# SPEC CPU®2017 Floating Point Rate Result

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## Dell Inc.

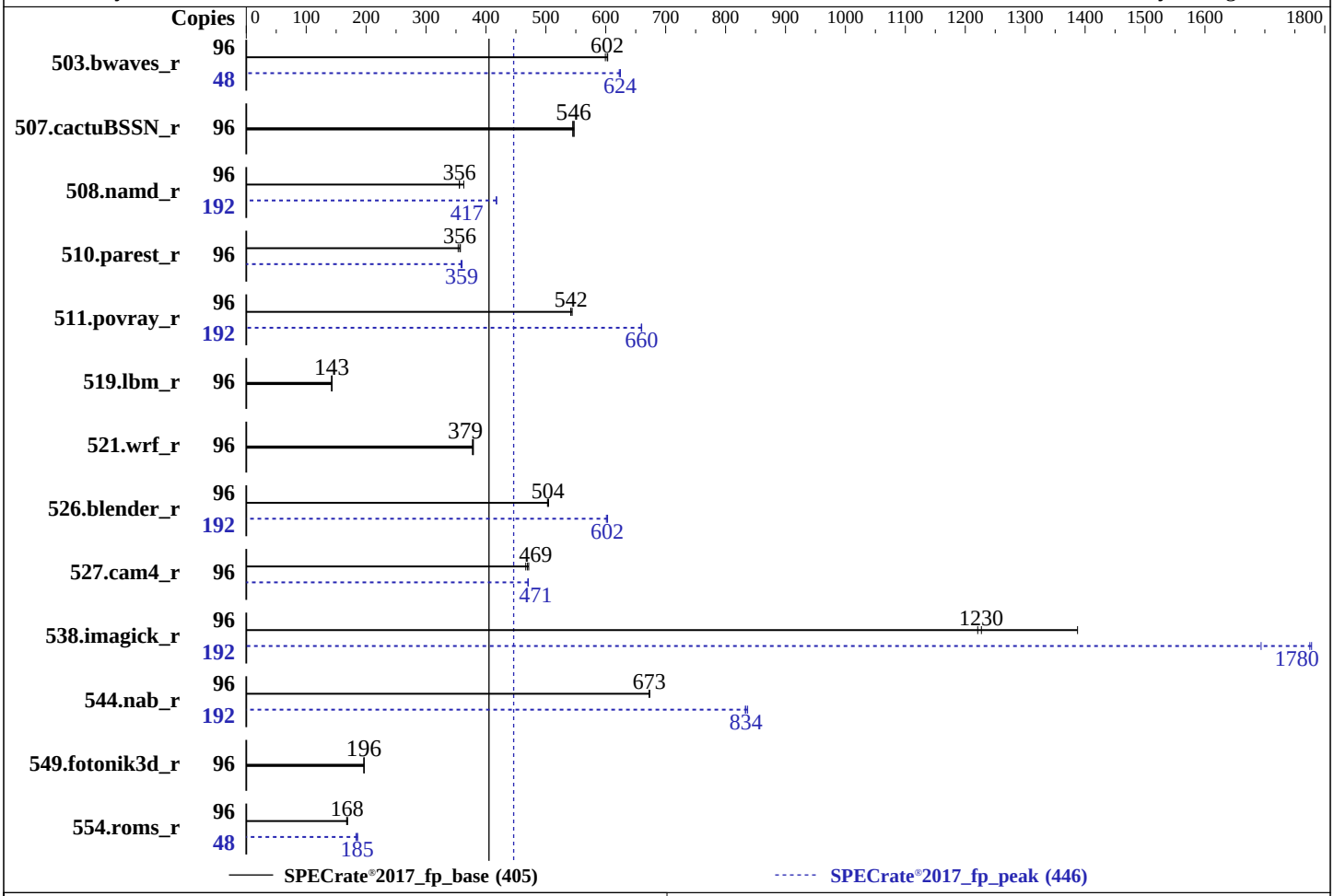
PowerEdge C6525 (AMD EPYC 7552, 2.20 GHz)

