



# SPEC® CPU2017 Integer Speed Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## Dell Inc.

PowerEdge R740xd2 (Intel Xeon Silver 4116, 2.10GHz)

SPECspeed2017\_int\_base = 6.72

SPECspeed2017\_int\_peak = 6.94

CPU2017 License: 55

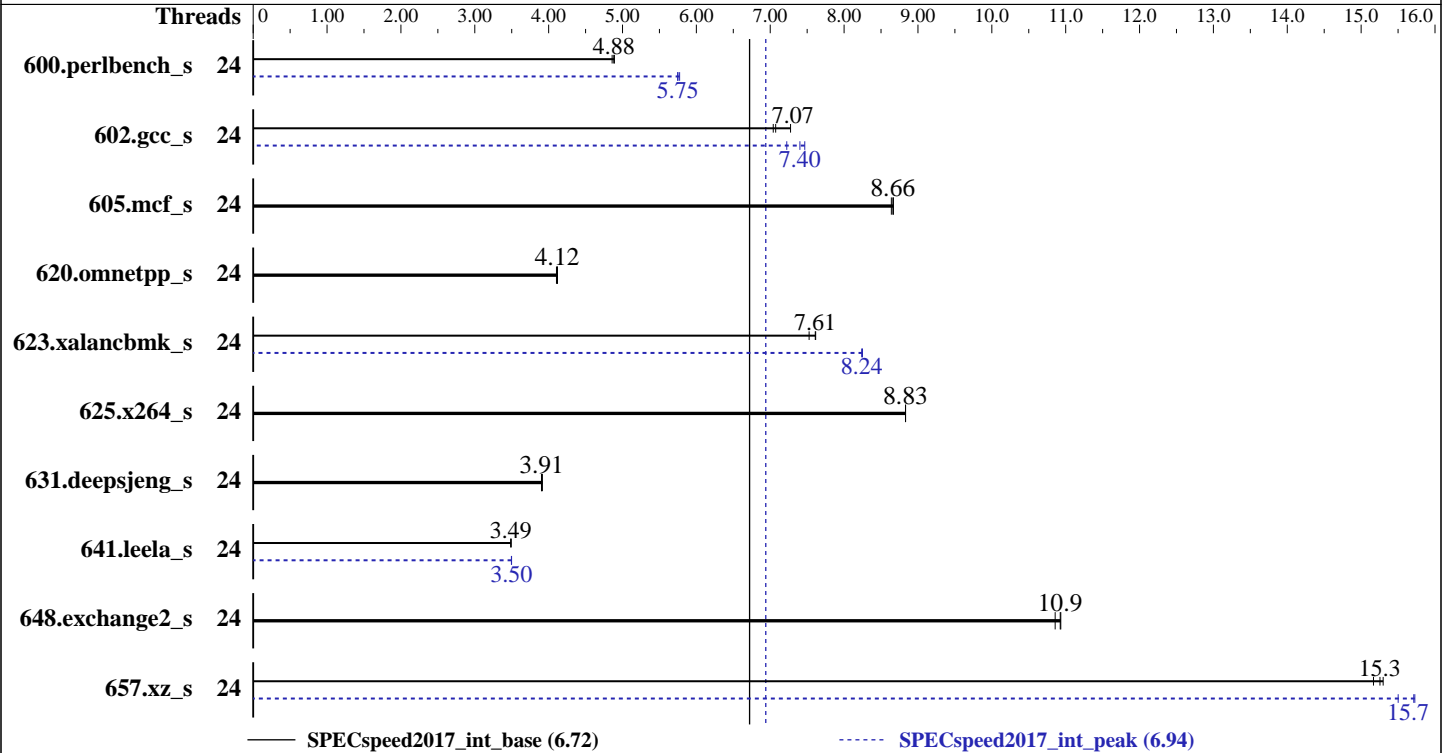
Test Sponsor: Dell Inc.

Tested by: Dell Inc.

Test Date: Nov-2018

Hardware Availability: Dec-2018

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: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)  
 Storage: 1 x 250 GB M.2 SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 12 SP3  
 kernel 4.4.114-94.11-default  
 Compiler: C/C++: Version 18.0.2.20180210 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 18.0.2.20180210 of Intel Fortran Compiler for Linux  
 Parallel: Yes  
 Firmware: Version 1.0.3 released Oct-2018  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit  
 Other: jemalloc memory allocator v5.0.1



