64;/root/cpu2017-1.1.0/amd_speed_aocc200_rome_C_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 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 64 1 65 2 66 3 67 4 68 5 69 6 70 7 71 8 72 9 73 10 74 11 75 12 76 13 77 14 78 15 79 16 80 17 81 18 82 19 83 20 84 21 85 22 86 23 87 24 88 25 89 26 90 27 91 28 92 29 93 30 94 31 95 32 96 33 97 34 98 35 99 36 100 37 101 38 102 39 103 40 104 41 105 42 106 43 107 44 108 45 109 46 110 47 111 48 112 49 113 50 114 51 115 52 116 53 117 54 118 55 119 56 120 57 121 58 122 59 123 60 124 61 125 62 126 63 127"

Environment variables set by runcpu during the 621.wrf_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 64 1 65 2 66 3 67 4 68 5 69 6 70 7 71 8 72 9 73 10 74 11 75 12 76 13 77 14 78 15 79 16 80 17 81 18 82 19 83 20 84 21 85 22 86 23 87 24 88 25 89 26 90 27 91 28 92 29 93 30 94 31 95 32 96 33 97 34 98 35 99 36 100 37 101 38 102 39 103 40 104 41 105 42 106 43 107 44 108 45 109 46 110 47 111 48 112 49 113 50 114 51 115 52 116 53 117 54 118 55 119 56 120 57 121 58 122 59 123 60 124 61 125 62 126 63 127"

Environment variables set by runcpu during the 649.fotonik3d_s peak run:
GOMP_CPU_AFFINITY = "0-127"

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

**Dell Inc.**

PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>185</td>
<td>171</td>
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</table>

**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Test Date:** Dec-2019

**Tested by:** Dell Inc.

**Hardware Availability:** Feb-2019

**Software Availability:** Aug-2019

### Environment Variables Notes (Continued)

Environment variables set by runcpu during the 654.roms_s peak run:

```
GOMP_CPU_AFFINITY = "0-127"
```

### General Notes

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using Fedora 26

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 v9.1.0 in Ubuntu 19.04 with -O3 -znver2 -flto
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:**
- NUMA Nodes Per Socket set to 4
- CCX as NUMA Domain set to Enabled
- System Profile set to Custom
- CPU Power Management set to Maximum Performance
- Memory Frequency set to Maximum Performance
- Turbo Boost Enabled
- Cstates set to Enabled
- Memory Patrol Scrub Disabled
- Memory Refresh Rate set to 1x
- PCI ASPM L1 Link Power Management Disabled
- Determinism Slider set to Power Determinism
- Efficiency Optimized Mode Disabled
- Memory Interleaving set to Disabled
- Logical Processor disabled

**Sysinfo program** /root/cpu2017-1.1.0/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7ed8b1e6e46a485a0011
running on linux-g3ob Fri Dec 6 18:21:52 2019

**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

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

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Platform Notes (Continued)

From /proc/cpuinfo

model name : AMD EPYC 7662 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
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: 43 bits physical, 48 bits virtual
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): 32
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49
Model name: AMD EPYC 7662 64-Core Processor
Stepping: 0
CPU MHz: 1996.307
BogoMIPS: 3992.61
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0-3
NUMA node1 CPU(s): 4-7
NUMA node2 CPU(s): 8-11
NUMA node3 CPU(s): 12-15
NUMA node4 CPU(s): 16-19
NUMA node5 CPU(s): 20-23
NUMA node6 CPU(s): 24-27
NUMA node7 CPU(s): 28-31

(Continued on next page)
Dell Inc.

PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

SPEC CPU®2017 Floating Point Speed Result

| Spec CPU®2017_fp_base = 185 |
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CPU2017 License: 55
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Platform Notes (Continued)

NUMA node8 CPU(s): 32-35
NUMA node9 CPU(s): 36-39
NUMA node10 CPU(s): 40-43
NUMA node11 CPU(s): 44-47
NUMA node12 CPU(s): 48-51
NUMA node13 CPU(s): 52-55
NUMA node14 CPU(s): 56-59
NUMA node15 CPU(s): 60-63
NUMA node16 CPU(s): 64-67
NUMA node17 CPU(s): 68-71
NUMA node18 CPU(s): 72-75
NUMA node19 CPU(s): 76-79
NUMA node20 CPU(s): 80-83
NUMA node21 CPU(s): 84-87
NUMA node22 CPU(s): 88-91
NUMA node23 CPU(s): 92-95
NUMA node24 CPU(s): 96-99
NUMA node25 CPU(s): 100-103
NUMA node26 CPU(s): 104-107
NUMA node27 CPU(s): 108-111
NUMA node28 CPU(s): 112-115
NUMA node29 CPU(s): 116-119
NUMA node30 CPU(s): 120-123
NUMA node31 CPU(s): 124-127

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
constant_tsc rep_good nopl xtopology nonstop_tsc cpuid extd_apicid aperfmperf npi
pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx
f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse
3dnowprefetch osuw lfs skinit wdt tce topoext perfctr_core perfctr_nb bpext
perfctr_l2 mwaitx cpb cat_l3 cdp_l3 hw_pstate sme ssbd sev ibrs ibpb stibp vmmcall
fsqsgbase bmi1 avx2 smep bmi2 cmq rdt_a rdseed adx smap clflushopt clwb sha ni
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_l1c cqm_mbb_local clzero irperf
xsaveerptr arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean
flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgif umip
rpdpid overflow_reco0v 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: 32 nodes (0-31)
  node 0 cpus: 0 1 2 3
  node 0 size: 15548 MB
  node 0 free: 15406 MB
  node 1 cpus: 4 5 6 7

(Continued on next page)
Dell Inc.

PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

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Platform Notes (Continued)

node 1 size: 16127 MB
done 1 free: 16075 MB
done 2 cpus: 8 9 10 11
done 2 size: 16097 MB
done 2 free: 16061 MB
done 3 cpus: 12 13 14 15
done 3 size: 16126 MB
done 3 free: 16033 MB
done 4 cpus: 16 17 18 19
done 4 size: 16127 MB
done 4 free: 16108 MB
done 5 cpus: 20 21 22 23
done 5 size: 16127 MB
done 5 free: 16106 MB
done 6 cpus: 24 25 26 27
done 6 size: 16127 MB
done 6 free: 16112 MB
done 7 cpus: 28 29 30 31
done 7 size: 16126 MB
done 7 free: 16058 MB
done 8 cpus: 32 33 34 35
done 8 size: 16127 MB
done 8 free: 16093 MB
done 9 cpus: 36 37 38 39
done 9 size: 16127 MB
done 9 free: 16104 MB
node 10 cpus: 40 41 42 43
node 10 size: 16127 MB
node 10 free: 16112 MB
node 11 cpus: 44 45 46 47
node 11 size: 16126 MB
node 11 free: 16111 MB
node 12 cpus: 48 49 50 51
node 12 size: 16127 MB
node 12 free: 16093 MB
node 13 cpus: 52 53 54 55
node 13 size: 16127 MB
node 13 free: 16113 MB
node 14 cpus: 56 57 58 59
node 14 size: 16127 MB
node 14 free: 16113 MB
node 15 cpus: 60 61 62 63
node 15 size: 16114 MB
node 15 free: 16100 MB
node 16 cpus: 64 65 66 67
node 16 size: 16127 MB
node 16 free: 16091 MB

