Dell Inc.

PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)

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

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

| Threads | 0 | 30.0 | 60.0 | 90.0 | 120 | 150 | 180 | 210 | 240 | 270 | 300 | 330 | 360 | 390 | 420 | 450 | 480 | 510 | 540 | 570 | 600 | 630 | 660 | 690 | 720 | 750 | 780 | 810 | 840 | 870 | 900 | 930 | 960 | 990 | 1020 | 1050 | 1080 | 1110 | 1140 | 1170 | 1200 | 1230 | 1260 | 1290 | 1320 | 1350 | 1380 | 1410 | 1440 | 1470 | 1500 | 1530 | 1560 | 1590 | 1620 | 1650 | 1680 | 1710 | 1740 | 1770 | 1800 | 1830 | 1860 | 1890 | 1920 | 1950 | 1980 | 2010 | 2040 | 2070 | 2100 | 2130 | 2160 | 2190 | 2220 | 2250 | 2280 | 2310 | 2340 | 2370 | 2400 | 2430 | 2460 | 2490 | 2520 | 2550 | 2580 | 2610 | 2640 | 2670 | 2700 | 2730 | 2760 | 2790 | 2820 | 2850 | 2880 | 2910 | 2940 | 2970 | 3000 | 3030 | 3060 | 3090 | 3120 | 3150 | 3180 | 3210 | 3240 | 3270 | 3300 | 3330 | 3360 | 3390 | 3420 | 3450 | 3480 | 3510 | 3540 | 3570 | 3600 | 3630 | 3660 | 3690 | 3720 | 3750 | 3780 | 3810 | 3840 | 3870 | 3900 | 3930 | 3960 | 3990 | 4020 | 4050 | 4080 | 4110 | 4140 | 4170 | 4200 | 4230 | 4260 | 4290 | 4320 | 4350 | 4380 | 4410 | 4440 | 4470 | 4500 | 4530 | 4560 | 4590 | 4620 | 4650 | 4680 | 4710 | 4740 | 4770 | 4800 | 4830 | 4860 | 4890 | 4920 | 4950 | 4980 | 5010 | 5040 | 5070 | 5100 | 5130 | 5160 | 5190 | 5220 | 5250 | 5280 | 5310 | 5340 | 5370 | 5400 | 5430 | 5460 | 5490 | 5520 | 5550 | 5580 | 5610 | 5640 | 5670 | 5700 | 5730 | 5760 | 5790 | 5820 | 5850 | 5880 | 5910 | 5940 | 5970 | 6000 | 6030 | 6060 | 6090 | 6120 | 6150 |

<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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<tr>
<td>603.bwaves_s</td>
<td>32</td>
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</tr>
<tr>
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<td>621.wrf_s</td>
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<tr>
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<tr>
<td>628.pop2_s</td>
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<tr>
<td>638.imagick_s</td>
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<tr>
<td>644.nab_s</td>
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<td>202</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>181</td>
<td>181</td>
</tr>
</tbody>
</table>

**Hardware**

CPU Name: Intel Xeon Gold 5217
Max MHz: 3700
Nominal: 3000
Enabled: 32 cores, 4 chips
Orderable: 1.2 chips
Cache L1: 32 KB I + 32 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 11 MB I+D on chip per chip
Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)
Storage: 1 x 480 GB SATA SSD
Other: None

**Software**

OS: Ubuntu 18.04.2 LTS
kernel 4.15.0-45-generic
Compiler: C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux
Parallel: Yes
Firmware: Version 2.2.9 released May-2019
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Power Management: --
Dell Inc.

PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)

SPEC Speed®2017_fp_base = 133
SPEC Speed®2017_fp_peak = 133

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<th>Seconds</th>
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<th>Peak</th>
<th>Seconds</th>
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<td>45.3</td>
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<td>87.0</td>
<td>181</td>
<td>86.9</td>
<td>181</td>
<td>87.2</td>
</tr>
</tbody>
</table>

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i9–7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
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-2017-5755 (Spectre variant 2) is mitigated in the system as tested and documented.
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3>/proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
Dell Inc.

PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)

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

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

Platform Notes

BIOS settings:
- ADDDC setting disabled
- Sub NUMA Cluster enabled
- Virtualization Technology disabled
- DCU Streamer Prefetcher enabled
- System Profile set to Custom
- CPU Performance set to Maximum Performance
- C States set to Autonomous
- C1E disabled
- Uncore Frequency set to Dynamic
- Energy Efficiency Policy set to Performance
- Memory Patrol Scrub disabled
- Logical Processor disabled
- CPU Interconnect Bus Link Power Management disabled
- PCI ASPM L1 Link Power Management disabled
- Sysinfo program /home/cpu2017/bin/sysinfo
- Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
- running on intel-sut Thu Nov 21 23:21:03 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 : Intel(R) Xeon(R) Gold 5217 CPU @ 3.00GHz
  - 4 "physical id"'s (chips)
  - 32 "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 : 8
  - siblings : 8
  - physical 0: cores 0 1 2 3 4 5 6 7
  - physical 1: cores 0 1 2 3 4 5 6 7
  - physical 2: cores 0 1 2 3 4 5 6 7
  - physical 3: cores 0 1 2 3 4 5 6 7

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- CPU(s): 32
- On-line CPU(s) list: 0-31
- Thread(s) per core: 1
- Core(s) per socket: 8
- Socket(s): 4
- NUMA node(s): 4
- Vendor ID: GenuineIntel

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

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)

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

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

<table>
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</tr>
</thead>
<tbody>
<tr>
<td>Mar-2019</td>
<td>Apr-2019</td>
<td>May-2019</td>
</tr>
</tbody>
</table>

