Dell Inc.  
PowerEdge XR12 (Intel Xeon Gold 6314U, 2.30 GHz)

**SPECrate®2017_fp_base = 204**  
**SPECrate®2017_fp_peak = 217**

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

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**Hardware**

- **CPU Name:** Intel Xeon Gold 6314U  
- **Max MHz:** 3400  
- **Nominal:** 2300  
- **Enabled:** 32 cores, 1 chip, 2 threads/core  
- **Orderable:** 1 chip  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 1.25 MB I+D on chip per core  
- **L3:** 48 MB I+D on chip per chip  
- **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)  
- **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.
Results Table

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</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 = 
"/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/jec5.0.1-64"

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
General Notes (Continued)

Prior to runcpu invocation
Filesyste page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
umactl --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 Wed Apr 21 09:30:10 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 6314U CPU @ 2.30GHz
  1 "physical id"s (chips)
  64 "processors"

(Continued on next page)
Dell Inc.

PowerEdge XR12 (Intel Xeon Gold 6314U, 2.30 GHz)

**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 : 32
siblings : 64
physical 0: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
```

From lscpu:

```plaintext
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6314U CPU @ 2.30GHz
Stepping: 6
CPU MHz: 3033.283
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s):
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62
NUMA node1 CPU(s):
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrm pdcm pccd dca ssse4_1 ssse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced fsqsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmov rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_hwi avx512bw avx512vl xsaveopt xsaveopt xgetbv1 xsavecs qm_llc qm_occuptl1c qm_mbb_total qm_mbb_local split_lock_detect writeback dtherm ida arat pfn pts avx512vmbi umip pku ospke avx512_vmbi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tm avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
```

(Continued on next page)
Platform Notes (Continued)

```
arch_capabilities

/proc/cpuinfo cache data
  cache size : 49152 KB

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 36 38 40 42 44 46 48 50
  52 54 56 58 60 62
  node 0 size: 248393 MB
  node 0 free: 241422 MB
  node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51
  53 55 57 59 61 63
  node 1 size: 248916 MB
  node 1 free: 256306 MB
  node distances:
    node   0   1
    0:  10  11
    1:  11  10

From /proc/meminfo
  MemTotal:       527808252 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
```

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

### Dell Inc.

**PowerEdge XR12 (Intel Xeon Gold 6314U, 2.30 GHz)**

<table>
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</table>

### Platform Notes (Continued)

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 Bypass disabled via prctl and seccomp
- **CVE-2017-5753 (Spectre variant 1):** Not affected
- **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

run-level 5 Apr 21 04:13

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

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<td>7.0G</td>
<td>219G</td>
<td>4%</td>
<td>/mnt/ramdisk</td>
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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)
Dell Inc.

PowerEdge XR12 (Intel Xeon Gold 6314U, 2.30 GHz)

**SPEC CPU 2017 Floating Point Rate Result**

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**Compiler Version Notes**

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<td>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.</td>
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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, 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. |

|C++, C  | 511.povray_r(base) 526.blender_r(base, peak) |
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### Base Compiler Invocation

**C benchmarks:**

- icx

**C++ benchmarks:**

- icpx

**Fortran benchmarks:**

- ifort

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

Dell Inc.
PowerEdge XR12 (Intel Xeon Gold 6314U, 2.30 GHz)

SPECrate®2017_fp_base = 204
SPECrate®2017_fp_peak = 217

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

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

Base Compiler Invocation (Continued)

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.cactusBBSSN_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

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

(Continued on next page)
Dell Inc.  

PowerEdge XR12 (Intel Xeon Gold 6314U, 2.30 GHz)  

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):
- `-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`  
- `-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`

Fortran benchmarks:
- `ifort`

Benchmarks using both Fortran and C:
- `521.wrf_r:ifort icc`

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

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

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

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 -03 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only

(Continued on next page)
Dell Inc. PowerEdge XR12 (Intel Xeon Gold 6314U, 2.30 GHz)

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Peak Optimization Flags (Continued)

503.bwaves_r (continued):
- 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

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
Dell Inc.  
PowerEdge XR12 (Intel Xeon Gold 6314U, 2.30 GHz)  

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