



SPEC® CPU2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate2017_int_base = 301

PowerEdge R840 (Intel Xeon Gold 6146, 3.20 GHz)

SPECrate2017_int_peak = 316

CPU2017 License: 55

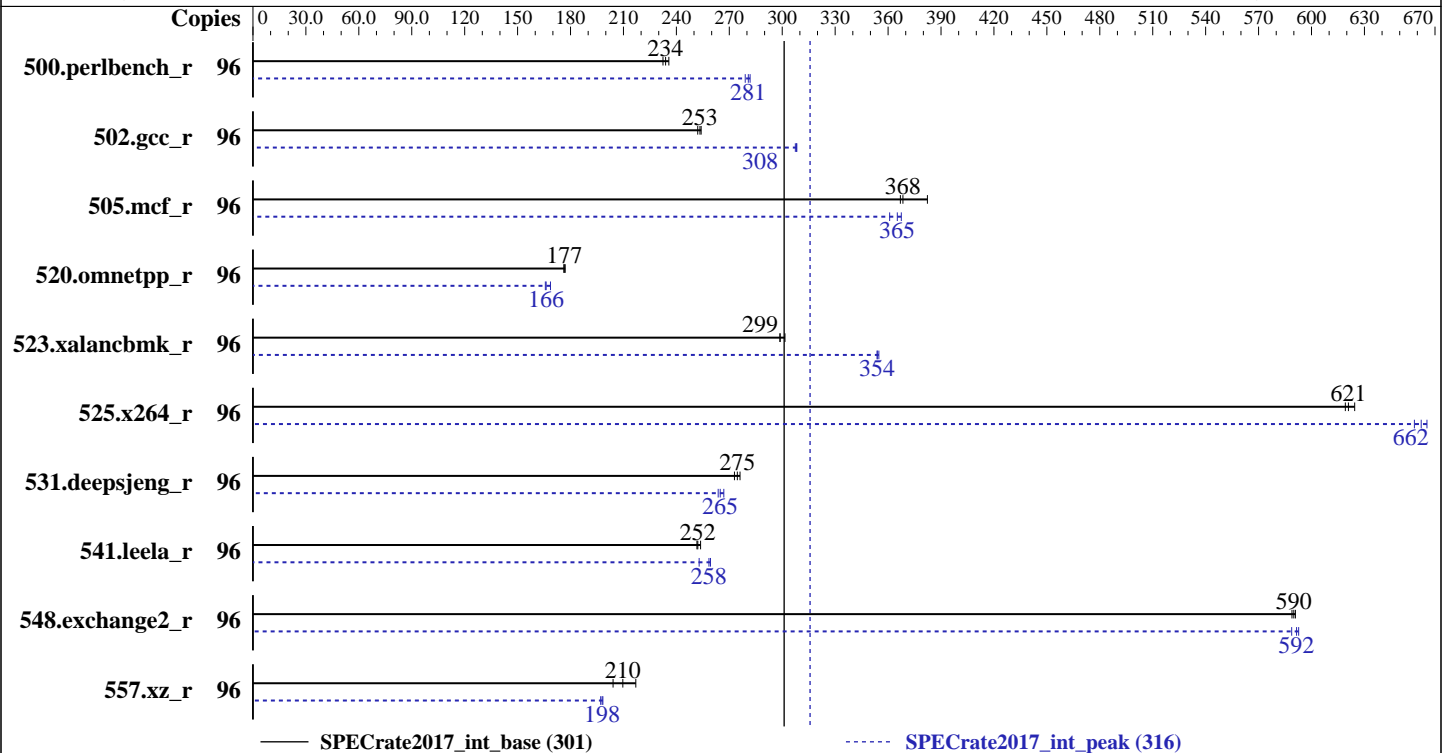
Test Date: May-2018

Test Sponsor: Dell Inc.

Hardware Availability: May-2018

Tested by: Dell Inc.