SPECrate®2017_fp_base = 405

SPECrate®2017_fp_peak = 446

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

**Test Date:** Dec-2019
**Hardware Availability:** Feb-2020
**Software Availability:** Aug-2019




## Hardware

| | |
|---|---|
| CPU Name: | AMD EPYC 7552 |
| Max MHz: | 3300 |
| Nominal: | 2200 |
| Enabled: | 96 cores, 2 chips, 2 threads/core |
| Orderable: | 1,2 chips |
| Cache L1: | 32 KB I + 32 KB D on chip per core |
| L2: | 512 KB I+D on chip per core |
| L3: | 192 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 480 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: | No |
| Firmware: | Version 1.2.2 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. |

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 503.bwaves_r | 96 | **1598** | **602** | 1596 | 603 | 1606 | 599 | 48 | 771 | 625 | **772** | **624** | 773 | 623 |
| 507.cactuBSSN_r | 96 | 222 | 547 | **222** | **546** | 223 | 545 | 96 | 222 | 547 | **222** | **546** | 223 | 545 |
| 508.namd_r | 96 | 251 | 363 | 256 | 356 | **256** | **356** | 192 | **437** | **417** | 437 | 417 | 437 | 418 |
| 510.parest_r | 96 | 703 | 357 | **705** | **356** | 710 | 354 | 96 | 697 | 360 | 701 | 358 | **699** | **359** |
| 511.povray_r | 96 | **414** | **542** | 414 | 542 | 412 | 544 | 192 | 680 | 659 | 679 | 660 | **680** | **660** |
| 519.lbm_r | 96 | 707 | 143 | **708** | **143** | 711 | 142 | 96 | 707 | 143 | **708** | **143** | 711 | 142 |
| 521.wrf_r | 96 | 570 | 377 | **568** | **379** | 567 | 379 | 96 | 570 | 377 | **568** | **379** | 567 | 379 |
| 526.blender_r | 96 | 290 | 504 | **290** | **504** | 291 | 503 | 192 | 486 | 601 | 485 | 603 | **485** | **602** |
| 527.cam4_r | 96 | 360 | 466 | 356 | 471 | **358** | **469** | 96 | 357 | 471 | **357** | **471** | 357 | 470 |
| 538.imagick_r | 96 | **195** | **1230** | 172 | 1390 | 196 | 1220 | 192 | 282 | 1690 | 269 | 1780 | **269** | **1780** |
| 544.nab_r | 96 | 240 | 673 | **240** | **673** | 240 | 672 | 192 | 386 | 837 | 388 | 833 | **387** | **834** |
| 549.fotonik3d_r | 96 | 1904 | 196 | **1904** | **196** | 1903 | 197 | 96 | 1904 | 196 | **1904** | **196** | 1903 | 197 |
| 554.roms_r | 96 | **905** | **168** | 911 | 168 | 903 | 169 | 48 | 417 | 183 | 410 | 186 | **412** | **185** |

**SPECrate®2017_fp_base =** **405**

**SPECrate®2017_fp_peak =** **446**

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
```

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## Operating System Notes (Continued)

```
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:
LD_LIBRARY_PATH =
     "/root/cpu2017-1.0.5/cpu2017-1.1.0/amd_rate_aocc200_rome_C_lib/64;/root/
     cpu2017-1.0.5/cpu2017-1.1.0/amd_rate_aocc200_rome_C_lib/32:"
MALLOC_CONF = "retain:true"
```

## 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 1
  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
```

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## Platform Notes (Continued)

```
Sysinfo program /root/cpu2017-1.0.5/cpu2017-1.1.0/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on linux-g3ob Fri Dec 13 19:46:54 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

From /proc/cpuinfo
   model name : AMD EPYC 7552 48-Core Processor
      2  "physical id"s (chips)
      192 "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 : 48
      siblings  : 96
      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
      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

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):              192
     On-line CPU(s) list: 0-191
     Thread(s) per core:  2
     Core(s) per socket:  48
     Socket(s):           2
     NUMA node(s):        24
     Vendor ID:           AuthenticAMD
     CPU family:          23
     Model:               49
     Model name:          AMD EPYC 7552 48-Core Processor
     Stepping:            0
     CPU MHz:             2195.741
     BogoMIPS:            4391.48
     Virtualization:      AMD-V
     L1d cache:           32K
     L1i cache:           32K
     L2 cache:            512K
     L3 cache:            16384K
     NUMA node0 CPU(s):   0-3,96-99
     NUMA node1 CPU(s):   4-7,100-103
```

