Dell Inc.
PowerEdge MX740 (Intel Xeon Silver 4210R, 2.40 GHz)

| SPECspeed®2017_fp_base = 83.5 | SPECspeed®2017_fp_peak = 86.8 |

| Test Sponsor: Dell Inc. | Hardware Availability: Feb-2020 |
| Tested by: Dell Inc. | Software Availability: Nov-2019 |

**Threads**

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base (83.5)</th>
<th>SPECspeed®2017_fp_peak (86.8)</th>
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<tbody>
<tr>
<td>603.bwaves_s 20</td>
<td>90.0</td>
</tr>
<tr>
<td>607.cactuBSSN_s 20</td>
<td>69.1</td>
</tr>
<tr>
<td>619.lbm_s 20</td>
<td>77.3</td>
</tr>
<tr>
<td>621.wrf_s 20</td>
<td>82.0</td>
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<tr>
<td>627.cam4_s 20</td>
<td>48.7</td>
</tr>
<tr>
<td>628.pop2_s 20</td>
<td>56.8</td>
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<tr>
<td>638.imagick_s 20</td>
<td>52.2</td>
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<tr>
<td>644.nab_s 20</td>
<td>62.0</td>
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<tr>
<td>649.fotonik3d_s 20</td>
<td>67.0</td>
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<tr>
<td>654.roms_s 20</td>
<td>73.3</td>
</tr>
<tr>
<td>Hardware</td>
<td>Software</td>
</tr>
<tr>
<td>CPU Name: Intel Xeon Silver 4210R</td>
<td>OS: Red Hat Enterprise Linux 8.1</td>
</tr>
<tr>
<td>Max MHz: 3200</td>
<td>kernel 4.18.0-147.el8.x86_64</td>
</tr>
<tr>
<td>Nominal: 2400</td>
<td>Compiler: C/C++: Version 19.0.5.281 of Intel C/C++</td>
</tr>
<tr>
<td>Enabled: 20 cores, 2 chips, 2 threads/core</td>
<td>Compiler for Linux; Fortran: Version 19.0.5.281 of Intel Fortran</td>
</tr>
<tr>
<td>Orderable: 1.2 chips</td>
<td>Compiler for Linux</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>L2: 1 MB I+D on chip per core</td>
<td>Firmware: Version 2.7.1 released Feb-2020</td>
</tr>
<tr>
<td>L3: 13.75 MB I+D on chip per chip</td>
<td>File System: tmpfs</td>
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<tr>
<td>Other: None</td>
<td>System State: Run level 3 (multi-user)</td>
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<tr>
<td>Memory: 768 GB (24 x 32 GB 2Rx8 PC4-2933V-R, running at 2400)</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Storage: 1 x 480 GB SATA SSD</td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
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## Results Table

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<tr>
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<th>Seconds</th>
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<th>Ratio</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>90.5</td>
<td>185</td>
<td>90.0</td>
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<tr>
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<td>628.pop2_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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<tr>
<td>654.roms_s</td>
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<td>73.1</td>
</tr>
</tbody>
</table>

**SPECspeed®2017_fp_base = 83.5**
**SPECspeed®2017_fp_peak = 86.8**

## 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.
### General Notes (Continued)

- 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
  ```
- runcpu command invoked through numactl i.e.:
  ```
  numactl --interleave=all runcpu <etc>
  ```

### Platform Notes

- BIOS settings:
- Virtualization Technology disabled
- DCU Streamer Prefetcher 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 disabled
- Logical Processor enabled
- CPU Interconnect Bus Link Power Management enabled
- PCI ASPM L1 Link Power Management enabled

- Sysinfo program /dev/shm/cpu2017/bin/sysinfo
- Rev: r6365 of 2019-08-21 295195f888a3d7ed1b1e6e46a485a0011
- running on localhost.localdomain Tue Apr 28 21:06:33 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

- From /proc/cpuinfo
  ```
  model name : Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz
  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 : 10
  siblings : 20
  physical 0: cores 0 1 2 3 4 8 9 10 11 12
  physical 1: cores 0 1 2 3 4 8 9 10 11 12
  ```

- From lscpu:
  ```
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  ```

(Continued on next page)
Dell Inc.
PowerEdge MX740 (Intel Xeon Silver 4210R, 2.40 GHz)

