SPEC CPU®2017 Integer Speed Result

Dell Inc.

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

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

Hardware
CPU Name: Intel Xeon Gold 6230R
Max MHz: 4000
Nominal: 2100
Enabled: 52 cores, 2 chips
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: 35.75 MB I+D on chip per chip
Other: None

Memory: 768 GB (24 x 32 GB 2Rx8 PC4-2933V-R, running at 2933)
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

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

SPECspeed®2017_int_base = 10.1
SPECspeed®2017_int_peak = 10.2
### 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>
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</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
<td>52</td>
<td>269</td>
<td>6.59</td>
<td>266</td>
<td>6.67</td>
<td>267</td>
<td>6.66</td>
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<tr>
<td>602.gcc_s</td>
<td>52</td>
<td>399</td>
<td>9.99</td>
<td>400</td>
<td>9.96</td>
<td>400</td>
<td>9.96</td>
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<tr>
<td>605.mcf_s</td>
<td>52</td>
<td>378</td>
<td>12.5</td>
<td>379</td>
<td>12.5</td>
<td>378</td>
<td>12.5</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>52</td>
<td>183</td>
<td>8.90</td>
<td>179</td>
<td>9.12</td>
<td>184</td>
<td>8.86</td>
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<td>623.xalanchmk_s</td>
<td>52</td>
<td>133</td>
<td>10.7</td>
<td>132</td>
<td>10.8</td>
<td>132</td>
<td>10.8</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>52</td>
<td>121</td>
<td>14.5</td>
<td>122</td>
<td>14.5</td>
<td>121</td>
<td>14.5</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>52</td>
<td>261</td>
<td>5.50</td>
<td>261</td>
<td>5.50</td>
<td>261</td>
<td>5.50</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>52</td>
<td>364</td>
<td>4.69</td>
<td>363</td>
<td>4.69</td>
<td>363</td>
<td>4.69</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>52</td>
<td>188</td>
<td>15.7</td>
<td>189</td>
<td>15.6</td>
<td>188</td>
<td>15.7</td>
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<td>657.xz_s</td>
<td>52</td>
<td>264</td>
<td>23.4</td>
<td>264</td>
<td>23.4</td>
<td>264</td>
<td>23.4</td>
</tr>
</tbody>
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### 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

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.

(Continued on next page)
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Test Sponsor: Dell Inc.
Test Date: Apr-2020
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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.:
numactl --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
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 disabled
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 295195f888a3d7edbbbe6e46a485a0011
running on localhost.localdomain Mon Apr 20 14:15:32 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)
  52 "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 : 26

(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): 52
On-line CPU(s) list: 0-51
Thread(s) per core: 1
Core(s) per socket: 26
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6230R CPU @ 2.10GHz
Stepping: 7
CPU MHz: 1076.322
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):
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50
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
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 rdtsscp
  lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
  aperfmperf pni pclmulqdq dts eez 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 abtm 3dnowprefetch cpuid_fault ebpx cat_t1 cdp cld
  invpcid_single intel_pmcgov ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi
  flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invvpidd rtm
  cmq mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
  avx512bw avx512vl xsaveopt xsavecdf xsavec xsavec xgetbv1 xsavec cqm_llc cqm_heaplook cqm_mbb_total
  cqm_mbb_local dtherm ida arat pln pts pkup ospke avx512_vnni md_clear flush_l1d
  arch_capabilities

/proc/cpuinfo cache data

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

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

---

### Platform Notes (Continued)

**cache size : 36608 KB**

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

<table>
<thead>
<tr>
<th>Available</th>
<th>Node 0 CPUs</th>
<th>Node 0 Size</th>
<th>Node 0 Free</th>
<th>Node 1 CPUs</th>
<th>Node 1 Size</th>
<th>Node 1 Free</th>
<th>Node Distances</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nodes</td>
<td>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</td>
<td>385606 MB</td>
<td>369352 MB</td>
<td>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</td>
<td>387040 MB</td>
<td>385862 MB</td>
<td></td>
</tr>
</tbody>
</table>

From `/proc/meminfo`

- **MemTotal:** 791190504 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

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

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SPECspeed®2017_int_base = 10.1
SPECspeed®2017_int_peak = 10.2

CPU2017 License: 55
Test Sponsor: Dell Inc.
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Platform Notes (Continued)

pointer sanitization
Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

run-level 3 Apr 20 14:09

SPEC is set to: /dev/shm/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 378G 7.6G 370G 2% /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 00AD06320000 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       | 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)
---------------------------------------------------------------------
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.
---------------------------------------------------------------------

(Continued on next page)
### Compiler Version Notes (Continued)

```plaintext
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

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### 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.xz_s: `-DSPEC_LP64`

### Base Optimization Flags

- C benchmarks: 
  - `-m64` `-std=c11` `-Wl,-z,muldefs` `-xCORE-AVX512` `-ipo` `-O3` `-no-prec-div`
  - `-qopt-mem-layout-trans=4` `-gopenmp` `-DSPEC_OPENMP`
  - `-L/usr/local/je5.0.1-64/lib` `-ljemalloc`
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### Base Optimization Flags (Continued)

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`
- `nstandard-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`

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`

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

602.gcc_s (continued):
- ljemalloc

605.mcf_s: -m64 -std=gnu11 -Wl,-z,muldefs -O2 -Wl,-z,memdefs -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=gnu11 -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
-DSPEC_SUPPRESS_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
-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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-04-20 14:15:31-0400.