# Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

<table>
<thead>
<tr>
<th>Software</th>
<th>Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS: SUSE Linux Enterprise Server 12 SP3 (x86_64)</td>
<td>CPU Name: Intel Xeon Gold 6140</td>
</tr>
<tr>
<td>4.4.114-94.11-default</td>
<td>Max MHz.: 3700</td>
</tr>
<tr>
<td>Compiler: C/C++: Version 18.0.0.128 of Intel C/C++</td>
<td>Nominal: 2300</td>
</tr>
<tr>
<td>Compiler for Linux:</td>
<td>Enabled: 36 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Fortran: Version 18.0.0.128 of Intel Fortran</td>
<td>Orderable: 1.2 chips</td>
</tr>
<tr>
<td>Compiler for Linux</td>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Parallel: Yes</td>
<td>Cache L2: 1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Firmware: Version 1.3.7 released Feb-2018</td>
<td>Cache L3: 24.75 MB I+D on chip per core</td>
</tr>
<tr>
<td>File System: btrfs</td>
<td>Other: None</td>
</tr>
<tr>
<td>System State: Run level 3 (multi-user)</td>
<td>Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)</td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td>Storage: 1 TB SATA SSD</td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
<td>Other: None</td>
</tr>
</tbody>
</table>

CPU2017 License: 55

Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Feb-2018

Hardware Availability: Sep-2017

Software Availability: Sep-2017

### SPECspeed2017_fp_base = 104

| SPECspeed2017_fp_peak = 104 |

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>72</td>
<td>415</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>72</td>
<td>407</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>72</td>
<td>39,4</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>72</td>
<td>76,0</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>72</td>
<td>94,2</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>72</td>
<td>57,7</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>72</td>
<td>101</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>72</td>
<td>101</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>72</td>
<td>67,7</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>72</td>
<td>101</td>
</tr>
</tbody>
</table>

---

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Dell Inc. PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

**SPECspeed2017_fp_base = 104**

**SPECspeed2017_fp_peak = 104**

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>72</td>
<td>145</td>
<td>407</td>
<td>144</td>
<td>409</td>
<td>146</td>
<td>404</td>
<td>72</td>
<td>147</td>
<td>402</td>
<td>410</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>72</td>
<td>124</td>
<td>134</td>
<td>124</td>
<td>134</td>
<td>125</td>
<td>134</td>
<td>72</td>
<td>123</td>
<td>135</td>
<td>136</td>
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<tr>
<td>619.ibm_s</td>
<td>72</td>
<td>133</td>
<td>39.5</td>
<td>133</td>
<td>39.3</td>
<td>132</td>
<td>39.8</td>
<td>72</td>
<td>132</td>
<td>39.6</td>
<td>133</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>72</td>
<td>171</td>
<td>77.4</td>
<td>171</td>
<td>77.3</td>
<td>170</td>
<td>77.7</td>
<td>72</td>
<td>174</td>
<td>76.0</td>
<td>174</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>72</td>
<td>93.0</td>
<td>95.3</td>
<td>92.9</td>
<td>95.4</td>
<td>93.2</td>
<td>95.1</td>
<td>72</td>
<td>94.1</td>
<td>94.2</td>
<td>94.3</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>72</td>
<td>212</td>
<td>56.1</td>
<td>207</td>
<td>57.3</td>
<td>206</td>
<td>57.7</td>
<td>72</td>
<td>210</td>
<td>56.7</td>
<td>206</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>72</td>
<td>143</td>
<td>134</td>
<td>143</td>
<td>134</td>
<td>143</td>
<td>134</td>
<td>72</td>
<td>143</td>
<td>134</td>
<td>143</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>72</td>
<td>85.1</td>
<td>205</td>
<td>83.8</td>
<td>208</td>
<td>83.8</td>
<td>209</td>
<td>72</td>
<td>84.1</td>
<td>208</td>
<td>84.1</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>72</td>
<td>123</td>
<td>73.9</td>
<td>119</td>
<td>76.6</td>
<td>120</td>
<td>76.1</td>
<td>72</td>
<td>119</td>
<td>76.7</td>
<td>120</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>72</td>
<td>151</td>
<td>104</td>
<td>153</td>
<td>103</td>
<td>151</td>
<td>104</td>
<td>72</td>
<td>150</td>
<td>105</td>
<td>147</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"