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## Platform Notes (Continued)

```
      NUMA node2 CPU(s):   8-11,104-107
      NUMA node3 CPU(s):   12-15,108-111
      NUMA node4 CPU(s):   16-19,112-115
      NUMA node5 CPU(s):   20-23,116-119
      NUMA node6 CPU(s):   24-27,120-123
      NUMA node7 CPU(s):   28-31,124-127
      NUMA node8 CPU(s):   32-35,128-131
      NUMA node9 CPU(s):   36-39,132-135
      NUMA node10 CPU(s):  40-43,136-139
      NUMA node11 CPU(s):  44-47,140-143
      NUMA node12 CPU(s):  48-51,144-147
      NUMA node13 CPU(s):  52-55,148-151
      NUMA node14 CPU(s):  56-59,152-155
      NUMA node15 CPU(s):  60-63,156-159
      NUMA node16 CPU(s):  64-67,160-163
      NUMA node17 CPU(s):  68-71,164-167
      NUMA node18 CPU(s):  72-75,168-171
      NUMA node19 CPU(s):  76-79,172-175
      NUMA node20 CPU(s):  80-83,176-179
      NUMA node21 CPU(s):  84-87,180-183
      NUMA node22 CPU(s):  88-91,184-187
      NUMA node23 CPU(s):  92-95,188-191
      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 pni
     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 osvw ibs 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
     fsgsbase bmi1 avx2 smep bmi2 cqm rdt_a rdseed adx smap clflushopt clwb sha_ni
     xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
     clzero irperf xsaveerptr arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean
     flushbyasid decodeassists pausefilter pfthreshold avic v_vmsave_vmload vgif umip
     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: 24 nodes (0-23)
    node 0 cpus: 0 1 2 3 96 97 98 99
    node 0 size: 21051 MB
    node 0 free: 20766 MB
    node 1 cpus: 4 5 6 7 100 101 102 103
    node 1 size: 21501 MB
    node 1 free: 21203 MB
```


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## Platform Notes (Continued)

```
node 2 cpus: 8 9 10 11 104 105 106 107
node 2 size: 21502 MB
node 2 free: 21233 MB
node 3 cpus: 12 13 14 15 108 109 110 111
node 3 size: 21501 MB
node 3 free: 21205 MB
node 4 cpus: 16 17 18 19 112 113 114 115
node 4 size: 21501 MB
node 4 free: 21238 MB
node 5 cpus: 20 21 22 23 116 117 118 119
node 5 size: 21503 MB
node 5 free: 20932 MB
node 6 cpus: 24 25 26 27 120 121 122 123
node 6 size: 21501 MB
node 6 free: 21205 MB
node 7 cpus: 28 29 30 31 124 125 126 127
node 7 size: 21501 MB
node 7 free: 21244 MB
node 8 cpus: 32 33 34 35 128 129 130 131
node 8 size: 21503 MB
node 8 free: 21241 MB
node 9 cpus: 36 37 38 39 132 133 134 135
node 9 size: 21501 MB
node 9 free: 21244 MB
node 10 cpus: 40 41 42 43 136 137 138 139
node 10 size: 21501 MB
node 10 free: 21245 MB
node 11 cpus: 44 45 46 47 140 141 142 143
node 11 size: 21490 MB
node 11 free: 21233 MB
node 12 cpus: 48 49 50 51 144 145 146 147
node 12 size: 21472 MB
node 12 free: 21216 MB
node 13 cpus: 52 53 54 55 148 149 150 151
node 13 size: 21501 MB
node 13 free: 21242 MB
node 14 cpus: 56 57 58 59 152 153 154 155
node 14 size: 21502 MB
node 14 free: 21244 MB
node 15 cpus: 60 61 62 63 156 157 158 159
node 15 size: 21501 MB
node 15 free: 21242 MB
node 16 cpus: 64 65 66 67 160 161 162 163
node 16 size: 21501 MB
node 16 free: 21237 MB
node 17 cpus: 68 69 70 71 164 165 166 167
node 17 size: 21503 MB
```

