Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6254, 3.10GHz)

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Mar-2019  
**Hardware Availability:** Apr-2019  
**Software Availability:** Mar-2019

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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<tr>
<td>bwaves_s</td>
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<tr>
<td>imagick_s</td>
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<td>82.4</td>
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<td>nab_s</td>
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<tr>
<td>fotoni3d_s</td>
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</tr>
<tr>
<td>roms_s</td>
<td>36</td>
<td></td>
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</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Gold 6254  
- **Max MHz.:** 4000  
- **Nominal:** 3100  
- **Enabled:** 36 cores, 2 chips  
- **Orderable:** 1.2 chips  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **Cache L2:** 1 MB I+D on chip per core  
- **Cache L3:** 24.75 MB I+D on chip per core  
- **Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)  
- **Storage:** 1 x 480 GB SATA SSD

**Software**

- **OS:** Ubuntu 18.04.2 LTS  
- **Compiler:** C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.1.6 released Mar-2019
- **File System:** ext4  
- **System State:** Run level 5 (multi-user)

- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** None
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>122</td>
<td>129</td>
<td>122</td>
<td>131</td>
<td>120</td>
</tr>
</tbody>
</table>

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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64"

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
runcpu command invoked through numactl i.e.:
umactl --interleave=all runcpu <etc>
Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6254, 3.10GHz)

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SPECspeed2017_fp_base = 139
SPECspeed2017_fp_peak = 140

Test Date: Mar-2019
Hardware Availability: Apr-2019
Software Availability: Mar-2019

**Platform Notes**

BIOS settings:
- ADDDC setting disabled
- Sub NUMA Cluster enabled
- Virtualization Technology disabled
- DCU Streamer Prefetcher enabled
- 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
- Sysinfo program /home/cpu2017/bin/sysinfo
- Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64f985e45859ea9
  running on intel-sut Sat Jun 1 17:08:16 2019

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 6254 CPU @ 3.10GHz
  - 2 "physical id"s (chips)
  - 36 "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: 18
  - siblings: 18
  - physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  - physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

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: 1
- Core(s) per socket: 18
- Socket(s): 2
- NUMA node(s): 2
- Vendor ID: GenuineIntel
- CPU family: 6
- Model: 85

(Continued on next page)
**SPEC CPU2017 Floating Point Speed Result**

**Dell Inc.**

PowerEdge C6420 (Intel Xeon Gold 6254, 3.10GHz)

---

**Dell Inc.**

PowerEdge C6420 (Intel Xeon Gold 6254, 3.10GHz)

---

**Platform Notes (Continued)**

- **Model name:** Intel(R) Xeon(R) Gold 6254 CPU @ 3.10GHz
- **Stepping:** 6
- **CPU MHz:** 3865.313
- **BogoMIPS:** 6200.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 25344K
- **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 arch_perfmon pebs bts rep_good 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 aes xsave f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmlk flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erva invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clfshopto ciwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cmq_llc cmq_occclq cmq_mbm_total cmq_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities

```
From /proc/cpuinfo cache data
  cache size : 25344 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
  node 0 size: 191936 MB
  node 0 free: 188071 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: 193510 MB
  node 1 free: 189360 MB
  node distances:
    node 0   1
    0:  10  21
    1:  21  10
```

```
From /proc/meminfo
  MemTotal:          394697320 kB
  HugePages_Total:   0
  Hugepagesize:      2048 kB
```

```
/usr/bin/lsb_release -d
  Ubuntu 18.04.2 LTS
```

(Continued on next page)
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SPECspeed2017_fp_peak = 140

CPU2017 License: 55
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Test Date: Mar-2019
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Platform Notes (Continued)

From /etc/*release* /etc/*version*

   debian_version: buster/sid
   os-release:
        NAME="Ubuntu"
        VERSION="18.04.2 LTS (Bionic Beaver)"
        ID=ubuntu
        ID_LIKE=debian
        PRETTY_NAME="Ubuntu 18.04.2 LTS"
        VERSION_ID="18.04"
        HOME_URL="https://www.ubuntu.com/"
        SUPPORT_URL="https://help.ubuntu.com/"

    uname -a:
        Linux intel-sut 4.15.0-47-generic #50-Ubuntu SMP Wed Mar 13 10:44:52 UTC 2019 x86_64
        x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB

run-level 5 Jun 1 12:19

SPEC is set to: /home/cpu2017
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sda2 ext4 439G 26G 391G 7% /

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 SMIOS" standard.
 BIOS Dell Inc. 2.1.6 03/04/2019
 Memory:
    9x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
 CC 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
==============================================================================

(Continued on next page)
Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6254, 3.10GHz)

**SPEC CPU2017 Floating Point Speed Result**

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**CPU2017 License:** 55

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**Software Availability:** Mar-2019

**Compiler Version Notes (Continued)**

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
FC  607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
FC  603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
------------------------------------------------------------------------------

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
FC  603.bwaves_s(peak) 649.fotonik3d_s(peak)
------------------------------------------------------------------------------

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

------------------------------------------------------------------------------
CC  621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
------------------------------------------------------------------------------

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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(Continued on next page)
SPEC CPU2017 Floating Point Speed Result

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Compiler Version Notes (Continued)

CC   621.wrf_s(peak) 628.pop2_s(peak)
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Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
______________________________________________________________

Base 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

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_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
### Dell Inc.

PowerEdge C6420 (Intel Xeon Gold 6254, 3.10GHz)

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#### 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 C6420 (Intel Xeon Gold 6254, 3.10GHz)

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SPECspeed2017_fp_peak = 140

CPU2017 License: 55
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Test Date: Mar-2019
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Tested by: Dell Inc.
Software Availability: Mar-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: Same as 603.bwaves_s
654.roms_s: -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:
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++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs

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 C6420 (Intel Xeon Gold 6254, 3.10GHz)

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

**Test Date:** Mar-2019  
**Hardware Availability:** Apr-2019  
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