**SPEC CPU®2017 Floating Point Rate Result**

**Dell Inc.**

**PowerEdge R760 (Intel Xeon Platinum 8470Q)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
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<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
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**CPU2017 License:** 6573  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Test Date:** Dec-2022  
**Hardware Availability:** Feb-2023  
**Software Availability:** Jun-2022

### Hardware

| Software | **CPU Name:** Intel Xeon Platinum 8470Q  
**Max MHz:** 3800  
**Nominal:** 2100  
**Enabled:** 104 cores, 2 chips, 2 threads/core  
**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 core  
**Other:** None  
**Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)  
**Storage:** 125 GB on tmpfs  
**Other:** None |

| Software | **OS:** SUSE Linux Enterprise Server 15 SP4  
5.14.21-150400.22-default  
**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:** No  
**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. |

### Test Result

<table>
<thead>
<tr>
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**Dell Inc.**

PowerEdge R760 (Intel Xeon Platinum 8470Q)

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Results Table

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**SPECrate®2017_fp_base = 916**

**SPECrate®2017_fp_peak = 981**

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"
MALLOCONF_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 R760 (Intel Xeon Platinum 8470Q)

SPECrates®

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

Test Date: Dec-2022
Hardware Availability: Feb-2023
Software Availability: Jun-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:
  ADDDC Setting : Disabled
  DIMM Self Healing on
  Uncorrectable Memory Error : Disabled
  Virtualization Technology : Disabled
  Sub NUMA Cluster : 4-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 982a61ec0915b55891ef0e16acaf64d
running on localhost Sat Dec 3 13:36:52 2022

SUT (System Under Test) info as seen by some common utilities.
Dell Inc.

PowerEdge R760 (Intel Xeon Platinum 8470Q)

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

| SPECrate\(^{\circledR}2017\)\(_{\text{fp_base}}\) | 916  
| SPECrate\(^{\circledR}2017\)\(_{\text{fp_peak}}\) | 981

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

**Platform Notes (Continued)**

For more information on this section, see  
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From `/proc/cpuinfo`

```plaintext
model name : Intel(R) Xeon(R) Platinum 8470Q
  2 "physical id"s (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 : 52
siblings : 104
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 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
```

From `lscpu` from `util-linux 2.37.2`

```plaintext
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 46 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 208
On-line CPU(s) list: 0-207
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8470Q
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 52
Socket(s): 2
Stepping: 8
BogoMIPS: 4200.00
Flags:
  fpu vme de pse mce cx8 apic sep mtrr
  pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx
  pdflush pdtopd tsc msr pke tpxe pbe
  nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 ds_cpl smx est tm2
  ssse3 sse2 fmulDiv mmx plus xea2pic movbe popcnt
  tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
  ebpx cat_13 cat_12 cd_p13 invpcid_single cd_p12 ssbd mba ibrs ibpb stibp
  ibrs_enhanced fsqbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a
  avx512f avx512dq rdseed adrp adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni
  avx512bw avx512vl xsavesopt xsaveopt xgetbv1 xsaves cqm_1lc cqm_occu_1lc cqm_mb_total
  cqm_mbapus local split_lock detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pin
  pts avx512vbmi umip pku ospke waiptkg avx512_vbmi2 gfnl vaes vpclmulqdq avx512_vnni
  avx512_bleal gte avx512_vpopcntdq la57 rpdpd bus_lock_detect cldemote movdiri
  movdir64b enqcmd fse m_clear serialize tsxdltrk pconfig arch_ibr avx512_fp16
  amx_tile flush_l1d arch_capabilities
```

(Continued on next page)
Platform Notes (Continued)

L1d cache: 4.9 MiB (104 instances)
L1i cache: 3.3 MiB (104 instances)
L2 cache: 208 MiB (104 instances)
L3 cache: 210 MiB (2 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0-12,104-116
NUMA node1 CPU(s): 13-25,117-129
NUMA node2 CPU(s): 26-38,130-142
NUMA node3 CPU(s): 39-51,143-155
NUMA node4 CPU(s): 52-64,156-168
NUMA node5 CPU(s): 65-77,169-181
NUMA node6 CPU(s): 78-90,182-194
NUMA node7 CPU(s): 91-103,195-207
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d  48K  4.9M  12 Data 1 64 1 64
L1i  32K  3.3M  8 Instruction 1 64 1 64
L2   2M  208M  16 Unified 2 2048 1 64
L3  105M  210M  15 Unified 3 114688 1 64

/proc/cpuinfo cache data
  cache size : 107520 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 8 nodes (0-7)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 104 105 106 107 108 109 110 111 112 113 114 115 116
  node 0 size: 63923 MB
  node 0 free: 48515 MB
  node 1 cpus: 13 14 15 16 17 18 19 20 21 22 23 24 25 117 118 119 120 121 122 123 124 125 126 127 128 129
  node 1 size: 64505 MB
  node 1 free: 46797 MB

