# Dell Inc.

PowerEdge FC640 (Intel Xeon Gold 6248, 2.50GHz)

## SPECspeed2017_fp_base = 133

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_peak = 134</th>
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</thead>
</table>

### Test Sponsor: Dell Inc.

### Tested by: Dell Inc.

### Test Date: Mar-2019

### Hardware Availability: Apr-2019

### Software Availability: Feb-2019

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<table>
<thead>
<tr>
<th>Specname</th>
<th>Threads</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>40</td>
<td>147</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>40</td>
<td>93.2</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>40</td>
<td>95.1</td>
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<tr>
<td>621.wrf_s</td>
<td>40</td>
<td>123</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>40</td>
<td>97.8</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>40</td>
<td>68.3</td>
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<tr>
<td>638.imagick_s</td>
<td>40</td>
<td>124</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>40</td>
<td>237</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>40</td>
<td>83.8</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>40</td>
<td>131</td>
</tr>
</tbody>
</table>

---

### Software

**Operating System:** 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

**Firmware:** Version 2.2.2 released Mar-2019

**File System:** ext4

**Base Pointers:** 64-bit

**Peak Pointers:** 64-bit

**Other:** None

---

### Hardware

**CPU Name:** Intel Xeon Gold 6248

**Max MHz.:** 3900

**Nominal:** 2500

**Enabled:** 40 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:** 27.5 MB I+D on chip per chip

**Other:** None

**Memory:** 384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R)

**Storage:** 1 x 480 GB SATA SSD

**Other:** None

---

### Performance Results

- SPECspeed2017_fp_base = 133
- SPECspeed2017_fp_peak = 134

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---
Dell Inc.

PowerEdge FC640 (Intel Xeon Gold 6248, 2.50GHz)

**SPECspeed2017_fp_base = 133**  
**SPECspeed2017_fp_peak = 134**

Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>± 468</th>
<th>± 466</th>
<th>± 467</th>
<th>± 467</th>
<th>± 467</th>
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<tr>
<td>603.bwaves_s</td>
<td>40</td>
<td>122</td>
<td>485</td>
<td>126</td>
<td>468</td>
<td>127</td>
<td>466</td>
<td>126</td>
<td>467</td>
<td>126</td>
</tr>
</tbody>
</table>
| 607.cactuBSSN_s            | 40      | 112     | 148   | 114   | 147   | **113** | **147** | 114   | 147   | **113** | **147**
| 619.lbm_s                  | 40      | 107     | **123** | 107   | 124   | 107   | 123   | 101   | 131   | 101   | 131   |
| 621.wrf_s                  | 40      | 90.6    | **97.8** | 90.9 | 97.5 | 90.4 | 98.1 | 90.4 | 98.0 | **90.5** | **97.9** | 90.7 | 97.7 |
| 628.pop2_s                 | 40      | 90.6    | **97.8** | 90.9 | 97.5 | 90.4 | 98.1 | 90.4 | 98.0 | **90.5** | **97.9** | 90.7 | 97.7 |
| 638.imagick_s              | 40      | 73.8    | 237   | 73.7 | 237   | **73.8** | **237** | 73.6 | 237   | 73.6 | 237   |
| 644.nab_s                  | 40      | 110     | 83.2  | 109  | **83.8** | 109  | 84.0  | 109  | **83.6** | 108  | 84.4  |
| 649.fotonik3d_s            | 40      | 118     | 133   | 120  | 131   | **120** | **131** | 119  | 133   | 119  | **133** |
| **SPECspeed2017_fp_base = 133** |         |         |       |       |       |       |       |       |       |       |
| **SPECspeed2017_fp_peak = 134** |         |         |       |       |       |       |       |       |       |       |

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
Filesysten 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>
Dell Inc. (Intel Xeon Gold 6248, 2.50GHz)