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

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Platform Notes (Continued)

node 17 cpus: 68 69 70 71
node 17 size: 16127 MB
node 17 free: 16107 MB
node 18 cpus: 72 73 74 75
node 18 size: 16127 MB
node 18 free: 16106 MB
node 19 cpus: 76 77 78 79
node 19 size: 16126 MB
node 19 free: 16111 MB
node 20 cpus: 80 81 82 83
node 20 size: 16127 MB
node 20 free: 16111 MB
node 21 cpus: 84 85 86 87
node 21 size: 16127 MB
node 21 free: 16112 MB
node 22 cpus: 88 89 90 91
node 22 size: 16127 MB
node 22 free: 16113 MB
node 23 cpus: 92 93 94 95
node 23 size: 16126 MB
node 23 free: 16008 MB
node 24 cpus: 96 97 98 99
node 24 size: 16127 MB
node 24 free: 16113 MB
node 25 cpus: 100 101 102 103
node 25 size: 16127 MB
node 25 free: 16113 MB
node 26 cpus: 104 105 106 107
node 26 size: 16127 MB
node 26 free: 16113 MB
node 27 cpus: 108 109 110 111
node 27 size: 16126 MB
node 27 free: 16112 MB
node 28 cpus: 112 113 114 115
node 28 size: 16127 MB
node 28 free: 16112 MB
node 29 cpus: 116 117 118 119
node 29 size: 16127 MB
node 29 free: 16112 MB
node 30 cpus: 120 121 122 123
node 30 size: 16127 MB
node 30 free: 16110 MB
node 31 cpus: 124 125 126 127
node 31 size: 16124 MB
node 31 free: 16110 MB
node distances:

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

**Dell Inc.**

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**Platform Notes (Continued)**

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(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.

PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

SPECspeed®2017_fp_base = 185
SPECspeed®2017_fp_peak = 171

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Dec-2019
Tested by: Dell Inc.
Hardware Availability: Feb-2019
Software Availability: Aug-2019

Platform Notes (Continued)

23:  32  32  32  32  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12
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From /proc/meminfo
MemTotal:       527808276 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15-SP1"
      VERSION_ID="15.1"
      PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
   Linux linux-g3ob 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:
   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: __user pointer sanitization

(Continued on next page)
Dell Inc. PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

SPECspeed®2017_fp_base = 185
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Test Sponsor: Dell Inc.
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Test Sponsor: Dell Inc.
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Test Date: Dec-2019
Hardware Availability: Feb-2019
Software Availability: Aug-2019

SPEC CPU 2017 Floating Point Speed Result

Platform Notes (Continued)

CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBBP:
conditional, IBRS_FW, STIBP: disabled, RSB
filling

run-level 3 Dec 6 14:41

SPEC is set to: /root/cpu2017-1.1.0

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
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</thead>
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<td>/dev/sda2</td>
<td>xfs</td>
<td>440G</td>
<td>41G</td>
<td>400G</td>
<td>10%</td>
<td>/</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 1.2.4 11/05/2019
Vendor: Dell Inc.
Product: PowerEdge R6525
Product Family: PowerEdge
Serial: 1234567

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:
5x 802C80B3802C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
2x 802C8632802C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
1x 802C869D802C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
8x 80AD863280AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200
16x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base, peak)
------------------------------------------------------------------------------
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-ununknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)

(Continued on next page)
Dell Inc.

PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)

SPECspeed®2017_fp_base = 185
SPECspeed®2017_fp_peak = 171

Compiler Version Notes (Continued)

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin
AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

==============================================================================

Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)
==============================================================================

AOCC.LLVM.2.0.0.B191.2019_07_19 clang version 8.0.0 (CLANG: Jenkins
AOCC_2_0_0-Build#191) (based on LLVM AOCC.LLVM.2.0.0.B191.2019_07_19)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

------------------------------------------------------------------------------

Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_s(base, peak)

------------------------------------------------------------------------------
Dell Inc.  
PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz)  

**SPECspeed®2017_fp_base = 185**  
**SPECspeed®2017_fp_peak = 171**

<table>
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<tr>
<th>CPU2017 License</th>
<th>Test Date</th>
<th>Hardware Availability</th>
<th>Software Availability</th>
</tr>
</thead>
</table>