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

**PowerEdge R760 (Intel Xeon Platinum 8470Q)**

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### Platform Notes (Continued)

node 2 cpus: 26 27 28 29 30 31 32 33 34 35 36 37 38 130 131 132 133 134 135 136 137 138 139 140 141 142
node 2 size: 64505 MB
node 2 free: 54233 MB
node 3 cpus: 39 40 41 42 43 44 45 46 47 48 49 50 51 143 144 145 146 147 148 149 150 151 152 153 154 155
node 3 size: 64505 MB
node 3 free: 54209 MB
node 4 cpus: 52 53 54 55 56 57 58 59 60 61 62 63 64 156 157 158 159 160 161 162 163 164 165 166 167 168
node 4 size: 64505 MB
node 4 free: 54233 MB
node 5 cpus: 65 66 67 68 69 70 71 72 73 74 75 76 77 169 170 171 172 173 174 175 176 177 178 179 180 181
node 5 size: 64505 MB
node 5 free: 54240 MB
node 6 cpus: 78 79 80 81 82 83 84 85 86 87 88 89 90 182 183 184 185 186 187 188 189 190 191 192 193 194
node 6 size: 64505 MB
node 6 free: 54246 MB
node 7 cpus: 91 92 93 94 95 96 97 98 99 100 101 102 103 195 196 197 198 199 200 201 202 203 204 205 206 207
node 7 size: 64458 MB
node 7 free: 54161 MB
node distances:

From /proc/meminfo
MemTotal: 527784340 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15-SP4"
    VERSION_ID="15.4"
    PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
    ID="sles"

(Continued on next page)
Platform Notes (Continued)

ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp4"

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/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 3 Dec 3 09:09

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2022.1
Filesystem Type Size Used Avail Use% Mounted on
  tmpfs tmpfs 125G 82G 44G 66% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
  Vendor: Dell Inc.
  Product: PowerEdge R760
  Product Family: PowerEdge
  Serial: SLR7603

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 002C0632002C MTC20F2085S1RC48BA1 32 GB 2 rank 4800

BIOS:
  BIOS Vendor: Dell Inc.
  BIOS Version: 0.3.2

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

**Dell Inc.**

PowerEdge R760 (Intel Xeon Platinum 8470Q)

**SPECrate®2017_fp_base = 916**

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**Platform Notes (Continued)**

- **BIOS Date:** 11/30/2022
- **BIOS Revision:** 0.3

(End of data from sysinfo program)

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**Compiler Version Notes**

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<th>C++/C++ Programs</th>
<th>C++/C Programs</th>
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<td>Copyright (C) 1985-2022 Intel Corporation. All rights reserved.</td>
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**PowerEdge R760 (Intel Xeon Platinum 8470Q)**

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### Compiler Version Notes (Continued)

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**Fortran**

- 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
- 554.roms_r(base, peak)

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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
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**Fortran, C**

- 521.wrf_r(base, peak) 527.cam4_r(base, peak)

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### 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

Benchmarks using Fortran, C, and C++:
- icpx icx ifx
Dell Inc. PowerEdge R760 (Intel Xeon Platinum 8470Q)

**SPEC®CPU®2017 Floating Point Rate Result**

**Test Sponsor:** Dell Inc.  
**Test Date:** Dec-2022

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

**SPECrate®2017_fp_base = 916**  
**Hardware Availability:** Feb-2023

**SPECrate®2017_fp_peak = 981**  
**Software Availability:** Jun-2022

### 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.lbm_r: -DSPEC_LP64
- 521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- 526.blender_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
- 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`

**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`

(Continued on next page)
Dell Inc.
PowerEdge R760 (Intel Xeon Platinum 8470Q)

CPU2017 License: 6573
Test Sponsor: Dell Inc.
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Test Date: Dec-2022
Hardware Availability: Feb-2023
Software Availability: Jun-2022

SPECrate®2017_fp_base = 916
SPECrate®2017_fp_peak = 981

Base Optimization Flags (Continued)

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

Peak 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

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

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops

(Continued on next page)
Peak Optimization Flags (Continued)

544.nab_r (continued):
-qopt-mem-layout-trans=4 -qopt-zmm-usage=high -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flt0 -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

554.roms_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flt0 -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:

521.wrf_r: -w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-ffast-math -flt0 -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: basepeak = yes

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flt0 -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
### SPEC CPU®2017 Floating Point Rate Result

**Dell Inc.**

PowerEdge R760 (Intel Xeon Platinum 8470Q)

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<th>SPECrate®2017_fp_peak = 981</th>
<th>SPECrate®2017_fp_base = 916</th>
</tr>
</thead>
</table>

- **CPU2017 License:** 6573
- **Test Sponsor:** Dell Inc.
- **Tested by:** Dell Inc.
- **Test Date:** Dec-2022
- **Hardware Availability:** Feb-2023
- **Software Availability:** Jun-2022

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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