



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

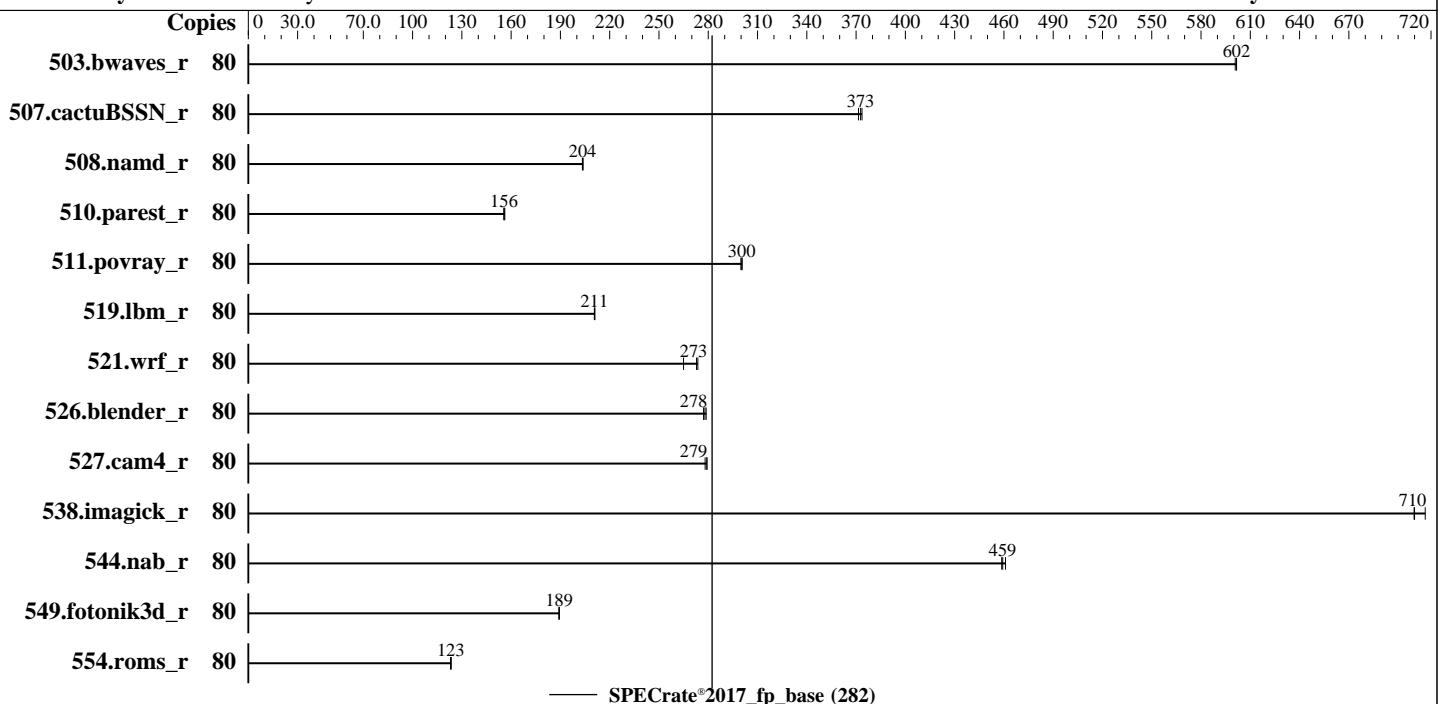
Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Jul-2021

Hardware Availability: Jun-2021

Software Availability: Dec-2020



Hardware

CPU Name: Intel Xeon Silver 4316
 Max MHz: 3400
 Nominal: 2300
 Enabled: 40 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: 30 MB I+D on chip per chip
 Other: None
 Memory: 2 TB (32 x 64 GB 2Rx4 PC4-3200AA-R,
 running at 2666)
 Storage: 1 x 480 GB SATA SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP2
 5.3.18-22-default
 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;
 Parallel: No
 Firmware: Version 4.2.1c released Jul-2021
 File System: btrfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 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

