## SPEC CPU®2017 Integer Speed Result

**Dell Inc.**

PowerEdge R650 (Intel Xeon Gold 6348, 2.60 GHz)

### Hardware

<table>
<thead>
<tr>
<th>600.perlbench_s</th>
<th>56</th>
</tr>
</thead>
<tbody>
<tr>
<td>602.gcc_s</td>
<td>56</td>
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<td>620.omnetpp_s</td>
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<tr>
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<tr>
<td>625.x264_s</td>
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<td>56</td>
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<tr>
<td>641.leela_s</td>
<td>56</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>56</td>
</tr>
<tr>
<td>657.xz_s</td>
<td>56</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
- **Parallel:** Yes
- **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:** 64-bit
- **Other:** None
- **Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage.

### Test Details

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

### Performance Results

<table>
<thead>
<tr>
<th>Test</th>
<th>SPECspeed 2017_int_base</th>
<th>SPECspeed 2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>8.29</td>
<td>12.2</td>
</tr>
<tr>
<td>gcc_s</td>
<td>11.0</td>
<td>20.1</td>
</tr>
<tr>
<td>mcf_s</td>
<td>11.3</td>
<td>20.1</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>12.0</td>
<td>20.1</td>
</tr>
<tr>
<td>xalancbmk_s</td>
<td>13.6</td>
<td>17.2</td>
</tr>
<tr>
<td>x264_s</td>
<td>5.94</td>
<td>7.9</td>
</tr>
<tr>
<td>deepsjeng_s</td>
<td>4.85</td>
<td>19.4</td>
</tr>
<tr>
<td>leela_s</td>
<td>5.94</td>
<td>24.0</td>
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## Dell Inc.

PowerEdge R650 (Intel Xeon Gold 6348, 2.60 GHz)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>600.perlbench_s</td>
<td>56</td>
<td>247</td>
<td>7.18</td>
<td>245</td>
<td>7.23</td>
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<tr>
<td>602.gcc_s</td>
<td>56</td>
<td>361</td>
<td>11.0</td>
<td>366</td>
<td>10.9</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>56</td>
<td>235</td>
<td>20.1</td>
<td>237</td>
<td>19.9</td>
</tr>
<tr>
<td>620.omnetpp_s</td>
<td>56</td>
<td>136</td>
<td>12.0</td>
<td>139</td>
<td>11.7</td>
</tr>
<tr>
<td>623.xalanchmk_s</td>
<td>56</td>
<td>104</td>
<td>13.6</td>
<td>104</td>
<td>13.6</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>56</td>
<td>103</td>
<td>17.2</td>
<td>103</td>
<td>17.1</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>56</td>
<td>241</td>
<td>5.94</td>
<td>241</td>
<td>5.94</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>56</td>
<td>352</td>
<td>4.85</td>
<td>352</td>
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</tr>
<tr>
<td>648.exchange2_s</td>
<td>56</td>
<td>152</td>
<td>19.4</td>
<td>152</td>
<td>19.3</td>
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<td>56</td>
<td>257</td>
<td>24.0</td>
<td>257</td>
<td>24.0</td>
</tr>
</tbody>
</table>

**Results Table**

Stack size set to unlimited using "ulimit -s unlimited"

Environment variables set by runcpu before the start of the run:

- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-ic2021.1/je5.0.1-64"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "192M"

General Notes

- Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
- Transparent Huge Pages enabled by default
- Prior to runcpu invocation

Filesystem page cache synced and cleared with:

csync; echo 3 > /proc/sys/vm/drop_caches

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.

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

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:
- Logical Processor: Disabled
- 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 Mon May 3 04:07:52 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 6348 CPU @ 2.60GHz
- 2 "physical id"s (chips)
- 56 "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: 28
  - siblings: 28
  - physical 0: cores: 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
  - physical 1: cores: 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

From lscpu:
- Architecture: x86_64
- CPU op-mode(s): 32-bit, 64-bit
- Byte Order: Little Endian

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

**PowerEdge R650 (Intel Xeon Gold 6348, 2.60 GHz)**

<table>
<thead>
<tr>
<th>SPECspeed®2017_int_base = 12.0</th>
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<tr>
<td><strong>CPU2017 License:</strong> 55</td>
<td><strong>Test Date:</strong> May-2021</td>
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<td><strong>Software Availability:</strong> Feb-2021</td>
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</tbody>
</table>