**Base Compiler Invocation**

C benchmarks:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

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

**Base Portability Flags**

603.bwaves_s: -DSPEC_LP64  
607.cactuBSSN_s: -DSPEC_LP64  
619.lbm_s: -DSPEC_LP64  
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64  
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64  
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64  
638.imagick_s: -DSPEC_LP64  
644.nab_s: -DSPEC_LP64  
649.fotonik3d_s: -DSPEC_LP64  
654.roms_s: -DSPEC_LP64

**Base Optimization Flags**

C benchmarks:
-ff1to -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mllvm -unroll-threshold=50
-fremap-arrays -mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -reduce-array-computations=3 -mllvm -global-vectorize-slp
-mllvm -vector-library=LIBMVEC -mllvm -inline-threshold=1000
-fly-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
-DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-lljemalloc -llflang

Fortran benchmarks:
-ff1to -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC

(Continued on next page)
Base Optimization Flags ( Continued )

Fortran benchmarks (continued):
-W, -mlvm -W, -reduce-array-computations=3 -O3 -march=znver2
-ffast-math -march=znver2 -mllvm -reduce-array-computations=3
-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50
-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50
-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50
-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50

Benchmarks using both Fortran and C:
-ffast-math -march=znver2 -mllvm -reduce-array-computations=3
-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50
-ffast-math -march=znver2 -mllvm -unroll-threshold=50
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-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50
-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50

Benchmarks using Fortran, C, and C++:
-ffast-math -march=znver2 -mllvm -reduce-array-computations=3
-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50
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-ffast-math -march=znver2 -mllvm -unroll-threshold=50
-ffast-math -march=znver2 -mllvm -unroll-vectorize=50

Base Other Flags

C benchmarks:
-Wno-return-type

Fortran benchmarks:
-Wno-return-type
Dell Inc. PowerEdge R6525 (AMD EPYC 7662, 2.00 GHz) SPECspeed®2017_fp_base = 185
SPECspeed®2017_fp_peak = 171

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

Test Date: Dec-2019
Hardware Availability: Feb-2019
Software Availability: Aug-2019

Base Other Flags (Continued)

Benchmarks using both Fortran and C:
-Wno-return-type

Benchmarks using Fortran, C, and C++:
-Wno-return-type

Peak Compiler Invocation

C benchmarks: clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-ftlo -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver2
-mno-sse4a -fstruct-layout=5 -mllvm -vectorize-memory-aggressively
-mllvm -function-specialize -mllvm -enable-gvn-hoist
-mllvm -unroll-threshold=50 -fremap-arrays
-mllvm -vector-library=LIBMVEC -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp -mllvm -inline-threshold=1000
-flv-function-specialization -DSPEC_OPENMP -fopenmp -DUSE_OPENMP
-lmvec -lamdlibm -fopenmp=libomp -lomp -lpthread -ldl -ljemalloc
-llflang

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

**Fortran benchmarks:**


649.fotonik3d_s: Same as 603.bwaves_s


**Benchmarks using both Fortran and C:**


**Benchmarks using Fortran, C, and C++:**

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-mlir -global-vectorize-slp -mlir -inline-threshold=1000
-llvm-function-specialization -mlir -unroll-threshold=100
-mlir -enable-partial-unswitch -mlir -loop-unswitch-threshold=200000
-O3 -funroll-loops -Mrecursive -Kieee -fno-finite-math-only
-DSPEC_OPENMP -fopenmp -DUSE_OPENMP -fopenmp=libomp -lomp -lpthread
-ldl -lmvec -lamdlibm -ljemalloc -lflang

Peak Other Flags

C benchmarks:
-Wno-return-type

Fortran benchmarks:
-Wno-return-type

Benchmarks using both Fortran and C:
-Wno-return-type

Benchmarks using Fortran, C, and C++:
-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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