**CPU family:** 6  
**Model:** 85  
**Model name:** Intel(R) Xeon(R) Gold 5217 CPU @ 3.00GHz  
**Stepping:** 6  
**CPU MHz:** 3382.461  
**BogoMIPS:** 6000.00  
**Virtualization:** VT-x  
**L1d cache:** 32K  
**L1i cache:** 32K  
**L2 cache:** 1024K  
**L3 cache:** 11264K  

**NUMA node0 CPU(s):** 0,4,8,12,16,20,24,28  
**NUMA node1 CPU(s):** 1,5,9,13,17,21,25,29  
**NUMA node2 CPU(s):** 2,6,10,14,18,22,26,30  
**NUMA node3 CPU(s):** 3,7,11,15,19,23,27,31  

**Flags:** fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt aes f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_pmm ssbd mba ibrs ibpb ibrs_leaf ibrs��enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

```
From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a physical chip.

<table>
<thead>
<tr>
<th>available: 4 nodes (0-3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>node 0 cpus: 0 4 8 12 16 20 24 28</td>
</tr>
<tr>
<td>node 0 size: 191895 MB</td>
</tr>
<tr>
<td>node 0 free: 188595 MB</td>
</tr>
<tr>
<td>node 1 cpus: 1 5 9 13 17 21 25 29</td>
</tr>
<tr>
<td>node 1 size: 193534 MB</td>
</tr>
<tr>
<td>node 1 free: 192211 MB</td>
</tr>
<tr>
<td>node 2 cpus: 2 6 10 14 18 22 26 30</td>
</tr>
<tr>
<td>node 2 size: 193534 MB</td>
</tr>
<tr>
<td>node 2 free: 191859 MB</td>
</tr>
<tr>
<td>node 3 cpus: 3 7 11 15 19 23 27 31</td>
</tr>
<tr>
<td>node 3 size: 193533 MB</td>
</tr>
<tr>
<td>node 3 free: 191611 MB</td>
</tr>
</tbody>
</table>
```

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

**Dell Inc.**

**PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_peak</th>
<th>SPECspeed®2017_fp_base</th>
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<td>133</td>
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</table>

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Mar-2019  
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---

**Platform Notes (Continued)**

```
0:  10  21  31  21
1:  21  10  21  31
2:  31  21  10  21
3:  21  31  21  10
```

From /proc/meminfo

```
MemTotal:       791038392 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

```
/usr/bin/lsb_release -d
Ubuntu 18.04.2 LTS
```

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

```
debian_version: buster/sid
os-release:
  NAME="Ubuntu"
  VERSION="18.04.2 LTS (Bionic Beaver)"
  ID=ubuntu
  ID_LIKE=debian
  PRETTY_NAME="Ubuntu 18.04.2 LTS"
  VERSION_ID="18.04"
  HOME_URL="https://www.ubuntu.com/"
  SUPPORT_URL="https://help.ubuntu.com/"
```

```
uname -a:
  Linux intel-sut 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 UTC 2019 x86_64
  x86_64 x86_64 GNU/Linux
```

**Kernel self-reported vulnerability status:**

- CVE-2017-5754 (Meltdown): Not affected
- CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

**run-level 3 Nov 21 18:00**

```
SPEC is set to: /home/cpu2017
  Filesystem  Type  Size  Used Avail Use% Mounted on
  /dev/sda2   ext4   439G  37G  380G   9% /
```

**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.

**BIOS Dell Inc. 2.2.9 05/08/2019**

Memory:

(Continued on next page)
Dell Inc.

PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)  

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<td></td>
</tr>
</tbody>
</table>

SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Platform Notes (Continued)

16x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2666
8x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2666
24x 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) |

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, 
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, 
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, 
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 
64, Version 19.0.4.227 Build 20190416
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Fortran

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran, C

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 
64, Version 19.0.4.227 Build 20190416

(Continued on next page)
## Dell Inc.

PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)

### SPEC CPU®2017 Floating Point Speed Result

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### Compiler Version Notes (Continued)

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Intel (R) C Intel (R) 64 Compiler for applications running on Intel(R) 64,
   Version 19.0.4.227 Build 20190416
Microsoft (R) Fortran Compiler 2019.0.4.226 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

### Base Compiler Invocation

**C benchmarks:**
```bash
icc -m64 -std=c11
```

**Fortran benchmarks:**
```bash
ifort -m64
```

**Benchmarks using both Fortran and C:**
```bash
ifort -m64 icc -m64 -std=c11
```

**Benchmarks using Fortran, C, and C++:**
```bash
icpc -m64 icc -m64 -std=c11 ifort -m64
```

### Base Portability Flags

- `603.bwaves_s`: `-DSPEC_LP64`
- `607.cactuBSSN_s`: `-DSPEC_LP64`
- `619.lbm_s`: `-DSPEC_LP64`
- `621.wrf_s`: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
- `627.cam4_s`: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
- `628.pop2_s`: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
- `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:**
```bash
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

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

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SPECspeed®2017_fp_base = 133
SPECspeed®2017_fp_peak = 133

Dell Inc. PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)

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

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: May-2019

Base Optimization Flags (Continued)

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
# Dell Inc.

## PowerEdge M640 (Intel Xeon Gold 5217, 3.00GHz)

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**CPU2017 License:** 55  
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**Peak Optimization Flags (Continued)**

**Fortran benchmarks:**

- 603.bwaves_s: `-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs`
- 649.fotonik3d_s: Same as 603.bwaves_s
- 654.roms_s: `-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs`

**Benchmarks using both Fortran and C:**

- 621.wrf_s: `-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`
- 627.cam4_s: `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`
- 628.pop2_s: Same as 621.wrf_s

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

- `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`

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:

- [Dell-Platform-Flags-PowerEdge-revE7.xml](http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE7.xml)

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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