Dell Inc.

PowerEdge XR12 (Intel Xeon Gold 6354, 3.00 GHz)

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

**SPECrates**

- SPECrate®2017_fp_base = 166
- SPECrate®2017_fp_peak = 172

### Hardware

- **CPU Name:** Intel Xeon Gold 6354
- **Max MHz:** 3600
- **Nominal:** 3000
- **Enabled:** 18 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **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:** 39 MB I+D on chip per core
- **Other:** None
- **Memory:** 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)
- **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 0.6.2 released Apr-2021
- **File System:** tmpfs
- **System State:** Run level 5 (graphical multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
SPEC CPU®2017 Floating Point Rate Result

Dell Inc.
PowerEdge XR12 (Intel Xeon Gold 6354, 3.00 GHz)

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

SPECrate®2017_fp_base = 166
SPECrate®2017_fp_peak = 172

Test Date: Apr-2021
Hardware Availability: Jul-2021
Software Availability: Feb-2021

Results Table

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

SPECrate®2017_fp_base = 166
SPECrate®2017_fp_peak = 172

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/ramdisk/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-64"
MALLOCP_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

(Continued on next page)
Dell Inc. PowerEdge XR12 (Intel Xeon Gold 6354, 3.00 GHz)

<table>
<thead>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Apr-2021  
**Hardware Availability:** Jul-2021  
**Software Availability:** Feb-2021

### 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/ramdisk/cpu2017-1.1.5-ic2021.1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Fri Apr 30 15:27:07 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) Gold 6354 CPU @ 3.00GHz
- 1 "physical id"s (chips)
- 36 "processors"

(Continued on next page)
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.)
cpu cores : 18
siblings : 36
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

From lscpu:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 36
On-line CPU(s) list: 0-35
Thread(s) per core: 2
Core(s) per socket: 18
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6354 CPU @ 3.00GHz
Stepping: 6
CPU MHz: 3600.000
BogoMIPS: 6000.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 39936K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35

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 aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm sse3 sdbg fma cx16 xmx pdcm pcid 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_pni ssbd mba ibrs ibpb stibp ibrs_enhanced fsasbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaves xsaveopt xsavec xsaveopt xsaves cmqm llc cmq_occup_llc cmq_mbb_total cmq_mbb_local split_lock_detect wbnoinvd dtherm ida arat pln pts avx512vbm1 umip pku ospke avx512vbm12 qfni vaes vpcm12ldq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d arch_capabilities

/proc/cpuinfo cache data

   cache size : 39936 KB

(Continued on next page)
Dell Inc.

PowerEdge XR12 (Intel Xeon Gold 6354, 3.00 GHz)

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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 32 34
   node 0 size: 250366 MB
   node 0 free: 255701 MB
   node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35
   node 1 size: 250697 MB
   node 1 free: 242315 MB
   node distances:
     node  0   1
     0: 10 11
     1: 11 10

From /proc/meminfo
   MemTotal: 527814304 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
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store

(Continued on next page)
## Dell Inc.

**PowerEdge XR12 (Intel Xeon Gold 6354, 3.00 GHz)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_peak</th>
<th>SPECrate®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>172</td>
<td>166</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

Bypass disabled via prctl and seccomp
Mitigation: usercopy/swapsgs barriers and __user pointer sanitization

CVE-2017-5753 (Spectre variant 1):

CVE-2017-5715 (Spectre variant 2):

CVE-2020-0543 (Special Register Buffer Data Sampling):
Not affected

CVE-2019-11135 (TSX Asynchronous Abort):
Not affected

run-level 5 Apr 30 11:10

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1

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<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
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<td>tmpfs</td>
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<td>225G</td>
<td>7.0G</td>
<td>219G</td>
<td>4% /mnt/ramdisk</td>
</tr>
</tbody>
</table>

From /sys/devices/virtual/dmi/id

- Vendor: Dell Inc.
- Product: PowerEdge XR12
- Product Family: PowerEdge
- Serial: 0990104

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:

5x 002C0632002C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200
3x 00CE063200CE M393A8G40AB2-CWE 64 GB 2 rank 3200

BIOS:

- BIOS Vendor: Dell Inc.
- BIOS Version: 0.6.2
- BIOS Date: 04/12/2021
- BIOS Revision: 0.6

(End of data from sysinfo program)

### Compiler Version Notes

==============================================================================
<table>
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<th>C</th>
<th>519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)</th>
</tr>
</thead>
</table>

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

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

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,  
Version 2021.1 Build 20201113                                          
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.         
-----------------------------------------------------------------------------

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.         
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                                          
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.         
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++, C           | 511.povray_r(peak)
-----------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on   
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-----------------------------------------------------------------------------
C++, C           | 511.povray_r(base) 526.blender_r(base, peak)
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Compiler Version Notes (Continued)

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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C++, C, Fortran | 507.cactuBSSN_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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Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)

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, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)

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

(Continued on next page)
### Base Compiler Invocation (Continued)

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 -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:
- -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

(Continued on next page)
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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:
-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
-mstandard-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
-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
-flto -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

(Continued on next page)
Dell Inc.
PowerEdge XR12 (Intel Xeon Gold 6354, 3.00 GHz)  Dell Inc.

SPEC CPU®2017 Floating Point Rate Result

SPECrater®2017 fp_base = 166
SPECrater®2017 fp_peak = 172

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

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
-flto -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
-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)
### Dell Inc.

**PowerEdge XR12 (Intel Xeon Gold 6354, 3.00 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

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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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