## SPEC CPU®2017 Floating Point Speed Result

**Dell Inc.**

PowerEdge R450 (Intel Xeon Gold 5315Y, 3.20 GHz)

### SPECspeed®2017_fp_base = 104

### SPECspeed®2017_fp_peak = 106

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>Dell Inc.</th>
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<tbody>
<tr>
<td>Test Date:</td>
<td>Dec-2021</td>
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<tr>
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<td>Oct-2021</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>May-2021</td>
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</tbody>
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### Benchmarks

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>16</td>
<td>122</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>16</td>
<td>83.8</td>
<td>104</td>
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<tr>
<td>619.ibm_s</td>
<td>16</td>
<td>101</td>
<td>106</td>
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<tr>
<td>621.wrf_s</td>
<td>16</td>
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<td>121</td>
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<tr>
<td>627.cam4_s</td>
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<td>628.pop2_s</td>
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<tr>
<td>638.imagick_s</td>
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<td>68.9</td>
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<tr>
<td>644.nab_s</td>
<td>16</td>
<td>143</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>16</td>
<td>163</td>
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<tr>
<td>654.roms_s</td>
<td>16</td>
<td>102</td>
<td>126</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 5315Y
- **Max MHz:** 3600
- **Nominal:** 3200
- **Enabled:** 16 cores, 2 chips
- **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:** 12 MB I+D on chip per chip
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)
- **Storage:** 125 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:** Yes
- **Firmware:** Version 1.3.8 released Aug-2021
- **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.
Dell Inc.
PowerEdge R450 (Intel Xeon Gold 5315Y, 3.20 GHz)

Results Table

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<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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,compact"
LD_LIBRARY_PATH = "/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/lib/je5.0.1-64"
MALLOCONF = "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:
sync; echo 3>/proc/sys/vm/drop_caches

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 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G 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
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 982a61ec0915b55891ef0e16acaf64d
running on localhost.localdomain Wed Dec 8 13:48:26 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

From /proc/cpuinfo
model name : Intel(R) Xeon(R) Gold 5315Y CPU @ 3.20GHz
  2 "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 : 8
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

From lscpu from util-linux 2.32.1:
Architecture: x86_64
SPEC CPU®2017 Floating Point Speed Result
Copyright 2017-2022 Standard Performance Evaluation Corporation

Dell Inc.  
PowerEdge R450 (Intel Xeon Gold 5315Y, 3.20 GHz)

CPU2017 License: 55  
Test Sponsor: Dell Inc.  
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SPECspeed®2017_fp_base = 104  
SPECspeed®2017_fp_peak = 106

Platform Notes (Continued)

CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 16
On-line CPU(s) list: 0-15
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 5315Y CPU @ 3.20GHz
BIOS Model name: Intel(R) Xeon(R) Gold 5315Y CPU @ 3.20GHz
Stepping: 6
CPU MHz: 1387.009
BogoMIPS: 6400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 12288K
NUMA node0 CPU(s): 0,2,4,6,8,10,12,14
NUMA node1 CPU(s): 1,3,5,7,9,11,13,15
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 pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 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 avx f16c rdrand vfpv10 coreinfo rdtsc ept vpid fpu vme pbe ts mmu clflush dts msr pae mce cx8ika mmx fpxr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand vfpv10 coreinfo rdtsc ept vpid fpu vme pbe ts mmu clflush dts msr pae mce cx8ika

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
   node 0 size: 257147 MB
   node 0 free: 243812 MB

(Continued on next page)
SPEC CPU®2017 Floating Point Speed Result

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

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

Platform Notes (Continued)

node 1 cpus: 1 3 5 7 9 11 13 15
node 1 size: 258043 MB
node 1 free: 255609 MB
node distances:
node 0 1
0:  10  20
1:  20  10

From /proc/meminfo
MemTotal:       527555524 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="8.4 (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 prct1 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): (Continued on next page)
Dell Inc.

PowerEdge R450 (Intel Xeon Gold 5315Y, 3.20 GHz)

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**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 3 Dec 8 10:57

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

Filesystem     Type   Size  Used Avail Use% Mounted on
   tmpfs          tmpfs  125G   10G  116G   8% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
   Vendor:         Dell Inc.
   Product:        PowerEdge R450
   Product Family: PowerEdge
   Serial:         1S31501

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 002C00B3002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2933

BIOS:  
   BIOS Vendor:       Dell Inc.
   BIOS Version:      1.3.8
   BIOS Date:         08/31/2021
   BIOS Revision:     1.3

(End of data from sysinfo program)

**Compiler Version Notes**

---

C          | 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base)  

---

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.

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C          | 644.nab_s(peak)  

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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Dell Inc.
PowerEdge R450 (Intel Xeon Gold 5315Y, 3.20 GHz)

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

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

SPEC CPU®2017 Floating Point Speed Result

SPEC speed®2017_fp_peak = 106
SPEC speed®2017_fp_base = 104

Compiler Version Notes (Continued)

Copyright 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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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, 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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Intel(R) Fortran 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.

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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-----------------------------------------------------------------------------------
Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
628.pop2_s(base, peak)

(Continued on next page)
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Compiler Version Notes (Continued)

Intel(R) Fortran 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.

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.

Base Compiler Invocation

C benchmarks:
icc

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icc

Benchmarks using Fortran, C, and C++:
icpc icc ifort

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
   -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

(Continued on next page)
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### Base Optimization Flags (Continued)

- **C benchmarks (continued):**
  - `-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP`  
  - `-mbranches-within-32B-boundaries`

- **Fortran benchmarks:**
  - `-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3`  
  - `-no-prec-div -qopt-prefetch -ffinite-math-only`  
  - `-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs`  
  - `-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

- **Benchmarks using both Fortran and C:**
  - `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
  - `-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`  
  - `-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`  
  - `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

- **Benchmarks using Fortran, C, and C++:**
  - `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
  - `-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp`  
  - `-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs`  
  - `-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

### Peak Compiler Invocation

- **C benchmarks (except as noted below):**
  - `icc`
  - `644.nab_s: icx`

- **Fortran benchmarks:**
  - `ifort`

- **Benchmarks using both Fortran and C:**
  - `ifort icc`

- **Benchmarks using Fortran, C, and C++:**
  - `icpc icc ifort`
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### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

**C benchmarks:**

- 619.lbm_s: basepeak = yes
- 638.imagick_s: basepeak = yes

**Fortran benchmarks:**

- 603.bwaves_s: basepeak = yes
- 649.fotonik3d_s: basepeak = yes
- 654.roms_s: basepeak = yes

**Benchmarks using both Fortran and C:**

- 621.wrf_s: -m64 -std=c11 -W1,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX512 -03 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

- 627.cam4_s: basepeak = yes

**Benchmarks using Fortran, C, and C++:**

- 607.cactuBSSN_s: basepeak = yes
# SPEC CPU®2017 Floating Point Speed Result

**Dell Inc.**

PowerEdge R450 (Intel Xeon Gold 5315Y, 3.20 GHz)

<table>
<thead>
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<th>CPU2017 License:</th>
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<td>Tested by:</td>
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<tr>
<td>Test Date:</td>
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<td>Hardware Availability:</td>
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<td>SPECspeed®2017_fp_peak = 106</td>
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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
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.5.xml

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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 v1.1.8 on 2021-12-08 13:48:25-0500.
Report generated on 2022-01-05 13:30:30 by CPU2017 PDF formatter v6442.
Originally published on 2022-01-04.