Dell Inc.

PowerEdge R340 (Intel Xeon E-2236, 3.40 GHz)

SPECrates:
- SPECrates2017_int_base = 44.8
- SPECrates2017_int_peak = 46.9

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

Hardware:
- CPU Name: Intel Xeon E-2236
- Max MHz: 4800
- Nominal: 3400
- Enabled: 6 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: 12 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
- 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: No
- Firmware: Version 2.1.6 released Nov-2019
- 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
- Power Management: BIOS set to prefer performance at the cost of additional power usage
Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>12</td>
<td>519</td>
<td>36.8</td>
<td>527</td>
<td>36.2</td>
<td>12</td>
<td>447</td>
<td>42.8</td>
<td>447</td>
<td>42.8</td>
<td></td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>12</td>
<td>453</td>
<td>37.5</td>
<td>446</td>
<td>38.1</td>
<td>12</td>
<td>374</td>
<td>45.5</td>
<td>375</td>
<td>45.3</td>
<td></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>12</td>
<td>344</td>
<td>56.4</td>
<td>343</td>
<td>56.4</td>
<td>12</td>
<td>345</td>
<td>56.3</td>
<td>344</td>
<td>56.4</td>
<td></td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>12</td>
<td>715</td>
<td>22.0</td>
<td>715</td>
<td>22.0</td>
<td>12</td>
<td>716</td>
<td>22.0</td>
<td>719</td>
<td>21.9</td>
<td></td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>12</td>
<td>261</td>
<td>48.5</td>
<td>263</td>
<td>48.2</td>
<td>12</td>
<td>242</td>
<td>52.4</td>
<td>242</td>
<td>52.3</td>
<td></td>
</tr>
<tr>
<td>525.x264_r</td>
<td>12</td>
<td>203</td>
<td>104</td>
<td>203</td>
<td>104</td>
<td>12</td>
<td>196</td>
<td>107</td>
<td>195</td>
<td>108</td>
<td></td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>12</td>
<td>340</td>
<td>40.4</td>
<td>341</td>
<td>40.3</td>
<td>12</td>
<td>341</td>
<td>40.3</td>
<td>341</td>
<td>40.3</td>
<td></td>
</tr>
<tr>
<td>541.leela_r</td>
<td>12</td>
<td>536</td>
<td>37.1</td>
<td>537</td>
<td>37.0</td>
<td>12</td>
<td>536</td>
<td>37.0</td>
<td>537</td>
<td>37.0</td>
<td></td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>12</td>
<td>325</td>
<td>96.7</td>
<td>326</td>
<td>96.6</td>
<td>12</td>
<td>326</td>
<td>96.5</td>
<td>326</td>
<td>96.5</td>
<td></td>
</tr>
<tr>
<td>557.xz_r</td>
<td>12</td>
<td>484</td>
<td>26.8</td>
<td>484</td>
<td>26.8</td>
<td>12</td>
<td>484</td>
<td>26.8</td>
<td>484</td>
<td>26.8</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"

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017/lib/intel64/:/home/cpu2017/lib/ia32/:/home/cpu2017/je5.0.1-32"

General Notes

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5
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.
**General Notes (Continued)**

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.:
`numactl --interleave=all runcpu <etc>`
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

**Platform Notes**

BIOS settings:
Virtualization Technology disabled
DCU Streamer Prefetcher 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
PCI ASPM L1 Link Power Management disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7ed1b1e6e46a485a0011
running on linux-g3ob Sun Dec  8 12:25:42 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-2236 CPU @ 3.40GHz`
`1 "physical id"s (chips)`
`12 "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 : 6
siblings : 12
physical 0: cores 0 1 2 3 4 5

From lscpu:
`Architecture: x86_64`
`CPU op-mode(s): 32-bit, 64-bit`
`Byte Order: Little Endian`
Dell Inc.
PowerEdge R340 (Intel Xeon E-2236, 3.40 GHz)

SPECrater®2017_int_base = 44.8
SPECrater®2017_int_peak = 46.9

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

Test Date: Dec-2019
Hardware Availability: Dec-2018
Software Availability: Jun-2019

Platform Notes (Continued)
Address sizes: 39 bits physical, 48 bits virtual
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2236 CPU @ 3.40GHz
Stepping: 10
CPU MHz: 3400.000
BogoMIPS: 6816.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-11
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperf perf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdmb 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
pti ssbd ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust
bm1 hle avx2 smep bmi2 erms invvpid rtm mpx rdseed adx smap clflushopt intel_pt
xsaveopt xsavec xsaves dtherm ida arat pln pts md_clear flush_l1d