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

**SPECspeed®2017_fp_base = 83.5**
**SPECspeed®2017_fp_peak = 86.8**

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

| CPU(s): | 40 |
| On-line CPU(s) list: | 0-39 |
| Thread(s) per core: | 2 |
| Core(s) per socket: | 10 |
| Socket: | 2 |
| NUMA node(s): | 2 |
| Vendor ID: | GenuineIntel |
| CPU family: | 6 |
| Model: | 85 |
| Model name: | Intel(R) Xeon(R) Silver 4210R CPU @ 2.40GHz |
| Stepping: | 7 |
| CPU MHz: | 1711.433 |
| CPU max MHz: | 3200.0000 |
| CPU min MHz: | 1000.0000 |
| BogoMIPS: | 4800.00 |
| Virtualization: | VT-x |
| L1d cache: | 32K |
| L1i cache: | 32K |
| L2 cache: | 1024K |
| L3 cache: | 14080K |
| 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 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 cpuid aperfmpref pni pclmulqdq dtc64 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 cpuid_fault ebpx cat_l3 cdp_l3 invpcid_single intel_pinn ssbd mba ibpbb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 6rns invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsaves xsavec xgetbv1 xsavec cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_lld arch_capabilities |

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

```
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: 385583 MB
node 0 free: 369265 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: 387067 MB
node 1 free: 379703 MB
```

---

(Continued on next page)
Platform Notes (Continued)

node distances:

node  0  1
0:  10  21
1:  21  10

From /proc/meminfo
MemTotal:       791194144 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

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 28 15:03

SPEC is set to: /dev/shm/cpu2017

Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 378G 14G 364G 4% /dev/shm

From /sys/devices/virtual/dmi/id

(Continued on next page)
Platform Notes (Continued)

BIOS: Dell Inc. 2.7.1 02/14/2020
Vendor: Dell Inc.
Product: PowerEdge MX740c
Product Family: PowerEdge
Serial: 1234567

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)
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)
==============================================================================

(Continued on next page)
**SPEC CPU®2017 Floating Point Speed Result**

Dell Inc.  
PowerEdge MX740 (Intel Xeon Silver 4210R, 2.40 GHz)  

**SPECspeed®2017_fp_base = 83.5**  
**SPECspeed®2017_fp_peak = 86.8**

<table>
<thead>
<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: Apr-2020</th>
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<tbody>
<tr>
<td>Test Sponsor: Dell Inc.</td>
<td>Hardware Availability: Feb-2020</td>
</tr>
<tr>
<td>Tested by: Dell Inc.</td>
<td>Software Availability: Nov-2019</td>
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**Compiler Version Notes (Continued)**

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)  
628.pop2_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.

---

**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  
638.imagick_s: -DSPEC_LP64  
644.nab_s: -DSPEC_LP64  
649.fotonik3d_s: -DSPEC_LP64

(Continued on next page)
Dell Inc.
PowerEdge MX740 (Intel Xeon Silver 4210R, 2.40 GHz)

SPECspeed®2017_fp_base = 83.5
SPECspeed®2017_fp_peak = 86.8

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

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

Base Portability Flags (Continued)

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
-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
SPEC CPU®2017 Floating Point Speed Result

Dell Inc.
PowerEdge MX740 (Intel Xeon Silver 4210R, 2.40 GHz)

SPECspeed®2017_fp_base = 83.5
SPECspeed®2017_fp_peak = 86.8

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

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

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
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
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

Benchmarks using Fortran, C, and C++:
607.cactuBSSN_s: basepeak = yes
## SPEC CPU®2017 Floating Point Speed Result

### Dell Inc.

**PowerEdge MX740** (Intel Xeon Silver 4210R, 2.40 GHz)

<table>
<thead>
<tr>
<th>CPU2017 License</th>
<th>Test Sponsor</th>
<th>Tested by</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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</thead>
<tbody>
<tr>
<td>55</td>
<td>Dell Inc.</td>
<td>Dell Inc.</td>
<td>83.5</td>
<td>86.8</td>
</tr>
</tbody>
</table>

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

The flags files that were used to format this result can be browsed at

- [Intel icl9.0u5-official-linux64_revD.html](http://www.spec.org/cpu2017/flags/Intel-icl9.0u5-official-linux64_revD.html)

You can also download the XML flags sources by saving the following links:

- [Intel icl9.0u5-official-linux64_revD.xml](http://www.spec.org/cpu2017/flags/Intel-icl9.0u5-official-linux64_revD.xml)

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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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