SPEC CPU®2017 Integer Speed Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R240 (Intel Xeon E-2288G, 3.70 GHz)

SPECspeed®2017_int_base = 11.4

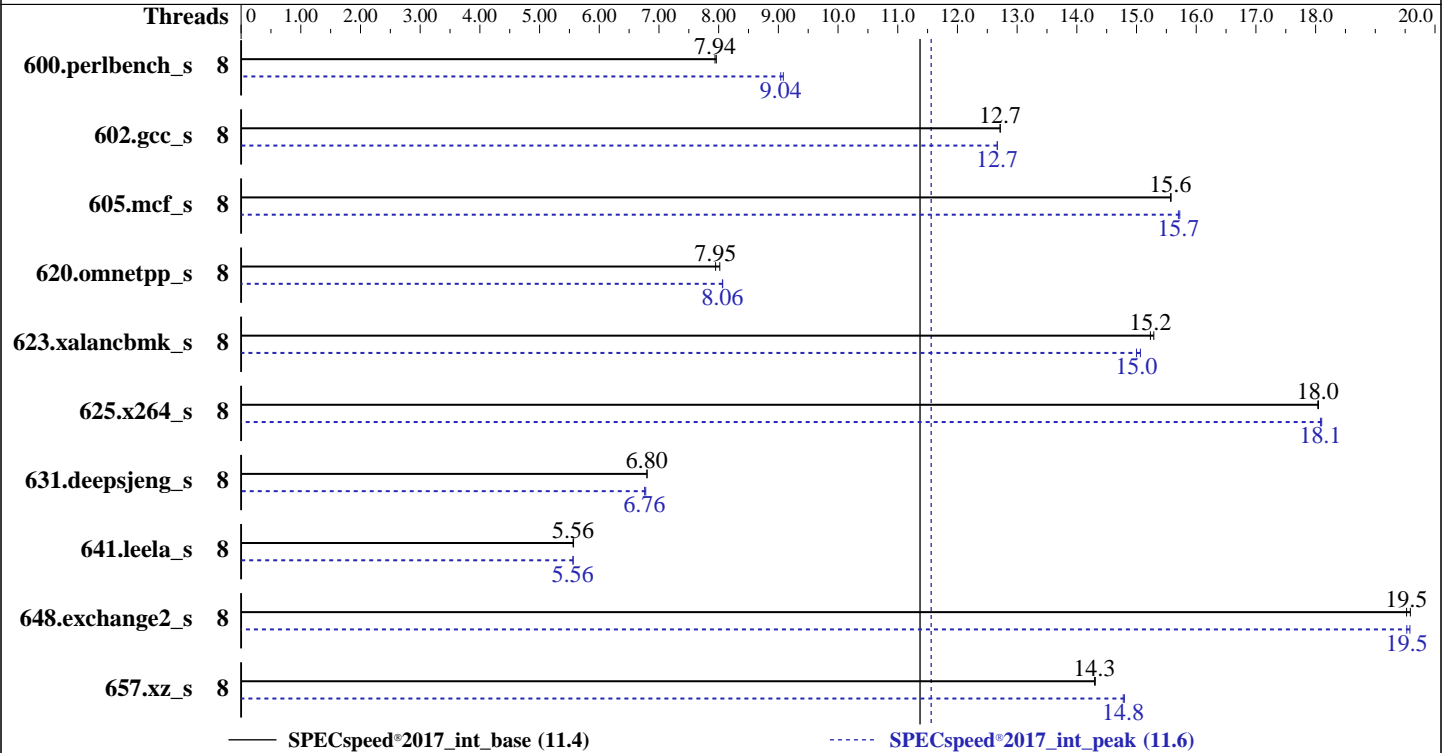SPECspeed®2017_int_peak = 11.6

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

Test Date: Jan-2020
Hardware Availability: Dec-2019
Software Availability: Jun-2019

Threads

Benchmark	Threads	base	peak
600.perlbench_s	8	7.94	9.04
602.gcc_s	8	12.7	12.7
605.mcf_s	8	15.6	15.7
620.omnetpp_s	8	7.95	8.06
623.xalancbmk_s	8	15.2	15.0
625.x264_s	8	18.0	18.1
631.deepsjeng_s	8	6.80	6.76
641.leela_s	8	5.56	5.56
648.exchange2_s	8	19.5	19.5
657.xz_s	8	14.3	14.8

SPECspeed®2017_int_base (11.4)

SPECspeed®2017_int_peak (11.6)

Hardware

CPU Name: Intel Xeon E-2288G
 Max MHz: 5000
 Nominal: 3700
Enabled: 8 cores, 1 chip, 2 threads/core
Orderable: 1 chips
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 256 KB I+D on chip per core
 L3: 16 MB I+D on chip per chip
 Other: None
Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-R)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP1
 kernel 4.12.14-195-default
Compiler: C/C++: Version 19.0.4.227 of Intel C/C++
 Compiler Build 20190416 for Linux;
 Fortran: Version 19.0.4.227 of Intel Fortran
 Compiler Build 20190416 for Linux
Parallel: Yes
Firmware: Version 2.1.6 released Sep-2018
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	8	**224**	**7.94**	223	7.96			8	195	9.08	**196**	**9.04**		
602.gcc_s	8	**313**	**12.7**	313	12.7			8	**314**	**12.7**	314	12.7		
605.mcf_s	8	**303**	**15.6**	303	15.6			8	**301**	**15.7**	300	15.7		
620.omnetpp_s	8	**205**	**7.95**	203	8.02			8	**202**	**8.06**	202	8.07		
623.xalancbmk_s	8	92.7	15.3	**93.0**	**15.2**			8	94.1	15.1	**94.5**	**15.0**		
625.x264_s	8	97.7	18.0	**97.8**	**18.0**			8	**97.6**	**18.1**	97.4	18.1		
631.deepsjeng_s	8	**211**	**6.80**	211	6.80			8	211	6.78	**212**	**6.76**		
641.leela_s	8	306	5.57	**307**	**5.56**			8	307	5.56	**307**	**5.56**		
648.exchange2_s	8	**151**	**19.5**	150	19.6			8	**151**	**19.5**	150	19.6		
657.xz_s	8	432	14.3	**432**	**14.3**			8	**418**	**14.8**	418	14.8		
SPECspeed®2017_int_base =		**11.4**												
SPECspeed®2017_int_peak =		**11.6**												

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 i9-7900X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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
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.
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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SPECspeed®2017_int_peak = 11.6

CPU2017 License:	55	**Test Date:**	Jan-2020
Test Sponsor:	Dell Inc.	**Hardware Availability:**	Dec-2019
Tested by:	Dell Inc.	**Software Availability:**	Jun-2019

Platform Notes

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on linux-g3ob Fri Jan 31 12:26:09 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) E-2288G CPU @ 3.70GHz
      1  "physical id"s (chips)
      16 "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 : 8
      siblings  : 16
      physical 0: cores 0 1 2 3 4 5 6 7

From lscpu:
     Architecture:        x86_64
     CPU op-mode(s):      32-bit, 64-bit
     Byte Order:          Little Endian
     Address sizes:       39 bits physical, 48 bits virtual
     CPU(s):              16
     On-line CPU(s) list: 0-15
     Thread(s) per core:  2
     Core(s) per socket:  8
     Socket(s):           1
     NUMA node(s):        1
     Vendor ID:           GenuineIntel
     CPU family:          6
     Model:               158
     Model name:          Intel(R) Xeon(R) E-2288G CPU @ 3.70GHz
     Stepping:            13
     CPU MHz:             3700.000
     BogoMIPS:            7392.00
     Virtualization:      VT-x
     L1d cache:           32K
     L1i cache:           32K
     L2 cache:            256K
     L3 cache:            16384K
     NUMA node0 CPU(s):   0-15
     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
     aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
```

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Platform Notes (Continued)

```
    sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
    aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
    ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase
    tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt
    intel_pt xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts md_clear flush_l1d
    arch_capabilities

/proc/cpuinfo cache data
   cache size : 16384 KB

From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 1 nodes (0)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  node 0 size: 64131 MB
  node 0 free: 63322 MB
  node distances:
  node   0
    0:  10

From /proc/meminfo
   MemTotal:       65670280 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15-SP1"
      VERSION_ID="15.1"
      PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15:sp1"

uname -a:
   Linux linux-g3ob 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
   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
```

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CPU2017 License:	55	**Test Date:**	Jan-2020
Test Sponsor:	Dell Inc.	**Hardware Availability:**	Dec-2019
Tested by:	Dell Inc.	**Software Availability:**	Jun-2019

Platform Notes (Continued)

```
CVE-2017-5753 (Spectre variant 1):        Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):        Mitigation: Enhanced IBRS, IBPB: conditional,
                                          RSB filling


 run-level 3 Jan 31 12:25 last=5


 SPEC is set to: /home/cpu2017
    Filesystem      Type  Size  Used Avail Use% Mounted on
    /dev/sda2       xfs   440G   34G  407G   8% /


 From /sys/devices/virtual/dmi/id
    BIOS:    Dell Inc. 2.1.6 09/27/2018
    Vendor:  Dell Inc.
    Product: PowerEdge R240
    Product Family: PowerEdge


 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.
   Memory:
     2x 00AD00000A02 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
     2x 00AD00000A07 HMA82GU7CJR8N-VK 16 GB 2 rank 2666


 (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 19.0.4.227 Build 20190416
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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
==============================================================================
Fortran | 648.exchange2_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

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=4 -qopenmp -DSPEC_OPENMP`
`-L/usr/local/je5.0.1-64/lib -ljemalloc`

C++ benchmarks:
`-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div`

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Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

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

Peak Compiler Invocation

C benchmarks:
```
icc -m64 -std=c11
```

C++ benchmarks:
```
icpc -m64
```

Fortran benchmarks:
```
ifort -m64
```

Peak Portability Flags

```
Same as Base Portability Flags
```

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=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: -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
```

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Peak Optimization Flags (Continued)

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=4`
`-DSPEC_SUPPRESS_OPENMP` `-qopenmp` `-DSPEC_OPENMP`
`-L/usr/local/je5.0.1-64/lib` `-ljemalloc`

625.x264_s: `-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`

657.xz_s: `-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:

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=4`
`-DSPEC_SUPPRESS_OPENMP`
`-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
`-lqkmalloc`

623.xalancbmk_s: `-Wl,-z,muldefs` `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div`
`-qopt-mem-layout-trans=4`
`-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64`
`-lqkmalloc`

631.deepsjeng_s: `Same as 623.xalancbmk_s`

641.leela_s: `Same as 623.xalancbmk_s`

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.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-ic19.0u1-official-linux64.2019-07-09.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-revE9.xml

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