Dell Inc.
PowerEdge M640 (Intel Xeon Silver 4214R, 2.40 GHz)

**SPEC CPU®2017 Integer Speed Result**

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

**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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</thead>
<tbody>
<tr>
<td>600.perlbmch_s</td>
<td>48</td>
<td>8.33</td>
<td>8.54</td>
</tr>
<tr>
<td>602.gec_s</td>
<td>48</td>
<td>8.33</td>
<td>8.54</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>48</td>
<td>11.2</td>
<td>11.2</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>48</td>
<td>5.07</td>
<td>4.91</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>48</td>
<td>9.23</td>
<td></td>
</tr>
<tr>
<td>625.x264_s</td>
<td>48</td>
<td>11.6</td>
<td></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>48</td>
<td>4.89</td>
<td></td>
</tr>
<tr>
<td>641.leela_s</td>
<td>48</td>
<td>4.10</td>
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<tr>
<td>648.exchange2_s</td>
<td>48</td>
<td></td>
<td>13.7</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>48</td>
<td></td>
<td>20.2</td>
</tr>
</tbody>
</table>

---

**Hardware**

- **CPU Name:** Intel Xeon Silver 4214R
- **Max MHz:** 3500
- **Nominal:** 2400
- **Enabled:** 24 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:** 16.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (12 x 32 GB 2Rx8 PC4-2933V-R, running at 2400)
- **Storage:** 1 x 480 GB SATA SSD
- **Other:** None

**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 2.6.3 released Feb-2020
- **File System:** tmpfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** 64-bit
- **Other:** jemalloc memory allocator V5.0.1
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
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SPECspeed®2017_int_base = 8.29
SPECspeed®2017_int_peak = 8.39

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>
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<th>Threads</th>
<th>Seconds</th>
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<th>Ratio</th>
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<tbody>
<tr>
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<td>657.xz_s</td>
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<td>303</td>
<td>20.4</td>
<td>302</td>
<td>20.4</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,scatter"
LD_LIBRARY_PATH = "/dev/shm/cpu2017/lib/intel64:/dev/shm/cpu2017/je5.0.1-64"
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

(Continued on next page)
SPEC CPU®2017 Integer Speed Result

Dell Inc.
PowerEdge M640 (Intel Xeon Silver 4214R, 2.40GHz)

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---

**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.:
```
umactl --interleave=all runcpu <etc>
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
```

**Platform Notes**

BIOS settings:
Sub NUMA Cluster enabled
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 295195f888a3d7edbl1e6e46a485a0011
running on localhost.localdomain Sun May 10 17:05:59 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) Silver 4214R CPU @ 2.40GHz
  2 "physical id"s (chips)
  48 "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 : 12
siblings : 24
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
```

(Continued on next page)
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Platform Notes (Continued)

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Thread(s) per core: 2
Core(s) per socket: 12
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Silver 4214R CPU @ 2.40GHz
Stepping: 7
CPU MHz: 2973.493
CPU max MHz: 3500.0000
CPU min MHz: 1000.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44
NUMA node1 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45
NUMA node2 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47
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 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 xtrnr 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_pstate ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 irdst invpcid rtm cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaves xsaveopt xsavefcvt xsavec xsavecfvt xsaves cqm_llc cqm_occmap llc cqm_mbb_total cqm_mbb_local dtherm ida arat plc pts pkup ospke avx512_vnni md_clear flush_l1d arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)

(Continued on next page)
### Dell Inc.
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---

**Platform Notes (Continued)**

```
node 0 cpus: 0 4 8 12 16 20 24 28 32 36 40 44  
node 0 size: 95281 MB  
node 0 free: 82681 MB  
node 1 cpus: 1 5 9 13 17 21 25 29 33 37 41 45  
node 1 size: 96765 MB  
node 1 free: 89236 MB  
node 2 cpus: 2 6 10 14 18 22 26 30 34 38 42 46  
node 2 size: 96765 MB  
node 2 free: 73766 MB  
node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47  
node 3 size: 96764 MB  
node 3 free: 89539 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:       394830944 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
```

(Continued on next page)
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Platform Notes (Continued)

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 May 8 12:33

SPEC is set to: /dev/shm/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 189G 40G 150G 21% /dev/shm

From /sys/devices/virtual/dmi/id
BIOS: Dell Inc. 2.6.3 02/03/2020
Vendor: Dell Inc.
Product: PowerEdge M640
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:
5x 00AD00B300AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
4x 00AD063200AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
3x 00AD069D00AD HMA84GR7CJR4N-WM 32 GB 2 rank 2933
4x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

================================================================================
C       | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_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++     | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(base, peak)
================================================================================

(Continued on next page)
### 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.

---

Fortran | 648.exchange2_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

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

### Base Portability Flags

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.zxz_s: -DSPEC_LP64

### Base Optimization Flags

C benchmarks:
- -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div

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

C benchmarks (continued):
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:
-m64 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs

Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -O2 -xCORE-AVX512
-qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc

(Continued on next page)
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Peak Optimization Flags (Continued)

602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
  -prof-use(pass 2) -O2 -xCORE-AVX512
  -qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
  -DSPEC_SUPPRESS_OPENMP -L/usr/local/je5.0.1-64/lib
  -ljemalloc

605.mcf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
  -prof-use(pass 2) -ipo -xCORE-AVX512 -O3 -no-prec-div
  -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
  -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

625.x264_s: basepeak = yes

657.xz_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
  -prof-use(pass 2) -O2 -xCORE-AVX512
  -qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
  -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
  -L/usr/local/je5.0.1-64/lib -ljemalloc

C++ benchmarks:

620.omnetpp_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
  -ipo -xCORE-AVX512 -O3 -no-prec-div
  -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP
  -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.5.281/linux/compiler/lib/intel64_lin
  -lqkmalloc

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: basepeak = yes

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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**Dell Inc.**

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Tested with SPEC CPU®2017 v1.1.0 on 2020-05-10 17:05:59-0400.
