



SPEC CPU®2017 Integer Speed Result

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Dell Inc.

SPECspeed®2017_int_base = 7.86

PowerEdge R440 (Intel Xeon Silver 4214, 2.20 GHz)

SPECspeed®2017_int_peak = 7.99

CPU2017 License: 55

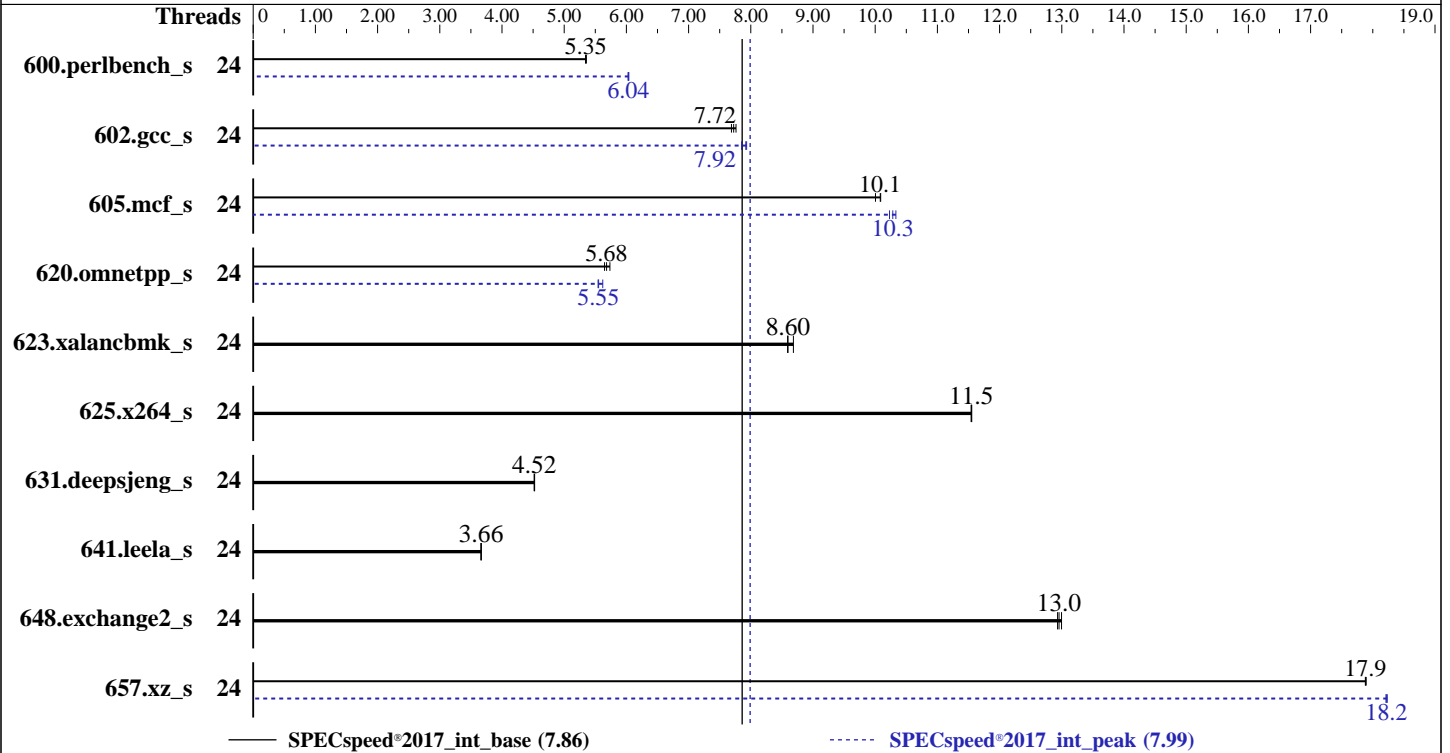
Test Date: Apr-2020

Test Sponsor: Dell Inc.

Hardware Availability: Feb-2020

Tested by: Dell Inc.

Software Availability: Nov-2019



Hardware

CPU Name: Intel Xeon Silver 4214
 Max MHz: 3200
 Nominal: 2200
 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 (12 x 32 GB 2Rx8 PC4-3200V-R, running at 2400)
 Storage: 1 x 1.92 TB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux 8.1
 kernel 4.18.0-147.el8.x86_64
 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
 Firmware: Version 2.6.3 released Jan-2020
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 Other: None
 jemalloc memory allocator V5.0.1
 Power Management: BIOS set to prefer performance at the cost of additional power usage.