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Date: Jul-2021

Test Sponsor: Cisco Systems

Hardware Availability: Jun-2021

Tested by: Cisco Systems

Software Availability: Dec-2020

Results Table

Benchmark	Base								Peak							
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	80	1335	601	1333	602	1334	602									
507.cactubSSN_r	80	272	373	271	374	273	371									
508.namd_r	80	373	204	374	203	373	204									
510.parest_r	80	1345	156	1340	156	1344	156									
511.povray_r	80	622	300	621	301	623	300									
519.lbm_r	80	400	211	400	211	400	211									
521.wrf_r	80	655	274	657	273	676	265									
526.blender_r	80	437	279	438	278	440	277									
527.cam4_r	80	501	279	503	278	501	279									
538.imagick_r	80	280	710	278	716	280	710									
544.nab_r	80	292	461	294	459	293	459									
549.fotonik3d_r	80	1648	189	1647	189	1648	189									
554.roms_r	80	1031	123	1029	123	1032	123									

SPECrate®2017_fp_base = 282

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 = "/home/cpu2017/lib/intel64:/home/cpu2017/je5.0.1-64"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7940X CPU + 64GB RAM
memory using openSUSE Leap 15.2
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Date: Jul-2021

Test Sponsor: Cisco Systems

Hardware Availability: Jun-2021

Tested by: Cisco Systems

Software Availability: Dec-2020

General Notes (Continued)

```
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
```

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.

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

Platform Notes

BIOS Settings:

Adjacent Cache Line Prefetcher set to Disabled
DCU Streamer Prefetch set to Disabled
UPI Link Enablement set to Auto
UPI Power Management set to Disabled
Sub NUMA Clustering set to Enabled
LLC Dead Line set to Disabled
Memory Refresh Rate set to 1x Refresh
ADDDC Sparing set to Disabled
Patrol Scrub set to Disabled
Enhanced CPU performance set to Disabled
Energy Efficient Turbo set to Enabled
Processor C6 Report set to Enabled
Processor C1E set to Enabled

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafcc64d
running on install Fri Jul 30 13:21:30 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 4316 CPU @ 2.30GHz
  2 "physical id"s (chips)
  80 "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 : 20
  siblings   : 40
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Date: Jul-2021

Test Sponsor: Cisco Systems

Hardware Availability: Jun-2021

Tested by: Cisco Systems

Software Availability: Dec-2020

Platform Notes (Continued)

```
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
```

From lscpu from util-linux 2.33.1:

```
Architecture:           x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:             Little Endian
Address sizes:          46 bits physical, 57 bits virtual
CPU(s):                 80
On-line CPU(s) list:   0-79
Thread(s) per core:    2
Core(s) per socket:    20
Socket(s):              2
NUMA node(s):           4
Vendor ID:              GenuineIntel
CPU family:             6
Model:                  106
Model name:             Intel(R) Xeon(R) Silver 4316 CPU @ 2.30GHz
Stepping:                6
CPU MHz:                3372.455
CPU max MHz:            3400.0000
CPU min MHz:            800.0000
BogoMIPS:                4600.00
Virtualization:         VT-x
L1d cache:               48K
L1i cache:               32K
L2 cache:                1280K
L3 cache:                30720K
NUMA node0 CPU(s):      0-9,40-49
NUMA node1 CPU(s):      10-19,50-59
NUMA node2 CPU(s):      20-29,60-69
NUMA node3 CPU(s):      30-39,70-79
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
xtpr 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 ssbd
mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad
fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f
avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp
hwp_pkg_req avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni
avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
arch_capabilities
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Date: Jul-2021

Test Sponsor: Cisco Systems

Hardware Availability: Jun-2021

Tested by: Cisco Systems

Software Availability: Dec-2020

Platform Notes (Continued)

