# SPEC® CPU2017 Integer Speed Result

**Dell Inc.**

**PowerEdge MX740c (Intel Xeon Silver 4116, 2.10GHz)**

<table>
<thead>
<tr>
<th>Software Availability: Feb-2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor: Dell Inc.</td>
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<td>Tested by: Dell Inc.</td>
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<td>Test Date: Mar-2018</td>
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**CPU2017 License:** 55

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base = 7.08</th>
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<tbody>
<tr>
<td>SPECspeed2017_int_peak = 7.29</td>
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</tbody>
</table>

## Hardware

- **CPU Name:** Intel Xeon Silver 4116
- **Max MHz.:** 3000
- **Nominal:** 2100
- **Enabled:** 24 cores, 2 chips
- **Orderable:** 1.2 chips
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **Cache L2:** 1 MB I+D on chip per core
- **Cache L3:** 16.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
- **Storage:** 960 GB SAS SSD
- **Other:** None

## Software

- **OS:** SUSE Linux Enterprise Server 12 SP3 4.4.114-94.11-default
- **Compiler:** C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux; 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:** 32/64-bit
- **Other:** jemalloc memory allocator library V5.0.1

## Threads

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base (7.08)</th>
<th>SPECspeed2017_int_peak (7.29)</th>
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<tbody>
<tr>
<td>Threads</td>
<td></td>
</tr>
<tr>
<td>600.perlbench_s</td>
<td></td>
</tr>
<tr>
<td>605.mcf_s</td>
<td></td>
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<tr>
<td>641.leela_s</td>
<td></td>
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<tr>
<td>648.exchange2_s</td>
<td></td>
</tr>
<tr>
<td>657.xz_s</td>
<td></td>
</tr>
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</table>

| 602.gcc_s                      |                                |
| 623.xalancbmk_s                |                                |
| 625.x264_s                     |                                |
| 631.deepsjeng_s                |                                |
| 641.leela_s                    |                                |
| 648.exchange2_s                |                                |
| 657.xz_s                       |                                |
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<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>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>24</td>
<td>357</td>
<td>4.97</td>
<td>354</td>
<td>5.01</td>
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<td>5.98</td>
<td>296</td>
<td>5.99</td>
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<tr>
<td>602.gcc_s</td>
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<td>519</td>
<td>7.67</td>
<td>519</td>
<td>7.67</td>
<td>531</td>
<td>7.50</td>
<td>24</td>
<td>505</td>
<td>7.88</td>
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<td>7.92</td>
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<td>350</td>
<td>4.66</td>
<td>24</td>
<td>355</td>
<td>4.59</td>
<td>360</td>
<td>4.53</td>
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<td>171</td>
<td>8.31</td>
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<tr>
<td>641.leela_s</td>
<td>24</td>
<td>489</td>
<td>3.49</td>
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<td>3.48</td>
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<tr>
<td>648.exchange2_s</td>
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<td>270</td>
<td>10.9</td>
<td>270</td>
<td>10.9</td>
<td>271</td>
<td>10.8</td>
<td>24</td>
<td>270</td>
<td>10.9</td>
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<tr>
<td>657.xz_s</td>
<td>24</td>
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<td>17.0</td>
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<td>17.4</td>
<td>354</td>
<td>17.5</td>
<td>355</td>
<td>17.4</td>
</tr>
</tbody>
</table>

**SPECspeed2017_int_base = 7.08**

**SPECspeed2017_int_peak = 7.29**

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,scatter"


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.

jemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets;

jemalloc: built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5;

jemalloc: sources available via jemalloc.net

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
  - System Profile set to Custom
  - CPU Performance set to Maximum Performance
  - C States set to Autonomous
  - C1EE 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-kuth Fri Mar 23 07:59:09 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

  - From `/proc/cpuinfo`
    - model name: Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz
      - 2 "physical id"s (chips)
      - 24 "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: 12
      - 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

  - From `lscpu`
    - Architecture: x86_64
    - CPU op-mode(s): 32-bit, 64-bit
    - Byte Order: Little Endian
    - CPU(s): 24
    - On-line CPU(s) list: 0-23
    - Thread(s) per core: 1
    - Core(s) per socket: 12
    - Socket(s): 2
    - NUMA node(s): 2
    - Vendor ID: GenuineIntel
    - CPU family: 6
    - Model: 85
    - Model name: Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz
    - Stepping: 4

