



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

**Huawei**

**Huawei CH242 V5 (Intel Xeon Gold 6126)**

CPU2017 License: 3175

Test Sponsor: Huawei

Tested by: Huawei

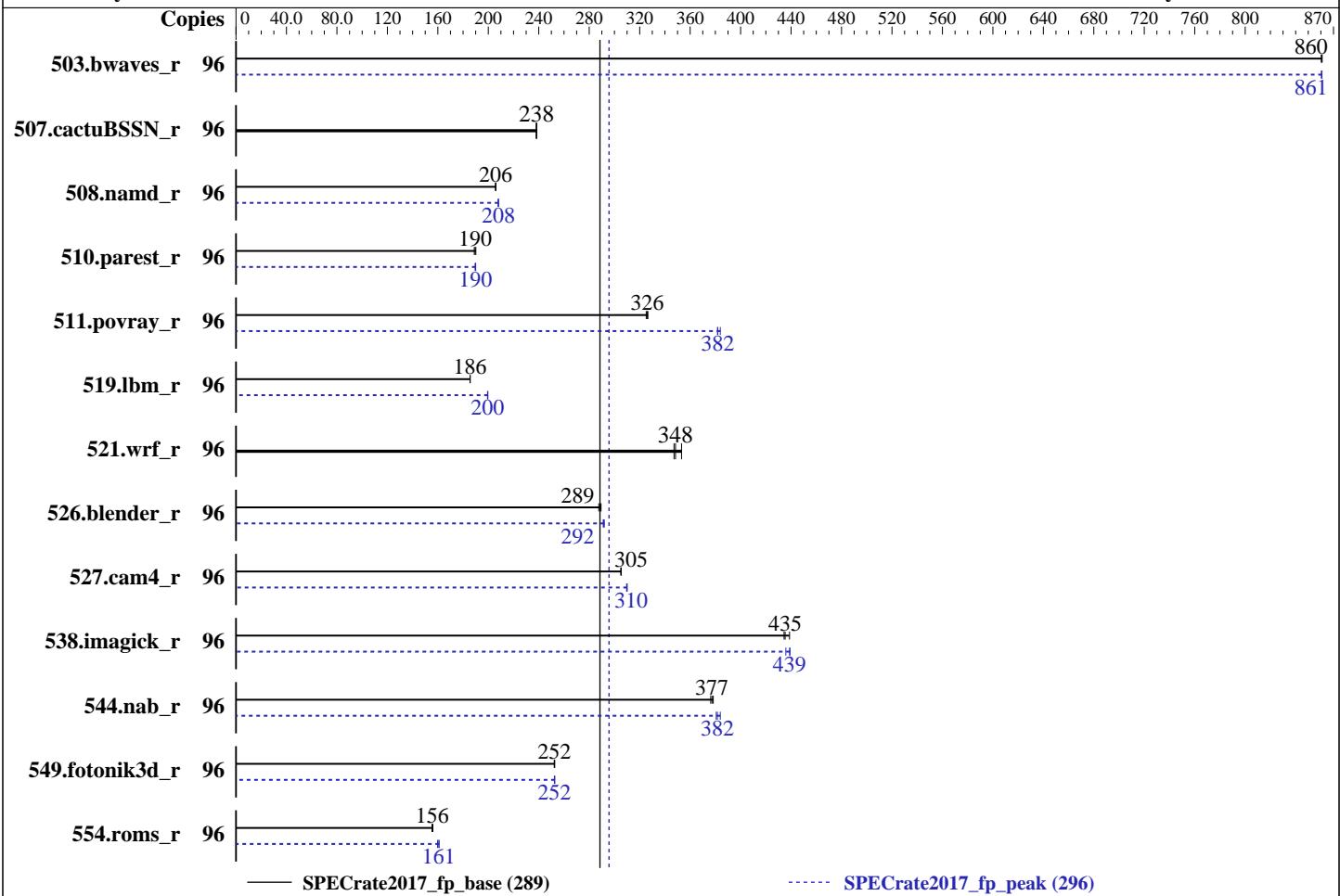
**SPECrate2017\_fp\_base = 289**

**SPECrate2017\_fp\_peak = 296**

Test Date: May-2018

Hardware Availability: Jul-2017

Software Availability: Jan-2018



## Hardware

CPU Name: Intel Xeon Gold 6126  
 Max MHz.: 3700  
 Nominal: 2600  
 Enabled: 48 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: 19.25 MB I+D on chip per chip  
 Other: None  
 Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)  
 Storage: 1 x 1200 GB SAS, 10000 RPM  
 Other: None

