## SPEC CPU®2017 Floating Point Rate Result

### Dell Inc.

**PowerEdge R940xa (Intel Xeon Platinum 8270, 2.70 GHz)**

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>55</th>
<th>Test Date:</th>
<th>Nov-2022</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Dell Inc.</td>
<td>Hardware Availability:</td>
<td>Apr-2019</td>
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<td>Tested by:</td>
<td>Dell Inc.</td>
<td>Software Availability:</td>
<td>May-2022</td>
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### SPECrate®2017_fp_base = 676

### SPECrate®2017_fp_peak = Not Run

#### Hardware

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<thead>
<tr>
<th>Copies</th>
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<tbody>
<tr>
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<td>208</td>
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<tr>
<td>507.cactuBSSN_r</td>
<td>208</td>
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<tr>
<td>508.namd_r</td>
<td>208</td>
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<tr>
<td>510.parest_r</td>
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<tr>
<td>511.povray_r</td>
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<td>519.lbm_r</td>
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<td>521.wrf_r</td>
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<td>526.blender_r</td>
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<td>527.cam4_r</td>
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<td>538.imagick_r</td>
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<td>544.nab_r</td>
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<td>549.fotonik3d_r</td>
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<td>554.roms_r</td>
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#### Software

<table>
<thead>
<tr>
<th>OS:</th>
<th>Red Hat Enterprise Linux 8.6 (Ootpa)</th>
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<tr>
<td></td>
<td>4.18.0-372.9.1.el8.x86_64</td>
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<tr>
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<th>C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;</th>
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<tr>
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<td>Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;</td>
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<th>Parallel:</th>
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<th>Firmware:</th>
<th>Version 2.15.1 released Jun-2022</th>
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<table>
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<tr>
<th>File System:</th>
<th>tmpfs</th>
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<table>
<thead>
<tr>
<th>System State:</th>
<th>Run level 3 (multi-user)</th>
</tr>
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<table>
<thead>
<tr>
<th>Base Pointers:</th>
<th>64-bit</th>
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<table>
<thead>
<tr>
<th>Peak Pointers:</th>
<th>Not Applicable</th>
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<table>
<thead>
<tr>
<th>Other:</th>
<th>jemalloc memory allocator V5.0.1</th>
</tr>
</thead>
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<table>
<thead>
<tr>
<th>Power Management:</th>
<th>BIOS and OS set to prefer performance at the cost of additional power usage.</th>
</tr>
</thead>
</table>

## CPU Name:
Intel Xeon Platinum 8270

## Max MHz:
4000

## Nominal:
2700

## Enabled:
104 cores, 4 chips, 2 threads/core

## Orderable:
1,2,4 chips

## Cache L1:
32 KB I + 32 KB D on chip per core

## L2:
1 MB I+D on chip per core

## L3:
35.75 MB I+D on chip per chip

## Memory:
768 GB (24 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)

## Storage:
125 GB on tmpfs

## Other:
None
SPEC CPU®2017 Floating Point Rate Result

Dell Inc.
PowerEdge R940xa (Intel Xeon Platinum 8270, 2.70 GHz)

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

Results Table

<table>
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</tr>
</tbody>
</table>

SPECrate®2017_fp_base = 676
SPECrate®2017_fp_peak = Not Run

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/cpu2017-1.1.8-ic2022.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2022.1/je5.0.1-64"
MALLOCC_CONF = "retain:true"

General Notes
Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Red Hat Enterprise Linux 8.4
Transparent Huge Pages enabled by default

(Continued on next page)
Dell Inc.
PowerEdge R940xa (Intel Xeon Platinum 8270, 2.70 GHz)

SPEC CPU®2017 Floating Point Rate Result
Copyright 2017-2022 Standard Performance Evaluation Corporation

SPECrate®2017_fp_base = 676
SPECrate®2017_fp_peak = Not Run

CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Nov-2022
Hardware Availability: Apr-2019
Software Availability: May-2022

General Notes (Continued)

Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numacl 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 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"

Platform Notes

BIOS settings:
   Virtualization Technology : Disabled
   Sub NUMA Cluster : Enabled
   DCU Streamer Prefetcher : Disabled
   Dead Line LLC Alloc : Disabled
   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 982a61ec0915b555891ef0e16a6a615e
running on localhost.localdomain Thu Nov 17 23:50:15 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 8270 CPU @ 2.70GHz