Software Availability: Feb-2018



Hardware

CPU Name: Intel Xeon Gold 6146
 Max MHz.: 4200
 Nominal: 3200
 Enabled: 48 cores, 4 chips, 2 threads/core
 Orderable: 2,4 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 24.75 MB I+D on chip per chip
 Other: None
 Memory: 768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
 Storage: 1 x 480 GB SATA 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: No
 Firmware: Version 1.0.0 released Mar-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, version 5.0.1



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	96	648	236	653	234	658	232	96	542	282	548	279	544	281
502.gcc_r	96	535	254	537	253	539	252	96	441	308	441	308	442	307
505.mcf_r	96	406	382	421	368	423	367	96	430	361	422	367	425	365
520.omnetpp_r	96	712	177	715	176	714	177	96	747	169	760	166	758	166
523.xalancbmk_r	96	339	299	336	302	339	299	96	286	354	286	355	287	354
525.x264_r	96	271	619	271	621	269	624	96	253	665	254	662	255	658
531.deepsjeng_r	96	398	276	401	275	403	273	96	415	265	417	264	412	267
541.leela_r	96	630	252	632	252	627	254	96	615	258	613	259	629	253
548.exchange2_r	96	426	590	426	591	427	589	96	425	592	427	589	424	593
557.xz_r	96	478	217	495	210	508	204	96	523	198	526	197	524	198

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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"

General Notes

Environment variables set by runcpu before the start of the run:

LD_LIBRARY_PATH = "/root/cpu2017/lib/ia32:/root/cpu2017/lib/intel64:/root/cpu2017/je5.0.1-32:/root/cpu2017/je5.0.1-64"

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

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General Notes (Continued)

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>
 Dell PowerEdge R840 and PowerEdge R940xa are electronically equivalent.
 This result was measured on Dell PowerEdge R840.

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 disabled
 Logical Processor enabled
 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-p0hc Thu May 10 10:50:57 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) Gold 6146 CPU @ 3.20GHz
 4 "physical id"s (chips)
 96 "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 4 9 10 11 17 18 24 25 26 27
 physical 1: cores 0 1 2 3 4 9 10 16 18 19 25 26
 physical 2: cores 0 1 2 3 8 9 10 11 18 19 24 27
 physical 3: cores 0 1 2 3 4 8 9 11 17 18 19 20

From lscpu:
 Architecture: x86_64
 CPU op-mode(s): 32-bit, 64-bit

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Platform Notes (Continued)

```

Byte Order:                Little Endian
CPU(s):                    96
On-line CPU(s) list:      0-95
Thread(s) per core:       2
Core(s) per socket:       12
Socket(s):                 4
NUMA node(s):             8
Vendor ID:                 GenuineIntel
CPU family:                6
Model:                     85
Model name:                Intel(R) Xeon(R) Gold 6146 CPU @ 3.20GHz
Stepping:                  4
CPU MHz:                   3192.499
BogoMIPS:                  6384.99
Virtualization:           VT-x
L1d cache:                 32K
L1i cache:                 32K
L2 cache:                  1024K
L3 cache:                  25344K
NUMA node0 CPU(s):        0,8,16,24,32,40,48,56,64,72,80,88
NUMA node1 CPU(s):        1,9,17,25,33,41,49,57,65,73,81,89
NUMA node2 CPU(s):        2,10,18,26,34,42,50,58,66,74,82,90
NUMA node3 CPU(s):        3,11,19,27,35,43,51,59,67,75,83,91
NUMA node4 CPU(s):        4,12,20,28,36,44,52,60,68,76,84,92
NUMA node5 CPU(s):        5,13,21,29,37,45,53,61,69,77,85,93
NUMA node6 CPU(s):        6,14,22,30,38,46,54,62,70,78,86,94
NUMA node7 CPU(s):        7,15,23,31,39,47,55,63,71,79,87,95
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 vnmi 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 : 25344 KB

```

```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 8 nodes (0-7)
node 0 cpus: 0 8 16 24 32 40 48 56 64 72 80 88
node 0 size: 95360 MB
node 0 free: 95136 MB

