Dell Inc.

PowerEdge R350 (Intel Xeon E-2388G, 3.20 GHz)

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

SPECrater®2017_int_base = 68.1
SPECrater®2017_int_peak = 71.2

Test Date: Sep-2021
Hardware Availability: Oct-2021
Software Availability: May-2021

<table>
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<tr>
<th>Copies</th>
<th>SPECrate®2017_int_base (68.1)</th>
<th>SPECrate®2017_int_peak (71.2)</th>
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<td>57.8</td>
</tr>
<tr>
<td>502.gcc_r</td>
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<tr>
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<td>523.xalancbmk_r</td>
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<td>531.deepsjeng_r</td>
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</tr>
<tr>
<td>557.xz_r</td>
<td>16</td>
<td>37.8</td>
</tr>
</tbody>
</table>

Hardware

CPU Name: Intel Xeon E-2388G
Max MHz: 5100
Nominal: 3200
Enabled: 8 cores, 1 chip, 2 threads/core
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 512 KB I+D on chip per core
L3: 16 MB I+D on chip per chip
Other: None
Memory: 64 GB (2 x 32 GB 2Rx8 PC4-3200AA-E)
Storage: 70 GB on tmpfs
Other: None

Software

OS: Red Hat Enterprise Linux 8.4 (Ootpa)
4.18.0-305.el8_x86_64
Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;
Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux
Parallel: No
Firmware: Version 1.0.1 released Aug-2021
File System: tmpfs
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 and OS set to prefer performance at the cost of additional power usage.
SPEC CPU®2017 Integer Rate Result

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Dell Inc.

PowerEdge R350 (Intel Xeon E-2388G, 3.20 GHz)

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Results Table

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<th>Benchmark</th>
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<td>Peak</td>
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</tr>
</tbody>
</table>

SPECrate®2017_int_base = 68.1

SPECrate®2017_int_peak = 71.2

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

Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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 =
"/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/ia32:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/je5.0.1-32"
MALLOCP_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1
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

(Continued on next page)
Dell Inc.

PowerEdge R350 (Intel Xeon E-2388G, 3.20 GHz)

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**SPEC CPU®2017 Integer Rate Result**

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General Notes (Continued)

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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.

Benchmark run from a 70 GB ramdisk created with the cmd: "mount -t tmpfs -o size=70G tmpfs /mnt/ramdisk"

Platform Notes

BIOS settings:

- Virtualization Technology : Disabled
- System Profile : Custom
- CPU Power Management : Maximum Performance
- C1E : Disabled
- C States : Autonomous
- PCI ASPM L1 Link
- Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2021.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca6c64d
running on localhost.localdomain Wed Sep 1 21:07:47 2021

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-2388G CPU @ 3.20GHz
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 from util-linux 2.32.1:
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
```

(Continued on next page)
**Dell Inc.**

PowerEdge R350 (Intel Xeon E-2388G, 3.20 GHz)

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**SPECrate®2017_int_base = 68.1**

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---

**Platform Notes (Continued)**

<table>
<thead>
<tr>
<th>Byte Order:</th>
<th>Little Endian</th>
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<tbody>
<tr>
<td>CPU(s):</td>
<td>16</td>
</tr>
<tr>
<td>On-line CPU(s) list:</td>
<td>0-15</td>
</tr>
<tr>
<td>Thread(s) per core:</td>
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</tr>
<tr>
<td>Core(s) per socket:</td>
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</tr>
<tr>
<td>Socket(s):</td>
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</tr>
<tr>
<td>NUMA node(s):</td>
<td>1</td>
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<tr>
<td>Vendor ID:</td>
<td>GenuineIntel</td>
</tr>
<tr>
<td>BIOS Vendor ID:</td>
<td>Intel</td>
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<tr>
<td>CPU family:</td>
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<tr>
<td>Model:</td>
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<tr>
<td>Model name:</td>
<td>Intel(R) Xeon(R) E-2388G CPU @ 3.20GHz</td>
</tr>
<tr>
<td>BIOS Model name:</td>
<td>Intel(R) Xeon(R) E-2388G CPU @ 3.20GHz</td>
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<tr>
<td>Stepping:</td>
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<tr>
<td>L1d cache:</td>
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<tr>
<td>L1i cache:</td>
<td>32K</td>
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<tr>
<td>L2 cache:</td>
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<td>L3 cache:</td>
<td>16384K</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-15</td>
</tr>
</tbody>
</table>

**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 arch_perfmon pbebs 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 invvpiddsingle ssbd ibrs ibrd ibpb brs ibrs_enhanced fsgsbase tsc_adjust bmi1 avx2 smep bmi2 ibrs INVPCID mpx avx512f avx512dq rdseed adx smap avx512ifma clflushopt intel_pt avx512cd sha_ni avx512bw avx512v1 xsaveopt xsavevc xsave xsvsetbv1 xsavec dtherm ida arat pln pts avx512v bmi umip pku ospke avx512_vmbi2 gfn vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid fsrmdc clear flush_lld arch_capabilities
```

