Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)

**SPECspeed®2017_fp_base = 146**

**SPECspeed®2017_fp_peak = 147**

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (146)</th>
<th>SPECspeed®2017_fp_peak (147)</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>52</td>
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</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>52</td>
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</tr>
<tr>
<td>621.wrf_s</td>
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<td>52</td>
</tr>
<tr>
<td>627.cam4_s</td>
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</tr>
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<tr>
<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>52</td>
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</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 6230R
- **Max MHz:** 4000
- **Nominal:** 2100
- **Enabled:** 52 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 1 MB I+D on chip per core
- **L3:** 35.75 MB I+D on chip per chip
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2933V-R, running at 2933)
- **Storage:** 1 x 1.92 TB SATA SSD
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 SP1
  - kernel 4.12.14-195-default
- **Compiler:** C/C++: Version 19.0.4.227 of Intel C/C++ Compiler Build 20190416 for Linux;
  - Fortran: Version 19.0.4.227 of Intel Fortran Compiler Build 20190416 for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.5.4 released Jan-2020
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>84.5</td>
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<td>105</td>
<td>150</td>
<td>107</td>
<td>148</td>
<td>52</td>
<td>105</td>
<td>149</td>
<td>105</td>
<td>150</td>
<td>107</td>
<td>148</td>
</tr>
</tbody>
</table>

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 = "/home/cpu2017/lib/intel64"
- OMP_STACKSIZE = "192M"

### General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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.

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`
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)

**SPECspeed®2017_fp_base = 146**
**SPECspeed®2017_fp_peak = 147**

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

<table>
<thead>
<tr>
<th>Test Date:</th>
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<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Feb-2020</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2019</td>
</tr>
</tbody>
</table>

**Platform Notes**

BIOS settings:
Sub NUMA Cluster disabled
Virtualization Technology disabled
System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
C1E disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
Logical Processor disabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
UPI Prefetch enabled
LLC Prefetch disabled
Dead Line LLC Alloc enabled
Directory AtoS disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on linux-g3ob Wed Jan 22 19:03:27 2020

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 6230R CPU @ 2.10GHz
          2 "physical id"s (chips)
          52 "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 : 26
siblings : 26
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
Address sizes: 46 bits physical, 48 bits virtual
CPU(s): 52
On-line CPU(s) list: 0-51
Thread(s) per core: 1

* (Continued on next page)
Dell Inc.  
PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)  

SPEC CPU®2017 Floating Point Speed Result

Dell Inc.  
PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)  

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

Test Date: Jan-2020  
Hardware Availability: Feb-2020  
Software Availability: Jun-2019

Core(s) per socket: 26  
Socket(s): 2  
NUMA node(s): 2  
Vendor ID: GenuineIntel  
CPU family: 6  
Model: 85  
Model name: Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz  
Stepping: 7

CPU MHz: 2100.000  
BogoMIPS: 4200.00  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 36608K  

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  
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

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 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 dcp_l3 invvpidd_single intel_pni ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cmq mxrt rdt_a avx512f avx512vfm rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cmq_llc cmq衮ucp_llc cmq衮mb_total cmq衮mb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

/proc/cpuinfo cache data  
cache size : 36608 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  
node 0 size: 192071 MB  
node 0 free: 184399 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  
node 1 size: 193500 MB  
node 1 free: 192994 MB  
node distances:  
node 0 1  
0: 10 21

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

Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)

| SPECspeed®2017_fp_peak = 147 |
| SPECspeed®2017_fp_base = 146 |

CPU2017 License: 55  Test Date:  Jan-2020
Test Sponsor:  Dell Inc.  Hardware Availability:  Feb-2020
Tested by:  Dell Inc.  Software Availability:  Jun-2019

Platform Notes (Continued)

1:  21  10

From /proc/meminfo
MemTotal:       394825676 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15-SP1"
    VERSION_ID="15.1"
    PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
    ID="sles"
    ID_LIKE="suse"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
    Linux linux-g3ob 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

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

run-level 3 Jan 22 08:34 last=5

SPEC is set to: /home/cpu2017
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sda2      xfs  440G  52G  389G 12% /

From /sys/devices/virtual/dmi/id
  BIOS:  Dell Inc. 2.5.4 01/13/2020
  Vendor:  Dell Inc.
  Product: PowerEdge R740xd
  Product Family: PowerEdge
  Serial:  F5BMCS2

Additional information from dmidecode follows.  WARNING: Use caution when you interpret

(Continued on next page)
Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)

SPECspeed®2017_fp_base = 146
SPECspeed®2017_fp_peak = 147

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Jan-2020
Tested by: Dell Inc.
Hardware Availability: Feb-2020
Software Availability: Jun-2019

Platform Notes (Continued)

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 18ASF2G72PDZ-2G9E1 16 GB 2 rank 2933
- 7x 00AD00B300AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933
- 5x 00AD063200AD HMA82GR7CJR8N-WM 16 GB 2 rank 2933

(End of data from sysinfo program)

Compiler Version Notes

=================================================================================================
C               | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
=================================================================================================
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
=================================================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
=================================================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
=================================================================================================
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak) 654.roms_s(base, peak)
=================================================================================================
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
=================================================================================================
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
(Continued on next page)
### Dell Inc.

**PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)**

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| CPU2017 License: 55 | Test Date: Jan-2020 |
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#### Compiler Version Notes (Continued)

<table>
<thead>
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<th>628.pop2_s(base, peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416</td>
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#### Base Compiler Invocation

<table>
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<th>C benchmarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>icc -m64 -std=c11</td>
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</tbody>
</table>

<table>
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<tr>
<th>Fortran benchmarks:</th>
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<tbody>
<tr>
<td>ifort -m64</td>
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<table>
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<table>
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<tr>
<th>Benchmarks using Fortran, C, and C++:</th>
</tr>
</thead>
<tbody>
<tr>
<td>icpc -m64 icc -m64 -std=c11 ifort -m64</td>
</tr>
</tbody>
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#### Base Portability Flags

<table>
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<tr>
<td>-assume byterecl</td>
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Tested by: Dell Inc.  

Test Date: Jan-2020  
Hardware Availability: Feb-2020  
Software Availability: Jun-2019  

**Base Optimization Flags**  

C benchmarks:  
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC\_OPENMP  

Fortran benchmarks:  
-DSPEC\_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp  
-nostandard-realloc-lhs  

Benchmarks using both Fortran and C:  
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC\_OPENMP  
-nostandard-realloc-lhs  

Benchmarks using Fortran, C, and C++:  
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC\_OPENMP  
-nostandard-realloc-lhs  

**Peak Compiler Invocation**  

C benchmarks:  
icc -m64 -std=c11  

Fortran benchmarks:  
ifort -m64  

Benchmarks using both Fortran and C:  
ifort -m64 icc -m64 -std=c11  

Benchmarks using Fortran, C, and C++:  
icpc -m64 icc -m64 -std=c11 ifort -m64  

**Peak Portability Flags**  

Same as Base Portability Flags
Dell Inc.

PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)

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

Test Date: Jan-2020
Hardware Availability: Feb-2020
Software Availability: Jun-2019

Peak Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:

603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
-qopenmp -nostandard-realloc-lhs

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs

628.pop2_s: Same as 621.wrf_s

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:
Dell Inc.  

PowerEdge R740xd (Intel Xeon Gold 6230R, 2.10 GHz)  

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