Dell Inc. PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz) SPECspeed$^{2017}$ fp_base = 139
SPECspeed$^{2017}$ fp_peak = 142

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

Test Date: Apr-2020
Hardware Availability: Feb-2020
Software Availability: Nov-2019

### Hardware

<table>
<thead>
<tr>
<th>Thread</th>
<th>SPECspeed$^{2017}$ fp peak</th>
<th>SPECspeed$^{2017}$ fp base</th>
</tr>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>52</td>
<td>165</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>52</td>
<td>103</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>52</td>
<td>118</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>52</td>
<td>107</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>104</td>
<td>60.6</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>104</td>
<td>58.2</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>52</td>
<td>146</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>104</td>
<td>258</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>52</td>
<td>82.1</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>52</td>
<td>127</td>
</tr>
</tbody>
</table>

### Software

- **OS:** Red Hat Enterprise Linux 8.1
- **Compiler:** C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux;
  Fortran: Version 19.0.5.281 of Intel Fortran Compiler for Linux
- **Parallel:** Yes
- **Firmware:** Version 2.7.1 released Feb-2020
- **File System:** tmpfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
### SPEC CPU®2017 Floating Point Speed Result

**Dell Inc.**

PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)

---

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

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
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<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>125</td>
<td>126</td>
<td>123</td>
<td>128</td>
<td></td>
</tr>
</tbody>
</table>

---

### 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"

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

KMP_AFFINITY = "granularity=fine,compact,1,0"

LD_LIBRARY_PATH = "/dev/shm/cpu2017/lib/intel64"

OMP_STACKSIZE = "192M"

### General Notes

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.
Dell Inc.

PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)

<table>
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<tr>
<th>SPECspeed®2017_fp_base</th>
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| CPU2017 License:      | 55  |
| Test Sponsor:         | Dell Inc. |
| Tested by:            | Dell Inc. |
| Test Date:            | Apr-2020 |
| Hardware Availability | Feb-2020 |
| Software Availability | Nov-2019 |

General Notes (Continued)

- Transparent Huge Pages enabled by default
- Prior to runcpu invocation
- Filesystem page cache synced and cleared with:
  - `echo 3 > /proc/sys/vm/drop_caches`
  - `sync`
- runcpu command invoked through numactl i.e.:
  - `numactl --interleave=all runcpu <etc>`

Platform Notes

- BIOS settings:
- Sub NUMA Cluster enabled
- Virtualization Technology disabled
- 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 set to standard
- Logical Processor enabled
- CPU Interconnect Bus Link Power Management disabled
- PCI ASPM L1 Link Power Management disabled
- UPI Prefetch enabled
- LLC Prefetch disabled
- Dead Line LLC Alloc enabled
- Directory AtoS disabled

Sysinfo program /dev/shm/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edbi6e6e46a485a0011
running on localhost.localdomain Sun Apr 19 14:28:04 2020

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 6230R CPU @ 2.10GHz`
- `2 "physical id"s (chips)`
- `104 "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 : 26`
- `siblings : 52`
- `physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28 29`
- `physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28`

(Continued on next page)
Dell Inc. PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)

**SPECspeed®2017_fp_base = 139**

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CPU2017 License: 55
Test Date: Apr-2020
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Hardware Availability: Feb-2020
Tested by: Dell Inc.
Software Availability: Nov-2019

---

**Platform Notes (Continued)**

From `lscpu`:

- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Byte Order:** Little Endian
- **CPU(s):** 104
- **On-line CPU(s) list:** 0-103
- **Thread(s) per core:** 2
- **Core(s) per socket:** 26
- **Socket(s):** 2
- **NUMA node(s):** 4
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 85
- **Model name:** Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz
- **Stepping:** 7
- **CPU MHz:** 3054.173
- **CPU max MHz:** 4000.0000
- **CPU min MHz:** 1000.0000
- **BogoMIPS:** 4200.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 1024K
- **L3 cache:** 36608K
- **NUMA node0 CPU(s):** 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,100
- **NUMA node1 CPU(s):** 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,101
- **NUMA node2 CPU(s):** 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102
- **NUMA node3 CPU(s):** 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95,99,103
- **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 pdelgb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xpr tp pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3 invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmiflexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves cxsaveopt xsave cxsave cqm_llc cqm_occupa llc cqm_mbb_total cqm_mbb_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

(Continued on next page)
Dell Inc. PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)

**SPECspeed®2017_fp_base = 139**
**SPECspeed®2017_fp_peak = 142**

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<td>Nov-2019</td>
</tr>
</tbody>
</table>

