Dell Inc.
PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)

SPECraten2017_fp_base = 223
SPECraten2017_fp_peak = 226

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

Test Date: Apr-2018
Hardware Availability: Sep-2018
Software Availability: Feb-2018

Hardware
CPU Name: Intel Xeon Platinum 8168
Max MHz.: 3700
Nominal: 2700
Enabled: 48 cores, 2 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: 33 MB I+D on chip per chip
Other: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)
Storage: 960 GB SAS SSD
Other: None

Software
OS: SUSE Linux Enterprise Server 12 SP3
4.4.14-94.11-default
Compiler: C/C++: Version 18.0.0.128 of Intel C/C++
Compiler for Linux;
Fortran: Version 18.0.0.128 of Intel Fortran
Compiler for Linux
Parallel: No
Firmware: Version 0.4.0 released Mar-2018
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
Dell Inc.

PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)

SPEC CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

Test Sponsor: Dell Inc.

Hardware Availability: Sep-2018

Tested by: Dell Inc.

Software Availability: Feb-2018

Results Table

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</tbody>
</table>

SPECrate2017_fp_base = 223
SPECrate2017_fp_peak = 226

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:

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.
Files system page cache synced and cleared with:

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Dell Inc.
PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)

<table>
<thead>
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

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<td>Sep-2018</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Feb-2018</td>
</tr>
</tbody>
</table>

General Notes (Continued)

sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numacll i.e.:
numactl --interleave=all runcpu <etc>

Platform Notes

BIOS settings:
Sub NUMA Cluster Disabled
Virtualization Technology Disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
C1EE 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 /root/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-kuth Thu Apr 12 16:03:32 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) Platinum 8168 CPU @ 2.70GHz
  2 "physical id"s (chips)
  48 "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 : 24
siblings : 24
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 1
Core(s) per socket: 24

(Continued on next page)
**SPEC CPU2017 Floating Point Rate Result**

**Dell Inc.**

PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)  

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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2018  
**Hardware Availability:** Sep-2018  
**Software Availability:** Feb-2018

**Platform Notes (Continued)**

- **Socket(s):** 2  
- **NUMA node(s):** 2  
- **Vendor ID:** GenuineIntel  
- **CPU family:** 6  
- **Model:** 85  
- **Model name:** Intel(R) Xeon(R) Platinum 8168 CPU @ 2.70GHz  
- **Stepping:** 4  
- **CPU MHz:** 2693.670  
- **BogoMIPS:** 5387.34  
- **Virtualization:** VT-x  
- **L1d cache:** 32K  
- **L1i cache:** 32K  
- **L2 cache:** 1024K  
- **L3 cache:** 33792K  
- **NUMA node0 CPU(s):** 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46  
- **NUMA node1 CPU(s):** 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47  
- **Flags:** fpu vme de pm xsr pae mce cx8 apic sep mtrr pge 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 nopl xtopology nonstop_tsc aperfmperf eagerfpu 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 tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb invpcid_single pln pts dtherm intel_pt rsb_ctxts spec_ctrl retropoline kaiser tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erva invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaveprecq xsaveprecv11 cqm_llc cqm_occup_llc pku ospke

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 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46  
- **node 0 size:** 95352 MB  
- **node 0 free:** 94749 MB  
- **node 1 cpus:** 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47  
- **node 1 size:** 96747 MB  
- **node 1 free:** 96228 MB  
- **node distances:**  
  - node 0: 10 21  
  - node 1: 21 10

From `/proc/meminfo`  
```
cache size : 33792 KB
```

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Dell Inc.
PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)

| SPECrate2017_fp_base = 223 |
| SPECrate2017_fp_peak = 226 |

CPU2017 License: 55
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Test Date: Apr-2018
Hardware Availability: Sep-2018
Software Availability: Feb-2018

Platform Notes (Continued)

MemTotal: 196711100 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.
  # Please check /etc/os-release for details about this release.
  os-release:
    NAME="SLES"
    VERSION="12-SP3"
    VERSION_ID="12.3"
    PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12:sp3"

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 Apr 12 16:00

SPEC is set to: /root/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 890G 17G 874G 2% /

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. 0.4.0 03/28/2018
Memory:
  12x 00AD063200AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666
  12x Not Specified Not Specified

(End of data from sysinfo program)
**Compiler Version Notes**

```
---
CC  519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base)
---
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

---
CC  519.lbm_r(peak) 544.nab_r(peak)
---
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

---
CXXC 508.namd_r(base) 510.parest_r(base)
---
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

---
CXXC 508.namd_r(peak) 510.parest_r(peak)
---
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

---
CC  511.povray_r(base) 526.blender_r(base)
---
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---

---
CC  511.povray_r(peak) 526.blender_r(peak)
---
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
iccc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
---
```

