## Dell Inc.

PowerEdge XR12 (Intel Xeon Gold 6312U, 2.40 GHz)

| Test Sponsor: | Dell Inc. | Test Date: | May-2021 |
| Test Date: | Dell Inc. | Hardware Availability: | Jul-2021 |
| Tested by: | Dell Inc. | Software Availability: | Feb-2021 |

### SPEC CPU®2017 Floating Point Speed Result

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECspeed®2017_fp_peak</th>
<th>SPECspeed®2017_fp_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>123</td>
<td>120</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>138</td>
<td>120</td>
</tr>
<tr>
<td>619.lbmk_s</td>
<td>77.8</td>
<td>64.0</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>92.9</td>
<td>80.0</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>92.6</td>
<td>80.0</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>71.1</td>
<td>64.0</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>192</td>
<td>160</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>105</td>
<td>92.0</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>211</td>
<td>160</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>105</td>
<td>105</td>
</tr>
</tbody>
</table>

### Hardware

**CPU Name:** Intel Xeon Gold 6312U  
**Max MHz:** 3600  
**Nominal:** 2400  
**Enabled:** 24 cores, 1 chip  
**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:** 36 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:** Yes  
**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 Speed Result

Dell Inc.

PowerEdge XR12 (Intel Xeon Gold 6312U, 2.40 GHz)

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

Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
<th>Peak Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Peak Seconds</th>
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<tr>
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<td>92.6</td>
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<td>156</td>
<td>92.6</td>
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<td>105</td>
<td>148</td>
<td>107</td>
<td>150</td>
<td>105</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 120
SPECspeed®2017_fp_peak = 123

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

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:
  KMP_AFFINITY = "granularity=fine,compact"
  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"
  MALLOC_CONF = "retain:true"
  OMP_STACKSIZE = "192M"

General Notes

- Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
- memory using Redhat Enterprise Linux 8.0
- 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
- 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.

(Continued on next page)
Dell Inc. PowerEdge XR12 (Intel Xeon Gold 6312U, 2.40 GHz) SPECspeak®2017_fp_base = 120 SPECspeak®2017_fp_peak = 123

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

General Notes (Continued)

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:
 Logical Processor : Disabled
 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 Tue May 4 09:28:15 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 6312U CPU @ 2.40GHz
 1 "physical id"s (chips)
 24 "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 : 24
siblings : 24
physical 0: cores 0 1 10 11 12 13 14 15 16 17 18 19 20 21 22 23

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 24

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

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PowerEdge XR12 (Intel Xeon Gold 6312U, 2.40 GHz)

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| SPECspeed®2017_fp_peak | = 123 |

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

**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-line CPU(s) list</td>
<td>0-23</td>
</tr>
<tr>
<td>Thread(s) per core</td>
<td>1</td>
</tr>
<tr>
<td>Core(s) per socket</td>
<td>24</td>
</tr>
<tr>
<td>Socket(s)</td>
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</tr>
<tr>
<td>NUMA node(s)</td>
<td>1</td>
</tr>
<tr>
<td>Vendor ID</td>
<td>GenuineIntel</td>
</tr>
<tr>
<td>CPU family</td>
<td>6</td>
</tr>
<tr>
<td>Model</td>
<td>106</td>
</tr>
<tr>
<td>Model name</td>
<td>Intel(R) Xeon(R) Gold 6312U CPU @ 2.40GHz</td>
</tr>
<tr>
<td>Stepping</td>
<td>6</td>
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<tr>
<td>CPU MHz</td>
<td>2111.620</td>
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<td>BogoMIPS</td>
<td>4800.00</td>
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<tr>
<td>Virtualization</td>
<td>VT-x</td>
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<tr>
<td>L1d cache</td>
<td>48K</td>
</tr>
<tr>
<td>L1i cache</td>
<td>32K</td>
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<tr>
<td>L2 cache</td>
<td>1280K</td>
</tr>
<tr>
<td>L3 cache</td>
<td>36864K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s)</td>
<td>0-23</td>
</tr>
<tr>
<td>Flags</td>
<td>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 aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr 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 invpctid_single intel_pstate ssbd mba ibrs ibpb stibp ibrs_enabled fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cmov rdtscp lm rdtscp dcp md msa pbe sfence tsc_adjust mmx cdtes64 pmxs pac mcm cpbicc arch_capabilities</td>
</tr>
</tbody>
</table>

```
/proc/cpuinfo cache data  
cache size : 36864 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 12 13 14 15 16 17 18 19 20 21 22 23  
node 0 size: 490610 MB  
node 0 free: 492145 MB  
node distances:  
node 0  
0: 10

From /proc/meminfo  
MemTotal:  527817236 KB

(Continued on next page)
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Platform Notes (Continued)

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

run-level 5 May 4 05:35

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1
  Filesystem  Type  Size  Used Avail Use% Mounted on
  tmpfs     tmpfs  225G  13G  213G   6% /mnt/ramdisk
```

(Continued on next page)
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Platform Notes (Continued)

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

==============================================================================
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base)
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 | 644.nab_s(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 | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
| 644.nab_s(base)
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)

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

64, Version 2021.1 Build 20201112_000000
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C                  | 644.nab_s(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, Fortran    | 607.cactuBSSN_s(base, peak)
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Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
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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.
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
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Fortran            | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
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Base Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.libm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -gopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -gopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

(Continued on next page)
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CPU2017 License: 55
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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
- -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
- -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
- -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
- -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
- -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
- -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc

644.nab_s: icx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes

(Continued on next page)
Dell Inc. PowerEdge XR12 (Intel Xeon Gold 6312U, 2.40 GHz) Dell Inc.

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Test Date: May-2021
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Peak Optimization Flags (Continued)

644.nab_s: -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
       -flto -mfpmath=sse -funroll-loops -fiopenmp
       -DSPEC_OPENMP -qopt-mem-layout-trans=4
       -fimf-accuracy-bits=14:sqrt
       -mbranches-within-32B-boundaries
       -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:

603.bwaves_s: basepeak = yes

649.fotonik3d_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
       -DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX512
       -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
       -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
       -mbranches-within-32B-boundaries
       -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
       -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div
       -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
       -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
       -mbranches-within-32B-boundaries -nostandard-realloc-lhs
       -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: 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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<th>SPEC CPU®2017 Floating Point Speed Result</th>
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<td>PowerEdge XR12 (Intel Xeon Gold 6312U, 2.40 GHz)</td>
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<td>Software Availability: Feb-2021</td>
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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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