# SPEC® CPU2017 Floating Point Speed Result

## Dell Inc.

PowerEdge MX740c (Intel Xeon Bronze 3106 CPU, 1.70GHz)

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Dell Inc.</th>
<th>Hardware Availability:</th>
<th>Sep-2017</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
<td>Software Availability:</td>
<td>Sep-2017</td>
</tr>
<tr>
<td>CPU2017 License:</td>
<td>55</td>
<td>Test Date:</td>
<td>Jun-2018</td>
</tr>
<tr>
<td></td>
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</tbody>
</table>

### SPECspeed2017_fp_base = 45.9

### SPECspeed2017_fp_peak = 46.6

<table>
<thead>
<tr>
<th>Software</th>
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</tr>
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<tbody>
<tr>
<td>OS:</td>
<td>SUSE Linux Enterprise Server 12 SP3 4.4.114-94.11-default</td>
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<tr>
<td>Compiler:</td>
<td>C/C++: Version 18.0.0.128 of Intel C/C++</td>
</tr>
<tr>
<td>Compiler for Linux:</td>
<td>Fortran: Version 18.0.0.128 of Intel Fortran</td>
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<tr>
<td>Firmware:</td>
<td>Version 0.4.4 released May-2018</td>
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<tr>
<td>File System:</td>
<td>xfs</td>
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<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
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<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other:</td>
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### Hardware

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Hardware</th>
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<tbody>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon Bronze 3106</td>
</tr>
<tr>
<td>Max MHz.:</td>
<td>1700</td>
</tr>
<tr>
<td>Nominal:</td>
<td>1700</td>
</tr>
<tr>
<td>Enabled:</td>
<td>16 cores, 2 chips</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1.2 chips</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>1 MB I+D on chip per core</td>
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<tr>
<td>L3:</td>
<td>11 MB I+D on chip per chip</td>
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<tr>
<td>Memory:</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2133)</td>
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<tr>
<td>Storage:</td>
<td>960 GB SAS SSD</td>
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<td>Other:</td>
<td>None</td>
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### SPECspeed2017_fp_base (45.9)

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<thead>
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<tr>
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<tr>
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<td>275</td>
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### SPECspeed2017_fp_peak (46.6)

<table>
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<tbody>
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<td>225</td>
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### Table of Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>56.6</td>
<td>56.6</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>58.1</td>
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<tr>
<td>619.lbm_s</td>
<td>16</td>
<td>28.6</td>
<td>28.6</td>
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<tr>
<td>621.wrf_s</td>
<td>16</td>
<td>32.6</td>
<td>32.6</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>16</td>
<td>22.6</td>
<td>22.6</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>16</td>
<td>32.3</td>
<td>32.3</td>
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<td>638.imagick_s</td>
<td>16</td>
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<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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</table>
Dell Inc.
PowerEdge MX740c (Intel Xeon Bronze 3106 CPU, 1.70GHz)

SPECspeed2017_fp_base = 45.9
SPECspeed2017_fp_peak = 46.6

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>621.wrf_s</td>
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<td>627.cam4_s</td>
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<td>628.pop2_s</td>
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<td>644.nab_s</td>
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<td>52.0</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>184</td>
<td>49.5</td>
<td>185</td>
<td>49.3</td>
<td>185</td>
<td>49.3</td>
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<tr>
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<td>51.6</td>
<td>305</td>
<td>51.6</td>
<td>305</td>
<td>51.6</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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:
KMP_AFFINITY = "granularity=fine,compact"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4
Yes: 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.
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache sync'd and cleared with:
sync; echo 3>/proc/sys/vm/drop_caches

Platform Notes

BIOS settings:
Sub NUMA Cluster Disabled
Virtualization Technology Disabled

(Continued on next page)
Dell Inc.

PowerEdge MX740c (Intel Xeon Bronze 3106 CPU, 1.70GHz)

SPEC CPU2017 Floating Point Speed Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

SPECspeed2017_fp_base = 45.9
SPECspeed2017_fp_peak = 46.6

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

Test Date: Jun-2018
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Platform Notes (Continued)

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
CPU Interconnect Bus Link Power Management Disabled
PCI ASPM L1 Link Power Management Disabled
Sysinfo program /root/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-kuth Wed Jun 6 00:46:05 2018

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) Bronze 3106 CPU @ 1.70GHz
  2 "physical id"s (chips)
  16 "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

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3106 CPU @ 1.70GHz
Stepping: 4
CPU MHz: 1696.006
BogoMIPS: 3392.01
Virtualization: VT-x
L1d cache: 32K
SPEC CPU2017 Floating Point Speed Result
Copyright 2017-2018 Standard Performance Evaluation Corporation

Dell Inc.
PowerEdge MX740c (Intel Xeon Bronze 3106 CPU, 1.70GHz)

| SPECspeed2017_fp_base | 45.9 |
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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Test Date: Jun-2018
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Platform Notes (Continued)

L1i cache: 32K
L2 cache: 1024K
L3 cache: 11264K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15
Flag: fpu vme de pse tsc msr pae mca 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 ntopology nonstop_tsc
aperfmon perf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xptr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch arat epb invpcid_single pln pts
dtherm intel_pt rsb_ctxtsw spec_ctrl retpoline kaiser tpr_shadow vnmim flexpriority
ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavex getbv1 cqm_llc cqm_occup_llc pku ospke

