## SPEC CPU®2017 Floating Point Rate Result

**Dell Inc.**  
PowerEdge R750xs (Intel Xeon Silver 4314, 2.40 GHz)

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>= 249</td>
<td>= 257</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4314
- **Max MHz:** 3400
- **Nominal:** 2400
- **Enabled:** 32 cores, 2 chips, 2 threads/core
- **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:** 24 MB I+D on chip per core
- **Other:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R, running at 2666)
- **Storage:** 225 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:** No
- **Firmware:** Version 1.2.1 released May-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 R750xs (Intel Xeon Silver 4314, 2.40 GHz)

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

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

Results Table

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</tbody>
</table>

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-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.8-ic2021.1/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1
Transparent Huge Pages enabled by default

(Continued on next page)
Dell Inc.
PowerEdge R750xs (Intel Xeon Silver 4314, 2.40 GHz)

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.

SPECrate®2017_fp_base = 249
SPECrate®2017_fp_peak = 257

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

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 numacl1 i.e.:
    numacl1 --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 225 GB ramdisk created with the cmd: "mount -t tmpfs -o size=225G tmpfs /mnt/ramdisk"

Platform Notes

BIOS settings:
    Sub NUMA Cluster : 2-Way Clustering
    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 982a61ec0915b55891ef0e16acafc64d
running on r750xs.jzjpm83.inside.dell.com Tue Sep 14 20:12:47 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) Silver 4314 CPU @ 2.40GHz

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

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**SPECrate®2017_fp_base = 249**

**SPECrate®2017_fp_peak = 257**

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### Platform Notes (Continued)

2 "physical id"s (chips)  
64 "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 : 16
- siblings : 32
- physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
- physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

---

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): 64  
On-line CPU(s) list: 0-63  
Thread(s) per core: 2  
Core(s) per socket: 16  
Socket(s): 2  
NUMA node(s): 4  
Vendor ID: GenuineIntel  
BIOS Vendor ID: Intel  
CPU family: 6  
Model: 106  
Model name: Intel(R) Xeon(R) Silver 4314 CPU @ 2.40GHz  
BIOS Model name: Intel(R) Xeon(R) Silver 4314 CPU @ 2.40GHz  
Stepping: 6  
CPU MHz: 2712.828  
BogoMIPS: 4800.00  
Virtualization: VT-x  
L1d cache: 48K  
L1i cache: 32K  
L2 cache: 1280K  
L3 cache: 24576K  
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60  
NUMA node1 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62  
NUMA node2 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61  
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63  
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 xtopology nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xptr pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm ablm abm 3nowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced fsnsbase tsc_adjust bmi1 hle avx2 smep bmi2  
smem invpd cmq rdt_a avx512f avx512dq rdseed adx amap avx512ifma clflushopt clwb intel_pt avx512cd sha_hni avx512bw avx512vl xsaves xsaveopt xsavec xgetbv1 xswaps cmq_llc cmq_occup_llc cmq_mmb_total cmq_mmb_local split_lock_detect wbnoinvd

(Continued on next page)
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**Test Date:** Sep-2021  
**Hardware Availability:** Jul-2021  
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---

**Platform Notes (Continued)**

```
dtherm ida arat pln pts avx512vbmi umip pkpu oslo avx512_vbmi2 qfni vasm vpcmulsion dq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid fasm md_clear pconfig flush_lld arch_capabilities
```

```
/proc/cpuinfo cache data  
cache size : 24576 KB
```

From `numactl --hardware`

- **WARNING:** a numactl 'node' might or might not correspond to a physical chip.
- **available:** 4 nodes (0-3)
  - **node 0 cpus:** 0 4 8 12 16 20 24 28 32 36 40 44 48 52 56 60
  - **node 0 size:** 128157 MB
  - **node 0 free:** 117234 MB
  - **node 1 cpus:** 2 6 10 14 18 22 26 30 34 38 42 46 50 54 58 62
  - **node 1 size:** 129020 MB
  - **node 1 free:** 121782 MB
  - **node 2 cpus:** 1 5 9 13 17 21 25 29 33 37 41 45 49 53 57 61
  - **node 2 size:** 128983 MB
  - **node 2 free:** 122400 MB
  - **node 3 cpus:** 3 7 11 15 19 23 27 31 35 39 43 47 51 55 59 63
  - **node 3 size:** 129017 MB
  - **node 3 free:** 113450 MB
  - **node distances:**
    - **node 0:** 10 11 20 20
    - **node 1:** 11 10 20 20
    - **node 2:** 20 20 10 11
    - **node 3:** 20 20 11 10

