SPEC CPU®2017 Integer Rate Result

Dell Inc.

PowerEdge R750 (Intel Xeon Gold 6334, 3.60 GHz)

SPECraten®2017_int_base = 147
SPECraten®2017_int_peak = 152

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

Test Date: May-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

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<th>SPECrate®2017_int_peak (152)</th>
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<tr>
<td>557.xz_r 32</td>
<td><img src="xz_graph.png" alt="Graph" /></td>
<td>79.5</td>
</tr>
</tbody>
</table>

Software

OS: Red Hat Enterprise Linux 8.3 (Ootpa)
4.18.0-240.15.1.el8_3.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 1.2.1 released May-2021
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 and OS set to prefer performance
at the cost of additional power usage.

Hardware

CPU Name: Intel Xeon Gold 6334
Max MHz: 3700
Nominal: 3600
Enabled: 16 cores, 2 chips, 2 threads/core
Orderable: 1.2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 1.25 MB I+D on chip per core
L3: 18 MB I+D on chip per chip
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)
Storage: 1 x 480 GB M.2 SATA SSD
Other: None
## Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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SPECrater®2017_int_base = 147
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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 = 
"/mnt/ramdisk2/lib/intel64:/mnt/ramdisk2/lib/ia32:/mnt/ramdisk2/je5.0.1-32"
MALLOC_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
runcpu command invoked through numactl i.e.:
Dell Inc. PowerEdge R750 (Intel Xeon Gold 6334, 3.60 GHz)

**General Notes (Continued)**

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

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.

**Platform Notes**

BIOS Settings:
- Sub NUMA Cluster : 2-Way Clustering
- Virtualization Technology : Disabled

System Profile : Custom
- CPU Power Management : Maximum Performance
- C1E : Disabled
- C States : Autonomous
- Memory Patrol Scrub : Disabled
- Energy Efficiency Policy : Performance
- CPU Interconnect Bus Link : Disabled
- Power Management : Disabled

Sysinfo program /mnt/ramdisk2/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e666d2d7080afeaa89d4b38e2f1c
running on localhost.localdomain Mon May 17 18:36:28 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) Gold 6334 CPU @ 3.60GHz
- 2 "physical id"s (chips)
- 32 "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
physical 1: cores 0 1 2 3 4 5 6 7

(Continued on next page)
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Test Date: May-2021
Hardware Availability: May-2021
Software Availability: Feb-2021

Platform Notes (Continued)

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 32
On-line CPU(s) list: 0-31
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6334 CPU @ 3.60GHz
Stepping: 6
CPU MHz: 3611.309
BogoMIPS: 7200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 18432K
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28
NUMA node1 CPU(s): 2,6,10,14,18,22,26,30
NUMA node2 CPU(s): 1,5,9,13,17,21,25,29
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31
Flags: fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pe syscall nx pda eps GT2o IOPl mce pxrt pdcm pcid dca sse4_1 se4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abal3nowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrs Enhanced fsogbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaveex cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local split_lock detect wbnoinvd dtherm ida arat pln pts avx512vmbmi umip pku ospke avx512_vmbni gfnl vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpoicntdq la57 rdpid md_clear pconfig flush_lld arch_capabilities

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)

(Continued on next page)
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Platform Notes (Continued)

node 0 cpus: 0 4 8 12 16 20 24 28
node 0 size: 127364 MB
node 0 free: 127287 MB
node 1 cpus: 2 6 10 14 18 22 26 30
node 1 size: 128040 MB
node 1 free: 128387 MB
node 2 cpus: 1 5 9 13 17 21 25 29
node 2 size: 127843 MB
node 2 free: 128267 MB
node 3 cpus: 3 7 11 15 19 23 27 31
node 3 size: 127961 MB
node 3 free: 128508 MB

node distances:
node 0   1   2   3
0:  10  11  20  20
1:  11  10  20  20
2:  20  20  10  11
3:  20  20  11  10

From /proc/meminfo
MemTotal:       527814896 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

/sbin/tuned-adm active
Current active profile: throughput-performance

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.3 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.3"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
  ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 2021 x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

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

## Dell Inc.

**PowerEdge R750 (Intel Xeon Gold 6334, 3.60 GHz)**

<table>
<thead>
<tr>
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<tr>
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<td>Feb-2021</td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

**CVE-2018-12207 (iTLB Multihit):** Not affected

**CVE-2018-3620 (L1 Terminal Fault):** Not affected

**Microarchitectural Data Sampling:** Not affected

**CVE-2017-5754 (Meltdown):** Not affected

**CVE-2018-3639 (Speculative Store Bypass):**
- **Mitigation:** Speculative Store Bypass disabled via prctl and seccomp
- **Mitigation:** usercopy/swaps barriers and __user pointer sanitization

**CVE-2017-5753 (Spectre variant 1):**

**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

SPEC is set to: /mnt/ramdisk2

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<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
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<tr>
<td>/dev/mapper/rhel-root</td>
<td>xfs</td>
<td>50G</td>
<td>32G</td>
<td>19G</td>
<td>63%</td>
<td>/</td>
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</tbody>
</table>

From /sys/devices/virtual/dmi/id

- **Vendor:** Dell Inc.
- **Product:** PowerEdge R750
- **Product Family:** PowerEdge
- **Serial:** 1234567

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:**
- 12x 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200
- 4x 00AD063200AD HMMA4GR7AR8N-XN 32 GB 2 rank 3200
- 16x Not Specified Not Specified

**BIOS:**
- **BIOS Vendor:** Dell Inc.
- **BIOS Version:** 1.2.1
- **BIOS Date:** 05/06/2021
- **BIOS Revision:** 1.2

(End of data from sysinfo program)
Dell Inc. PowerEdge R750 (Intel Xeon Gold 6334, 3.60 GHz)

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Compiler Version Notes

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
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C | 502.gcc_r(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

C | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113

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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
Fortran | 548.exchange2_r(base, peak)
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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### Base Compiler Invocation

**C benchmarks:**  
icx

**C++ benchmarks:**  
icpx

**Fortran benchmarks:**  
ifort

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tr>
<td>500.perlbench_r</td>
<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
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</tbody>
</table>

### Base Optimization Flags

**C benchmarks:**

```bash
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-f1to -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:**

```bash
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -f1to
-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:**

```bash
-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
```

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

## Dell Inc.

### PowerEdge R750 (Intel Xeon Gold 6334, 3.60 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>147</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>152</td>
</tr>
</tbody>
</table>

### CPU2017 License: 55

### Test Sponsor: Dell Inc.

### Tested by: Dell Inc.

### Test Date: May-2021

### Hardware Availability: May-2021

### Software Availability: Feb-2021

## Base Optimization Flags (Continued)

### Fortran benchmarks (continued):

```
-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
```

## 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
```

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

**Dell Inc.**

**PowerEdge R750 (Intel Xeon Gold 6334, 3.60 GHz)**

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**SPECrate®2017_int_base = 147**

**SPECrate®2017_int_peak = 152**

### Peak Optimization Flags (Continued)

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

525.x264_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

523.xalancbk_r: basepeak = yes

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

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:

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml
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**PowerEdge R750 (Intel Xeon Gold 6334, 3.60 GHz)**

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

 Tested with SPEC CPU®2017 v1.1.5 on 2021-05-17 19:36:28-0400.
 Report generated on 2021-07-08 13:30:01 by CPU2017 PDF formatter v6442.
 Originally published on 2021-07-06.