### Dell Inc.

**PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>bwaves_s</td>
<td>32</td>
<td>163</td>
<td>538</td>
</tr>
<tr>
<td>cactuBSSN_s</td>
<td>32</td>
<td>52.2</td>
<td>134</td>
</tr>
<tr>
<td>lbm_s</td>
<td>32</td>
<td>106</td>
<td>135</td>
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<tr>
<td>wrf_s</td>
<td>32</td>
<td>66.4</td>
<td>192</td>
</tr>
<tr>
<td>cam4_s</td>
<td>32</td>
<td>66.6</td>
<td>235</td>
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<tr>
<td>pop2_s</td>
<td>32</td>
<td>51.5</td>
<td>71.1</td>
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<tr>
<td>imagick_s</td>
<td>32</td>
<td>51.8</td>
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<tr>
<td>nab_s</td>
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<tr>
<td>fotonik3d_s</td>
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<tr>
<td>roms_s</td>
<td>32</td>
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### Hardware

- **CPU Name:** AMD EPYC 7302
- **Max MHz:** 3300
- **Nominal:** 3000
- **Enabled:** 32 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:** 128 MB I+D on chip per chip, 16 MB shared / 2 cores
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)
- **Storage:** 2 x 960 GB SAS SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP1
- **Compiler:** C/C++/Fortran: Version 2.0.0 of AOCC
- **Parallel:** Yes
- **Firmware:** Version 1.2.6 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.
## SPEC CPU®2017 Floating Point Speed Result

**Dell Inc.**

PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)

### SPECspeed®2017_fp_base = 119

### SPECspeed®2017_fp_peak = 121

<table>
<thead>
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<tr>
<td>Test Date:</td>
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### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Base</th>
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<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tbody>
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<td>654.roms_s</td>
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<td>188</td>
<td>86.8</td>
<td>181</td>
<td>86.9</td>
<td>181</td>
</tr>
</tbody>
</table>

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 -1 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 = "0-63"
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:"
MALLO_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 628.pop2_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 638.imagick_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42 11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54 23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"

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

(Continued on next page)
Dell Inc.
PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)

<table>
<thead>
<tr>
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<tbody>
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</table>

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Nov-2019
Tested by: Dell Inc.
Hardware Availability: Feb-2020
Software Availability: Aug-2019

Platform Notes (Continued)

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

Sysinfo program /root/cpu2017-1.1.0/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on linux-g3ob Fri Nov 29 10:11:53 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 7302 16-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 : 16
  siblings : 32
  physical 0: cores 0 1 4 5 8 9 12 13 16 17 20 21 24 25 28 29
  physical 1: cores 0 1 4 5 8 9 12 13 16 17 20 21 24 25 28 29

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): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 16
Vendor ID: AuthenticAMD
CPU family: 23
Model: 49
Model name: AMD EPYC 7302 16-Core Processor

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

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PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz) 

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Platform Notes (Continued)

Stepping: 0
CPU MHz: 2994.478
BogoMIPS: 5988.95
Virtualization: AMD-V
L1d cache: 32K
L1i cache: 32K
L2 cache: 512K
L3 cache: 16384K
NUMA node0 CPU(s): 0, 1, 32, 33
NUMA node1 CPU(s): 2, 3, 34, 35
NUMA node2 CPU(s): 4, 5, 36, 37
NUMA node3 CPU(s): 6, 7, 38, 39
NUMA node4 CPU(s): 8, 9, 40, 41
NUMA node5 CPU(s): 10, 11, 42, 43
NUMA node6 CPU(s): 12, 13, 44, 45
NUMA node7 CPU(s): 14, 15, 46, 47
NUMA node8 CPU(s): 16, 17, 48, 49
NUMA node9 CPU(s): 18, 19, 50, 51
NUMA node10 CPU(s): 20, 21, 52, 53
NUMA node11 CPU(s): 22, 23, 54, 55
NUMA node12 CPU(s): 24, 25, 56, 57
NUMA node13 CPU(s): 26, 27, 58, 59
NUMA node14 CPU(s): 28, 29, 60, 61
NUMA node15 CPU(s): 30, 31, 62, 63

Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpte1gb rdtscp lm constant_tsc rep_good nopl xtopology nonstop_tsc cpuid extd_apicid aperfmperpfn pi pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osvw ibskinittwd tce topoext perfctr_core perfctr_nb bпечат perfctr_l2 mwaitx cpx cat_l3 cdp_l3 hw_pstate smesb sev ibrs ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 qcm rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsaves xsavec xgetbv1 xsaves qcm_llc qcm_occunc llc qcm_mmb_total qcm_mmb_local clzero irperf xsaveopt xsaveopt xsaveopt xsaveopt xsaverptr arat ar tpt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeaissists pausefilter pffpart xf vmsave_vmload vg f umip rdpid overflow_recover succor smca

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 32 33
node 0 size: 31676 MB
node 0 free: 31614 MB
node 1 cpus: 2 3 34 35
node 1 size: 32254 MB

(Continued on next page)
Dell Inc.  
PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz) 

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Platform Notes (Continued)

node 1 free: 32201 MB
node 2 cpus: 4 5 36 37
node 2 size: 32255 MB
node 2 free: 32219 MB
node 3 cpus: 6 7 38 39
node 3 size: 32254 MB
node 3 free: 32219 MB
node 4 cpus: 8 9 40 41
node 4 size: 32255 MB
node 4 free: 32208 MB
node 5 cpus: 10 11 42 43
node 5 size: 32254 MB
node 5 free: 32212 MB
node 6 cpus: 12 13 44 45
node 6 size: 32255 MB
node 6 free: 32200 MB
node 7 cpus: 14 15 46 47
node 7 size: 32242 MB
node 7 free: 32147 MB
node 8 cpus: 16 17 48 49
node 8 size: 32255 MB
node 8 free: 32213 MB
node 9 cpus: 18 19 50 51
node 9 size: 32254 MB
node 9 free: 32215 MB
node 10 cpus: 20 21 52 53
node 10 size: 32255 MB
node 10 free: 32133 MB
node 11 cpus: 22 23 54 55
node 11 size: 32254 MB
node 11 free: 32184 MB
node 12 cpus: 24 25 56 57
node 12 size: 32255 MB
node 12 free: 32214 MB
node 13 cpus: 26 27 58 59
node 13 size: 32225 MB
node 13 free: 32188 MB
node 14 cpus: 28 29 60 61
node 14 size: 32255 MB
node 14 free: 32162 MB
node 15 cpus: 30 31 62 63
node 15 size: 32253 MB
node 15 free: 32217 MB
node distances:

(Continued on next page)
Dell Inc. PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)