(Continued on next page)
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SPECspeed2017_int_base = 7.08
SPECspeed2017_int_peak = 7.29

Platform Notes (Continued)

CPU MHz: 2095.070
BogoMIPS: 4190.14
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 16896K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14,16,18,20,22
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15,17,19,21,23
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
aperfmpref eagerfpu pni pclmulqdq dtst64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
fma cx16 xtpmr pdcm pcd 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 pln pts
dtherm intel_pt rsb_cxsw spec_ctrl retpoline kaiser tpr_shadow vmmi flexpriority
ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erdms invpcid rtm cqm mp
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc pkpu ospke

/proc/cpuinfo cache data
  cache size : 16896 KB

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
  node 0 size: 95354 MB
  node 0 free: 94690 MB
  node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23
  node 1 size: 96749 MB
  node 1 free: 96242 MB
  node distances:
  node 0 1
    0: 10 21
    1: 21 10

From /proc/meminfo
  MemTotal: 196714268 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:

(Continued on next page)
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Dell Inc.
2.10GHz)

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Platform Notes (Continued)

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-kuth 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 23 07:58

SPEC is set to: /root/cpu2017

Filesystem     Type  Size  Used  Avail  Use%  Mounted on
/dev/sda2      xfs   890G  16G  874G   2%  /

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.

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 00AD063200AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666, configured at 2400
12x Not Specified Not Specified

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
CC  600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base, peak) 657.xz_s(base)
==============================================================================

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

==============================================================================

(Continued on next page)
Dell Inc.
PowerEdge MX740c (Intel Xeon Silver 4116, 2.10GHz)

**Compiler Version Notes (Continued)**

```plaintext
CC   600.perlbench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 657.xz_s(peak)

---

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

---

CXXC 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
641.leela_s(base)

---

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

---

CXXC 620.omnetpp_s(peak) 623.xalancbmk_s(peak) 631.deepsjeng_s(peak)
641.leela_s(peak)

---

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

---

FC  648.exchange2_s(base, peak)

---

ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 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
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**Base Portability Flags (Continued)**

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**:
  -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP
  -L/usr/local/je5.0.1-64/lib -ljemalloc

- **C++ benchmarks**:
  -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc

- **Fortran benchmarks**:
  -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
  -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
  -L/usr/local/je5.0.1-64/lib -ljemalloc

**Base Other Flags**

- **C benchmarks**:
  -m64 -std=c11

- **C++ benchmarks**:
  -m64

- **Fortran benchmarks**:
  -m64
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Peak Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

Peak 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: -D_FILE_OFFSET_BITS=64 -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

Peak Optimization Flags

C benchmarks:
600.perlbench_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX2 -qopt-mem-layout-trans=3 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -fno-strict-overflow
-L/usr/local/je5.0.1-64/1ib -ljemalloc

602.gcc_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
-xCORE-AVX2 -qopt-mem-layout-trans=3 -ipo -O3
-no-prec-div -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -L/usr/local/je5.0.1-64/1ib -ljemalloc

605.mcf_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/1ib -ljemalloc

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

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<th>Benchmark</th>
<th>Flags</th>
</tr>
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<tbody>
<tr>
<td>625.x264_s</td>
<td><code>-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=3 -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc</code></td>
</tr>
<tr>
<td>657.xz_s</td>
<td>Same as 602.gcc_s</td>
</tr>
<tr>
<td>C++ benchmarks:</td>
<td></td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td><code>-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc</code></td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>Same as 620.omnetpp_s</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>Same as 620.omnetpp_s</td>
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<td>Fortran benchmarks:</td>
<td></td>
</tr>
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<td><code>-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte -L/usr/local/je5.0.1-64/lib -ljemalloc</code></td>
<td></td>
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**Peak Other Flags**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tr>
<td>C benchmarks:</td>
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<tr>
<td><code>-m64 -std=c11</code></td>
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</tr>
<tr>
<td>C++ benchmarks (except as noted below):</td>
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</tr>
<tr>
<td><code>-m64</code></td>
<td></td>
</tr>
<tr>
<td>623.xalancbnk_s</td>
<td><code>-m32</code></td>
</tr>
<tr>
<td>Fortran benchmarks:</td>
<td></td>
</tr>
<tr>
<td><code>-m64</code></td>
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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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