Dell Inc.

PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)

**SPECrate®2017_fp_base = 50.4**

**SPECrate®2017_fp_peak = 53.7**

---

### Hardware

- **CPU Name:** Intel Xeon E-2356G
- **Max MHz:** 5000
- **Nominal:** 3200
- **Enabled:** 6 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 512 KB I+D on chip per core
- **Cache L3:** 12 MB I+D on chip per chip
- **Memory:** 64 GB (2 x 32 GB 2Rx8 PC4-3200AA-E)
- **Storage:** 70 GB on tmpfs
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.4 (Ootpa)
  
  4.18.0-305.el8.x86_64
- **Compiler:**
  
  C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  
  Compiler Build 20211113 for Linux;
  
  Fortran: Version 2021.1 of Intel Fortran Compiler
  
  Classic Build 20211112 for Linux;
- **Parallel:**
  
  No
- **Firmware:**
  
  Version 1.0.1 released Aug-2021
- **File System:**
  
  tmpfs
- **System State:**
  
  Run level 3 (multi-user)
- **Base Pointers:**
  
  64-bit
- **Peak Pointers:**
  
  64-bit
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.

---

### Test Details

- **CPU2017 License:** 55
- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** Aug-2021
- **Hardware Availability:** Oct-2021
- **Software Availability:** May-2021

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SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.
PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz) SPECrate®2017_fp_base = 50.4
SPECrate®2017_fp_peak = 53.7

CPU2017 License: 55
Test Sponsor: Dell Inc.
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</tbody>
</table>

SPECrate®2017_fp_base = 50.4
SPECrate®2017_fp_peak = 53.7

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

Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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 =
"/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/je5.0.0.1-64"

MALLOCCONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1
Transparent Huge Pages enabled by default

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

Dell Inc.

PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)

SPECrate®2017_fp_base = 50.4
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Dell Inc.

PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)

Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

Benchmark run from a 70 GB ramdisk created with the cmd: "mount -t tmpfs -o size=70G tmpfs /mnt/ramdisk"

Platform Notes

BIOS settings:
- Virtualization Technology : Disabled
- System Profile : Custom
- CPU Power Management : Maximum Performance
- C1E : Disabled
- C States : Autonomous
- PCI ASPM L1 Link
- Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca2c64d
running on localhost.localdomain Thu Aug 26 23:14:57 2021

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-2356G CPU @ 3.20GHz
- 1 "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 : 12
- physical 0: cores 0 1 2 3 4 5

(Continued on next page)
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<td>Software Availability: May-2021</td>
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**Platform Notes (Continued)**

From lscpu from util-linux 2.32.1:

- **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
- **Thread(s) per core:** 2
- **Core(s) per socket:** 6
- **Socket(s):** 1
- **NUMA node(s):** 1
- **Vendor ID:** GenuineIntel
- **BIOS Vendor ID:** Intel
- **CPU family:** 6
- **Model:** 167
- **Model name:** Intel(R) Xeon(R) E-2356G CPU @ 3.20GHz
- **BIOS Model name:** Intel(R) Xeon(R) E-2356G CPU @ 3.20GHz
- **Stepping:** 1
- **CPU MHz:** 4803.558
- **BogoMIPS:** 6384.00
- **Virtualization:** VT-x
- **L1d cache:** 48K
- **L1i cache:** 32K
- **L2 cache:** 512K
- **L3 cache:** 12288K
- **NUMA node0 CPU(s):** 0-11
- **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

```shell
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: 64027 MB
  node 0 free: 43879 MB
```

(Continued on next page)
Dell Inc.

PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)

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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Software Availability: May-2021

Platform Notes (Continued)

node distances:
node 0
0: 10

From /proc/meminfo
   MemTotal: 65563976 kB
   HugePages_Total: 0
   Hugepagesize: 2048 kB

/sbin/tuned-adm active
   Current active profile: throughput-performance

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux"
      VERSION="8.4 (Ootpa)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="8.4"
      PLATFORM_ID="platform:el8"
      PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
      ANSI_COLOR="0;31"
   redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
   system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

uname -a:
   Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
   x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapsgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected
Dell Inc.

PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)

SPECrate®2017_fp_base = 50.4
SPECrate®2017_fp_peak = 53.7

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Aug-2021
Hardware Availability: Oct-2021
Software Availability: May-2021

Platform Notes (Continued)

run-level 3 Aug 26 19:07

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 70G 15G 56G 21% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R350
Product Family: PowerEdge
Serial: 7SWFFF3

Additional information from dmidecode 3.2 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 002C00000C01 18ASF4G72AZ-3G2B1 32 GB 2 rank 3200

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 1.0.1
BIOS Date: 08/18/2021
BIOS Revision: 1.0

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                | 544.nab_r(base, peak)
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
==============================================================================

C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
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(Continued on next page)
Dell Inc.  
PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)  

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

**SPECRate®2017_fp_base = 50.4**

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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Test Date:** Aug-2021  
**Hardware Availability:** Oct-2021  
**Tested by:** Dell Inc.  
**Software Availability:** May-2021

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**Compiler Version Notes (Continued)**

C++, C  | 511.povray_r(peak)

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

C++, C  | 511.povray_r(base) 526.blender_r(base, peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113  
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---

C++, C  | 511.povray_r(peak)

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C++, C  | 511.povray_r(base) 526.blender_r(base, peak)

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C++, C  | 511.povray_r(peak)

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---

C++, C, Fortran  | 507.cactuBSSN_r(base, peak)

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
Fortran, C      | 521.wrf_r(peak)
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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000
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CPU2017 License: 55
Test Sponsor: Dell Inc.
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Compiler Version Notes (Continued)

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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64

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## Dell Inc.

PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)

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### Base Portability Flags (Continued)

- povray_r: -DSPEC_LP64
- ibm_r: -DSPEC_LP64
- wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
- cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
- imagick_r: -DSPEC_LP64
- nab_r: -DSPEC_LP64
- fotonik3d_r: -DSPEC_LP64
- roms_r: -DSPEC_LP64

### Base Optimization Flags

**C benchmarks:**

- -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries -ljemalloc
- -L/usr/local/jemalloc64-5.0.1/lib

**C++ benchmarks:**

- -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
- -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries -ljemalloc
- -L/usr/local/jemalloc64-5.0.1/lib

**Fortran benchmarks:**

- -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
- -qopt-prefetch -ffinite-math-only
- -qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
- -nostandard-realloc-lhs -align array32byte -auto
- -mbranches-within-32B-boundaries -ljemalloc
- -L/usr/local/jemalloc64-5.0.1/lib

**Benchmarks using both Fortran and C:**

- -w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
- -no-prec-div -qopt-prefetch -ffinite-math-only
- -qopt-multiple-gather-scatter-by-shuffles
- -mbranches-within-32B-boundaries -nostandard-realloc-lhs
- -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

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

- -w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
- -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
- -mbranches-within-32B-boundaries -ljemalloc

(Continued on next page)
SPECCPU®2017 Floating Point Rate Result

Dell Inc.  
PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_peak</th>
<th>SPECrate®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>53.7</td>
<td>50.4</td>
</tr>
</tbody>
</table>

CPU2017 License: 55  
Test Sponsor: Dell Inc.  
Tested by: Dell Inc.  
Test Date: Aug-2021  
Hardware Availability: Oct-2021  
Software Availability: May-2021

Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-fflto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
521.wrf_r:ifort icc
527.cam4_r:ifort icx

Benchmarks using both C and C++:
511.povray_r:icpc icc
526.blender_r:icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifort

Peak Portability Flags

Same as Base Portability Flags
Dell Inc.
PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)

SPECrate®2017_fp_base = 50.4
SPECrate®2017_fp_peak = 53.7

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

Test Date: Aug-2021
Hardware Availability: Oct-2021
Software Availability: May-2021

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_r: basepeak = yes

544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-Ofast -qopt-mem-layout-trans=4
-fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503.bwaves_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

549.fotonik3d_r: basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

527.cam4_r: basepeak = yes

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

### Dell Inc.

**PowerEdge R350 (Intel Xeon E-2356G, 3.20 GHz)**

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**Test Date:** Aug-2021  
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**Software Availability:** May-2021  

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### Peak Optimization Flags (Continued)

Benchmarks using both C and C++:


- `526.blender_r`: `basepeak = yes`

Benchmarks using Fortran, C, and C++:

- `507.cactuBSSN_r`: `basepeak = yes`

---

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.

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