/proc/cpuinfo cache data
  cache size: 11264 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0 2 4 6 8 10 12 14
  node 0 size: 95354 MB
  node 0 free: 93078 MB
  node 1 cpus: 1 3 5 7 9 11 13 15
  node 1 size: 96749 MB
  node 1 free: 91109 MB
  node distances:
  node 0 1
  0: 10 21
  1: 21 10

From /proc/meminfo
  MemTotal: 196715324 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
  SUSE Linux Enterprise Server 12 SP3

From /etc/*release* /etc/*version*
  SuSE-release:
    SUSE Linux Enterprise Server 12 (x86_64)
    VERSION = 12
    PATCHLEVEL = 3
    # This file is deprecated and will be removed in a future service pack or release.

(Continued on next page)
<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td># Please check /etc/os-release for details about this release.</td>
</tr>
<tr>
<td>os-release:</td>
</tr>
<tr>
<td>NAME=&quot;SLES&quot;</td>
</tr>
<tr>
<td>VERSION=&quot;12-SP3&quot;</td>
</tr>
<tr>
<td>VERSION_ID=&quot;12.3&quot;</td>
</tr>
<tr>
<td>PRETTY_NAME=&quot;SUSE Linux Enterprise Server 12 SP3&quot;</td>
</tr>
<tr>
<td>ID=&quot;sles&quot;</td>
</tr>
<tr>
<td>ANSI_COLOR=&quot;0;32&quot;</td>
</tr>
<tr>
<td>CPE_NAME=&quot;cpe:/o:suse:sles:12:sp3&quot;</td>
</tr>
</tbody>
</table>

```
uname -a:
Linux linux-kuth 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)
x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Jun 5 14:17

SPEC is set to: /root/cpu2017

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 890G 24G 867G 3% /
```

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. 0.4.4 05/22/2018

Memory:
12x 00AD063200AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666, configured at 2133
12x Not Specified Not Specified

(End of data from sysinfo program)

<table>
<thead>
<tr>
<th>Compiler Version Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CC 619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)</td>
</tr>
</tbody>
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```
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```
CC 619.lbm_s(peak)
```

```
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

(Continued on next page)
Compiler Version Notes (Continued)

==============================================================================
FC  607.cactuBSSN_s(base)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ic (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
FC  607.cactuBSSN_s(peak)

icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ic (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
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==============================================================================
FC   603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
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FC   603.bwaves_s(peak) 649.fotonik3d_s(peak) 654.roms_s(peak)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================
CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

(Continued on next page)
### Dell Inc.

**PowerEdge MX740c (Intel Xeon Bronze 3106 CPU, 1.70GHz)**

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**Test Sponsor:** Dell Inc.  
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### Compiler Version Notes (Continued)

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<th>CC</th>
<th>621.wrf_s(peak) 628.pop2_s(peak)</th>
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<tr>
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</tr>
<tr>
<td></td>
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</tr>
</tbody>
</table>

### Base Compiler Invocation

- **C benchmarks:**
  - `icc`

- **Fortran benchmarks:**
  - `ifort`

- **Benchmarks using both Fortran and C:**
  - `ifort icc`

- **Benchmarks using Fortran, C, and C++:**
  - `icpc icc ifort`

### Base Portability Flags

- `603.bwaves_s: -DSPEC_LP64`
- `607.cactusBSSN_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`
- `628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl`
- `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:**
  - `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP`
Dell Inc.
PowerEdge MX740c (Intel Xeon Bronze 3106 CPU, 1.70GHz)

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### Base Optimization Flags (Continued)

#### Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

#### Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

#### Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

### Base Other Flags

#### C benchmarks:
-m64 -std=c11

#### Fortran benchmarks:
-m64

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

#### Benchmarks using Fortran, C, and C++:
-m64 -std=c11

### Peak Compiler Invocation

#### C benchmarks:
icc

#### Fortran benchmarks:
ifort

#### Benchmarks using both Fortran and C:
ifort icc

(Continued on next page)
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PowerEdge MX740c (Intel Xeon Bronze 3106 CPU, 1.70GHz)

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

Peak Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP

644.nab_s: Same as 638.imagick_s

Fortran benchmarks:
-prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX2 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

Benchmarks using both Fortran and C:
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

628.pop2_s: Same as 621.wrf_s

(Continued on next page)
### Dell Inc.

**PowerEdge MX740c (Intel Xeon Bronze 3106 CPU, 1.70GHz)**

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<td>46.6</td>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Jun-2018  
**Hardware Availability:** Sep-2017  
**Software Availability:** Sep-2017

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#### Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
- `-prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -qopt-prefetch`
- `-ipo -O3 -ffinite-math-only -no-prec-div -qopt-mem-layout-trans=3`
- `-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`
- `-align array32byte`

#### Peak Other Flags

- **C benchmarks:**
  - `-m64 -std=c11`
- **Fortran benchmarks:**
  - `-m64`
- **Benchmarks using both Fortran and C:**
  - `-m64 -std=c11`
- **Benchmarks using Fortran, C, and C++:**
  - `-m64 -std=c11`

---

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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