**Platform Notes (Continued)**

/proc/cpuinfo cache data
  cache size : 36608 KB

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 56 60 64 68 72 76 80 84 88 92 96 100
  node 0 size: 192070 MB
  node 0 free: 155931 MB
  node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97 101
  node 1 size: 193530 MB
  node 1 free: 179276 MB
  node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98 102
  node 2 size: 193530 MB
  node 2 free: 172936 MB
  node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95 99 103
  node 3 size: 193504 MB
  node 3 free: 179495 MB
  node distances:
  node 0 1 2 3
  0:  10  21  11  21
  1:  21  10  21  11
  2:  11  21  10  21
  3:  21  11  21  10

From /proc/meminfo
  MemTotal:       791180048 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.1 (Ootpa)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="8.1"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.1 (Ootpa)"
    ANSI_COLOR="0;31"
  redhat-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
  system-release: Red Hat Enterprise Linux release 8.1 (Ootpa)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:8.1:ga

(Continued on next page)
Dell Inc.  
PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)  

SPEC CPU®2017 Floating Point Speed Result  

**Spec CPU 2017 Floating Point Speed Result**  

Copyright 2017-2020 Standard Performance Evaluation Corporation  

**Dell Inc.**  
PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)  

**SPECspeed®2017_fp_base = 139**  
**SPECspeed®2017_fp_peak = 142**  

**CPU2017 License:** 55  
**Test Date:** Apr-2020  
**Test Sponsor:** Dell Inc.  
**Hardware Availability:** Feb-2020  
**Tested by:** Dell Inc.  
**Software Availability:** Nov-2019  

**Platform Notes (Continued)**  

```
uname -a:
    Linux localhost.localdomain 4.18.0-147.el8.x86_64 #1 SMP Thu Sep 26 15:52:44 UTC 2019
    x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- **CVE-2018-3620 (L1 Terminal Fault):** Not affected  
- **Microarchitectural Data Sampling:** Not affected  
- **CVE-2017-5754 (Meltdown):** Not affected  
- **CVE-2018-3639 (Speculative Store Bypass):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp  
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: usercopy/swapgs barriers and __user pointer sanitization  
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling  

```
run-level 3 Apr 17 17:16
```

SPEC is set to: /dev/shm/cpu2017  

```
Filesystem     Type   Size  Used Avail Use% Mounted on
tmpfs          tmpfs  378G   72G  306G  19% /dev/shm
```

From /sys/devices/virtual/dmi/id  
- **BIOS:** Dell Inc. 2.7.1 02/14/2020  
- **Vendor:** Dell Inc.  
- **Product:** PowerEdge Mx740c  
- **Product Family:** PowerEdge  

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.  

```
Memory:
    21x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    1x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
    2x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
```

(End of data from sysinfo program)  

**Compiler Version Notes**  

```
C                  619.lbm_s(base, peak) 638.imagick_s(base, peak)
                    644.nab_s(base, peak)
```

(Continued on next page)
Dell Inc.
PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)

SPEC CPU®2017 Floating Point Speed Result
Copyright 2017-2020 Standard Performance Evaluation Corporation

Dell Inc.

SPECspeed®2017_fp_base = 139
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Compiler Version Notes (Continued)

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
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Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
Base Compiler Invocation

C benchmarks:
icc

(Continued on next page)
Base Compiler Invocation (Continued)

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.cauchyBSN_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:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

Fortran benchmarks:
-m64 -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:
-m64 -std=c11 -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++:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP

(Continued on next page)
Dell Inc. PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)

**SPEC CPU®2017 Floating Point Speed Result**

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---

**Base Optimization Flags (Continued)**

Benchmarks using Fortran, C, and C++ (continued):

-`-nostandard-realloc-lhs`

---

**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: `basepeak = yes`

638.imagick_s: `basepeak = yes`

644.nab_s: `-m64 -std=c11 -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: `-m64 -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`

(Continued on next page)
**Dell Inc.**

PowerEdge Mx740 (Intel Xeon Gold 6230R, 2.10 GHz)

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**Tested by:** Dell Inc.  
**Software Availability:** Nov-2019

---

**Peak Optimization Flags (Continued)**

649.fotonik3d_s: Same as 603.bwaves_s

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

```
621.wrf_s: -m64 -std=c11 -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
```

```
654.roms_s: basepeak = yes
```

Benchmarks using Fortran, C, and C++:

```
627.cam4_s: -m64 -std=c11 -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

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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