## Dell Inc.

**PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>149</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>154</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4309Y
- **Max MHz:** 3600
- **Nominal:** 2800
- **Enabled:** 16 cores, 2 chips, 2 threads/core
- **Orderable:** 1,2 chips
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 1.25 MB I+D on chip per core
- **Cache L3:** 12 MB I+D on chip per chip
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
- **Storage:** 225 GB on tmpfs
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa) 4.18.0-240.15.1.el8_3.x86_64
- **Compiler:** C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  - Compiler Build 20201113 for Linux;
  - Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
  - C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux
- **Parallel:** No
- **Firmware:** Version 1.2.1 released May-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.

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### Test Details

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>55</th>
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<tbody>
<tr>
<td>Test Sponsor</td>
<td>Dell Inc.</td>
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<td>Tested by</td>
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- **503.bwaves_r**
- **507.caactuBSSN_r**
- **508.namd_r**
- **510.parest_r**
- **511.povray_r**
- **519.lbm_r**
- **521.wrf_r**
- **526.blender_r**
- **527.cam4_r**
- **538.imagick_r**
- **544.nab_r**
- **549.fotonik3d_r**
- **554.roms_r**

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### Graphs

- SPECrate®2017_fp_base: 149
- SPECrate®2017_fp_peak: 154

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Dell Inc.  

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)  

SPECrated®2017_fp_base = 149  
SPECrated®2017_fp_peak = 154  

Results Table

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = 
"/mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/je5.0.1-64"

MALLOC_CONF = "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
SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

| SPECrate®2017_fp_base = 149 |
| SPECrate®2017_fp_peak = 154 |

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

General Notes (Continued)

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>
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 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

Platform Notes

BIOS Settings:
  Sub NUMA Cluster : 2-Way Clustering
  Virtualization Technology : Disabled

  System Profile : Custom
  CPU Power Management : Maximum Performance
  C1E : Disabled
  C States : Autonomous
  Memory Patrol Scrub : Disabled
  Energy Efficiency Policy : Performance
  CPU Interconnect Bus Link
  Power Management : Disabled

Sysinfo program /mnt/ramdisk2/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Fri May 28 05:04:17 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) Silver 4309Y CPU @ 2.80GHz
  2 "physical id"s (chips)
  32 "processors"
**Platform Notes (Continued)**

cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

```plaintext
cpu cores : 8
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7
```

From `lscpu`:

```plaintext
Architecture:        x86_64
CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              32
On-line CPU(s) list: 0-31
Thread(s) per core:  2
Core(s) per socket:  8
Socket(s):           2
NUMA node(s):        2
Vendor ID:           GenuineIntel
CPU family:          6
Model:               106
Model name:          Intel(R) Xeon(R) Silver 4309Y CPU @ 2.80GHz
Stepping:            6
CPU MHz:             3400.315
BogoMIPS:            5600.00
Virtualization:      VT-x
L1d cache:           48K
L1i cache:           32K
L2 cache:            1280K
L3 cache:            12288K
NUMA node0 CPU(s):   0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
NUMA node1 CPU(s):   1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31
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 ptdbg rdtsscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf nokia pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtr Geoff pdcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pmin ssbd mba ibrs ibpb stibp ibrs_enhanced fsbsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsaves xgetbv1 xsaves cmqm_llc cmqm_occupa llc cmqm_mbm_total cmqm_mbm_local split_lock_detect wbnoinvd dtc ldi arat pni pts avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq lal7 rdpid md_clear pconfig flush_l1d arch_capabilities
```

/proc/cpuinfo cache data

```plaintext
cache size : 12288 KB
```

(Continued on next page)
Dell Inc.  

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)  

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

| SPECrate®2017_fp_base = 149 | SPECrate®2017_fp_peak = 154 |

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

---

### Platform Notes (Continued)

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  
- node 0 size: 251651 MB  
- node 0 free: 241716 MB  
- node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31  
- node 1 size: 250913 MB  
- node 1 free: 256342 MB  
- node distances:  
  - node 0: 10 20  
  - node 1: 20 10

From `/proc/meminfo`  

- MemTotal: 527815568 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="8.3 (Ootpa)"  
  - ID="rhel"  
  - ID_LIKE="fedora"  
  - VERSION_ID="8.3"  
  - PLATFORM_ID="platform:el8"  
  - PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"  
  - ANSI_COLOR="0;31"  
  - redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)  
  - system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)  
  - system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

/uname -a:  

```
Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 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): Not affected

(Continued on next page)
Dell Inc.  
PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)  

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Platform Notes (Continued)

CVE-2018-3639 (Speculative Store Bypass):  
Mitigation: Speculative Store Bypass disabled via prctl and seccomp

CVE-2017-5753 (Spectre variant 1):  
Mitigation: usercopy/swapsgs barriers and __user pointer sanitization

CVE-2017-5715 (Spectre variant 2):  
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

SPEC is set to: /mnt/ramdisk2/cpu2017-1.1.5-ic2021.1
Filesystem     Type   Size  Used Avail Use% Mounted on  
tmpfs          tmpfs  225G  6.9G  219G   4% /mnt/ramdisk2

From /sys/devices/virtual/dmi/id  
Vendor:         Dell Inc.  
Product:        PowerEdge R750  
Product Family: PowerEdge  
Serial:         1234567

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:
  12x 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666  
  4x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200, configured at 2666  
  16x Not Specified Not Specified

BIOS:  
  BIOS Vendor:     Dell Inc.  
  BIOS Version:    1.2.1  
  BIOS Date:       05/06/2021  
  BIOS Revision:   1.2

(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,
**Compiler Version Notes (Continued)**

Version 2021.1 Build 20201113
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==============================================================================
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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==============================================================================
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
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Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
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==============================================================================
C++, C | 511.povray_r(base) 526.blender_r(base, peak)
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### 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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### 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  
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 -fununsigned-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:  
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math  
-fflto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib

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

**Dell Inc.**  
PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)  

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
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#### Base Optimization Flags (Continued)

**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:**

Benchmarks using both Fortran and C:

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 -L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using Fortran, C, and C++:

### Peak Compiler Invocation

**C benchmarks:**  
`icx`

**C++ benchmarks:**  
`icpx`

(Continued on next page)
Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
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

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

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SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge R750 (Intel Xeon Silver 4309Y, 2.80 GHz)

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Peak Optimization Flags (Continued)

Fortran benchmarks:

503.bwaves_r: basepeak = yes
549.fotonik3d_r: basepeak = yes
554.roms_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

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes
527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_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
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
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:
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
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