## SPEC® CPU2017 Integer Speed Result

**Dell Inc.**

**PowerEdge R740xd (Intel Xeon Silver 4116, 2.10GHz)**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
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<tr>
<td>perlbench</td>
<td>7.06</td>
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</tr>
<tr>
<td>gcc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>mcf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>omnetpp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>xalancbmk</td>
<td></td>
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<tr>
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<td></td>
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<tr>
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<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>exchange2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>xz</td>
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**CPU2017 License:** 55

**Test Sponsor:** Dell Inc.

**Test Date:** Mar-2018

**Tested by:** Dell Inc.

**Hardware Availability:** Sep-2017

**Software Availability:** Feb-2018

---

### 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
- **L2:** 1 MB I+D on chip per core
- **L3:** 16.5 MB I+D on chip per chip
- **Other:** None
- **Memory:** 384 GB (24 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
- **Storage:** 480 GB SATA SSD
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 12 SP2 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 1.3.7 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
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### SPECspeed2017_int_base = 7.06

### SPECspeed2017_int_peak = 7.28

### Results Table

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<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>520</td>
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<tr>
<td>620.omnetpp_s</td>
<td>24</td>
<td>344</td>
<td>4.75</td>
<td>366</td>
<td>4.46</td>
<td>353</td>
<td>4.62</td>
<td>24</td>
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<td>648.exchange2_s</td>
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<td>16.9</td>
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<td>17.4</td>
<td>354</td>
<td>17.5</td>
<td>353</td>
<td>17.5</td>
</tr>
</tbody>
</table>

### 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
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### 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
- C1E 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 /home/cpu2017rev5/cpu2017/bin/sysinfo
- Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
- running on linux-bgfp Fri Mar 2 16:39:02 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

From /proc/cpuinfo

```plaintext
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:

```plaintext
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)
Dell Inc. PowerEdge R740xd (Intel Xeon Silver 4116, 2.10GHz)

SPECspeed2017_int_base = 7.06
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Platform Notes (Continued)

CPU MHz: 2095.084
BogoMIPS: 4190.16
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 rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
aperfmpref eagerfpu pni pclmulqdq dtes64 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 ida arat epb invpcid_single pln pts
tdts intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vmmi flexpriority
ept vpid fsgsbase tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid rtm cmp mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cmq_llc cmq_occult_llc pkp ospe

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: 191989 MB
node 0 free: 191556 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23
node 1 size: 193517 MB
node 1 free: 193200 MB
node distances:
node 0 1
  0: 10 21
  1: 21 10

From /proc/meminfo
MemTotal: 394758972 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP2

From /etc/*release* /etc/*version*
SuSE-release:

(Continued on next page)
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Platform Notes (Continued)

SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 2
# 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-SP2"
  VERSION_ID="12.2"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp2"
uname -a:
  Linux linux-bgfp 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 2 16:37

SPEC is set to: /home/cpu2017rev5/cpu2017

Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda4      xfs   405G   53G  353G  14% /home

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. 1.3.7 02/08/2018
Memory:
  22x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666, configured at 2400
  2x 00CE0632000CE M393A2K43BB1-CTD 16 GB 2 rank 2666, configured at 2400

(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.                      SPECspeed2017_int_base =  7.06
PowerEdge R740xd (Intel Xeon Silver 4116, 2.10GHz)  SPECspeed2017_int_peak =  7.28

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

Compiler Version Notes (Continued)

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

<table>
<thead>
<tr>
<th>Benchmark</th>
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<td>600.perlbench</td>
<td><code>-DSPEC_LP64 -DSPEC_LINUX_X64</code></td>
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<td><code>-DSPEC_LP64</code></td>
</tr>
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<td>620.omnetpp</td>
<td><code>-DSPEC_LP64</code></td>
</tr>
<tr>
<td>623.xalan-bmk</td>
<td><code>-D_FILE_OFFSET_BITS=64 -DSPEC_LINUX</code></td>
</tr>
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<td>625.x264</td>
<td><code>-DSPEC_LP64</code></td>
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<td>657.xz</td>
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### Peak Optimization Flags

C benchmarks:

```bash
600.perlbench -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/lib -ljemalloc
```

```bash
602.gcc -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/lib -ljemalloc
```

```bash
605.mcf -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
```

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Peak Optimization Flags (Continued)

625.x264_s: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

657.xz_s: Same as 602.gcc_s

C++ benchmarks:

620.omnetpp_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 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc

623.xalancbmk_s: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-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 -gopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng_s: Same as 620.omnetpp_s

641.leela_s: Same as 620.omnetpp_s

Fortran benchmarks:

-std=c11

Peak Other Flags

C benchmarks:

-m64

C++ benchmarks (except as noted below):

-m64

623.xalancbmk_s: -m32

Fortran benchmarks:

-m64
### SPEC CPU2017 Integer Speed Result

**Dell Inc.**

PowerEdge R740xd (Intel Xeon Silver 4116, 2.10GHz)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
<th>SPECspeed2017_int_peak</th>
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<td>7.28</td>
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**CPU2017 License:** 55  
**Test Date:** Mar-2018  
**Test Sponsor:** Dell Inc.  
**Hardware Availability:** Sep-2017  
**Tested by:** Dell Inc.  
**Software Availability:** Feb-2018

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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