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## Platform Notes (Continued)

```
node 17 free: 21245 MB
node 18 cpus: 72 73 74 75 168 169 170 171
node 18 size: 21501 MB
node 18 free: 21243 MB
node 19 cpus: 76 77 78 79 172 173 174 175
node 19 size: 21501 MB
node 19 free: 21244 MB
node 20 cpus: 80 81 82 83 176 177 178 179
node 20 size: 21503 MB
node 20 free: 21246 MB
node 21 cpus: 84 85 86 87 180 181 182 183
node 21 size: 21501 MB
node 21 free: 21240 MB
node 22 cpus: 88 89 90 91 184 185 186 187
node 22 size: 21501 MB
node 22 free: 21241 MB
node 23 cpus: 92 93 94 95 188 189 190 191
node 23 size: 21501 MB
node 23 free: 21244 MB
node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15  16  17  18  19
20  21  22  23
  0:  10  11  11  11  11  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  1:  11  10  11  11  11  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  2:  11  11  10  11  11  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  3:  11  11  11  10  11  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  4:  11  11  11  11  10  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  5:  11  11  11  11  11  10  12  12  12  12  12  12  32  32  32  32  32  32  32  32
  32  32  32  32
  6:  12  12  12  12  12  12  10  11  11  11  11  11  32  32  32  32  32  32  32  32
  32  32  32  32
  7:  12  12  12  12  12  12  11  10  11  11  11  11  32  32  32  32  32  32  32  32
  32  32  32  32
  8:  12  12  12  12  12  12  11  11  10  11  11  11  32  32  32  32  32  32  32  32
  32  32  32  32
  9:  12  12  12  12  12  12  11  11  11  10  11  11  32  32  32  32  32  32  32  32
  32  32  32  32
 10:  12  12  12  12  12  12  11  11  11  11  10  11  32  32  32  32  32  32  32  32
 32  32  32  32
 11:  12  12  12  12  12  12  11  11  11  11  11  10  32  32  32  32  32  32  32  32
 32  32  32  32
 12:  32  32  32  32  32  32  32  32  32  32  32  32  10  11  11  11  11  11  12  12
```


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## Platform Notes (Continued)

```
    12  12  12  12
    13:  32  32  32  32  32  32  32  32  32  32  32  32  32  11  10  11  11  11  11  12  12
    12  12  12  12
    14:  32  32  32  32  32  32  32  32  32  32  32  32  32  11  11  10  11  11  11  12  12
    12  12  12  12
    15:  32  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  10  11  11  12  12
    12  12  12  12
    16:  32  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  10  11  12  12
    12  12  12  12
    17:  32  32  32  32  32  32  32  32  32  32  32  32  32  11  11  11  11  11  10  12  12
    12  12  12  12
    18:  32  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  10  11
    11  11  11  11
    19:  32  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  10
    11  11  11  11
    20:  32  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  11
    10  11  11  11
    21:  32  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  11
    11  10  11  11
    22:  32  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  11
    11  11  10  11
    23:  32  32  32  32  32  32  32  32  32  32  32  32  32  12  12  12  12  12  12  11  11
    11  11  11  10

  From /proc/meminfo
     MemTotal:       527930332 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
```

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## Platform Notes (Continued)

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

 run-level 3 Dec 13 09:58

 SPEC is set to: /root/cpu2017-1.0.5/cpu2017-1.1.0
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      xfs   440G   23G  418G   6% /

 From /sys/devices/virtual/dmi/id
     BIOS:    Dell Inc. 1.2.2 11/13/2019
     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:
     5x 802C80B3802C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
     1x 802C8632802C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
     5x 802C869D802C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
     5x 80AD863280AD HMA84GR7CJR4N-XN 32 GB 2 rank 3200

 (End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                | 544.nab_r(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
------------------------------------------------------------------------------
```


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## Compiler Version Notes (Continued)

```
==============================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(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
------------------------------------------------------------------------------

==============================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(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
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
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(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)
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Target: x86_64-unknown-linux-gnu
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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         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
```

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## Compiler Version Notes (Continued)