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**Platform Notes (Continued)**

```plaintext

From /proc/meminfo

MemTotal:       527827632 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
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling

(Continued on next page)
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Platform Notes (Continued)

run-level 3 Nov 28 17:14 last=5

SPEC is set to: /root/cpu2017-1.1.0

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda2      xfs   440G   36G  405G   8% /

From /sys/devices/virtual/dmi/id
    BIOS: Dell Inc. 1.2.6 11/21/2019
    Vendor: Dell Inc.
    Product: PowerEdge R7525
    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:
7x 802C80B3802C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
8x 802C869D802C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200
1x 80AD80B380AD 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-unknown-linux-gnu
Thread model: posix
InstalledDir: /sppo/dev/compilers/aocc-compiler-2.0.0/bin

C++, C, Fortran
607.cactuBSSN_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)
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### Compiler Version Notes (Continued)

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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

Fortran benchmarks:
flang

(Continued on next page)
Dell Inc. PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)

SPECspeed®2017_fp_base = 119
SPECspeed®2017_fp_peak = 121

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

Test Date: Nov-2019
Hardware Availability: Feb-2020
Software Availability: Aug-2019

Base Compiler Invocation (Continued)

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.ibm_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:
-ffto -Wl,-mlibvm -Wl,-function-specialize
-Wl,-mlibvm -Wl,-region-vectorize -Wl,-mlibvm -Wl,-vector-library=LIBMVEC
-Wl,-mlibvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver2 -fstruct-layout=3 -mlibvm -unroll-threshold=50
-fremap-arrays -mlibvm -function-specialize -mlibvm -enable-gvn-hoist
-mlibvm -reduce-array-computations=3 -mlibvm -global-vectorize-slp
-mlibvm -vector-library=LIBMVEC -mlibvm -inline-threshold=1000
-flv-function-specialization -z muldefs -DSPEC_OPENMP -fopenmp
-DUSE_OPENMP -fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm
-ljemalloc -lflang

Fortran benchmarks:
-ffto -Wl,-mlibvm -Wl,-function-specialize
-Wl,-mlibvm -Wl,-region-vectorize -Wl,-mlibvm -Wl,-vector-library=LIBMVEC
-Wl,-mlibvm -Wl,-reduce-array-computations=3 -O3 -march=znver2
-funroll-loops -Mrecursive -mlibvm -vector-library=LIBMVEC -z muldefs
-Kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -DUSE_OPENMP
-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc

(Continued on next page)
Dell Inc.

PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)

| SPECspeed®2017_fp_base = 119 |
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**Test Date:** Nov-2019
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### Base Optimization Flags (Continued)

**Fortran benchmarks (continued):**

- `-lflang`

**Benchmarks using both Fortran and C:**

- `-flto -Wl,-ml1vvm -Wl,-function-specialize`
- `-Wl,-ml1vvm -Wl,-region-vectorize -Wl,-ml1vvm -Wl,-vector-library=LIBMVEC`
- `-Wl,-ml1vvm -Wl,-reduce-array-computations=3 -O3 -ffast-math`
- `-march=znver2 -fstruct-layout=3 -ml1vvm -unroll-threshold=50`
- `-fremap-arrays -ml1vvm -function-specialize -ml1vvm -enable-gvn-hoist`
- `-ml1vvm -reduce-array-computations=3 -ml1vvm -global-vectorize-slp`
- `-ml1vvm -vector-library=LIBMVEC -ml1vvm -inline-threshold=1000`
- `-flv-function-specialization -funroll-loops -Mrecursive -z muldefs`
- `-kieee -fno-finite-math-only -DSPEC_OPENMP -fopenmp -DUSE_OPENMP`
- `-fopenmp=libomp -lomp -lpthread -ldl -lmvec -lamdlibm -ljemalloc -lflang`

**Base 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`
Dell Inc. PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)

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### 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:

```
619.lbm_s: basepeak = yes
```

```
```

```
644.nab_s: Same as 638.imagick_s
```

Fortran benchmarks:

(Continued on next page)
Dell Inc. PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)

SPECspeed®2017_fp_base = 119
SPECspeed®2017_fp_peak = 121

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

Test Date: Nov-2019
Hardware Availability: Feb-2020
Software Availability: Aug-2019

Peak Optimization Flags (Continued)

603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes
654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes
627.cam4_s: -flto -Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-region-vectorize
-Wl,-mlllvm -Wl,-vector-library=LIBMVEC
-march=znver2 -mno-sse4a -fstruct-layout=5
-mlllvm -vectorize-memory-aggressively
-mlllvm -function-specialize -mlllvm -enable-gvn-hoist
-mlllvm -unroll-threshold=50 -fremap-arrays
-mlllvm -vector-library=LIBMVEC
-mlllvm -reduce-array-computations=3
-mlllvm -global-vectorize-slp -mlllvm -inline-threshold=1000
-flv-function-specialization -O3 -funroll-loops
-Mrecursive -Kieee -fno-finite-math-only -DSPEC_OPENMP
-fopenmp -DUSE_OPENMP -fopenmp=libomp -lomp -lpthread
-lld -lmvec -lamdlibm -ljemalloc -lflang

628.pop2_s: Same as 627.cam4_s

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

Peak Other Flags

C benchmarks:
-Wno-return-type

Fortran benchmarks:
-Wno-return-type

Benchmarks using both Fortran and C:
-Wno-return-type
### Dell Inc.

**PowerEdge R7525 (AMD EPYC 7302, 3.00 GHz)**

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#### CPU2017 License: 55

**Test Sponsor:** Dell Inc.

**Tested by:** Dell Inc.

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### Peak Other Flags (Continued)

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: