# SPEC® CPU2017 Integer Speed Result

**Dell Inc.**

PowerEdge R240 (Intel Xeon E-2144G, 3.60GHz)

<table>
<thead>
<tr>
<th>SPECspeed2017_int_base</th>
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Jan-2019  
**Hardware Availability:** Dec-2018  
**Software Availability:** Apr-2018

## Threads

<table>
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<tr>
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<th>Count</th>
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<th>SPECspeed2017_int_peak</th>
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<tr>
<td>600.perlbench_s</td>
<td>8</td>
<td>8.51</td>
<td>11.8</td>
</tr>
<tr>
<td>602.gcc_s</td>
<td>8</td>
<td>12.0</td>
<td>14.6</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>8</td>
<td>6.61</td>
<td>6.64</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>8</td>
<td>6.61</td>
<td>6.64</td>
</tr>
<tr>
<td>623.xalancbmk_s</td>
<td>8</td>
<td>11.5</td>
<td>13.8</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>8</td>
<td>6.53</td>
<td>6.48</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>8</td>
<td>5.16</td>
<td>5.09</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>8</td>
<td>5.16</td>
<td>5.09</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>8</td>
<td>10.6</td>
<td>12.3</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>8</td>
<td>10.6</td>
<td>12.7</td>
</tr>
</tbody>
</table>

---

## Hardware

**CPU Name:** Intel Xeon E-2144G  
**Max MHz.:** 4500  
**Nominal:** 3600  
**Enabled:** 4 cores, 1 chip, 2 threads/core  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**L2:** 256 KB I+D on chip per core  
**L3:** 8 MB I+D on chip per core  
**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 12 SP3  
**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 1.0.1 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

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<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
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<tr>
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<td>8</td>
<td>255</td>
<td>6.96</td>
<td>253</td>
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<td>623.xalanchmk_s</td>
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<td>8</td>
<td>333</td>
<td>5.12</td>
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<td>5.16</td>
<td>330</td>
<td>5.17</td>
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<td>335</td>
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<td>335</td>
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<td>648.exchange2_s</td>
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<td>181</td>
<td>16.3</td>
<td>183</td>
<td>16.1</td>
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<tr>
<td>657.xz_s</td>
<td>8</td>
<td>503</td>
<td>12.3</td>
<td>503</td>
<td>12.3</td>
<td>502</td>
<td>12.3</td>
<td>8</td>
<td>487</td>
<td>12.7</td>
<td>487</td>
</tr>
</tbody>
</table>

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

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CPU2017 License: 55
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Tested by: Dell Inc.

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Hardware Availability: Dec-2018
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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 disabled
Logical Processor enabled
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-gw0u Thu Jan 3 05:33:58 2019

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-2144G CPU @ 3.60GHz
  8 "physical id"s (chips)
  8 "processors"
core, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 4
siblings : 8
physical 0: cores 0 1 2 3

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 8
On-line CPU(s) list: 0-7
Thread(s) per core: 2
Core(s) per socket: 4
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2144G CPU @ 3.60GHz
Stepping: 10
CPU MHz: 4301.474
CPU max MHz: 4500.0000

(Continued on next page)
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Platform Notes (Continued)

CPU min MHz: 800.0000
BogoMIPS: 7199.96
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 8192K
NUMA node0 CPU(s): 0-7
Flags: fpu vme de pse tsc msr pae 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 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 hwp hwp_act_window hwp_epp intel_pt rsb_ctxsw spec_ctrl stibp retpoline
kaiser tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep
bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsavesm xgetbv1

/proc/cpuinfo cache data
 cache size: 8192 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
 node 0 size: 64277 MB
 node 0 free: 63651 MB
 node distances:
 node 0
 0: 10

From /proc/meminfo
 MemTotal: 65820248 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.
 os-release:

(Continued on next page)
Platform Notes (Continued)

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-gw0u 4.4.126-94.22-default #1 SMP Wed Apr 11 07:45:03 UTC 2018 (9649989)
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB

run-level 3 Jan 3 05:33 last=5

SPEC is set to: /home/cpu2017
   Filesystem  Type  Size  Used Avail Use% Mounted on
   /dev/sda2   xfs   301G   16G  285G   6% /

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. 1.0.1 10/19/2018
   Memory:
      3x 00AD00000A02 HMA82GU7CJR8N-VK 16 GB 2 rank 2666
      1x 00AD00000A07 HMA82GU7CJR8N-VK 16 GB 2 rank 2666

(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)
==============================================================================

icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

==============================================================================
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### Compiler Version Notes (Continued)

- **cc**  
  600.peribench_s(peak) 602.gcc_s(peak) 605.mcf_s(peak) 625.x264_s(peak)  
  657.xz_s(peak)  

  icc (ICC) 18.0.2 20180210  
  Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

- **cxxc**  
  620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)  
  641.leela_s(base)  

  icc (ICC) 18.0.2 20180210  
  Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

- **icpc**  
  620.omnetpp_s(peak) 623.xalancbmk_s(peak) 631.deepsjeng_s(peak)  
  641.leela_s(peak)  

  icc (ICC) 18.0.2 20180210  
  Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

---

- **fc**  
  648.exchange2_s(base)  

  ifort (IFORT) 18.0.2 20180210  
  Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

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### Base Compiler Invocation

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

**C++ benchmarks:**  
icpc -m64

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(Continued on next page)
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Base Compiler Invocation (Continued)

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:
-W1, -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:
-W1, -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:
-W1, -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

Peak Compiler Invocation

C benchmarks:
icc -m64 -std=c11

C++ benchmarks (except as noted below):
icpc -m64

(Continued on next page)
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#### Peak Compiler Invocation (Continued)

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

- 605.mcf_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 -gopenmp -DSPEC_OPENMP -L/usr/local/je5.0.1-64/lib -ljemalloc`

- 625.x264_s: Same as 602.gcc_s

(Continued on next page)
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Peak Optimization Flags (Continued)

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 -03 -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

623.xalancbmk_s: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -03 -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: Same as 620.omnetpp_s

641.leela_s: Same as 620.omnetpp_s

Fortran benchmarks:
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX2 -03
-no-prec-div -qopt-prefetch -qopt-mem-layout-trans=3 -qopenmp
-nostandard-realloc-lhs -L/usr/local/je5.0.1-64/lib -ljemalloc

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

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