## Dell Inc.

PowerEdge MX840c (Intel Xeon Gold 5120 CPU, 2.20GHz)

### SPECspeed2017_fp_base = 115

### SPECspeed2017_fp_peak = 118

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
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<tbody>
<tr>
<td>CPU2017 License</td>
<td>55</td>
</tr>
<tr>
<td>Test Sponsor</td>
<td>Dell Inc.</td>
</tr>
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<td>Tested by</td>
<td>Dell Inc.</td>
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<tr>
<td>Hardware Accuracy</td>
<td>Sep-2017</td>
</tr>
<tr>
<td>Hardware Availability</td>
<td>Sep-2017</td>
</tr>
<tr>
<td>Test Date</td>
<td>Mar-2018</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Sep-2017</td>
</tr>
<tr>
<td>Tested by</td>
<td>Dell Inc.</td>
</tr>
</tbody>
</table>

### Software

| OS | SUSE Linux Enterprise Server 12 SP3 |
| Compiler | C/C++: Version 18.0.0.128 of Intel C/C++ |
| Compiler for Linux | Compiler for Linux |
| Fortran | Fortran: Version 18.0.0.128 of Intel Fortran |
| Compiler for Linux | |
| Parallel | Yes |
| Firmware | Version 0.3.12 released Feb-2018 |
| File System | xfs |
| System State | Run level 3 (multi-user) |
| Base Pointers | 64-bit |
| Peak Pointers | 64-bit |
| Other | None |

### Hardware

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Gold 5120</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3200</td>
</tr>
<tr>
<td>Nominal</td>
<td>2200</td>
</tr>
<tr>
<td>Enabled</td>
<td>56 cores, 4 chips</td>
</tr>
<tr>
<td>Orderable</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Cache L2</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3</td>
<td>19.25 MB I+D on chip per core</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>768 GB (24 x 32 GB 2Rx8 PC4-2666V-R, running at 2400)</td>
</tr>
<tr>
<td>Storage</td>
<td>960 GB SAS SSD</td>
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<tr>
<td>Other</td>
<td>None</td>
</tr>
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</table>

### Performance Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed2017_fp_base</th>
<th>SPECspeed2017_fp_peak</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>56</td>
<td>150</td>
<td>158</td>
</tr>
<tr>
<td>607.cactuBSSS_s</td>
<td>56</td>
<td>154</td>
<td>154</td>
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<tr>
<td>619.lbm_s</td>
<td>56</td>
<td>67.2</td>
<td>66.8</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>56</td>
<td>60.7</td>
<td>60.7</td>
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<tr>
<td>627.cam4_s</td>
<td>56</td>
<td>98.3</td>
<td>98.4</td>
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<tr>
<td>628.pop2_s</td>
<td>56</td>
<td>23.7</td>
<td>28.9</td>
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<tr>
<td>638.imagick_s</td>
<td>56</td>
<td>127.8</td>
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<tr>
<td>644.nab_s</td>
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<td>93.1</td>
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<td>649.fotonik3d_s</td>
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<td>153</td>
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<tr>
<td>654.roms_s</td>
<td>56</td>
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Dell Inc.
PowerEdge MX840c (Intel Xeon Gold 5120 CPU, 2.20GHz)

SPECspeed2017_fp_base = 115
SPECspeed2017_fp_peak = 118

Results Table

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<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
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<td>161</td>
<td>98.5</td>
<td>160</td>
<td></td>
<td></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 MX840c (Intel Xeon Gold 5120 CPU, 2.20GHz)

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SPECspeed2017_fp_peak = 118

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Mar-2018
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
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 /root/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on linux-5y3r Tue Mar 6 22:06:55 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 5120 CPU @ 2.20GHz
  4 "physical id"s (chips)
  56 "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 : 14
  siblings : 14
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
  physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14

From lscpu:

  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 56
  On-line CPU(s) list: 0-55
  Thread(s) per core: 1
  Core(s) per socket: 14
  Socket(s): 4
  NUMA node(s): 4
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 85
  Model name: Intel(R) Xeon(R) Gold 5120 CPU @ 2.20GHz
  Stepping: 4
  CPU MHz: 2194.840

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

Dell Inc.
PowerEdge MX840c (Intel Xeon Gold 5120 CPU, 2.20GHz)

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Platform Notes (Continued)

BogoMIPS: 4389.68
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 19712K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44,48,52
NUMA node1 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45,49,53
NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46,50,54
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47,51,55
Flags: fpu vme de pse tsc msr pae mce 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 aperfmperf eagerfpu 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 ida arat epb invpcid_single pni pts dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 ets invpcid rtm cmp mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt xsaveopl xsavec xgetbv1 cqm_1lrc qopr qoccq 1l1c qom 1l1c qnm 1l1c pkp oskpe

From /proc/cpuinfo:
cache data

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 4 nodes (0-3)
node 0 cpus: 0 4 8 12 16 20 24 28 32 36 40 44 48 52
node 0 size: 192129 MB
node 0 free: 190631 MB
node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53
node 1 size: 193526 MB
node 1 free: 190373 MB
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54
node 2 size: 193526 MB
node 2 free: 193014 MB
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55
node 3 size: 193524 MB
node 3 free: 190574 MB
node distances:
node 0 1 2 3
0: 10 21 31 21
1: 21 10 21 31
2: 31 21 10 21
3: 21 31 21 10

From /proc/meminfo

(Continued on next page)
Platform Notes (Continued)

MemTotal: 791251968 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP3

From /etc/*release* /etc/*version*
SuSE-release:
  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-5y3r 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 Mar 6 16:13

SPEC is set to: /root/cpu2017
  Filesystem      Type Size  Used Avail Use% Mounted on
  /dev/sda3       xfs  882G  22G  861G  3% /

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. 0.3.12 02/06/2018
  Memory:
    12x 00AD00B300AD HMA84GR7AFR4N-VK 32 GB 2 rank 2666, configured at 2400
    12x 00AD063200AD HMA84GR7AFR4N-VK 32 GB 2 rank 2666, configured at 2400
    24x Not Specified Not Specified

(End of data from sysinfo program)
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Compiler Version Notes

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| icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved. |
|------------------------------------------------------------------------|

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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. |
|--------------------------------------------------------------------------------|

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### Compiler Version Notes (Continued)

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

```
CC  621.wrf_s(base) 627.cam4_s(base, peak) 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.

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

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

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

(Continued on next page)
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Base Portability Flags (Continued)

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-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-DSPEC_OPENMP -xCORE-AVX2 -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-AVX2 -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-AVX2 -ipo -O3 -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
Dell Inc.
PowerEdge MX840c (Intel Xeon Gold 5120 CPU, 2.20GHz)  

SPECspeed2017_fp_base = 115  
SPECspeed2017_fp_peak = 118

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

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

Peak 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

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-AVX2 
-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-AVX2 -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-AVX2 -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-AVX2 
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div 
-qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp
Dell Inc.
PowerEdge MX840c (Intel Xeon Gold 5120 CPU, 2.20GHz)

SPECspeed2017_fp_base = 115
SPECspeed2017_fp_peak = 118

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

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

Peak Optimization Flags (Continued)

621.wrf_s (continued):
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

627.cam4_s: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
- prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2 -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

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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