## SPEC® CPU2017 Integer Rate Result

**Dell Inc.**

PowerEdge R340 (Intel Xeon E-2144G, 3.60GHz)

<table>
<thead>
<tr>
<th>SPECrate2017_int_base</th>
<th>30.1</th>
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<tbody>
<tr>
<td>SPECrate2017_int_peak</td>
<td>30.9</td>
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### Results

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</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon E-2144G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz.</td>
<td>4500</td>
</tr>
<tr>
<td>Nominal</td>
<td>3600</td>
</tr>
<tr>
<td>Enabled</td>
<td>4 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>256 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>8 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>64 GB (4 x 16 GB 2Rx8 PC4-2666V-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 960 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS</th>
<th>SUSE Linux Enterprise Server 12 SP3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>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</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Version 1.0.1 released Oct-2018</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc memory allocator v5.0.1</td>
</tr>
</tbody>
</table>
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PowerEdge R340 (Intel Xeon E-2144G, 3.60GHz)

**SPECrate2017_int_base = 30.1**

**SPECrate2017_int_peak = 30.9**

---

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>8</td>
<td>510</td>
<td>25.0</td>
<td>510</td>
<td>512</td>
<td>24.9</td>
<td>25.0</td>
<td>510</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>8</td>
<td>401</td>
<td>28.3</td>
<td>402</td>
<td>403</td>
<td>28.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>8</td>
<td>353</td>
<td>36.6</td>
<td>357</td>
<td>368</td>
<td>35.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>8</td>
<td>622</td>
<td>16.9</td>
<td>619</td>
<td>625</td>
<td>16.8</td>
<td>619</td>
<td>625</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>8</td>
<td>292</td>
<td>28.9</td>
<td>291</td>
<td>290</td>
<td>29.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>525.x264_r</td>
<td>8</td>
<td>221</td>
<td>63.3</td>
<td>220</td>
<td>221</td>
<td>63.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>8</td>
<td>326</td>
<td>28.1</td>
<td>330</td>
<td>331</td>
<td>27.7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>541.leea_r</td>
<td>8</td>
<td>530</td>
<td>25.0</td>
<td>547</td>
<td>531</td>
<td>24.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>8</td>
<td>356</td>
<td>58.9</td>
<td>354</td>
<td>356</td>
<td>58.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>557.xz_r</td>
<td>8</td>
<td>425</td>
<td>20.3</td>
<td>462</td>
<td>463</td>
<td>18.7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**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 = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-32:/home/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.

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
```

runcpu command invoked through numactl i.e.:

**(Continued on next page)**
# SPEC CPU2017 Integer Rate Result

## Dell Inc.

**PowerEdge R340 (Intel Xeon E-2144G, 3.60GHz)**

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</table>

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

### General Notes (Continued)

```
numactl --interleave=all runcpu <etc>
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5
```

### 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-bx7m Wed Jan 2 05:23:16 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
  - `physical id"s (chips)`
  - `coalesced, 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

(Continued on next page)
SPEC CPU2017 Integer Rate Result

Dell Inc.
PowerEdge R340 (Intel Xeon E-2144G, 3.60GHz)

SPECrate2017_int_base = 30.1
SPECrate2017_int_peak = 30.9

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

Test Date: Jan-2019
Hardware Availability: Dec-2018
Software Availability: Apr-2018

Platform Notes (Continued)

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: 4032.852
CPU max MHz: 4500.0000
CPU min MHz: 800.0000
BogoMIPS: 7199.98
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 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
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_ctxswe spec_ctrl stibp retpoline
kaiser tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep
bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt xsaveopt xsavec 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: 63795 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

(Continued on next page)
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</table>

**Platform Notes (Continued)**

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:
- 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-bx7m 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 2 05:22 last=5

SPEC is set to: /home/cpu2017

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda2</td>
<td>xfs</td>
<td>300G</td>
<td>16G</td>
<td>285G</td>
<td>6%</td>
<td>/</td>
</tr>
</tbody>
</table>

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)
SPEC CPU2017 Integer Rate Result

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PowerEdge R340 (Intel Xeon E-2144G, 3.60GHz)

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Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Jan-2019
Hardware Availability: Dec-2018
Software Availability: Apr-2018

Compiler Version Notes

==============================================================================
CC  500.perlbench_r(base)  502.gcc_r(base)  505.mcf_r(base)  525.x264_r(base)
     557.xz_r(base)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CC  500.perlbench_r(peak)  502.gcc_r(peak)  505.mcf_r(peak)  525.x264_r(peak)
     557.xz_r(peak)
------------------------------------------------------------------------------
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CXXC 520.omnetpp_r(base)  523.xalancbmk_r(base)  531.deepsjeng_r(base)
     541.leela_r(base)
------------------------------------------------------------------------------
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
CXXC 520.omnetpp_r(peak)  523.xalancbmk_r(peak)  531.deepsjeng_r(peak)
     541.leela_r(peak)
------------------------------------------------------------------------------
icpc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC  548.exchange2_r(base)
------------------------------------------------------------------------------
ifort (IFORT) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
FC  548.exchange2_r(peak)
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| Test Sponsor:    | Dell Inc. |
| Tested by:       | Dell Inc. |
| Test Date:       | Jan-2019 |
| Hardware Availability: | Dec-2018 |
| Software Availability: | Apr-2018 |

### Base Compiler Invocation

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

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

- **Fortran benchmarks:**
  
  ifort -m64

### 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
- 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
  -L/usr/local/je5.0.1-64/lib -ljemalloc
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Peak Compiler Invocation

C benchmarks (except as noted below):  
icc -m64 -std=c11

502.gcc_r: icc -m32 -std=c11 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin

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

523.xalancbmk_r: icpc -m32 -L/home/prasadj/specdev/IC18u2_Internal/lin_18_0_20180210/compiler/lib/ia32_lin

Fortran benchmarks:  
ifort -m64

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.leea_r: -DSPEC_LP64  
548.exchange2_r: -DSPEC_LP64  
557.xz_r: -DSPEC_LP64

Peak Optimization Flags

C benchmarks:  
500.perlbench_r: -Wl,-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: -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

505.mcf_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

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

525.x264_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -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

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

531.deepsjeng_r: Same as 520.omnetpp_r

541.leela_r: Same as 520.omnetpp_r

Fortran benchmarks:
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2
-O3 -no-prec-div -qopt-mem-layout-trans=3 -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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU2017 v1.0.5 on 2019-01-02 06:23:16-0500.
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