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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	332	5.35	331	5.36	332	5.34	24	294	6.04	295	6.03	294	6.04
602.gcc_s	24	515	7.72	513	7.76	518	7.69	24	502	7.93	503	7.92	507	7.85
605.mcf_s	24	468	10.1	472	10.0	468	10.1	24	459	10.3	457	10.3	461	10.2
620.omnetpp_s	24	284	5.73	287	5.68	289	5.65	24	294	5.54	290	5.62	294	5.55
623.xalancbmk_s	24	165	8.60	165	8.59	163	8.69	24	165	8.60	165	8.59	163	8.69
625.x264_s	24	153	11.6	153	11.5	153	11.5	24	153	11.6	153	11.5	153	11.5
631.deepsjeng_s	24	317	4.52	317	4.52	317	4.52	24	317	4.52	317	4.52	317	4.52
641.leela_s	24	466	3.66	466	3.66	465	3.66	24	466	3.66	466	3.66	465	3.66
648.exchange2_s	24	226	13.0	227	13.0	227	12.9	24	226	13.0	227	13.0	227	12.9
657.xz_s	24	346	17.9	345	17.9	346	17.9	24	339	18.2	339	18.2	339	18.2

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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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 1x Intel Core i9-9900K CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
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.
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 7.5, 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:

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 /home/cpu2017/bin/sysinfo
 Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
 running on localhost.localdomain Thu Apr 23 06:02:57 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) Silver 4214 CPU @ 2.20GHz
 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

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Platform Notes (Continued)

```

CPU family:      6
Model:          85
Model name:     Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
Stepping:      6
CPU MHz:       2331.419
CPU max MHz:   3200.0000
CPU min MHz:   1000.0000
BogoMIPS:      4400.00
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 cpuid
aperfmpperf 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 cpuid_fault epb cat_l3 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm
cqm mpx rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni md_clear flush_l1d
arch_capabilities

```

```

/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: 192075 MB
node 0 free: 191143 MB
node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23
node 1 size: 193507 MB
node 1 free: 192526 MB
node distances:
node  0  1
  0:  10  21
  1:  21  10

```

```

From /proc/meminfo
MemTotal:      394836832 kB

```

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Platform Notes (Continued)

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/swaps barriers and __user
pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional,
RSB filling
```

run-level 3 Apr 23 06:02 last=5

SPEC is set to: /home/cpu2017

```
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 1.7T 20G 1.7T 2% /home
```

From /sys/devices/virtual/dmi/id

```
BIOS: Dell Inc. 2.6.3 01/18/2020
Vendor: Dell Inc.
Product: PowerEdge R440
Product Family: PowerEdge
Serial: F9TD613
```

Additional information from dmidecode follows. WARNING: Use caution when you interpret

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Platform Notes (Continued)

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:

12x 002C069D002C 36ASF4G72PZ-3G2E2 32 GB 2 rank 3200

4x Not Specified Not Specified

(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.

```
=====  
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

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Base Compiler Invocation (Continued)

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-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

C++ benchmarks:

```
-m64 -Wl,-z,muldefs -xCORE-AVX2 -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
-lqkmallo
```

Fortran benchmarks:

```
-m64 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs
```

Peak Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

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Peak Compiler Invocation (Continued)

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-AVX2
-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-AVX2
-qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
-DSPEC_SUPPRESS_OPENMP -L/usr/local/je5.0.1-64/lib
-ljemalloc
```

```
605.mcf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX2 -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=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-mem-layout-trans=4 -ipo -O3 -no-prec-div
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

C++ benchmarks:

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Peak Optimization Flags (Continued)

```
620.omnetpp_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-ipo -xCORE-AVX2 -O3 -no-prec-div
-qopt-mem-layout-trans=4 -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

http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_revD.html

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE9.html>

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

http://www.spec.org/cpu2017/flags/Intel-ic19.0u5-official-linux64_revD.xml

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE9.xml>

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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 2020-04-23 07:02:56-0400.

Report generated on 2020-05-12 14:57:38 by CPU2017 PDF formatter v6255.

Originally published on 2020-05-12.