## SPEC CPU®2017 Integer Rate Result

### Dell Inc.

**PowerEdge R650 (Intel Xeon Platinum 8352Y, 2.20 GHz)**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base = 422</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak = 437</td>
</tr>
</tbody>
</table>

| Copies | 0 | 40 | 80 | 120 | 160 | 200 | 240 | 280 | 320 | 360 | 400 | 440 | 480 | 520 | 560 | 600 | 640 | 680 | 720 | 760 | 800 | 840 | 880 | 920 | 960 |
|--------|---|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| perlbench_r | 128 | 349 |
| gcc_r | 128 | 329 |
| mcf_r | 128 | 345 |
| omnetpp_r | 128 | 248 |
| xalancbmk_r | 128 | 519 |
| x264_r | 128 | 892 |
| deepsjeng_r | 128 | 328 |
| leela_r | 128 | 329 |
| exchange2_r | 128 | 893 |
| xz_r | 128 | 895 |

**CPU2017 License:** 55  
**Test Date:** Apr-2021  
**Hardware Availability:** May-2021  
**Test Sponsor:** Dell Inc.  
**Software Availability:** Feb-2021  
**Tested by:** Dell Inc.

### Hardware

**CPU Name:** Intel Xeon Platinum 8352Y  
**Max MHz:** 3400  
**Nominal:** 2200  
**Enabled:** 64 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:** 48 MB I+D on chip per chip  
**Other:** None  
**Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)  
**Storage:** 225 GB on tmpfs  
**Other:** None

### Software

**OS:** Red Hat Enterprise Linux 8.3 (Ootpa)  
**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;  
**Parallel:** No  
**Firmware:** Version 1.1.2 released Apr-2021  
**File System:** tmpfs  
**System State:** Run level 5 (graphical multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 32/64-bit  
**Other:** None  
**jemalloc memory allocator V5.0.1**  
**Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.
Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8352Y, 2.20 GHz)

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Results Table

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<td>300</td>
<td>681</td>
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<td>583</td>
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<td>329</td>
<td>548</td>
<td>331</td>
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<td>456</td>
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<td>mcf_r</td>
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<td>304</td>
<td>680</td>
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<td>680</td>
<td>128</td>
<td>304</td>
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<tr>
<td>omnetpp_r</td>
<td>128</td>
<td>677</td>
<td>248</td>
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<td>519</td>
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<td>448</td>
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<tr>
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<td>128</td>
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<td>329</td>
<td>643</td>
<td>330</td>
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<tr>
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<td>373</td>
<td>898</td>
<td>375</td>
<td>893</td>
<td>128</td>
<td>373</td>
</tr>
<tr>
<td>xz_r</td>
<td>128</td>
<td>573</td>
<td>241</td>
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<td>128</td>
<td>588</td>
</tr>
</tbody>
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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/ramdisk/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/lib/ia32:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-32"
MALLOCONF = "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

(Continued on next page)
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### General Notes (Continued)

- 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

- 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 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

### 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
    - Power Management : Disabled

- Sysinfo program /mnt/ramdisk/cpu2017-1.1.5-ic2021.1/bin/sysinfo
  - Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
  - running on localhost.localdomain Tue Apr 20 10:50:26 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](https://www.spec.org/cpu2017/Docs/config.html#sysinfo)