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

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PowerEdge R940xa (Intel Xeon Platinum 8270, 2.70 GHz)

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CPU2017 License: 55
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Test Date: Nov-2022
Hardware Availability: Apr-2019
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Platform Notes (Continued)

4 "physical ids (chips)
208 "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 : 26
siblings : 52
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28
29
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28
29
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28
29
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 24 25 26 27 28
29

From lscpu from util-linux 2.32.1:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 208
On-line CPU(s) list: 0-207
Thread(s) per core: 2
Core(s) per socket: 26
Socket(s): 4
NUMA node(s): 8
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8270 CPU @ 2.70GHz
BIOS Model name: Intel(R) Xeon(R) Platinum 8270 CPU @ 2.70GHz
Stepping: 5
CPU MHz: 4000.000
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 5400.00
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0,10,18,26,34,42,50,58,66,74,82,90,98,104,114,122,130,138,146,154,162,170,178,186,194,202
NUMA node1 CPU(s): 1,9,17,25,33,41,49,57,65,73,81,89,97,105,113,121,129,137,145,153,161,169,177,185,193,199
NUMA node2 CPU(s): (Continued on next page)
Spec CPU®2017 Floating Point Rate Result

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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.
Test Date: Nov-2022
Hardware Availability: Apr-2019
Software Availability: May-2022

Platform Notes (Continued)

2,8,16,24,32,40,48,56,64,72,80,88,96,106,112,120,128,136,144,152,160,168,176,184,192,200
NUMA node3 CPU(s):
NUMA node4 CPU(s):
4,12,20,28,36,44,52,60,68,76,84,92,100,108,116,124,132,140,148,156,164,172,180,188,196,204
NUMA node5 CPU(s):
5,13,21,29,37,45,53,61,69,77,85,93,101,109,117,125,133,141,149,157,165,173,181,189,197,205
NUMA node6 CPU(s):
6,14,22,30,38,46,54,62,70,78,86,94,102,110,118,126,134,142,150,158,166,174,182,190,198,206
NUMA node7 CPU(s):
Flags: fpu vme de pse tsc msr tsc msr pae mce cmov pat pse36 clflush dts acpica mask cmov cmov pmx nonstop_tsc pvd tsc_adjust mispull dm coprocessor
From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.

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

Cache size: 36608 KB

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

PowerEdge R940xa (Intel Xeon Platinum 8270, 2.70 GHz)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
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<td>Dell Inc.</td>
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**SPEC CPU®2017 Floating Point Rate Result**

<table>
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<tr>
<th>SPECrate®2017_fp_base</th>
<th>676</th>
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</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
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</tbody>
</table>

**Platform Notes (Continued)**

```plaintext
node 3 cpus: 3 11 19 27 35 43 51 59 67 75 83 91 99 107 115 123 131 139 147 155 163 171 179 187 195 203
node 3 size: 96762 MB
node 3 free: 95512 MB
node 4 cpus: 4 12 20 28 36 44 52 60 68 76 84 92 100 108 116 124 132 140 148 156 164 172 180 188 196 204
node 4 size: 96762 MB
node 4 free: 96418 MB
node 5 cpus: 5 13 21 29 37 45 53 61 69 77 85 93 101 109 117 125 133 141 149 157 165 173 181 189 197 205
node 5 size: 96762 MB
node 5 free: 95745 MB
node 6 cpus: 6 14 22 30 38 46 54 62 70 78 86 94 102 110 118 126 134 142 150 158 166 174 182 190 198 206
node 6 size: 96762 MB
node 6 free: 96223 MB
node 7 cpus: 7 15 23 31 39 47 55 63 71 79 87 95 103 111 119 127 135 143 151 159 167 175 183 191 199 207
node 7 size: 96710 MB
node 7 free: 94807 MB
node distances:
node 0 1 2 3 4 5 6 7
0: 10 21 21 21 21 21 11 21
1: 21 10 21 21 21 11 21 21
2: 21 21 10 21 21 11 21 21
3: 21 21 21 10 21 21 21 21
4: 21 21 11 21 10 21 21 21
5: 21 11 21 21 21 10 21 21
6: 11 21 21 21 21 21 10 21
7: 21 21 21 11 21 21 21 21

From /proc/meminfo
MemTotal: 790698020 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
/sbin/tuned-adm active
Current active profile: throughput-performance
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*
os-release:
NAME="Red Hat Enterprise Linux"
VERSION="8.6 (Ootpa)"
ID="rhel"
```