```

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Platform Notes (Continued)

```

node 1 cpus: 1 9 17 25 33 41 49 57 65 73 81 89
node 1 size: 96762 MB
node 1 free: 96601 MB
node 2 cpus: 2 10 18 26 34 42 50 58 66 74 82 90
node 2 size: 96762 MB
node 2 free: 96582 MB
node 3 cpus: 3 11 19 27 35 43 51 59 67 75 83 91
node 3 size: 96762 MB
node 3 free: 96607 MB
node 4 cpus: 4 12 20 28 36 44 52 60 68 76 84 92
node 4 size: 96762 MB
node 4 free: 96608 MB
node 5 cpus: 5 13 21 29 37 45 53 61 69 77 85 93
node 5 size: 96762 MB
node 5 free: 96605 MB
node 6 cpus: 6 14 22 30 38 46 54 62 70 78 86 94
node 6 size: 96762 MB
node 6 free: 96608 MB
node 7 cpus: 7 15 23 31 39 47 55 63 71 79 87 95
node 7 size: 96760 MB
node 7 free: 96605 MB
node distances:
node  0  1  2  3  4  5  6  7
0:  10 21 21 21 11 21 21 21
1:  21 10 21 21 21 11 21 21
2:  21 21 10 21 21 21 11 21
3:  21 21 21 10 21 21 21 11
4:  11 21 21 21 10 21 21 21
5:  21 11 21 21 21 10 21 21
6:  21 21 11 21 21 21 10 21
7:  21 21 21 11 21 21 21 10

```

From /proc/meminfo

```

MemTotal:      791241340 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:

```

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.

```

(Continued on next page)



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Platform Notes (Continued)

```
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-p0hc 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 May 10 10:50
```

```
SPEC is set to: /root/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3       xfs   445G   16G  430G   4% /
```

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. 1.0.0 03/20/2018
Memory:
8x 002C00B3002C 18ASF2G72PDZ-2G6D1 16 GB 2 rank 2666
15x 00AD00B300AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666
19x 00AD063200AD HMA82GR7AFR8N-VK 16 GB 2 rank 2666
6x 00CE063200CE M393A2K43BB1-CTD 16 GB 2 rank 2666
```

(End of data from sysinfo program)

Compiler Version Notes

```
=====  
CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)  
525.x264_r(base, peak) 557.xz_r(base, peak)  
-----
```

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

```
=====  
CC 500.perlbench_r(peak) 502.gcc_r(peak)  
-----
```

```
icc (ICC) 18.0.0 20170811
```

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Compiler Version Notes (Continued)

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
541.leela_r(base)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====
CXXC 520.omnetpp_r(peak) 523.xalancbmk_r(peak) 531.deepsjeng_r(peak)
541.leela_r(peak)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====
FC 548.exchange2_r(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

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

502 gcc_r: -DSPEC_LP64

505.mcf_r: -DSPEC_LP64

520.omnetpp_r: -DSPEC_LP64

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Base Portability Flags (Continued)

```
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

Base Optimization Flags

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
```

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
```

Peak Compiler Invocation

C benchmarks:

```
icc
```

C++ benchmarks:

```
icpc
```

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Peak Compiler Invocation (Continued)

Fortran benchmarks:

ifort

Peak Portability Flags

```

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

```

Peak Optimization Flags

C benchmarks:

```

500.perlbench_r: -w1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc

502.gcc_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-w1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: -w1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib
-ljemalloc

525.x264_r: -w1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -fno-alias
-L/usr/local/je5.0.1-64/lib -ljemalloc

557.xz_r: Same as 505.mcf_r

```

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Peak Optimization Flags (Continued)

C++ benchmarks:

```
520.omnetpp_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```
523.xalancbmk_r: -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  
-L/usr/local/je5.0.1-32/lib -ljemalloc
```

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

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
```

Peak Other Flags

C benchmarks (except as noted below):

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

502.gcc_r: -m32 -std=c11

C++ benchmarks (except as noted below):

```
-m64
```

523.xalancbmk_r: -m32

Fortran benchmarks:

```
-m64
```

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.html>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge14G-revC.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge14G-revC.xml>



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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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