



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## ASUSTeK Computer Inc.

ASUS RS720-E9(Z11PP-D24) Server System  
(2.50 GHz, Intel Xeon Platinum 8180)

SPECrate2017\_fp\_base = 270

SPECrate2017\_fp\_peak = 273

CPU2017 License: 9016

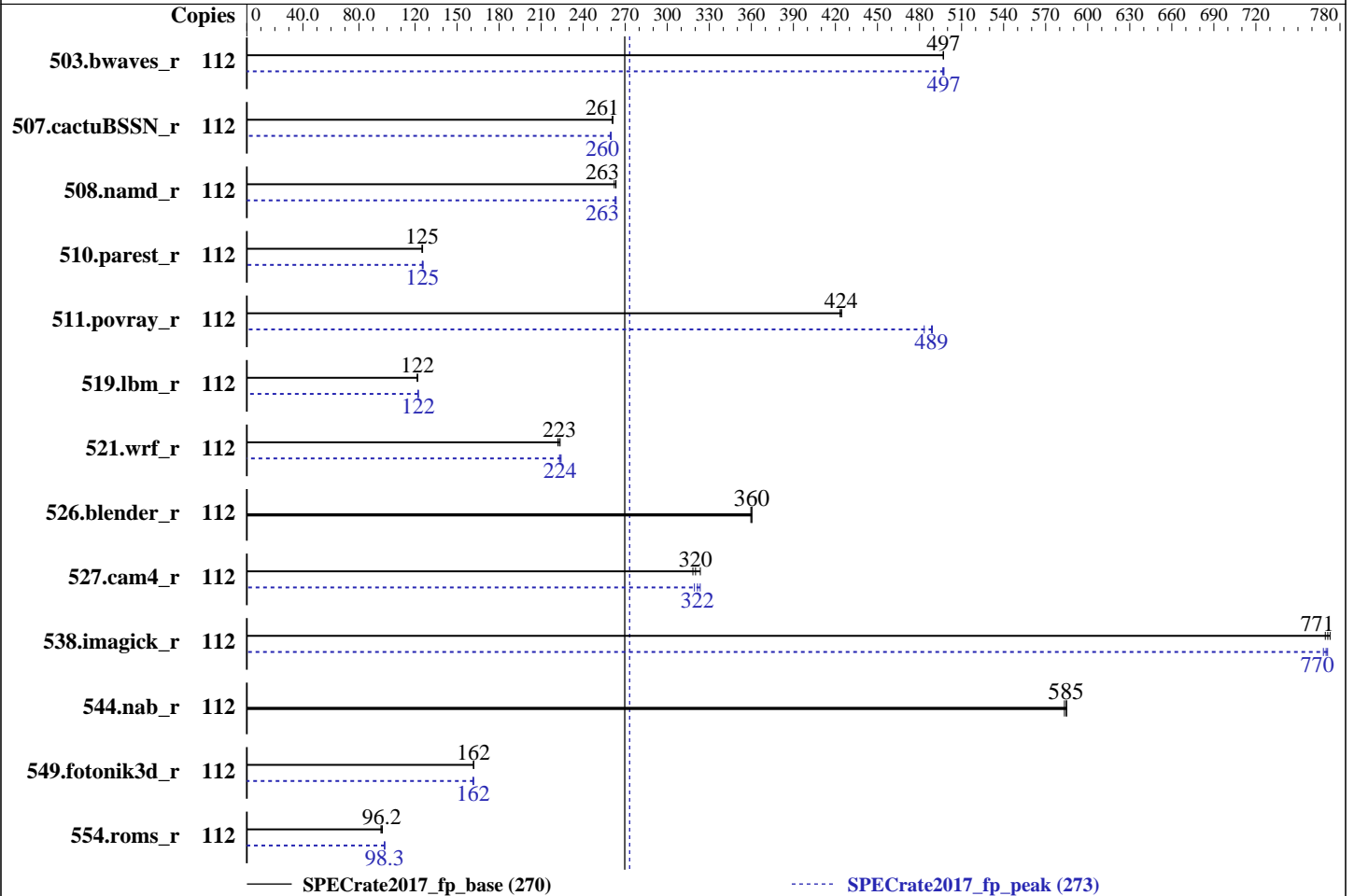
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Jun-2018