### 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

Yes: 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
```

### Platform Notes

BIOS settings:
- Sub NUMA Cluster disabled
- Virtualization Technology disabled

(Continued on next page)
Dell Inc. PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz) SPECspeak2017_fp_base = 104
SPECspeak2017_fp_peak = 104

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Feb-2018
Tested by: Dell Inc.
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Platform Notes (Continued)

System Profile set to Custom
CPU Performance set to Maximum Performance
C States set to Autonomous
C1EE disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Performance
Memory Patrol Scrub disabled
Logical Processor enabled
CPU Interconnect Bus Link Power Management disabled
PCI ASPM L1 Link Power Management disabled
Sysinfo program /root/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-ejwa Sat Feb 24 05:25:26 2018

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 6140 CPU @ 2.30GHz
  2 "physical id"s (chips)
  72 "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 : 36
    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): 72
  On-line CPU(s) list: 0-71
  Thread(s) per core: 2
  Core(s) per socket: 18
  Socket(s): 2
  NUMA node(s): 2
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85
  Model name: Intel(R) Xeon(R) Gold 6140 CPU @ 2.30GHz
  Stepping: 4
  CPU MHz: 2294.616
  BogoMIPS: 4589.23
  Virtualization: VT-x

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

Dell Inc.
PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

SPECspeed2017_fp_base = 104
SPECspeed2017_fp_peak = 104

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Feb-2018
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Platform Notes (Continued)

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, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70
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
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 pdpeslb 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 xtpr pdcm pclid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch ida arat epb invpclsingle pln pts dtcarm intelp tss_cxxsw spec_ctrl retpoline kaiser tpr_shadow vnumi flexpriority ept vpid fsgsbase tsc_adjust bml he avx2 smep bmi2 erts invpcid rtl cmpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl saxxopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku ospke

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
node 0 size: 95345 MB
node 0 free: 89736 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
node 1 size: 96746 MB
node 1 free: 94202 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 196702052 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-release:

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

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

<table>
<thead>
<tr>
<th>SPECspeed2017_fp_base = 104</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed2017_fp_peak = 104</td>
</tr>
</tbody>
</table>

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

Dell Inc.
PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

SPECspeed2017_fp_base = 104
SPECspeed2017_fp_peak = 104

Platform Notes (Continued)

SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 3
# 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-SP3"
VERSION_ID="12.3"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
Linux linux-ejwa 4.4.114-94.11-default #1 SMP Thu Feb 1 19:28:26 UTC 2018 (4309ff9)
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Feb 24 00:20

SPEC is set to: /root/cpu2017

Filesystem     Type   Size  Used Avail Use% Mounted on
/dev/sda3      btrfs  855G   42G  814G   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. 1.3.7 02/09/2018
Memory:
3x 002C00B3002C 18ASF2G72PDZ-2G6D1 16 GB 2 rank 2666
9x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666
4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  619.lbm_s(base) 638.imagick_s(base, peak) 644.nab_s(base, peak)
==============================================================================
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
==============================================================================

(Continued on next page)
Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

**SPECspeed2017_fp_base = 104**

**SPECspeed2017_fp_peak = 104**

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**Compiler Version Notes (Continued)**

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Dell Inc. PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

SPECspeed2017_fp_base = 104
SPECspeed2017_fp_peak = 104

Compiler Version Notes (Continued)

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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.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 bytereel
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64
SPEC CPU2017 Floating Point Speed Result

Dell Inc.

PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

| SPECspeed2017_fp_base = 104 |
| SPECspeed2017_fp_peak = 104 |

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

Test Date: Feb-2018
Hardware Availability: Sep-2017
Software Availability: Sep-2017

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX512 -ipo -03 -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 -03 -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 -03 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs -align array32byte

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

Peak Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

(Continued on next page)
Dell Inc.
PowerEdge M640 (Intel Xeon Gold 6140, 2.30 GHz)

**SPEC CPU2017 Floating Point Speed Result**

<table>
<thead>
<tr>
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**CPU2017 License:** 55
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**Software Availability:** Sep-2017

---

**Peak Compiler Invocation (Continued)**

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: -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=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP

638.imagick_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP

644.nab_s: Same as 638.imagick_s

Fortran benchmarks:

-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=3 -qopenmp
-nostandard-realloc-lhs -align array32byte

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=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -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

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

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</table>

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

**Peak Optimization Flags (Continued)**

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
- `prof-gen(pass 1)` - `prof-use(pass 2)` - `O2 -xCORE-AVX512 -gopt-prefetch`
- `ipo -O3 -ffinite-math-only -no-prec-div -gopt-mem-layout-trans=3`
- `DSPEC_SUPPRESS_OPENMP -gopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`
- `align array32byte`

**Peak 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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