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: 64027 MB
node 0 free: 40992 MB
node distances:
  node 0
  0: 10
```

(Continued on next page)
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**Specrate®2017_int_base = 68.1**

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---

**Platform Notes (Continued)**

From `/proc/meminfo`

- MemTotal: 65564200 kB
- HugePages_Total: 0
- Hugepagesize: 2048 kB

/sbin/tuned-adm active

No current active profile.

From `/etc/*release* /etc/*version*`

- NAME="Red Hat Enterprise Linux"
- VERSION="8.4 (Ootpa)"
- ID="rhel"
- ID_LIKE="fedora"
- VERSION_ID="8.4"
- PLATFORM_ID="platform:el8"
- PRETTY_NAME="Red Hat Enterprise Linux 8.4 (Ootpa)"
- ANSI_COLOR="0;31"

redhat-release: Red Hat Enterprise Linux release 8.4 (Ootpa)

system-release: Red Hat Enterprise Linux release 8.4 (Ootpa)

system-release-cpe: cpe:/o:redhat:enterprise_linux:8.4:ga

uname -a:

```
Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

- CVE-2018-12207 (iTLB Multihit): Not affected
- CVE-2018-3620 (L1 Terminal Fault): Not affected
- Microarchitectural Data Sampling: Not affected
- CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaps barriers and __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
- CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Sep 1 14:25

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1

Filesystem Type Size Used Avail Use% Mounted on

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

Dell Inc.  
PowerEdge R350 (Intel Xeon E-2388G, 3.20 GHz)  

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**Tested by:** Dell Inc.  
**Test Date:** Sep-2021  
**Hardware Availability:** Oct-2021  
**Software Availability:** May-2021

---

### Platform Notes (Continued)

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<tr>
<th>tmpfs</th>
<th>tmpfs</th>
<th>70G</th>
<th>17G</th>
<th>54G</th>
<th>25% /mnt/ramdisk</th>
</tr>
</thead>
</table>

From /sys/devices/virtual/dmi/id  
Vendor: Dell Inc.  
Product: PowerEdge R350  
Product Family: PowerEdge  
Serial: 7SWJFF3

Additional information from dmidecode 3.2 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 002C00000C01 18ASF4G72AZ-3G2B1 32 GB 2 rank 3200

BIOS:  
BIOS Vendor: Dell Inc.  
BIOS Version: 1.0.1  
BIOS Date: 08/18/2021  
BIOS Revision: 1.0

(End of data from sysinfo program)

---

### Compiler Version Notes

==============================================================================
<p>| C | 500.perlbench_r(peak) |
|-------------------------------------------|
| Intel (R) C Intel (R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000 |</p>
<table>
<thead>
<tr>
<th>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</th>
</tr>
</thead>
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==============================================================================
<p>| C | 502.gcc_r(peak) |
|-------------------------------------------|
| Intel (R) oneAPI DPC+/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113 |</p>
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</thead>
</table>

==============================================================================
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Version 2021.1 Build 20201113
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| Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) |
| 64, Version 2021.1 Build 20201112_000000 |
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**CPU2017 License:** 55  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

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**Compiler Version Notes (Continued)**

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

Fortran | 548.exchange2_r(base, peak)

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 2020112_000000  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

---

**Base Compiler Invocation**

C benchmarks:  
icx

C++ benchmarks:  
icpx

Fortran benchmarks:  
ifort

---

**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

(Continued on next page)
SPEC CPU®2017 Integer Rate Result
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Dell Inc.
PowerEdge R350 (Intel Xeon E-2388G, 3.20 GHz)

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

SPECrate®2017_int_base = 68.1
SPECrate®2017_int_peak = 71.2

Test Date: Sep-2021
Hardware Availability: Oct-2021
Software Availability: May-2021

Base Portability Flags (Continued)
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:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icx

500.perlbench_r.icc

C++ benchmarks:
icpx

Fortran benchmarks:
ifort
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### 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: -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

### Peak Optimization Flags

**C benchmarks:**

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)  
-xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=4 -fno-strict-overflow  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin  
-lqkmalloc

502.gcc_r: -m32  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin  
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)  
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -flto  
-OFAST(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

505.mcf_r: basepeak = yes

520.omnetpp_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto  
-O3 -ffast-math -qopt-mem-layout-trans=4 -fno-alias  
-mbranches-within-32B-boundaries  
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin  
-lqkmalloc

557.xz_r: basepeak = yes

**C++ benchmarks:**

520.omnetpp_r: basepeak = yes

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### Dell Inc.

**PowerEdge R350 (Intel Xeon E-2388G, 3.20 GHz)**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
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### Peak Optimization Flags (Continued)

- 523.xalancbmk_r: basepeak = yes
- 531.deepsjeng_r: basepeak = yes
- 541.leela_r: basepeak = yes

For Fortran benchmarks:
- 548.exchange2_r: basepeak = yes

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: