



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Cisco Systems

Cisco UCS C480 M5 (Intel Xeon Platinum 8168, 2.70 GHz)

SPECrate2017\_fp\_base = 483

SPECrate2017\_fp\_peak = 491

CPU2017 License: 9019

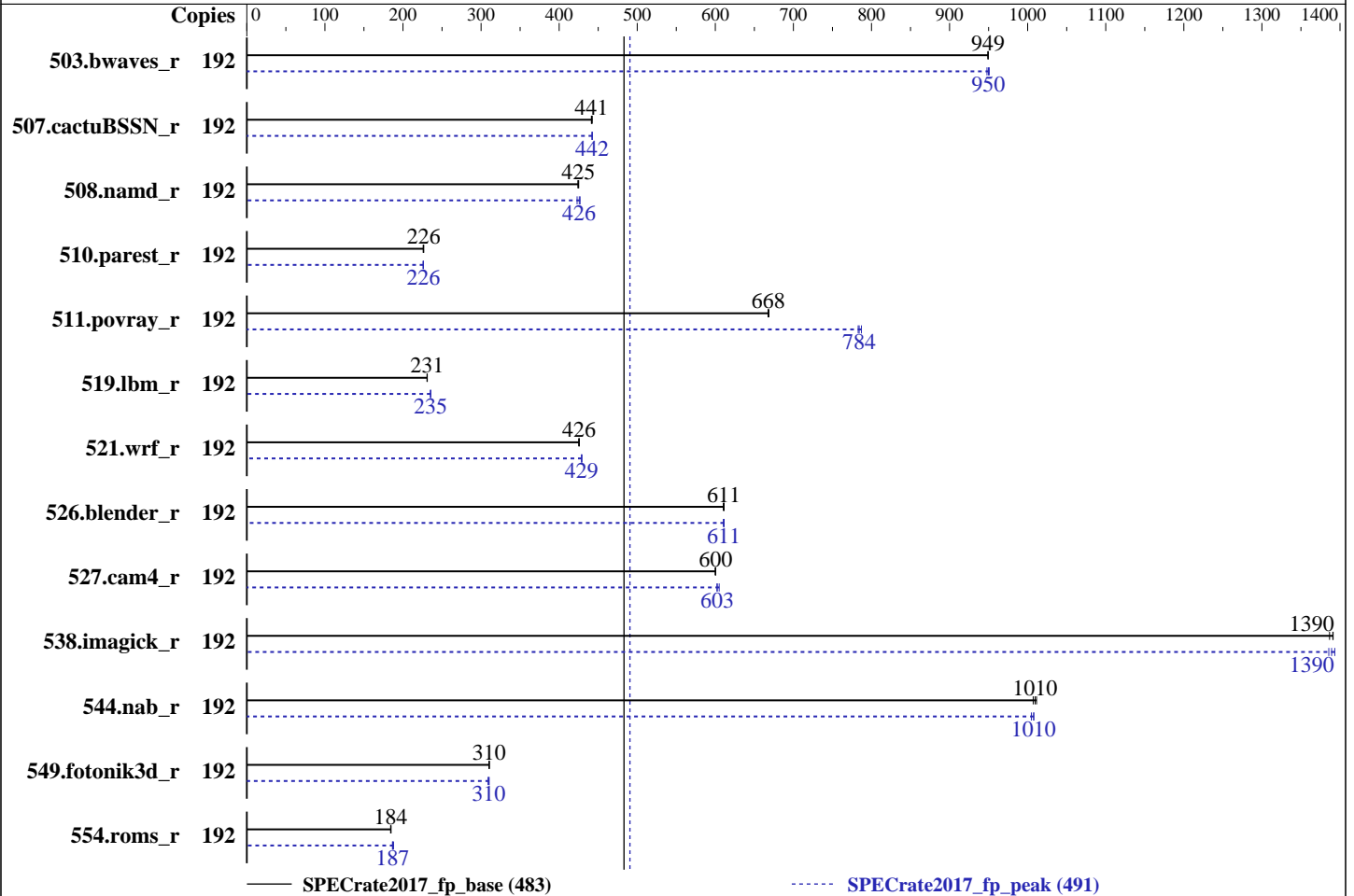
Test Sponsor: Cisco Systems

Tested by: Cisco Systems

Test Date: Dec-2018

Hardware Availability: Aug-2017

Software Availability: Mar-2018



### Hardware

CPU Name: Intel Xeon Platinum 8168  
 Max MHz.: 3700  
 Nominal: 2700  
 Enabled: 96 cores, 4 chips, 2 threads/core  
 Orderable: 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: 33 MB I+D on chip per chip  
 Other: None  
 Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)  
 Storage: 1 x 1 TB HDD, 7.2K RPM  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 12 SP2 (x86\_64) 4.4.120-92.70-default  
 Compiler: C/C++: Version 18.0.2.199 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 18.0.2.199 of Intel Fortran Compiler for Linux  
 Parallel: No  
 Firmware: Version 3.1.3e released Jun-2018  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: None



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	192	2029	949	<u>2028</u>	<u>949</u>	2028	950	192	2025	951	2031	948	<u>2027</u>	<u>950</u>
507.cactuBSSN_r	192	<u>551</u>	<u>441</u>	551	441	549	442	192	550	442	549	442	<u>550</u>	<u>442</u>
508.namd_r	192	430	424	<u>430</u>	<u>425</u>	429	425	192	427	427	<u>428</u>	<u>426</u>	431	423
510.parest_r	192	2218	226	2224	226	<u>2218</u>	<u>226</u>	192	2226	226	2220	226	<u>2221</u>	<u>226</u>
511.povray_r	192	672	668	670	669	<u>671</u>	<u>668</u>	192	573	783	570	787	<u>572</u>	<u>784</u>
519.lbm_r	192	<u>876</u>	<u>231</u>	876	231	877	231	192	860	235	<u>860</u>	<u>235</u>	860	235
521.wrf_r	192	<u>1011</u>	<u>426</u>	1012	425	1010	426	192	<u>1003</u>	<u>429</u>	1003	429	1003	429
526.blender_r	192	478	611	<u>479</u>	<u>611</u>	479	610	192	478	611	479	610	<u>479</u>	<u>611</u>
527.cam4_r	192	560	600	559	601	<u>559</u>	<u>600</u>	192	555	605	<u>557</u>	<u>603</u>	558	602
538.imagick_r	192	343	1390	<u>343</u>	<u>1390</u>	344	1390	192	343	1390	<u>344</u>	<u>1390</u>	345	1390
544.nab_r	192	321	1010	320	1010	<u>320</u>	<u>1010</u>	192	322	1000	<u>321</u>	<u>1010</u>	321	1010
549.fotonik3d_r	192	2409	311	<u>2410</u>	<u>310</u>	2413	310	192	2411	310	2422	309	<u>2416</u>	<u>310</u>
554.roms_r	192	<u>1654</u>	<u>184</u>	1652	185	1657	184	192	<u>1633</u>	<u>187</u>	1623	188	1636	187

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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"

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017/lib/ia32:/home/cpu2017/lib/intel64"

Binaries compiled on a system with 1x Intel Core i7-6700K CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.5  
Transparent Huge Pages enabled by default  
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>

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

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### General Notes (Continued)

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.

### Platform Notes

BIOS Settings:

Intel HyperThreading Technology set to Enabled

CPU performance set to Enterprise

Power Performance Tuning set to OS Controls

SNC set to Enabled

IMC Interleaving set to 1-way Interleave

Patrol Scrub set to Disabled

Sysinfo program /home/cpu2017/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f

running on linux-9r4j Fri Dec 7 18:31:05 2018

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 8168 CPU @ 2.70GHz

4 "physical id"s (chips)

192 "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 : 24

siblings : 48

physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:

Architecture: x86\_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 192

On-line CPU(s) list: 0-191

Thread(s) per core: 2

Core(s) per socket: 24

Socket(s): 4

NUMA node(s): 8

Vendor ID: GenuineIntel

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### Platform Notes (Continued)

```

CPU family:           6
Model:                85
Model name:           Intel(R) Xeon(R) Platinum 8168 CPU @ 2.70GHz
Stepping:             4
CPU MHz:              2007.619
CPU max MHz:          3700.0000
CPU min MHz:          1200.0000
BogoMIPS:             5394.18
Virtualization:       VT-x
L1d cache:            32K
L1i cache:            32K
L2 cache:             1024K
L3 cache:             33792K
NUMA node0 CPU(s):   0-2,6-8,12-14,18-20,96-98,102-104,108-110,114-116
NUMA node1 CPU(s):   3-5,9-11,15-17,21-23,99-101,105-107,111-113,117-119
NUMA node2 CPU(s):   24-26,30-32,36-38,42-44,120-122,126-128,132-134,138-140
NUMA node3 CPU(s):   27-29,33-35,39-41,45-47,123-125,129-131,135-137,141-143
NUMA node4 CPU(s):   48-50,54-56,60-62,66-68,144-146,150-152,156-158,162-164
NUMA node5 CPU(s):   51-53,57-59,63-65,69-71,147-149,153-155,159-161,165-167
NUMA node6 CPU(s):   72-74,78-80,84-86,90-92,168-170,174-176,180-182,186-188
NUMA node7 CPU(s):   75-77,81-83,87-89,93-95,171-173,177-179,183-185,189-191
Flags:                fpu vme de pse 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
aperfmpperf eagerfpu 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 ida arat epb invpcid_single pln pts
dtherm hwp hwp_act_window hwp_epp hwp_pkg_req intel_pt rsb_ctxsw spec_ctrl stibp
retpoline kaiser tpr_shadow vmmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle
avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt
clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc

```

```

/proc/cpuinfo cache data
cache size : 33792 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 6 7 8 12 13 14 18 19 20 96 97 98 102 103 104 108 109 110 114 115 116
node 0 size: 192093 MB
node 0 free: 191893 MB
node 1 cpus: 3 4 5 9 10 11 15 16 17 21 22 23 99 100 101 105 106 107 111 112 113 117 118
119
node 1 size: 193528 MB
node 1 free: 193234 MB
node 2 cpus: 24 25 26 30 31 32 36 37 38 42 43 44 120 121 122 126 127 128 132 133 134
138 139 140

```

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### Platform Notes (Continued)

```

node 2 size: 193528 MB
node 2 free: 193331 MB
node 3 cpus: 27 28 29 33 34 35 39 40 41 45 46 47 123 124 125 129 130 131 135 136 137
141 142 143
node 3 size: 193528 MB
node 3 free: 193345 MB
node 4 cpus: 48 49 50 54 55 56 60 61 62 66 67 68 144 145 146 150 151 152 156 157 158
162 163 164
node 4 size: 193528 MB
node 4 free: 193354 MB
node 5 cpus: 51 52 53 57 58 59 63 64 65 69 70 71 147 148 149 153 154 155 159 160 161
165 166 167
node 5 size: 193528 MB
node 5 free: 193218 MB
node 6 cpus: 72 73 74 78 79 80 84 85 86 90 91 92 168 169 170 174 175 176 180 181 182
186 187 188
node 6 size: 193528 MB
node 6 free: 193340 MB
node 7 cpus: 75 76 77 81 82 83 87 88 89 93 94 95 171 172 173 177 178 179 183 184 185
189 190 191
node 7 size: 193525 MB
node 7 free: 193332 MB
node distances:
node   0   1   2   3   4   5   6   7
  0:  10  11  21  21  21  21  21  21
  1:  11  10  21  21  21  21  21  21
  2:  21  21  10  11  21  21  21  21
  3:  21  21  11  10  21  21  21  21
  4:  21  21  21  21  10  11  21  21
  5:  21  21  21  21  11  10  21  21
  6:  21  21  21  21  21  21  10  11
  7:  21  21  21  21  21  21  11  10