## Software

OS: Red Hat Enterprise Linux Server release 7.3 (Maipo)  
 Compiler: C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux  
 Parallel: No  
 Firmware: Version 0.84 Released Mar-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	96	<b>1119</b>	<b>860</b>	1118	861	1119	860	96	1119	861	<b>1119</b>	<b>861</b>	1118	861
507.cactusBSSN_r	96	<b>510</b>	<b>238</b>	510	238	511	238	96	<b>510</b>	<b>238</b>	510	238	511	238
508.namd_r	96	443	206	443	206	<b>443</b>	<b>206</b>	96	438	208	<b>439</b>	<b>208</b>	439	208
510.parest_r	96	<b>1325</b>	<b>190</b>	1321	190	1330	189	96	<b>1322</b>	<b>190</b>	1322	190	1325	190
511.povray_r	96	689	325	<b>687</b>	<b>326</b>	687	326	96	584	384	587	382	<b>587</b>	<b>382</b>
519.lbm_r	96	545	186	545	186	<b>545</b>	<b>186</b>	96	507	200	507	199	<b>507</b>	<b>200</b>
521.wrf_r	96	<b>617</b>	<b>348</b>	609	353	619	347	96	<b>617</b>	<b>348</b>	609	353	619	347
526.blender_r	96	508	288	<b>506</b>	<b>289</b>	505	289	96	502	291	<b>502</b>	<b>292</b>	501	292
527.cam4_r	96	<b>550</b>	<b>305</b>	551	305	550	305	96	542	310	<b>542</b>	<b>310</b>	542	310
538.imagick_r	96	550	434	<b>548</b>	<b>435</b>	544	439	96	544	439	548	436	<b>544</b>	<b>439</b>
544.nab_r	96	427	378	<b>428</b>	<b>377</b>	429	376	96	421	384	424	381	<b>423</b>	<b>382</b>
549.fotonik3d_r	96	1483	252	1481	253	<b>1482</b>	<b>252</b>	96	<b>1482</b>	<b>252</b>	1482	252	1480	253
554.roms_r	96	977	156	982	155	<b>980</b>	<b>156</b>	96	948	161	<b>949</b>	<b>161</b>	955	160

**SPECrate2017\_fp\_base = 289**

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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 = "/spec/lib/ia32:/spec/lib/intel64:/spec/je5.0.1-32:/spec/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 7.4

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)

(Continued on next page)



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## General Notes (Continued)

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.

## Platform Notes

BIOS configuration:

Power Policy Set to Performance

SNC Set to Enabled

IMC Interleaving Set to 1-way Interleave

XPT Prefetch Set to Enabled

Sysinfo program /spec/bin/sysinfo

Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on localhost.localdomain Thu May 31 20:44:12 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) Gold 6126 CPU @ 2.60GHz
        4 "physical id"s (chips)
        96 "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 : 12
siblings : 24
physical 0: cores 0 1 3 4 5 6 8 9 10 11 12 13
physical 1: cores 0 1 3 5 6 8 9 10 11 12 13 14
physical 2: cores 0 1 2 4 5 6 8 9 10 11 13 14
physical 3: cores 0 1 3 4 5 6 8 9 10 11 12 13
```

From lscpu:

```
Architecture:           x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                96
On-line CPU(s) list:  0-95
Thread(s) per core:   2
Core(s) per socket:   12
Socket(s):             4
NUMA node(s):          8
Vendor ID:             GenuineIntel
CPU family:            6
```

(Continued on next page)



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## Platform Notes (Continued)

Model: 85  
Model name: Intel(R) Xeon(R) Gold 6126 CPU @ 2.60GHz  
Stepping: 4  
CPU MHz: 2600.000  
BogoMIPS: 5205.90  
Virtualization: VT-x  
L1d cache: 32K  
L1i cache: 32K  
L2 cache: 1024K  
L3 cache: 19712K  
NUMA node0 CPU(s): 0-2,6-8,48-50,54-56  
NUMA node1 CPU(s): 3-5,9-11,51-53,57-59  
NUMA node2 CPU(s): 12-14,17-19,60-62,65-67  
NUMA node3 CPU(s): 15,16,20-23,63,64,68-71  
NUMA node4 CPU(s): 24-26,30-32,72-74,78-80  
NUMA node5 CPU(s): 27-29,33-35,75-77,81-83  
NUMA node6 CPU(s): 36-38,42-44,84-86,90-92  
NUMA node7 CPU(s): 39-41,45-47,87-89,93-95

```
/proc/cpuinfo cache data
cache size : 19712 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 48 49 50 54 55 56
node 0 size: 194969 MB
node 0 free: 189936 MB
node 1 cpus: 3 4 5 9 10 11 51 52 53 57 58 59
node 1 size: 196608 MB
node 1 free: 191943 MB
node 2 cpus: 12 13 14 17 18 19 60 61 62 65 66 67
node 2 size: 196608 MB
node 2 free: 191959 MB
node 3 cpus: 15 16 20 21 22 23 63 64 68 69 70 71
node 3 size: 196608 MB
node 3 free: 191785 MB
node 4 cpus: 24 25 26 30 31 32 72 73 74 78 79 80
node 4 size: 196608 MB
node 4 free: 191974 MB
node 5 cpus: 27 28 29 33 34 35 75 76 77 81 82 83
node 5 size: 196608 MB
node 5 free: 191959 MB
node 6 cpus: 36 37 38 42 43 44 84 85 86 90 91 92
node 6 size: 196608 MB
node 6 free: 191871 MB
node 7 cpus: 39 40 41 45 46 47 87 88 89 93 94 95
```

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## Platform Notes (Continued)