```
                | 554.roms_r(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      | 521.wrf_r(base, peak) 527.cam4_r(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
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
------------------------------------------------------------------------------
```

## Base Compiler Invocation

C benchmarks:
`clang`

C++ benchmarks:
`clang++`

Fortran benchmarks:
`flang`

Benchmarks using both Fortran and C:
`flang clang`

Benchmarks using both C and C++:
`clang++ clang`

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

## Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -D__BOOL_DEFINED -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

## Base Optimization Flags

C benchmarks:
-flto -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
-flv-function-specialization -z muldefs -lmvec -lamdlibm -ljemalloc
-lflang

C++ benchmarks:
-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -O3 -ffast-math -march=znver2
-mllvm -loop-unswitch-threshold=200000 -mllvm -vector-library=LIBMVEC
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-partial-unswitch -z muldefs -lmvec -lamdlibm
-ljemalloc -lflang

Fortran benchmarks:
-flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver2
-funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC -z muldefs
-Kieee -fno-finite-math-only -lmvec -lamdlibm -ljemalloc -lflang

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
-flto -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
-flv-function-specialization -funroll-loops -Mrecursive -z muldefs
-Kieee -fno-finite-math-only -lmvec -lamdlibm -ljemalloc -lflang

Benchmarks using both C and C++:
-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -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
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -unroll-threshold=100 -mllvm -enable-partial-unswitch -z muldefs
-lmvec -lamdlibm -ljemalloc -lflang

Benchmarks using Fortran, C, and C++:
-std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -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
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -unroll-threshold=100 -mllvm -enable-partial-unswitch
-funroll-loops -Mrecursive -z muldefs -Kieee -fno-finite-math-only
-lmvec -lamdlibm -ljemalloc -lflang

## Peak Compiler Invocation

C benchmarks:
clang

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## Peak Compiler Invocation (Continued)

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using both C and C++:
clang++ clang

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

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_r: -flto -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 -lmvec -lamdlibm -ljemalloc
-lflang

544.nab_r: Same as 538.imagick_r

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## Peak Optimization Flags (Continued)

C++ benchmarks:

508.namd_r: -std=c++98 -flto -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 -flv-function-specialization
-mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000
-mllvm -vector-library=LIBMVEC
-mllvm -inline-threshold=1000 -lmvec -lamdlibm -ljemalloc
-lflang

510.parest_r: -std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-suppress-fmas -Ofast -march=znver2
-flv-function-specialization -mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000
-mllvm -vector-library=LIBMVEC
-mllvm -inline-threshold=1000 -lmvec -lamdlibm -ljemalloc
-lflang

Fortran benchmarks:

503.bwaves_r: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3
-march=znver2 -funroll-loops -Mrecursive
-mllvm -vector-library=LIBMVEC -Kieee
-fno-finite-math-only -lmvec -lamdlibm -ljemalloc
-lflang

549.fotonik3d_r: basepeak = yes

554.roms_r: -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver2
-funroll-loops -Mrecursive -mllvm -vector-library=LIBMVEC
-Kieee -fno-finite-math-only -lmvec -lamdlibm -ljemalloc

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## Peak Optimization Flags (Continued)

554.roms_r (continued):
-lflang

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes

527.cam4_r: -flto -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 -O3 -funroll-loops
-Mrecursive -Kieee -fno-finite-math-only -lmvec
-lamdlibm -ljemalloc -lflang

Benchmarks using both C and C++:

511.povray_r: -std=c++98 -flto -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-vector-library=LIBMVEC
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -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 -mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000 -lmvec -lamdlibm
-ljemalloc -lflang

526.blender_r: -std=c++98 -flto -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

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# Peak Optimization Flags (Continued)

526.blender_r (continued):

```
-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 -mllvm -unroll-threshold=100
-mllvm -enable-partial-unswitch
-mllvm -loop-unswitch-threshold=200000 -lmvec -lamdlibm
-ljemalloc -lflang
```

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: `basepeak = yes`

The flags files that were used to format this result can be browsed at

`http://www.spec.org/cpu2017/flags/aocc200-flags-B1-speed-Dell.html`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE7.html`

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

`http://www.spec.org/cpu2017/flags/aocc200-flags-B1-speed-Dell.xml`
`http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE7.xml`


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