SPEC CPU2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

**SPECspeed2017_fp_base = 133**

**SPECspeed2017_fp_peak = 134**

### CPU2017 License:
55

### Test Sponsor:
Dell Inc.

### Tested by:
Dell Inc.

### Test Date:
Mar-2019

### Hardware Availability:
Apr-2019

### Software Availability:
Feb-2019

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**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 9bcde8f2999c33d61f64985e45859ea9
  - running on intel-sut Thu May 2 18:26:34 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 6248 CPU @ 2.50GHz
  - 2 "physical id"s (chips)
  - 40 "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: 20
    - siblings: 20
    - physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
    - physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28

- From lscpu:
  - Architecture: x86_64
  - CPU op-mode(s): 32-bit, 64-bit
  - Byte Order: Little Endian
  - CPU(s): 40
  - On-line CPU(s) list: 0-39
  - Thread(s) per core: 1
  - Core(s) per socket: 20
  - Socket(s): 2
  - NUMA node(s): 2
  - Vendor ID: GenuineIntel
  - CPU family: 6
  - Model: 85

(Continued on next page)
Dell Inc. 

PowerEdge FC640 (Intel Xeon Gold 6248, 2.50GHz)

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

**Platform Notes (Continued)**

| Model name: | Intel(R) Xeon(R) Gold 6248 CPU @ 2.50GHz |
| Stepping: | 6 |
| CPU MHz: | 3579.729 |
| BogoMIPS: | 5000.00 |
| Virtualization: | VT-x |
| L1d cache: | 32K |
| L1i cache: | 32K |
| L2 cache: | 1024K |
| L3 cache: | 28160K |
| NUMA node0 CPU(s): | 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38 |
| NUMA node1 CPU(s): | 1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39 |
| 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 aperfmpref perf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrm 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 mbb ibrs ibpb stibp ibrs_enhanced tpr_shadow vmini flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 8xmvd invpcid rtm cmtd mpx rdt_a avx512f avx512d qrdseed adx smap clflushopt cibw intel_pt avx512cd avx512bw avx512vl vsasxopt xsaveopt xsave xsetbv1 xsaves cmq_llc cmq_occupp llc cmq_mmb_total cmq_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities |

```
From /proc/cpuinfo cache data
  cache size : 28160 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
  node 0 size: 191932 MB
  node 0 free: 188986 MB
  node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39
  node 1 size: 193510 MB
  node 1 free: 188303 MB
  node distances:
    node 0 1
    0: 10 21
    1: 21 10
```

```
From /proc/meminfo
  MemTotal: 394693612 KB
  HugePages_Total: 0
  Hugepagesize: 2048 KB
```

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

(Continued on next page)
Dell Inc.
PowerEdge FC640 (Intel Xeon Gold 6248, 2.50GHz)

SPECspeed2017_fp_base = 133
SPECspeed2017_fp_peak = 134

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 4.15.0-45-generic #48-Ubuntu SMP Tue Jan 29 16:28:13 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 May 2 13:46

    SPEC is set to: /home/cpu2017
        Filesystem     Type  Size  Used Avail Use% Mounted on
        /dev/sda2      ext4  439G   25G  392G   6% /

    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.
        BIOS Dell Inc. 2.2.2 03/05/2019
        Memory:
            3x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
            9x 00AD063200AD 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 FC640 (Intel Xeon Gold 6248, 2.50GHz)

SPECspeed2017_fp_base = 133
SPECspeed2017_fp_peak = 134

Benchmark Results:

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.

Compiler Version Notes (Continued)

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.

Compiler Version Notes (Continued)

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.

Compiler Version Notes (Continued)

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

Compiler Version Notes (Continued)

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, 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
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### SPEC CPU2017 Floating Point Speed Result

**Dell Inc.**

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

### Compiler Version Notes (Continued)

```
CC  621.wrf_s(peak) 628.pop2_s(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.

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.1.144 Build 20181018

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---

### 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`
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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 FC640 (Intel Xeon Gold 6248, 2.50GHz)

CPU2017 License: 55
Test Sponsor: Dell Inc.
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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:
# SPEC CPU2017 Floating Point Speed Result

**Dell Inc.**

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-05-02 14:26:33-0400.  
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