```
node 7 size: 196608 MB
node 7 free: 191965 MB
node distances:
node   0   1   2   3   4   5   6   7
  0: 10  20  20  20  20  20  20  20
  1: 20  10  20  20  20  20  20  20
  2: 20  20  10  20  20  20  20  20
  3: 20  20  20  10  20  20  20  20
  4: 20  20  20  20  10  20  20  20
  5: 20  20  20  20  20  10  20  20
  6: 20  20  20  20  20  20  10  20
  7: 20  20  20  20  20  20  20  10

From /proc/meminfo
MemTotal:      1583346104 kB
HugePages_Total:      0
Hugepagesize:     2048 kB

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.3 (Maipo)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="7.3"
  PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
  ANSI_COLOR="0;31"
  CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.3:ga:server

uname -a:
Linux localhost.localdomain 3.10.0-693.11.6.el7.x86_64 #1 SMP Thu Dec 28 14:23:39 EST
2017 x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 May 31 11:42

```
SPEC is set to: /spec
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4        xfs   600G   20G   581G   4%  /
```

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 INSYDE Corp. 0.84 03/26/2018

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## Platform Notes (Continued)

Memory:

40x Hynix HMA84GR7AFR4N-VK 32 GB 2 rank 2666  
8x Samsung 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)

=====

-----  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

-----

=====

CC 519.lbm\_r(peak) 544.nab\_r(peak)

=====

-----  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

-----

=====

CXXC 508.namd\_r(base) 510.parest\_r(base)

=====

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

-----

=====

CXXC 508.namd\_r(peak) 510.parest\_r(peak)

=====

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

-----

=====

CC 511.povray\_r(base) 526.blender\_r(base)

=====

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

-----

-----  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

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## Compiler Version Notes (Continued)

CC 511.povray\_r(peak) 526.blender\_r(peak)

```
-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

=====

FC 507.cactubSSN\_r(base)

```
-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

=====

FC 507.cactubSSN\_r(peak)

```
-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

=====

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

```
-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

=====

FC 554.roms\_r(peak)

```
-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

=====

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

(Continued on next page)



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## Compiler Version Notes (Continued)

```
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

```
=====
CC 521.wrf_r(peak) 527.cam4_r(peak)
=====
```

```
ifort (IFORT) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
icc (ICC) 18.0.0 20170811
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.
```

## Base Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using both C and C++:

icpc icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## Base Portability Flags

```
503.bwaves_r: -DSPEC_LP64
507.cactusBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
```

(Continued on next page)



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## Base Portability Flags (Continued)

```
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 -nostandard-realloc-lhs -align array32byte
```

Benchmarks using both Fortran and C:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
```

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 -nostandard-realloc-lhs -align array32byte
```

## Base Other Flags

C benchmarks:

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

C++ benchmarks:

```
-m64
```

(Continued on next page)



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## Base Other Flags (Continued)

Fortran benchmarks:

-m64

Benchmarks using both Fortran and C:

-m64 -std=c11

Benchmarks using both C and C++:

-m64 -std=c11

Benchmarks using Fortran, C, and C++:

-m64 -std=c11

## Peak Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using both C and C++:

icpc icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

(Continued on next page)



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## Peak Optimization Flags (Continued)

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 519.lbm\_r

C++ benchmarks:

-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

Fortran benchmarks:

503.bwaves\_r: -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3  
-nostandard-realloc-lhs -align array32byte

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 -nostandard-realloc-lhs  
-align array32byte

Benchmarks using both Fortran and C:

521.wrf\_r: basepeak = yes

527.cam4\_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 -nostandard-realloc-lhs  
-align array32byte

Benchmarks using both C 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

Benchmarks using Fortran, C, and C++:

507.cactusBSSN\_r: basepeak = yes



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## Peak Other Flags

C benchmarks:

-m64 -std=c11

C++ benchmarks:

-m64

Fortran benchmarks:

-m64

Benchmarks using both Fortran and C:

-m64 -std=c11

Benchmarks using both C and C++:

-m64 -std=c11

Benchmarks using Fortran, C, and C++:

-m64 -std=c11

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.html>

<http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.9-revC.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.xml>

<http://www.spec.org/cpu2017/flags/Huawei-Platform-Settings-SKL-V1.9-revC.xml>

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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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