```
/proc/cpuinfo cache data
    cache size : 30720 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 1 2 3 4 5 6 7 8 9 40 41 42 43 44 45 46 47 48 49

node 0 size: 515527 MB

node 0 free: 515141 MB

node 1 cpus: 10 11 12 13 14 15 16 17 18 19 50 51 52 53 54 55 56 57 58 59

node 1 size: 516090 MB

node 1 free: 515743 MB

node 2 cpus: 20 21 22 23 24 25 26 27 28 29 60 61 62 63 64 65 66 67 68 69

node 2 size: 516057 MB

node 2 free: 515743 MB

node 3 cpus: 30 31 32 33 34 35 36 37 38 39 70 71 72 73 74 75 76 77 78 79

node 3 size: 516087 MB

node 3 free: 515807 MB

node distances:

node 0 1 2 3

0: 10 11 20 20

1: 11 10 20 20

2: 20 20 10 11

3: 20 20 11 10

From /proc/meminfo

MemTotal: 2113292532 kB

HugePages_Total: 0

Hugepagesize: 2048 kB

```
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
    performance
```

From /etc/*release* /etc/*version*

os-release:

NAME="SLES"

VERSION="15-SP2"

VERSION_ID="15.2"

PRETTY_NAME="SUSE Linux Enterprise Server 15 SP2"

ID="sles"

ID_LIKE="suse"

ANSI_COLOR="0;32"

CPE_NAME="cpe:/o:suse:sles:15:sp2"

uname -a:

Linux install 5.3.18-22-default #1 SMP Wed Jun 3 12:16:43 UTC 2020 (720aebe) x86_64
x86_64 x86_64 GNU/Linux

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Date: Jul-2021

Test Sponsor: Cisco Systems

Hardware Availability: Jun-2021

Tested by: Cisco Systems

Software Availability: Dec-2020

Platform Notes (Continued)

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/swaps 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 Jul 30 13:20

SPEC is set to: /home/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda4	btrfs	445G	16G	428G	4%	/home

From /sys/devices/virtual/dmi/id

Vendor:	Cisco Systems Inc
Product:	UCSB-B200-M6
Serial:	FCH24097576

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:

32x 0xCE00 M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2666

BIOS:

BIOS Vendor:	Cisco Systems, Inc.
BIOS Version:	B200M6.4.2.1c.10.0723211453
BIOS Date:	07/23/2021
BIOS Revision:	5.22

(End of data from sysinfo program)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Date: Jul-2021

Test Sponsor: Cisco Systems

Hardware Availability: Jun-2021

Tested by: Cisco Systems

Software Availability: Dec-2020

Compiler Version Notes

=====

C | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)

=====

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) 510.parest_r(base)

=====

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 | 511.povray_r(base) 526.blender_r(base)

=====

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.
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.cactusBSSN_r(base)

=====

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.
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.
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.

=====

=====

Fortran | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)

=====

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.

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Date: Jul-2021

Test Sponsor: Cisco Systems

Hardware Availability: Jun-2021

Tested by: Cisco Systems

Software Availability: Dec-2020

Compiler Version Notes (Continued)

```
=====
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base)
-----
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) 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.
```

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.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Date: Jul-2021

Test Sponsor: Cisco Systems

Hardware Availability: Jun-2021

Tested by: Cisco Systems

Software Availability: Dec-2020

Base Portability Flags (Continued)

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  
-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
```

(Continued on next page)



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Cisco Systems

Cisco UCS B200 M6 (Intel Xeon Silver 4316,
2.30GHz)

SPECrate®2017_fp_base = 282

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9019

Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Jul-2021

Hardware Availability: Jun-2021

Software Availability: Dec-2020

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

```
-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  
-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/Intel-ic2021-official-linux64_revA.html
<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.0-ICX-revF.html>

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/Cisco-Platform-Settings-V1.0-ICX-revF.xml>

SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2021-07-30 13:21:29-0400.

Report generated on 2021-08-19 10:57:10 by CPU2017 PDF formatter v6442.

Originally published on 2021-08-17.