#### Platform Notes (Continued)

- **CPU(s):** 56
- **On-line CPU(s) list:** 0-55
- **Thread(s) per core:** 1
- **Core(s) per socket:** 28
- **Socket(s):** 2
- **NUMA node(s):** 2
- **Vendor ID:** GenuineIntel
- **CPU family:** 6
- **Model:** 106
- **Model name:** Intel(R) Xeon(R) Gold 6348 CPU @ 2.60GHz
- **Stepping:** 6
- **CPU MHz:** 2093.486
- **BogoMIPS:** 5200.00
- **Virtualization:** VT-x
- **L1d cache:** 48K
- **L1i cache:** 32K
- **L2 cache:** 1280K
- **L3 cache:** 43008K
- **NUMA node0 CPU(s):**
  - 0, 2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54
- **NUMA node1 CPU(s):**
  - 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55
- **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 tsc xtol x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_pni ssbd mba ibrs ibpb stibp ibrs_enhanced fs.gsbase tsc_adjust bmi1 hle avx2 smep bmi2 erva invpcid cmq rdt_a avx512f avx512dq rdseed adx smap avx512ifma cflushopt clwb intel_pt avx512cd sha_hni avx512bw avx512vl xsaveopt xsaves cqm_llc cqm_occ_label cqm_mbb_total cqm_mbb_local split_lock_detect wbinvd dtherm ida arat pln pts avx512vmbi umip pku ospke avx512_vmbi2 gfnl vaes vpcmsem dq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfug flush_lld arch_capabilities

From `numactl --hardware` WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 2 nodes (0-1)

- node 0 cpus: 0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54
- node 0 size: 244340 MB
- node 0 free: 241385 MB
- node 1 cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51

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

Platform Notes (Continued)

53 55
node 1 size: 245266 MB
node 1 free: 256800 MB
node distances:
node 0 1
0:  10  20
1:  20  10

From /proc/meminfo
MemTotal:       527810380 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:

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: usercopy/swapsgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB:
CVE-2017-5715 (Spectre variant 2):
SPEC CPU®2017 Integer Speed Result

Dell Inc.

PowerEdge R650 (Intel Xeon Gold 6348, 2.60 GHz)

SPECspeed®2017_int_base = 12.0

SPECspeed®2017_int_peak = 12.2

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

Platform Notes (Continued)
conditional, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 May 3 04:05

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1

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
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

C | 600.perlbench_s(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 | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
| 625.x264_s(base, peak) 657.xz_s(base, peak)

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---

### Compiler Version Notes (Continued)

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       | 600.perlbench_s(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       | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak) 657.xz_s(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.

---------------------------------------------------------------------

C++      | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak) 641.leela_s(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 | 648.exchange2_s(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

(Continued on next page)
Dell Inc.  
PowerEdge R650 (Intel Xeon Gold 6348, 2.60 GHz)  

| SPECspeed\textsuperscript{®}2017\textsubscript{int}\textsubscript{peak} | 12.2 |
| SPECspeed\textsuperscript{®}2017\textsubscript{int}\textsubscript{base} | 12.0 |

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

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

Base Compiler Invocation (Continued)

C++ benchmarks:  
icpx

Fortran benchmarks:  
ifort

Base Portability Flags

600.perlbench\_s: -DSPEC\_LP64 -DSPEC\_LINUX\_X64  
602.gcc\_s: -DSPEC\_LP64  
605.mcf\_s: -DSPEC\_LP64  
620.omnetpp\_s: -DSPEC\_LP64  
623.xalancbmk\_s: -DSPEC\_LP64 -DSPEC\_LINUX  
625.x264\_s: -DSPEC\_LP64  
631.deepsjeng\_s: -DSPEC\_LP64  
641.leela\_s: -DSPEC\_LP64  
648.exchange2\_s: -DSPEC\_LP64  
657.xz\_s: -DSPEC\_LP64

Base Optimization Flags

C benchmarks:  
-DSPEC\_OPENMP -std=c11 -m64 -flopenmp -Wl,-z,muldefs -xCORE-AVX512  
-O3 -ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:  
-DSPEC\_OPENMP -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:  
-m64 -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte -auto  
-mbranches-within-32B-boundaries
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SPECspeed®2017_int_peak = 12.2

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

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

Peak Compiler Invocation

C benchmarks (except as noted below):
icx
600.perlbench_s: icc

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
600.perlbench_s: -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/usr/local/jemalloc64-5.0.1/lib -ljemalloc

602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdatalib (pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -DSPEC_OPENMP -fopenmp -std=c11 -m64 -Wl,-z,muldefs
-xCORE-AVX512 -flto -O3 -ffast-math
-qopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz_s: basepeak = yes

(Continued on next page)
Dell Inc.

PowerEdge R650 (Intel Xeon Gold 6348, 2.60 GHz)

SPECspeed\textsuperscript{®}2017\textsubscript{int_base} = 12.0
SPECspeed\textsuperscript{®}2017\textsubscript{int_peak} = 12.2

C++ benchmarks:

620.omnetpp\_s: basepeak = yes
623.xalancbmk\_s: basepeak = yes
631.deepsjeng\_s: basepeak = yes
641.leela\_s: basepeak = yes

Fortran benchmarks:

648.exchange2\_s: 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