(Continued on next page)
Dell Inc.
PowerEdge R940xa (Intel Xeon Platinum 8270, 2.70 GHz)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
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<tr>
<td>SPECrate®2017_fp_base=</td>
<td>676</td>
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| Test Sponsor: | Dell Inc. |
| Tested by: | Dell Inc. |
| Test Date: | Nov-2022 |
| Hardware Availability: | Apr-2019 |
| Software Availability: | May-2022 |

### Platform Notes (Continued)

```bash
ID_LIKE="fedora"
VERSION_ID="8.6"
PLATFORM_ID="platform:el8"
PRETTY_NAME="Red Hat Enterprise Linux 8.6 (Ootpa)"
ANSIColor="0;31"
redhat-release: Red Hat Enterprise Linux release 8.6 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.6 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8::baseos
```

Kernel self-reported vulnerability status:

- **CVE-2018-12207 (iTLB Multihit):** KVM: Mitigation: VMX unsupported Not affected
- **CVE-2018-3620 (L1 Terminal Fault):** Mitigation: Clear CPU buffers; SMT vulnerable Not affected
- **Microarchitectural Data Sampling:** Mitigation: Clear CPU buffers; SMT vulnerable
- **CVE-2017-5754 (Meltdown):** Not affected
- **CVE-2018-3639 (Speculative Store Bypass):** Mitigation: Clear CPU buffers; SMT vulnerable
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: Clear CPU buffers; SMT vulnerable
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: conditional, RSB filling
- **CVE-2020-0543 (Special Register Buffer Data Sampling):** Not affected
- **CVE-2019-11135 (TSX Asynchronous Abort):** Mitigation: Clear CPU buffers; SMT vulnerable

run-level 3 Nov 17 20:16

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2022.1

```bash
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 R940xa
- **Product Family:** PowerEdge
- **Serial:** FRKY0Q2

Additional information from dmidecode 3.3 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to
Platform Notes (Continued)

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:
24x 00CE063200CE M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2933

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 2.15.1
BIOS Date: 06/16/2022
BIOS Revision: 2.15

(End of data from sysinfo program)
## Compiler Version Notes (Continued)

Version 2022.1.0 Build 20220316  
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.  
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.  
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.  
__________________________________________________________________________

<table>
<thead>
<tr>
<th></th>
<th>503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)</th>
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<td>Intel (R) Fortran Compiler for applications running on Intel (R) 64, Version 2022.1.0 Build 20220316</td>
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<tr>
<td>Copyright (C) 1985-2022 Intel Corporation. All rights reserved.</td>
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<th></th>
<th>521.wrf_r(base) 527.cam4_r(base)</th>
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<td>Intel (R) Fortran Compiler for applications running on Intel (R) 64, Version 2022.1.0 Build 20220316</td>
<td></td>
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</tbody>
</table>

Base Compiler Invocation

C benchmarks: icx

C++ benchmarks: icpx

Fortran benchmarks: ifx

Benchmarks using both Fortran and C: ifx icx

Benchmarks using both C and C++: icpx icx

(Continued on next page)
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Software Availability: May-2022

---

Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
icpx icx ifx

---

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.ibm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

---

Base Optimization Flags

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

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

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

Benchmarks using both Fortran and C:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

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

Dell Inc.
PowerEdge R940xa (Intel Xeon Platinum 8270, 2.70 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base = 676</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak = Not Run</td>
</tr>
</tbody>
</table>

CPU2017 License: 55
Test Sponsor: Dell Inc.
Test Date: Nov-2022
Hardware Availability: Apr-2019
Tested by: Dell Inc.
Software Availability: May-2022

Base Optimization Flags (Continued)

Benchmarks using both C and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

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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