Dell Inc.

PowerEdge M640 (Intel Xeon Bronze 3204, 1.90GHz)

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

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

SPECrate2017_fp_base = 50.3
SPECrate2017_fp_peak = 51.6

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</tr>
<tr>
<td>554.roms_r</td>
<td>33.6</td>
<td>34.8</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon Bronze 3204
Max MHz.: 1900
Nominal: 1900
Enabled: 12 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: 8.25 MB I+D on chip per chip
Other: None
Memory: 384 GB (12 x 32 GB 2Rx8 PC4-2933Y-R, running at 2133)
Storage: 1 x 480 GB SATA SSD
Other: None

Software

OS: Ubuntu 18.04.2 LTS
Compiler: C/C++: Version 19.0.1.144 of Intel C/C++
Compiler Build 20181018 for Linux;
Fortran: Version 19.0.1.144 of Intel Fortran
Compiler Build 20181018 for Linux
Parallel: No
Firmware: Version 2.2.2 released Mar-2019
File System: ext4
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None
## SPEC CPU2017 Floating Point Rate Result

Dell Inc.  
PowerEdge M640 (Intel Xeon Bronze 3204, 1.90GHz)  

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

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

### 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"

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 atests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
Yes: The test sponsor atests, 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 atests, 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

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

Dell Inc.

PowerEdge M640 (Intel Xeon Bronze 3204, 1.90GHz)

**General Notes (Continued)**

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>
```

**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
- 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 Tue Apr 16 06:21:32 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) Bronze 3204 CPU @ 1.90GHz
  2 "physical id"s (chips)
  12 "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 : 6
  siblings : 6
  physical 0: cores 0 1 2 3 4 5
  physical 1: cores 0 1 2 3 4 5
```

From lscpu:
```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                12
On-line CPU(s) list:   0-11
```
Dell Inc.

PowerEdge M640 (Intel Xeon Bronze 3204, 1.90GHz)

SPECrater2017_fp_base = 50.3
SPECrater2017_fp_peak = 51.6

CPU2017 License: 55
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Hardware Availability: Apr-2019
Software Availability: Feb-2019

Thread(s) per core: 1
Core(s) per socket: 6
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Bronze 3204 CPU @ 1.90GHz
Stepping: 6
CPU MHz: 1890.889
BogoMIPS: 3800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 8448K
NUMA node0 CPU(s): 0,2,4,6,8,10
NUMA node1 CPU(s): 1,3,5,7,9,11
Flags: fpu vme de pse tsc msr 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 cpuid
aperfmpсрf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtpr pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand
lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs
lrbbp stibp ibrs_enabled tpr_shadow vmi flexpriority ept vpid fsgsbase tsc_adjust
bmi1 hle avx2 smep bmi2 erts invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx
smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1
xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtc hyp 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.
available: 2 nodes (0-1)
node 0 cpus: 0 2 4 6 8 10
node 0 size: 192879 MB
node 0 free: 192016 MB
node 1 cpus: 1 3 5 7 9 11
node 1 size: 193513 MB
node 1 free: 192628 MB
da node distances:
  node   0   1
  0:  10  21
  1:  21  10

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

Dell Inc.
PowerEdge M640 (Intel Xeon Bronze 3204, 1.90GHz)

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Platform Notes (Continued)

From /proc/meminfo
MemTotal: 395665936 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 Apr 15 22:26

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 ext4 439G 19G 398G 5% /

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. 2.2.2 03/05/2019
Memory:
6x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2133
6x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933, configured at 2133
4x Not Specified Not Specified

(End of data from sysinfo program)
Dell Inc. PowerEdge M640 (Intel Xeon Bronze 3204, 1.90GHz) SPECrate2017_fp_base = 50.3
SPECrate2017_fp_peak = 51.6

CPU2017 License: 55
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Software Availability: Feb-2019

Compiler Version Notes
==============================================================================
CC 519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base, peak)
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CC 519.lbm_r(peak)
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
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==============================================================================
CXXC 508.namd_r(base) 510.parest_r(base, peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
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CC 511.povray_r(base) 526.blender_r(base, peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
==============================================================================
CC 511.povray_r(peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
(Continued on next page)
**Compiler Version Notes (Continued)**

Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 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) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

FC 507.cactuBSSN_r(base, peak)

---

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

FC 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base)

---

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

FC 554.roms_r(peak)

---

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
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---

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

---

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
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(Continued on next page)
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**Test Date: Mar-2019**

**Hardware Availability: Apr-2019**

**Software Availability: Feb-2019**

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### Compiler Version Notes (Continued)

---

### Base Compiler Invocation

**C benchmarks:**

```
icc -m64 -std=c11
```

**C++ benchmarks:**

```
icpc -m64
```

**Fortran benchmarks:**

```
ifort -m64
```

**Benchmarks using both Fortran and C:**

```
ifort -m64 icc -m64 -std=c11
```

**Benchmarks using both C and C++:**

```
icpc -m64 icc -m64 -std=c11
```

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

```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

---

### 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
```

*(Continued on next page)*
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### Base Portability Flags (Continued)

- 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-AVX2
- -ipo
- -O3
- -no-prec-div
- -qopt-prefetch
- -ffinite-math-only
- -qopt-mem-layout-trans=4

**C++ benchmarks:**
- -xCORE-AVX2
- -ipo
- -O3
- -no-prec-div
- -qopt-prefetch
- -ffinite-math-only
- -qopt-mem-layout-trans=4

**Fortran benchmarks:**
- -xCORE-AVX2
- -ipo
- -O3
- -no-prec-div
- -qopt-prefetch
- -ffinite-math-only
- -qopt-mem-layout-trans=4
- -auto
- -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=4
- -auto
- -nostandard-realloc-lhs
- -align array32byte

**Benchmarks using both C and C++:**
- -xCORE-AVX2
- -ipo
- -O3
- -no-prec-div
- -qopt-prefetch
- -ffinite-math-only
- -qopt-mem-layout-trans=4

**Benchmarks using Fortran, C, and C++:**
- -xCORE-AVX2
- -ipo
- -O3
- -no-prec-div
- -qopt-prefetch
- -ffinite-math-only
- -qopt-mem-layout-trans=4
- -auto
- -nostandard-realloc-lhs
- -align array32byte

### Peak Compiler Invocation

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

**C++ benchmarks:**
- icpc
- -m64

(Continued on next page)
SPEC CPU2017 Floating Point Rate Result
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Dell Inc.
PowerEdge M640 (Intel Xeon Bronze 3204, 1.90GHz)

SPECrate2017_fp_base = 50.3
SPECrate2017_fp_peak = 51.6

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

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

Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort -m64

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

Benchmarks using both C and C++:
icpc -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:
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

544.nab_r: Same as 538.imagick_r

C++ benchmarks:
508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4

510.parest_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:
503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto

(Continued on next page)
## Dell Inc. PowerEdge M640 (Intel Xeon Bronze 3204, 1.90GHz)

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

<table>
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<th>Test Date</th>
<th>Hardware Availability</th>
<th>Software Availability</th>
</tr>
</thead>
</table>

### Peak Optimization Flags (Continued)

503.bwaves_r (continued):
```
-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-AVX2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs  
-align array32byte

Benchmarks using both Fortran and C:
```
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs  
-align array32byte
```

Benchmarks using both C and C++:
```
511.povray_r -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4
```

```
526.blender_r -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4
```

Benchmarks using Fortran, C, and C++:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs  
-align array32byte
```

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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