### Dell Inc.

PowerEdge FC640 (Intel Xeon Gold 6138, 2.00 GHz)

**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**CPU2017 Floating Point Speed Result**

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base = 106</th>
<th>SPECspeed2017_fp_peak = Not Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td>80</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>80</td>
<td>207</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>80</td>
<td>108</td>
</tr>
</tbody>
</table>

**Software**

- **OS:** SUSE Linux Enterprise Server 12 SP2 (x86_64)  
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux; Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Version 1.0.0 released Aug-2017
- **File System:** btrfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** None

**Hardware**

- **CPU Name:** Intel Xeon Gold 6138
- **Max MHz.:** 3700
- **Nominal:** 2000
- **Enabled:** 40 cores, 2 chips, 2 threads/core
- **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:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)
- **Storage:** 960 GB SATA SSD
- **Other:** None

**Test Date:** Nov-2017  
**Hardware Availability:** Sep-2017  
**Software Availability:** Sep-2017
SPEC CPU2017 Floating Point Speed Result

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SPECspeed2017_fp_base = 106
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
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<td>139</td>
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<td>139</td>
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<tr>
<td>619.lbm_s</td>
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<td>95.4</td>
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<tr>
<td>628.pop2_s</td>
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<td>61.4</td>
<td>196</td>
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<tr>
<td>638.imagick_s</td>
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<td>80</td>
<td>148</td>
<td>107</td>
<td>146</td>
<td>108</td>
<td>144</td>
<td>109</td>
</tr>
</tbody>
</table>

SPECspeed2017_fp_base = 106
SPECspeed2017_fp_peak = Not Run

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"

General Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
OMP_STACKSIZE = "192M"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.4
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
No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.
No: 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.
No: 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.

This benchmark result is intended to provide perspective on past performance using the historical hardware and/or software described on this result page.

The system as described on this result page was formerly

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

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General Notes (Continued)

generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.html

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

Platform Notes

BIOS settings:
Virtualization Technology disabled
System Profile set to Custom
CPU Power Management set to Maximum Performance
Memory Frequency set to Maximum Performance
Turbo Boost enabled
C States disabled
Memory Patrol Scrub disabled
PCI ASPM L1 Link Power Management disabled
Sysinfo program /root/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618b0c091c0f
running on linux-u8yg Tue Nov 14 09:31:39 2017

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 6138 CPU @ 2.00GHz
  2  "physical id"s (chips)
  80 "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 : 40
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):                80
On-line CPU(s) list:   0-79
Thread(s) per core:    2

(Continued on next page)
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Test Date: Nov-2017
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Platform Notes (Continued)

Core(s) per socket: 20
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6138 CPU @ 2.00GHz
Stepping: 4
CPU MHz: 2000.091
BogoMIPS: 4000.18
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 28160K
NUMA node0 CPU(s):
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,
60,62,64,66,68,70,72,74,76,78
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,
61,63,65,67,69,71,73,75,77,79
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
aperfmperf eagerfpu 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 tsc_deadline_timer aes
xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb pln pts dtherm intel_pt
tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc

/platforminfo 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 40 42 44 46 48 50
    52 54 56 58 60 62 64 66 68 70 72 74 76 78
    node 0 size: 95341 MB
    node 0 free: 93712 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 65 67 69 71 73 75 77 79
    node 1 size: 96736 MB
    node 1 free: 93427 MB
    node distances:
    node 0 1

(Continued on next page)
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Software Availability: Sep-2017

Platform Notes (Continued)

0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 196687636 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release*/etc/*version*
SuSE-release:
   SUSE Linux Enterprise Server 12 (x86_64)
   VERSION = 12
   PATCHLEVEL = 2
   # This file is deprecated and will be removed in a future service pack or release.
   # Please check /etc/os-release for details about this release.
   os-release:
      NAME="SLES"
      VERSION="12-SP2"
      VERSION_ID="12.2"
      PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:
   Linux linux-u8yg 4.4.16-56-default #1 SMP Mon Aug 8 14:24:26 UTC 2016 (5b281a8) x86_64
   x86_64 x86_64 GNU/Linux

run-level 3 Nov 14 06:58

SPEC is set to: /root/cpu2017
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sdal btrfs 921G 41G 880G 5% /

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. 1.0.0 08/10/2017
   Memory:
      12x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666
      4x Not Specified Not Specified

(End of data from sysinfo program)
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Compiler Version Notes

==============================================================================
CC 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
FC 607.cactuBSSN_s(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
FC 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
CC 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

Base Compiler Invocation

C benchmarks:
  icc

Fortran benchmarks:
  ifort

Benchmarks using both Fortran and C:
  ifort icc

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#### Base Compiler Invocation (Continued)

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

#### 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

#### Base Optimization Flags

- **C benchmarks:**
  - -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
  - -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

- **Fortran benchmarks:**
  - -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
  - -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp  
  - -nostandard-realloc-lhs -align array32byte

- **Benchmarks using both Fortran and C:**
  - -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
  - -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP  
  - -nostandard-realloc-lhs -align array32byte

- **Benchmarks using Fortran, C, and C++:**
  - -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
  - -ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP  
  - -nostandard-realloc-lhs -align array32byte
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### Base Other Flags

C benchmarks:
- `-m64 -std=c11`

Fortran benchmarks:
- `-m64`

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

Benchmarks using Fortran, C, and C++:
- `-m64 -std=c11`

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:


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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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