Dell Inc.

PowerEdge T140 (Intel Xeon E-2224G, 3.50 GHz)

SPEC CPU®2017 Integer Rate Result

SPECrage®2017_int_base = 28.4

SPECrage®2017_int_peak = 29.3

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

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

Copies

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<td>557.xz_r</td>
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</tbody>
</table>

Hardware

CPU Name: Intel Xeon E-2224G
Max MHz: 4700
Nominal: 3500
Enabled: 4 cores, 1 chip
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 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: 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: None
jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage.
Results Table

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</table>

SPECrate®2017_int_base = 28.4
SPECrate®2017_int_peak = 29.3

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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 =

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.

(Continued on next page)
Dell Inc.  

PowerEdge T140 (Intel Xeon E-2224G, 3.50 GHz)  

| SPECrate®2017_int_base = 28.4 | Dell Inc.  
| SPECrate®2017_int_peak = 29.3 |

General Notes (Continued)

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.:
  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/ODM-SPECcpu2017-194/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edeb1e6e46a485a0011
running on linux-g3ob Sat Nov 16 13:54:42 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-2224G CPU @ 3.50GHz
  1 "physical id"s (chips)
  4 "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 : 4
  siblings : 4
  physical 0: cores 0 1 2 3

From lscpu:
  Architecture: x86_64
Dell Inc. PowerEdge T140 (Intel Xeon E-2224G, 3.50 GHz)

| SPECrate®2017_int_base = 28.4 |
| SPECrate®2017_int_peak = 29.3 |

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

Platform Notes (Continued)

- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian
- Address sizes: 39 bits physical, 48 bits virtual
- CPU(s): 4
- On-line CPU(s) list: 0-3
- Thread(s) per core: 1
- 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-2224G CPU @ 3.50GHz
- Stepping: 10
- CPU MHz: 3500.000
- BogoMIPS: 7008.00
- Virtualization: VT-x
- L1d cache: 32K
- L1i cache: 32K
- L2 cache: 256K
- L3 cache: 8192K
- NUMA node0 CPU(s): 0-3
- 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 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 pti ssbd ibrs ibpb stibp tpr_shadow vmlinux flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 3dnow invpcid rtm mpx rdseed adx smap clflushopt intel_pt xsaveopt xsaves xsaveopt xsavec xgetbv1 xsavec dtherm ida arat pln pts md_clear flush_l1d

From /proc/cpuinfo cache data
- cache size : 8192 KB

Warning: a numactl 'node' might or might not correspond to a physical chip.
- available: 1 nodes (0)
- node 0 cpus: 0 1 2 3
- node 0 size: 64259 MB
- node 0 free: 63486 MB
- node distances:
- node 0
- 0: 10

From /proc/meminfo
- MemTotal: 65801564 KB

(Continued on next page)
Platform Notes (Continued)

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): Mitigation: PTE Inversion
Microarchitectural Data Sampling: Mitigation: Clear CPU buffers; SMT disabled
CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled
  via prctl and seccomp
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: disabled, RSB filling

run-level 3 Nov 16 13:53 last=5

SPEC is set to: /home/cpu2017/ODM-SPECcpu2017-194/cpu2017
  Filesystem Type Size Used Avail Use% Mounted on
  /dev/sda2 xfs 440G 36G 405G 9% /

From /sys/devices/virtual/dmi/id
  BIOS: Dell Inc. 2.1.6 09/27/2018
  Vendor: Dell Inc.
  Product: PowerEdge T340
  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:
SPEC CPU®2017 Integer Rate Result

Dell Inc.
PowerEdge T140 (Intel Xeon E-2224G, 3.50 GHz)

SPECrater®2017_int_base = 28.4
SPECrater®2017_int_peak = 29.3

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

Platform Notes (Continued)
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       | 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.
------------------------------------------------------------------------------

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C       | 502.gcc_r(peak)
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------------------------------------------------------------------------------

==============================================================================
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

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

**Dell Inc.**

PowerEdge T140 (Intel Xeon E-2224G, 3.50 GHz)  

**SPEC CPU®2017 Rates:**  
- SPECrate®2017_int_base = 28.4  
- SPECrate®2017_int_peak = 29.3

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

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**Compiler Version Notes (Continued)**

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<td>531.deepsjeng_r(base, peak) 541.leela_r(base, peak)</td>
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**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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**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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**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`

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

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<th>SPECrate®2017_int_base = 28.4</th>
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<td>SPECrate®2017_int_peak = 29.3</td>
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</table>

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

### Base Compiler Invocation (Continued)

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

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

```
s02.gcc_r:icc -m32 -std=c11 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin

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

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.perlbmch_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64 -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
525.x264_r: -D_FILE_OFFSET_BITS=64 -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.perlbmch_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
-I/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin

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
-I/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64

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
```

(Continued on next page)
Dell Inc.
PowerEdge T140 (Intel Xeon E-2224G, 3.50 GHz)

SPECrate®2017_int_base = 28.4
SPECrate®2017_int_peak = 29.3

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

Peak Optimization Flags (Continued)

505.mcf_r (continued):
-1qkmalloc

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
-1qkmalloc

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/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-1qkmalloc

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/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-1qkmalloc

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:

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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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