Dell Inc. PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

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<td>508.namd_r</td>
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<tr>
<td>554.roms_r</td>
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</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6330N
- **Max MHz:** 3400
- **Nominal:** 2200
- **Enabled:** 28 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 1.25 MB I+D on chip per core
- **Cache L3:** 42 MB I+D on chip per core
- **Other:** None
- **Memory:** 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R, running at 2666)
- **Storage:** 225 GB on tmpfs
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux 8.3 (Ootpa)
  4.18.0-240.15.1.el8_3.x86_64
- **Compiler:**
  - C/C++: Version 2021.1 of Intel oneAPI DPC++/C++
  - Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux
- **Parallel:**
  - No
- **Firmware:**
  - Version 0.6.3 released May-2021
- **File System:**
  - tmpfs
- **System State:**
  - Run level 5 (graphical 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.
SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

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

SPECrate®2017_fp_base = 171
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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/cpu2017-1.1.5-ic2021.1/lib/intel64:/mnt/ramdisk/cpu2017-1.1.5-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 XR11 (Intel Xeon Gold 6330N, 2.20 GHz)  

| SPECrate®2017_fp_base | 171 |
| SPECrate®2017_fp_peak | 180 |

**CPU2017 License:** 55  
**Test Date:** May-2021  
**Test Sponsor:** Dell Inc.  
**Tested by:** Dell Inc.  
**Hardware Availability:** Jul-2021  
**Software Availability:** Feb-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 numactl 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 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

Sysinfo program /mnt/ramdisk/cpu2017-1.1.5-ic2021.1/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on localhost.localdomain Wed May 12 09:18:28 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 6330N CPU @ 2.20GHz
  1 "physical id"s (chips)
  56 "processors"
```

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

Dell Inc.
PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

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**Platform Notes (Continued)**

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 : 28
siblings : 56
physical 0: cores 0 1 2 3 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 56
On-line CPU(s) list: 0-55
Thread(s) per core: 2
Core(s) per socket: 28
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6330N CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2555.205
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 43008K
NUMA node0 CPU(s):
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54
NUMA node1 CPU(s):
1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55
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
xtrig pdcm pcid dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave
avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single
intel_pcin ssbd mbm ibrs ibpb stibp ibrs_enhanced fsgsbse tsc_adjust bmi1 hle avx2
smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsave xsetbv1
xsaves cqm_llc cqm_occu_p1lc cqm_mbb_total cqm_mbb_local split_lock_detect wbinvd
dtherm ida arat pln pts avx512vbm vmpku ospke avx512_vbmi2 gfin vaes vpcm1mulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfug flush_lid
arch_capabilities

/proc/cpuinfo cache data

(Continued on next page)
```
SPEC CPU®2017 Floating Point Rate Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

Dell Inc.
PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

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**Test Sponsor:** Dell Inc.
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### Platform Notes (Continued)

Cache size: 43008 KB

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 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54
  - size: 249038 MB
  - free: 255693 MB

- **node 1**
  - cpus: 1 3 5 7 9 11 13 15 17 19 21 23 25 27 29 31 33 35 37 39 41 43 45 47 49 51 53 55
  - size: 249570 MB
  - free: 242022 MB

Node distances:

```
node   0   1
0:  10  11
1:  11  10
```

From `/proc/meminfo`

- MemTotal: 527809992 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="8.3 (Ootpa)"
  - ID="rhel"
  - ID_LIKE="fedora"
  - VERSION_ID="8.3"
  - PLATFORM_ID="platform:el8"
  - PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
  - ANSI_COLOR="0;31"

- redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
- system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
- system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga

uname -a:
```
Linux localhost.localdomain 4.18.0-240.15.1.el8_3.x86_64 #1 SMP Wed Feb 3 03:12:15 EST 2021 x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:
```
CVE-2018-12207 (iTLB Multihit): Not affected
```

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

Dell Inc.

PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

SPECRate®2017_fp_base = 171
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CPU2017 License: 55
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: May-2021
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Platform Notes (Continued)

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 5 May 12 03:37

SPEC is set to: /mnt/ramdisk/cpu2017-1.1.5-ic2021.1
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 225G 7.0G 219G 4% /mnt/ramdisk

From /sys/devices/virtual/dmi/id
Vendor: Dell Inc.
Product: PowerEdge XR11
Product Family: PowerEdge
Serial: 09A000K

Additional information from dmidecode 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:
4x 00AD00B300AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2666
1x 00AD063200AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2666
3x 00AD069D00AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200, configured at 2666

BIOS:
BIOS Vendor: Dell Inc.
BIOS Version: 0.6.3
BIOS Date: 05/04/2020
BIOS Revision: 0.6

BIOS Note: Version 0.6.3 was built with an incorrect date stamp which is reflected in the sysinfo section. The correct release date is reflected in the "Firmware" field of the disclosure.
Dell Inc. PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

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Compiler Version Notes
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C       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.
==============================================================================
C++     508.namd_r(base, peak) 510.parest_r(base, peak)
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==============================================================================
C++, C   511.povray_r(peak)
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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) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
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(Continued on next page)
Dell Inc.
PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

SPECrates: SPECrate®2017_fp_base = 171
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Compiler Version Notes (Continued)

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

Fortran  | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)
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  | 521.wrf_r(peak)
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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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(Continued on next page)
Dell Inc.

PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

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<tr>
<th>CPU2017 License: 55</th>
<th>Test Date: May-2021</th>
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**Compiler Version Notes (Continued)**

Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)

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Fortran, C | 521.wrf_r(peak)

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Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)

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**Base Compiler Invocation**

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

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

**Dell Inc.**

PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

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### Base Compiler Invocation (Continued)

- **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.lbm_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`
  - `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`

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

PowerEdge XR11 (Intel Xeon Gold 6330N, 2.20 GHz)

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**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):
- `qopt-multiple-gather-scatter-by-shuffles` `qopt-mem-layout-trans=4`
- `n ostandard-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`
- `mbranches-within-32B-boundaries` `ljemalloc`
- `-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`
- `mbranches-within-32B-boundaries` `ljemalloc`
- `-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:
- `521.wrf_r` `ifort` `icc`

(Continued on next page)
Peak Compiler Invocation (Continued)

527.cam4_r: 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
-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: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only

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

503.bwaves_r (continued):
-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

549.fotonik3d_r: basepeak = yes
554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_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
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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++:

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
## SPEC CPU®2017 Floating Point Rate Result

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Tested with SPEC CPU®2017 v1.1.5 on 2021-05-12 10:18:28-0400.


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