(Continued on next page)
Dell Inc.
PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)

SPEC CPU2017 Floating Point Rate Result

SPECrade2017_fp_base = 223
SPECrade2017_fp_peak = 226

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

Test Date: Apr-2018
Hardware Availability: Sep-2018
Software Availability: Feb-2018

Compiler Version Notes (Continued)

FC 507.cactuBSSN_r(base)
------------------------------------------------------------------------------
icpc (ICC) 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.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

FC 507.cactuBSSN_r(peak)
------------------------------------------------------------------------------
icpc (ICC) 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.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

FC 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

FC 554.roms_r(peak)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

CC 521.wrf_r(base) 527.cam4_r(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.
------------------------------------------------------------------------------

CC 521.wrf_r(peak) 527.cam4_r(peak)
------------------------------------------------------------------------------
(Continued on next page)
SPEC CPU2017 Floating Point Rate Result

Dell Inc.
PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)

SPECraten2017_fp_base = 223
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CPU2017 License: 55
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Compiler Version Notes (Continued)

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.

Base Compiler Invocation

C benchmarks:
icc
C++ benchmarks:
icpc
Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using both C and C++:
icpc icc

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

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_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
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:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-align array32byte

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -nostandard-realloc-lhs
-align array32byte

Benchmarks using both C and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

Base Other Flags

C benchmarks:
-m64 -std=c11

C++ benchmarks:
-m64

Fortran benchmarks:
-m64

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

Benchmarks using both C and C++:
-m64 -std=c11
## Dell Inc.

PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)  

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<th>SPECrate2017_fp_base = 223</th>
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### CPU2017 License: 55  
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Hardware Availability: Sep-2018  
Software Availability: Feb-2018

### Base Other Flags (Continued)

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

### Peak Compiler Invocation

**C benchmarks:**
- `icc`

**C++ benchmarks:**
- `icpc`

Fortran benchmarks:
- `ifort`

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

Benchmarks using both C and C++:
- `icpc icc`

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

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**

- `519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`
- `538.imagick_r: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3`

- `544.nab_r: Same as 519.lbm_r`

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

**C++ benchmarks:**
- `--prof-gen(pass 1) --prof-use(pass 2) -ipo -xCORE-AVX512 -O3`
- `--no-prec-div --qopt-prefetch --ffinite-math-only`
- `--qopt-mem-layout-trans=3`

**Fortran benchmarks:**
- `503.bwaves_r: -xCORE-AVX512 -ipo -O3 -no-prec-div --qopt-prefetch  --ffinite-math-only --qopt-mem-layout-trans=3`
- `--nostandard-realloc-lhs --align array32byte`
- `549.fotonik3d_r: Same as 503.bwaves_r`
- `554.roms_r: --prof-gen(pass 1) --prof-use(pass 2) --ipo --xCORE-AVX512 -O3 -no-prec-div --qopt-prefetch --ffinite-math-only --qopt-mem-layout-trans=3 --nostandard-realloc-lhs --align array32byte`

**Benchmarks using both Fortran and C:**
- `--prof-gen(pass 1) --prof-use(pass 2) --ipo --xCORE-AVX512 -O3`
- `--no-prec-div --qopt-prefetch --ffinite-math-only`
- `--qopt-mem-layout-trans=3 --nostandard-realloc-lhs --align array32byte`

**Benchmarks using both C and C++:**
- `--prof-gen(pass 1) --prof-use(pass 2) --ipo --xCORE-AVX512 -O3`
- `--no-prec-div --qopt-prefetch --ffinite-math-only`
- `--qopt-mem-layout-trans=3`

**Benchmarks using Fortran, C, and C++:**
- `--prof-gen(pass 1) --prof-use(pass 2) --ipo --xCORE-AVX512 -O3`
- `--no-prec-div --qopt-prefetch --ffinite-math-only`
- `--qopt-mem-layout-trans=3 --nostandard-realloc-lhs --align array32byte`

## Peak Other Flags

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

**C++ benchmarks:**
- `-m64`

**Fortran benchmarks:**
- `-m64`
SPEC CPU2017 Floating Point Rate Result

Dell Inc.
PowerEdge MX740c (Intel Xeon Platinum 8168, 2.70GHz)

SPECrate2017_fp_base = 223
SPECrate2017_fp_peak = 226

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

Test Date: Apr-2018
Hardware Availability: Sep-2018
Software Availability: Feb-2018

Peak Other Flags (Continued)

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

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

Tested with SPEC CPU2017 v1.0.2 on 2018-04-12 04:03:31-0400.
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