```

From /proc/meminfo

```

MemTotal:      1583912920 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

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

```

SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 2
  # This file is deprecated and will be removed in a future service pack or release.
  # Please check /etc/os-release for details about this release.
os-release:
  NAME="SLES"

```

(Continued on next page)



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### Platform Notes (Continued)

```
VERSION="12-SP2"
VERSION_ID="12.2"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp2"
```

```
uname -a:
Linux linux-9r4j 4.4.120-92.70-default #1 SMP Wed Mar 14 15:59:43 UTC 2018 (52a83de)
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Oct 29 09:52
```

```
SPEC is set to: /home/cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda1        xfs   930G  244G  687G  27% /
```

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.

```
BIOS Cisco Systems, Inc. C480M5.3.1.3e.0.0613181101 06/13/2018
Memory:
48x 0xCE00 M393A4K40BB2-CTD 32 GB 2 rank 2666
```

(End of data from sysinfo program)

### Compiler Version Notes

```
=====
CC 519.lbm_r(base) 538.imagick_r(base, peak) 544.nab_r(base, peak)
-----
```

```
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----
```

```
=====
CC 519.lbm_r(peak)
-----
```

```
icc (ICC) 18.0.2 20180210
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
-----
```

```
=====
CXXC 508.namd_r(base) 510.parest_r(base, peak)
-----
```

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### Compiler Version Notes (Continued)

icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CXXC 508.namd\_r(peak)

-----  
icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CC 511.povray\_r(base) 526.blender\_r(base, peak)

-----  
icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
CC 511.povray\_r(peak)

-----  
icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
FC 507.cactuBSSN\_r(base, peak)

-----  
icpc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.

=====  
FC 503.bwaves\_r(base, peak) 549.fotonik3d\_r(base, peak) 554.roms\_r(base)

-----  
ifort (IFORT) 18.0.2 20180210  
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## Compiler Version Notes (Continued)

=====  
FC 554.roms\_r(peak)  
-----

ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
CC 521.wrf\_r(base) 527.cam4\_r(base)  
-----

ifort (IFORT) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.2 20180210  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
CC 521.wrf\_r(peak) 527.cam4\_r(peak)  
-----

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Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
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-----

## Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

Benchmarks using both Fortran and C:

ifort -m64 icc -m64 -std=c11

Benchmarks using both C and C++:

icpc -m64 icc -m64 -std=c11

Benchmarks using Fortran, C, and C++:

icpc -m64 icc -m64 -std=c11 ifort -m64





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## 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:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

C++ benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

Benchmarks using both Fortran and C:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

Benchmarks using both C and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```



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## Peak Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

Benchmarks using both Fortran and C:

```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using both C and C++:

```
icpc -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

```
519.lbm_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3
```

```
538.imagick_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3
```

```
544.nab_r: Same as 538.imagick_r
```

C++ benchmarks:

```
508.namd_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3
```

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## Peak Optimization Flags (Continued)

```
510.parest_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
503.bwaves_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -auto
-nostandard-realloc-lhs
```

```
549.fotonik3d_r: Same as 503.bwaves_r
```

```
554.roms_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

Benchmarks using both Fortran and C:

```
-prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

Benchmarks using both C and C++:

```
511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -ipo -xCORE-AVX2 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3
```

```
526.blender_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=3 -auto -nostandard-realloc-lhs
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.html>  
<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.2-revH.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.xml>  
<http://www.spec.org/cpu2017/flags/Cisco-Platform-Settings-V1.2-revH.xml>



# SPEC CPU2017 Floating Point Rate Result

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## Cisco Systems

Cisco UCS C480 M5 (Intel Xeon Platinum 8168, 2.70 GHz)

SPECrate2017\_fp\_base = 483

SPECrate2017\_fp\_peak = 491

**CPU2017 License:** 9019

**Test Sponsor:** Cisco Systems

**Tested by:** Cisco Systems

**Test Date:** Dec-2018

**Hardware Availability:** Aug-2017

**Software Availability:** Mar-2018

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

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