SPEC CPU®2017 Integer Speed Result

Dell Inc. PowerEdge R660 (Intel Xeon Platinum 8470Q)

SPECspeed®2017_int_base = 12.5
SPECspeed®2017_int_peak = 12.7

CPU2017 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Dec-2022
Hardware Availability: Feb-2023
Software Availability: Jun-2022

Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_s</td>
<td>104</td>
<td>8.45</td>
<td>12.7</td>
</tr>
<tr>
<td>gcc_s</td>
<td>104</td>
<td>10.3</td>
<td>12.5</td>
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<td>mcf_s</td>
<td>104</td>
<td></td>
<td>19.2</td>
</tr>
<tr>
<td>omnetpp_s</td>
<td>104</td>
<td>10.8</td>
<td></td>
</tr>
<tr>
<td>xalanchmk_s</td>
<td>104</td>
<td></td>
<td>23.5</td>
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<tr>
<td>x264_s</td>
<td>104</td>
<td></td>
<td></td>
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<tr>
<td>deepsjeng_s</td>
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<td>6.07</td>
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<tr>
<td>leela_s</td>
<td>104</td>
<td>4.75</td>
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<tr>
<td>exchange2_s</td>
<td>104</td>
<td></td>
<td>18.8</td>
</tr>
<tr>
<td>xz_s</td>
<td>104</td>
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<td>24.2</td>
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</tbody>
</table>

---

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_int_base</th>
<th>SPECspeed®2017_int_peak</th>
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<tbody>
<tr>
<td>perlbench_s</td>
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</tr>
<tr>
<td>gcc_s</td>
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<td></td>
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</tr>
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</tr>
<tr>
<td>leela_s</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>exchange2_s</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>xz_s</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Hardware**

CPU Name: Intel Xeon Platinum 8470Q
Max MHz: 3800
Nominal: 2100
Enabled: 104 cores, 2 chips
Orderable: 1.2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 105 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 125 GB on tmpfs
Other: None

**Software**

OS: SUSE Linux Enterprise Server 15 SP4
Compiler: C/C++; Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;
Parallel: Yes
Firmware: Version 0.3.2 released Nov-2022
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 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.
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>600.perlbench_s</td>
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<td>229</td>
<td>7.75</td>
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<td>7.75</td>
<td>104</td>
<td>229</td>
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<tr>
<td>602.gcc_s</td>
<td>104</td>
<td>387</td>
<td>10.3</td>
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<td>10.3</td>
<td>104</td>
<td>387</td>
</tr>
<tr>
<td>605.mcf_s</td>
<td>104</td>
<td>246</td>
<td>19.2</td>
<td>245</td>
<td>19.2</td>
<td>104</td>
<td>246</td>
</tr>
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<td>620.omnetpp_s</td>
<td>104</td>
<td>152</td>
<td>10.8</td>
<td>151</td>
<td>10.8</td>
<td>104</td>
<td>152</td>
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<tr>
<td>623.xalancbmk_s</td>
<td>104</td>
<td>60.3</td>
<td>23.5</td>
<td>60.4</td>
<td>23.5</td>
<td>104</td>
<td>60.3</td>
</tr>
<tr>
<td>625.x264_s</td>
<td>104</td>
<td>96.7</td>
<td>18.2</td>
<td>96.7</td>
<td>18.2</td>
<td>104</td>
<td>96.7</td>
</tr>
<tr>
<td>631.deepsjeng_s</td>
<td>104</td>
<td>359</td>
<td>4.75</td>
<td>359</td>
<td>4.75</td>
<td>104</td>
<td>359</td>
</tr>
<tr>
<td>641.leela_s</td>
<td>104</td>
<td>157</td>
<td>18.8</td>
<td>157</td>
<td>18.8</td>
<td>104</td>
<td>157</td>
</tr>
<tr>
<td>648.exchange2_s</td>
<td>104</td>
<td>255</td>
<td>24.2</td>
<td>256</td>
<td>24.2</td>
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<td>255</td>
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</tbody>
</table>

**SPECspeed®2017_int_base = 12.5**

**SPECspeed®2017_int_peak = 12.7**

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

### Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalanchmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

### 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:

- KMP_AFFINITY = "granularity=fine,scatter"
- LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.8-ic2022.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2022.1/je5.0.1-64"
- MALLOC_CONF = "retain:true"
- OMP_STACKSIZE = "192M"

### General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Redhat Enterprise Linux 8.0

Transparent Huge Pages enabled by default

(Continued on next page)
Dell Inc. PowerEdge R660 (Intel Xeon Platinum 8470Q)

**CPU2017 License:** 6573  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.

---

**SPEC CPU®2017 Integer Speed Result**

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---

**General Notes (Continued)**

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

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 125 GB ramdisk created with the cmd: “mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk”

---

**Platform Notes**

**BIOS settings:**

- ADDDC Setting : Disabled
- DIMM Self Healing on
- Uncorrectable Memory Error : Disabled
- Virtualization Technology : Disabled
- Logical Processor : Disabled
- Sub NUMA Cluster : 2-way Clustering
- DCU Streamer Prefetcher : Disabled
- LLC Prefetch : Disabled
- Dead Line LLC Alloc : Disabled
- Optimizer Mode : Enabled
- System Profile : Custom
- CPU Power Management : Maximum Performance
- C1E : Disabled
- C States : Autonomous
- Memory Patrol Scrub : Disabled
- Energy Efficiency Policy : Performance
- PCI ASPM L1 Link
- Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.8-ic2022.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acao64d
running on localhost Tue Dec 6 07:57:38 2022

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) Platinum 8470Q
2 "physical id"s (chips)
104 "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 : 52
siblings : 52
```

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

(Continued on next page)
Dell Inc.

PowerEdge R660 (Intel Xeon Platinum 8470Q)

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**SPECspeed®2017_int_base = 12.5**

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<table>
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<tr>
<th>CPU2017 License:</th>
<th>6573</th>
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<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Dell Inc.</td>
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<tr>
<td>Tested by:</td>
<td>Dell Inc.</td>
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<tr>
<td>Test Date:</td>
<td>Dec-2022</td>
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<tr>
<td>Hardware Availability:</td>
<td>Feb-2023</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2022</td>
</tr>
</tbody>
</table>

From `lscpu` from util-linux 2.37.2:

<table>
<thead>
<tr>
<th>Architecture:</th>
<th>x86_64</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU op-mode(s):</td>
<td>32-bit, 64-bit</td>
</tr>
<tr>
<td>Address sizes:</td>
<td>46 bits physical, 57 bits virtual</td>
</tr>
<tr>
<td>Byte Order:</td>
<td>Little Endian</td>
</tr>
<tr>
<td>CPU(s):</td>
<td>104</td>
</tr>
<tr>
<td>On-line CPU(s) list:</td>
<td>0-103</td>
</tr>
<tr>
<td>Vendor ID:</td>
<td>GenuineIntel</td>
</tr>
<tr>
<td>Model name:</td>
<td>Intel(R) Xeon(R) Platinum 8470Q</td>
</tr>
<tr>
<td>CPU family:</td>
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</tr>
<tr>
<td>Model:</td>
<td>143</td>
</tr>
<tr>
<td>Thread(s) per core:</td>
<td>1</td>
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<tr>
<td>Core(s) per socket:</td>
<td>52</td>
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<tr>
<td>Socket(s):</td>
<td>2</td>
</tr>
<tr>
<td>Stepping:</td>
<td>8</td>
</tr>
</tbody>
</table>

**From lscpu from util-linux 2.37.2:**

<table>
<thead>
<tr>
<th>NAME ONE-SIZE ALL-SIZE WAYS TYPE</th>
<th>LEVEL</th>
<th>SETS PHY-LINE COHERENCY-SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>48K</td>
<td>4.9M 12 Data</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>3.3M 8 Instruction</td>
</tr>
<tr>
<td>L2</td>
<td>2M</td>
<td>208M 16 Unified</td>
</tr>
</tbody>
</table>

(Continued on next page)
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PowerEdge R660 (Intel Xeon Platinum 8470Q)  SPECspeed®2017_int_base = 12.5
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Platform Notes (Continued)

L3 105M 210M 15 Unified 3 114688 1 64

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
  node 0 size: 257493 MB
  node 0 free: 255747 MB
  node 1 size: 258041 MB
  node 1 free: 250059 MB
  node 2 size: 258041 MB
  node 2 free: 257830 MB
  node 3 size: 257978 MB
  node 3 free: 257702 MB
node distances:
  node 0: 10 12 21 21
  node 1: 12 10 21 21
  node 2: 21 21 10 12
  node 3: 21 21 12 10

From /proc/meminfo
MemTotal: 1056311696 kB
MemFree: 2048 kB

uname -a:
Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222) 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/swaps

(Continued on next page)
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Platform Notes (Continued)

barriers and __user pointer sanitation
Mitigation: Enhanced IBRS, IBPB:
conditional, RBB filling

CVE-2017-5715 (Spectre variant 2):
 CVE-2018-0543 (Special Register Buffer Data Sampling): Not affected
 CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Dec 6 07:54
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2022.1
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 125G 3.6G 122G 3% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge R660
Product Family: PowerEdge
Serial: SLR6602

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:
16x 00CE00B300CE M321R8GA0BB0-CQKEG 64 GB 2 rank 4800

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 0.3.2
BIOS Date: 11/30/2022
BIOS Revision: 0.3

(End of data from sysinfo program)

Compiler Version Notes

============================================================================================================
C | 600.perlbench_s(base, peak) 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 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------
C++ | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak)
------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------
Fortran | 648.exchange2_s(base, peak)
------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------------------------------------
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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

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:
m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

C++ benchmarks:
m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX512 -O3
-ffast-math -ftlo -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-fno-strict-overflow -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.profdata(pass 2) -xCORE-AVX512 -O3
-ffast-math -ftlo -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

605.mcf_s: basepeak = yes

625.x264_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3
-ffast-math -ftlo -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-fno-alias -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

657.xz_s: basepeak = yes

C++ benchmarks:
Dell Inc.
PowerEdge R660 (Intel Xeon Platinum 8470Q)

Dell Inc.

SPECspeed®2017_int_base = 12.5
SPECspeed®2017_int_peak = 12.7

Peak Optimization Flags (Continued)

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
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.2.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.2.xml

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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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