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## Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	24	363	4.89	<b>364</b>	<b>4.88</b>	365	4.86	24	309	5.75	<b>309</b>	<b>5.75</b>	307	5.77
602.gcc_s	24	<b>563</b>	<b>7.07</b>	547	7.28	566	7.04	24	533	7.47	551	7.22	<b>538</b>	<b>7.40</b>
605.mcf_s	24	545	8.67	<b>545</b>	<b>8.66</b>	546	8.64	24	545	8.67	<b>545</b>	<b>8.66</b>	546	8.64
620.omnetpp_s	24	397	4.11	<b>396</b>	<b>4.12</b>	396	4.12	24	397	4.11	<b>396</b>	<b>4.12</b>	396	4.12
623.xalancbmk_s	24	186	7.62	<b>186</b>	<b>7.61</b>	188	7.53	24	172	8.25	<b>172</b>	<b>8.24</b>	172	8.24
625.x264_s	24	<b>200</b>	<b>8.83</b>	200	8.83	200	8.83	24	<b>200</b>	<b>8.83</b>	200	8.83	200	8.83
631.deepsjeng_s	24	366	3.92	<b>367</b>	<b>3.91</b>	367	3.90	24	366	3.92	<b>367</b>	<b>3.91</b>	367	3.90
641.leela_s	24	489	3.49	<b>489</b>	<b>3.49</b>	489	3.49	24	488	3.50	488	3.50	<b>488</b>	<b>3.50</b>
648.exchange2_s	24	269	10.9	<b>269</b>	<b>10.9</b>	271	10.9	24	269	10.9	<b>269</b>	<b>10.9</b>	271	10.9
657.xz_s	24	404	15.3	408	15.2	<b>405</b>	<b>15.3</b>	24	399	15.5	393	15.7	<b>393</b>	<b>15.7</b>

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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"

LD\_LIBRARY\_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/cpu2017/je5.0.1-64"

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.

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
```

jemalloc, a general purpose malloc implementation

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

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>



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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/cpu2017/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on linux-m8ku Wed Nov 7 12:10:45 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

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

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## Platform Notes (Continued)

```

CPU MHz:                2095.090
BogoMIPS:               4190.18
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
aperfmpperf 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
dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vmi flexpriority
ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
xsavec xgetbv1 cqm_llc cqm_occup_llc pku 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: 95285 MB
node 0 free: 94910 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23
node 1 size: 96749 MB
node 1 free: 96368 MB
node distances:
node  0  1
 0:  10  21
 1:  21  10

```

```

From /proc/meminfo
MemTotal:      196643524 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:

```

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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-m8ku 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

Kernel self-reported vulnerability status:

CVE-2017-5754 (Meltdown): Mitigation: PTI

CVE-2017-5753 (Spectre variant 1): Mitigation: Barriers

CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB

run-level 3 Nov 7 12:06 last=5

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sdz4	xfs	182G	4.0G	178G	3%	/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. 1.0.3 10/25/2018

Memory:

12x 002C04B3002C 18ASF2G72PDZ-2G6E1 16 GB 2 rank 2666, configured at 2400

4x 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)  
657.xz\_s(base)

(Continued on next page)



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## Compiler Version Notes (Continued)

-----  
icc (ICC) 18.0.2 20180210

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
CC 600.perlbench\_s(peak) 602.gcc\_s(peak) 605.mcf\_s(peak) 625.x264\_s(peak)  
657.xz\_s(peak)  
-----

icc (ICC) 18.0.2 20180210

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-----

=====  
CXXC 620.omnetpp\_s(base) 623.xalanbmk\_s(base) 631.deepsjeng\_s(base)  
641.leela\_s(base)  
-----

icpc (ICC) 18.0.2 20180210

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
CXXC 620.omnetpp\_s(peak) 623.xalanbmk\_s(peak) 631.deepsjeng\_s(peak)  
641.leela\_s(peak)  
-----

icpc (ICC) 18.0.2 20180210

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-----

=====  
FC 648.exchange2\_s(base)  
-----

ifort (IFORT) 18.0.2 20180210

Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
FC 648.exchange2\_s(peak)  
-----

ifort (IFORT) 18.0.2 20180210

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## Base Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

## 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:

```
-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
```

```
-L/usr/local/je5.0.1-64/lib -ljemalloc
```



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## Peak Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks (except as noted below):

```
icpc -m64
```

```
623.xalancbmk_s: icpc -m32 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin
```

Fortran benchmarks:

```
ifort -m64
```

## 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-prefetch -ipo -O3
```

```
-qopt-mem-layout-trans=3 -no-prec-div
```

```
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
```

```
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
```

```
-ljemalloc
```

```
602.gcc_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -O2
```

```
-xCORE-AVX2 -qopt-prefetch -ipo -O3
```

```
-qopt-mem-layout-trans=3 -no-prec-div
```

```
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
```

```
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

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## Peak Optimization Flags (Continued)

605.mcf\_s: basepeak = yes

625.x264\_s: basepeak = yes

657.xz\_s: Same as 602.gcc\_s

C++ benchmarks:

620.omnetpp\_s: basepeak = yes

623.xalancbmk\_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch  
-qopt-mem-layout-trans=3 -DSPEC\_SUPPRESS\_OPENMP -qopenmp  
-DSPEC\_OPENMP -L/usr/local/je5.0.1-32/lib -ljemalloc

631.deepsjeng\_s: basepeak = yes

641.leela\_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-prefetch  
-qopt-mem-layout-trans=3 -DSPEC\_SUPPRESS\_OPENMP -qopenmp  
-DSPEC\_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc

Fortran benchmarks:

648.exchange2\_s: basepeak = yes

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.html>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge14G-revD.2018-07-24.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge14G-revD.2018-07-24.xml>

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