From `/proc/meminfo`

- **MemTotal:** 527543792 kB
- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

From `/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"

(Continued on next page)
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Platform Notes (Continued)

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 r750xs.jzjpm83.inside.dell.com 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): 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 Sep 14 14:57

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.8-ic2021.1
From /sys/devices/virtual/dmi/id
    Vendor: Dell Inc.
    Product: PowerEdge R750xs
    Product Family: PowerEdge
    Serial: JZJPM83

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 002C069D002C 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2666

    BIOS:
        BIOS Vendor: Dell Inc.
        BIOS Version: 1.2.1

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

BIOS Date: 05/28/2021  
BIOS Revision: 1.2

(End of data from sysinfo program)

### Compiler Version Notes

|   | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(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.

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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

|   | 511.povray_r(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.

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Compiler Version Notes (Continued)

C++, C          | 511.povray_r(peak)
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------------------------------------------------------------------------------
C++, C          | 511.povray_r(base) 526.blender_r(base, peak)
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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++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
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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) 64, Version 2021.1 Build 20201112_000000
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------------------------------------------------------------------------------
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
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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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Base Compiler Invocation  

C benchmarks:  
icx  

C++ benchmarks:  
icpx  

Fortran benchmarks:  
ifort  

Benchmarks using both Fortran and C:  
ifort icx  

Benchmarks using both C and C++:  
icpx icx  

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

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.fbm_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  

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**PowerEdge R750xs (Intel Xeon Silver 4314, 2.40 GHz)**  

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

**SPECrate®2017_fp_base = 249**  
**SPECrate®2017_fp_peak = 257**

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**Base Portability Flags (Continued)**

554.roms_r: -DSPEC_LP64

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**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`
- `-mbranches-within-32B-boundaries -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`
- `-mbranches-within-32B-boundaries -ljemalloc`
- `-L/usr/local/jemalloc64-5.0.1/lib`

Fortran benchmarks:
- `-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div`
- `-qopt-prefetch -ffinite-math-only`
- `-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte -auto`
- `-mbranches-within-32B-boundaries -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 -O3 -ipo`
- `-no-prec-div -qopt-prefetch -ffinite-math-only`
- `-qopt-multiple-gather-scatter-by-shuffles`
- `-mbranches-within-32B-boundaries -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`
- `-mbranches-within-32B-boundaries -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 -O3`
- `-no-prec-div -qopt-prefetch -ffinite-math-only`
- `-qopt-multiple-gather-scatter-by-shuffles`
- `-mbranches-within-32B-boundaries -nostandard-realloc-lhs`

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SPEC CPU®2017 Floating Point Rate Result

Dell Inc.
PowerEdge R750xs (Intel Xeon Silver 4314, 2.40 GHz)

SPECrate®2017_fp_base = 249
SPECrate®2017_fp_peak = 257

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
511.povray_r: icpc icc
526.blender_r: icpx icx

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

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 -flto
-Ofast -qopt-mem-layout-trans=4

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

544.nab_r (continued):
  -fimf-accuracy-bits=14:sqrt
  -mbranches-within-32B-boundaries -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
  -flto -mfpmath=sse -funroll-loops
  -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
  -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 -O3 -ipo
  -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-multiple-gather-scatter-by-shuffles
  -qopt-mem-layout-trans=4 -nostandard-realloc-lhs
  -align array32byte -auto -mbranches-within-32B-boundaries
  -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
  -ipo -no-prec-div -qopt-prefetch -ffinite-math-only
  -qopt-multiple-gather-scatter-by-shuffles
  -qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
  -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

(Continued on next page)
Dell Inc.
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SPECrater®2017_fp_base = 249
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</table>

Peak Optimization Flags (Continued)

507.cactuBSSN_r: 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
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-ICX-rev1.4.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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