/proc/cpuinfo cache data
cache size : 12288 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
node 0 size: 64257 MB
node 0 free: 63443 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 65800056 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

(Continued on next page)
Platform Notes (Continued)

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):            Mitigation: PTE Inversion
   Microarchitectural Data Sampling:              Mitigation: Clear CPU buffers; SMT vulnerable
   CVE-2017-5754 (Meltdown):                     Mitigation: PTI
   CVE-2018-3639 (Speculative Store Bypass):     Mitigation: Speculative Store Bypass disabled
   CVE-2017-5753 (Spectre variant 1):            Mitigation: __user pointer sanitization
   CVE-2017-5715 (Spectre variant 2):            Mitigation: Indirect Branch Restricted
   Speculation, IBPB: conditional, IBRS_FW, STIBP:
   conditional, RSB filling

run-level 3 Dec 8 12:25 last=5

SPEC is set to: /home/cpu2017
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      xfs   440G   30G  411G   7% /

From /sys/devices/virtual/dmi/id
   BIOS:    Dell Inc. 2.1.6 09/27/2018
   Vendor:  Dell Inc.
   Product: PowerEdge R340
   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 00CE00000A02 M391A2K43BB1-CTD 16 GB 2 rank 2666
      2x 00CE00000A07 M391A2K43BB1-CTD 16 GB 2 rank 2666

(Continued on next page)
Dell Inc.

PowerEdge R340 (Intel Xeon E-2236, 3.40 GHz)

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

SPECrate®2017_int_base = 44.8
SPECrate®2017_int_peak = 46.9

Test Date: Dec-2019
Hardware Availability: Dec-2018
Software Availability: Jun-2019

Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>502.gcc_r(peak)</th>
</tr>
</thead>
</table>
intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
| 19.0.4.227 Build 20190416 |
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================

C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
       | 525.x264_r(base, peak) 557.xz_r(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       | 502.gcc_r(peak)                                     |
|-----------------------------|-----------------------------------------------------|
intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
| 19.0.4.227 Build 20190416 |
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================

C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
       | 525.x264_r(base, peak) 557.xz_r(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++     | 523.xalancbmk_r(peak)                               |
|-----------------------------|-----------------------------------------------------|
intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
| 19.0.4.227 Build 20190416 |
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**

Dell Inc.

PowerEdge R340 (Intel Xeon E-2236, 3.40 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base = 44.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak = 46.9</td>
</tr>
</tbody>
</table>

CPU2017 License: 55  Test Date: Dec-2019
Test Sponsor: Dell Inc.  Hardware Availability: Dec-2018
Tested by: Dell Inc.  Software Availability: Jun-2019

---

**Compiler Version Notes (Continued)**

```plaintext
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
        | 531.deepsjeng_r(base, peak) 541.leela_r(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.
```

```plaintext
C++     | 523.xalancbmk_r(peak)

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
```

```plaintext
C++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
        | 531.deepsjeng_r(base, peak) 541.leela_r(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.
```

```plaintext
Fortran | 548.exchange2_r(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
SPEC CPU®2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Dell Inc.
PowerEdge R340 (Intel Xeon E-2236, 3.40 GHz)

SPECrate®2017_int_base = 44.8
SPECrate®2017_int_peak = 46.9

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

Test Date: Dec-2019
Hardware Availability: Dec-2018
Software Availability: Jun-2019

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
530.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=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

C++ benchmarks:
-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

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

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


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

(Continued on next page)
Dell Inc.
PowerEdge R340 (Intel Xeon E-2236, 3.40 GHz)

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

Test Date: Dec-2019
Hardware Availability: Dec-2018
Software Availability: Jun-2019

Peak Compiler Invocation (Continued)

523.xalancbmk_r: icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/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.leela_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=4
-fno-strict-overflow
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc

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=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: -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

525.x264_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Dell Inc.
PowerEdge R340 (Intel Xeon E-2236, 3.40 GHz)

SPECrater®2017_int_base = 44.8
SPECrater®2017_int_peak = 46.9

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

Test Date: Dec-2019
Hardware Availability: Dec-2018
Software Availability: Jun-2019

Peak Optimization Flags (Continued)

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

520.omnetpp_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler2019/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

523.xalancbmk_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-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=4 -nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler2019/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

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:

SPEC CPU and SPECrater are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2019-12-08 13:25:41-0500.
Originally published on 2019-12-24.