- From /proc/cpuinfo
  ```
  model name : Intel(R) Xeon(R) Platinum 8352Y CPU @ 2.20GHz
  2 "physical id"s (chips)
  128 "processors"
  cores, siblings (Caution: counting these is hw and system dependent. The following
  (Continued on next page)```
Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8352Y, 2.20 GHz)

SPEC CPU®2017 Integer Rate Result

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Dell Inc.
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Test Date:  Apr-2021
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Platform Notes (Continued)

excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

  cpu cores : 32
  siblings : 64
  physical 0: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
  physical 1: cores 0 1 2 3 4 5 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

From 1scpu:
  Architecture: x86_64
  CPU op-mode(s): 32-bit, 64-bit
  Byte Order: Little Endian
  CPU(s): 128
  On-line CPU(s) list: 0-127
  Thread(s) per core: 2
  Core(s) per socket: 32
  Socket(s): 2
  NUMA node(s): 4
  Vendor ID: GenuineIntel
  CPU family: 6
  Model: 106
  Model name: Intel(R) Xeon(R) Platinum 8352Y CPU @ 2.20GHz
  Stepping: 6
  CPU MHz: 1916.883
  BogoMIPS: 4400.00
  Virtualization: VT-x
  L1d cache: 48K
  L1i cache: 32K
  L2 cache: 1280K
  L3 cache: 49152K
  NUMA node0 CPU(s):
  NUMA node1 CPU(s):
  NUMA node2 CPU(s):
  NUMA node3 CPU(s):
  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 pdpesgb rdtscp lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtex64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave

(Continued on next page)
Platform Notes (Continued)

avx f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single
intel_pinn ssbd mba ibrs ibpb stibp ibrs_enhanced fsqsbse 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
xsave xcm_lsc xcm_occrap_lsc xcm_mmb_total xcm_mmb_local split_lock_detect wbnoinvd
dtherm ida arat pln pts avx512v bmi umip pku ospke avx512_vmi2 gfnv vaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
arch_capabilities

/proc/cpuinfo cache data
  cache size : 49152 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60 64 68 72 76 80 84 88 92 96
  100 104 108 112 116 120 124
  node 0 size: 125111 MB
  node 0 free: 127350 MB
  node 1 cpus: 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62 66 70 74 78 82 86 90 94 98
  102 106 110 114 118 122 126
  node 1 size: 125626 MB
  node 1 free: 128406 MB
  node 2 cpus: 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61 65 69 73 77 81 85 89 93 97
  101 105 109 113 117 121 125
  node 2 size: 125662 MB
  node 2 free: 127955 MB
  node 3 cpus: 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63 67 71 75 79 83 87 91 95 99
  103 107 111 115 119 123 127
  node 3 size: 125842 MB
  node 3 free: 113958 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: 527794132 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

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

From /etc/*release* /etc/*version*
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Tested by: Dell Inc.

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

Platform Notes (Continued)

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:

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
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapgs 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 5 Apr 20 10:46

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 225G 6.9G 219G 4% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R650
Product Family: PowerEdge
Serial: 1234567

Additional information from dmidecode follows. WARNING: Use caution when you interpret

(Continued on next page)
Platform Notes (Continued)

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:
- 7x 00AD00B300AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200
- 9x 00AD063200AD HMAA4GR7AJR8N-XN 32 GB 2 rank 3200
- 16x Not Specified Not Specified

BIOS:
- BIOS Vendor: Dell Inc.
- BIOS Version: 1.1.2
- BIOS Date: 04/09/2021
- BIOS Revision: 1.1

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(peak) 557.xz_r(peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R) 64, Version 2021.1 Build 20201112_000000</td>
<td></td>
</tr>
<tr>
<td>Copyright (C) 1985-2020 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
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Compiler Version Notes (Continued)

C++
- 520.omnetpp_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
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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 20201112_000000
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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
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
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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: icx
557.xz_r: icx

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

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

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Tested by: Dell Inc.
Software Availability: Feb-2021

Peak Portability Flags (Continued)

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

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-03 -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: -Wl,-z,muldefs -xCORE-AVX512 -ipo -03 -no-prec-div
-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:
520.omnetpp_r: basepeak = yes

(Continued on next page)
Dell Inc.
PowerEdge R650 (Intel Xeon Platinum 8352Y, 2.20 GHz)

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**CPU2017 License:** 55
**Test Sponsor:** Dell Inc.
**Tested by:** Dell Inc.
**Test Date:** Apr-2021
**Hardware Availability:** May-2021
**Software Availability:** Feb-2021

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**Peak Optimization Flags (Continued)**

- 523.xalancbmk_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:

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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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