**Dell Inc.**  
**PowerEdge R240 (Intel Xeon E-2246G, 3.60 GHz)**

| Test Sponsor: | Dell Inc. |
| Test Date: | Nov-2019 |
| Hardware Availability: | Dec-2019 |
| Software Availability: | Jun-2019 |

**SPEC CPU2017 Floating Point Rate Result**

- **SPECrate®2017_fp_base** = 36.1
- **SPECrate®2017_fp_peak** = 38.3

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

### Hardware

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<tr>
<td>Parallel:</td>
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<td>Firmware:</td>
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<tr>
<td>File System:</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>
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<td>Peak Pointers:</td>
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<td>Other:</td>
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<tr>
<td>Power Management:</td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
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**CPU Name**: Intel Xeon E-2246G  
**Max MHz**: 4800  
**Nominal**: 3600  
**Enabled**: 12 cores, 1 chip  
**Orderable**: 1 chips  
**Cache L1**: 32 KB I + 32 KB D on chip per core  
**L2**: 256 KB I+D on chip per core  
**L3**: 12 MB I+D on chip per chip  
**Memory**: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-R)  
**Storage**: 1 x 960 GB SATA SSD  
**Other**: None

**Software**

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

SPECrate®2017_fp_base = 36.1
SPECrate®2017_fp_peak = 38.3

Results Table

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<td>6</td>
<td>597</td>
<td>16.0</td>
<td>604</td>
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</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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64"

General Notes

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
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.
Dell Inc.

PowerEdge R240 (Intel Xeon E-2246G, 3.60 GHz)

SPECrate®2017_fp_base = 36.1
SPECrate®2017_fp_peak = 38.3

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

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

General Notes (Continued)

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 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:
Virtualization Technology disabled
DCU Streamer Prefetcher disabled
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
PCI ASPM L1 Link Power Management disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbl1e6e46a485a0011
running on linux-g3ob Fri Nov 15 19:37:11 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) E-2246G CPU @ 3.60GHz
  1 "physical id"s (chips)
  12 "processors"
core, 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 : 12
physical 0: cores 0 1 2 3 4 5

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian

(Continued on next page)
## Platform Notes (Continued)

- **Address sizes:** 39 bits physical, 48 bits virtual
- **CPU(s):** 12
- **On-line CPU(s) list:** 0-11
- **Thread(s) per core:** 2
- **Core(s) per socket:** 6
- **Socket(s):** 1
- **NUMA node(s):** 1
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 158
- **Model name:** Intel(R) Xeon(R) E-2246G CPU @ 3.60GHz
- **Stepping:** 10
- **CPU MHz:** 3600.000
- **BogoMIPS:** 7200.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 256K
- **L3 cache:** 12288K
- **NUMA node0 CPU(s):** 0-11

**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
- aperf perfctr tsc_known_freq pni pclmulqdq dtes64 monit ds_cpl vmx smx est tm2 ssse3
- sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
- aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
- pti ssbd ibrs ibpb tpr_shadow vnmi flexpriority ept vpid fsgsbbase tsc_adjust
- bmi1 hle avx2 smep bmi2 erson invpcid rtm mxp rdsed adx smap clflushopt intel_pt
- xsaveopt xsaves dtherm ida arat pln pts md_clear flush_l1d

/proc/cpuinfo cache data
- cache size : 12288 KB

From numactl --hardware

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

- **Available:** 1 nodes (0)
- **Node 0 cpus:** 0 1 2 3 4 5 6 7 8 9 10 11
- **Node 0 size:** 64257 MB
- **Node 0 free:** 62740 MB
- **Node distances:**
  - **Node 0:** 10

From /proc/meminfo

```
MemTotal: 65800056 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

(Continued on next page)
Dell Inc.  
PowerEdge R240 (Intel Xeon E-2246G, 3.60 GHz)  

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

Test Date: Nov-2019  
Hardware Availability: Dec-2019  
Software Availability: Jun-2019

**Platform Notes (Continued)**

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):** Mitigation: PTE Inversion
- **Microarchitectural Data Sampling:** Mitigation: Clear CPU buffers; SMT vulnerable
- **CVE-2017-5754 (Meltdown):** Mitigation: PTI
- **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: Indirect Branch Restricted Speculation, IBFB: conditional, IBRS_FW, STIBP: conditional, RSB filling

```
    run-level 3 Nov 15 14:36 last=5
```

**SPEC is set to:** /home/cpu2017
```
    Filesystem  Type Size  Used Avail Use% Mounted on
    /dev/sda2    xfs  440G  34G  407G   8%  /
```

From `/sys/devices/virtual/dmi/id`  
```
BIOS:   Dell Inc. 2.1.6 09/27/2018
Vendor: Dell Inc.
Product: PowerEdge R240
Product Family: PowerEdge
```

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:**
```
    2x 00AD00000A02 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
    2x 00AD00000A07 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
```
**SPEC CPU®2017 Floating Point Rate Result**

**Dell Inc.**

**PowerEdge R240 (Intel Xeon E-2246G, 3.60 GHz)**

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**Platform Notes (Continued)**

(End of data from sysinfo program)

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**Compiler Version Notes**

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<thead>
<tr>
<th>Language</th>
<th>Compiler Packages</th>
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| C        | `1bm_r(base, peak) 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 19.0.4.227 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, Version 19.0.4.227 Build 20190416
|          | Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| C++, C   | `511.povray_r(base, peak) 526.blender_r(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, Version 19.0.4.227 Build 20190416
|          | Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
| C++, C, Fortran | `507.cactuBSSN_r(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, Version 19.0.4.227 Build 20190416
|          | Copyright (C) 1985-2019 Intel Corporation. All rights reserved. |
|          | 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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**Compiler Version Notes (Continued)**

```
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(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      | 521.wrf_r(base, peak) 527.cam4_r(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.

---

**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
```
**SPEC CPU®2017 Floating Point Rate Result**

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

**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-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
Dell Inc.
PowerEdge R240 (Intel Xeon E-2246G, 3.60 GHz)  

SPECrate®2017_fp_base = 36.1
SPECrate®2017_fp_peak = 38.3

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

Test Date: Nov-2019
Hardware Availability: Dec-2019
Software Availability: Jun-2019

### Peak 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

### 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

(Continued on next page)
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| SPECrate\textsuperscript{®}2017 fp_base = 36.1 |
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### Peak Optimization Flags (Continued)

510.parest\textsubscript{r} -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:

503.bwaves\textsubscript{r} -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realalloc-lhs -align array32byte

549.fotonik3d\textsubscript{r} Same as 503.bwaves\textsubscript{r}

554.roms\textsubscript{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-realalloc-lhs
-align array32byte

Benchmarks using both Fortran and C:

-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-realalloc-lhs
-align array32byte

Benchmarks using both C and C++:

511.povray\textsubscript{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\textsubscript{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-realalloc-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:

## SPEC CPU®2017 Floating Point Rate Result

### Dell Inc.

**PowerEdge R240 (Intel Xeon E-2246G, 3.60 GHz)**

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<thead>
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<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
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<td>38.3</td>
</tr>
</tbody>
</table>

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**Software Availability:** Jun-2019

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