Hardware Availability: Jun-2018

Software Availability: May-2018



### Hardware

CPU Name: Intel Xeon Platinum 8180  
 Max MHz.: 3800  
 Nominal: 2500  
 Enabled: 56 cores, 2 chips, 2 threads/core  
 Orderable: 1, 2 chip(s)  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 38.5 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R)  
 Storage: 1 x 240 GB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 12 (x86\_64) SP3  
 Kernel 4.4.120-94.17-default  
 Compiler: C/C++: Version 18.0.3.222 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 18.0.3.222 of Intel Fortran Compiler for Linux  
 Parallel: No  
 Firmware: Version 0905 released Mar-2018  
 File System: btrfs  
 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	112	2260	497	<b>2260</b>	<b>497</b>	2259	497	112	2258	497	2262	497	<b>2259</b>	<b>497</b>
507.cactuBSSN_r	112	<b>543</b>	<b>261</b>	544	261	543	261	112	<b>546</b>	<b>260</b>	545	260	547	259
508.namd_r	112	404	263	<b>404</b>	<b>263</b>	406	262	112	405	263	404	264	<b>405</b>	<b>263</b>
510.parest_r	112	2336	125	2344	125	<b>2341</b>	<b>125</b>	112	<b>2338</b>	<b>125</b>	2329	126	2339	125
511.povray_r	112	618	423	616	424	<b>617</b>	<b>424</b>	112	<b>535</b>	<b>489</b>	535	489	541	483
519.lbm_r	112	970	122	<b>970</b>	<b>122</b>	970	122	112	965	122	<b>966</b>	<b>122</b>	966	122
521.wrf_r	112	1122	224	1130	222	<b>1125</b>	<b>223</b>	112	1119	224	<b>1122</b>	<b>224</b>	1124	223
526.blender_r	112	473	360	<b>473</b>	<b>360</b>	474	360	112	473	360	<b>473</b>	<b>360</b>	474	360
527.cam4_r	112	<b>612</b>	<b>320</b>	615	318	605	324	112	613	319	<b>609</b>	<b>322</b>	606	323
538.imagick_r	112	<b>361</b>	<b>771</b>	360	773	362	770	112	<b>362</b>	<b>770</b>	361	771	363	768
544.nab_r	112	<b>322</b>	<b>585</b>	322	585	323	583	112	<b>322</b>	<b>585</b>	322	585	323	583
549.fotonik3d_r	112	2699	162	2695	162	<b>2698</b>	<b>162</b>	112	<b>2701</b>	<b>162</b>	2706	161	2697	162
554.roms_r	112	1860	95.7	1839	96.8	<b>1850</b>	<b>96.2</b>	112	1812	98.2	1809	98.4	<b>1810</b>	<b>98.3</b>

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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="/spec20171.0.5/lib/ia32:/spec20171.0.5/lib/intel64:/spec20171.0.5/je5.0.1-32:/spec20171.0.5/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) is mitigated in the system as tested and documented.

(Continued on next page)



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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 Configuration:

SNC = Enabled

IMC interleaving = 1 way

Patrol Scrub = Disabled

VT-d = Disabled

ENERGY\_PERF\_BIAS\_CFG mode = Performance

HyperThreading = Enabled

Sysinfo program /spec20171.0.5/bin/sysinfo

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on linux-pmm5 Fri Jun 29 23:30:09 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 8180 CPU @ 2.50GHz

2 "physical id"s (chips)

112 "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 : 28

siblings : 56

physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30

physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27  
28 29 30

From lscpu:

Architecture: x86\_64

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

Byte Order: Little Endian

CPU(s): 112

On-line CPU(s) list: 0-111

Thread(s) per core: 2

Core(s) per socket: 28

Socket(s): 2

NUMA node(s): 4

Vendor ID: GenuineIntel

(Continued on next page)



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### Platform Notes (Continued)

```

CPU family:           6
Model:               85
Model name:         Intel(R) Xeon(R) Platinum 8180 CPU @ 2.50GHz
Stepping:           4
CPU MHz:            2501.000
CPU max MHz:        2501.0000
CPU min MHz:        1000.0000
BogoMIPS:           5000.02
Virtualization:     VT-x
L1d cache:          32K
L1i cache:          32K
L2 cache:           1024K
L3 cache:           39424K
NUMA node0 CPU(s): 0-3,7-9,14-17,21-23,56-59,63-65,70-73,77-79
NUMA node1 CPU(s): 4-6,10-13,18-20,24-27,60-62,66-69,74-76,80-83
NUMA node2 CPU(s): 28-31,35-37,42-45,49-51,84-87,91-93,98-101,105-107
NUMA node3 CPU(s): 32-34,38-41,46-48,52-55,88-90,94-97,102-104,108-111
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
aperfperf 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 intel_pt rsb_ctxsw spec_ctrl stibp retpoline kaiser tpr_shadow vnmi
flexpriority ept vpid fsgsbase tsc_adjust bmil 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 pku ospke

```

```

/proc/cpuinfo cache data
cache size : 39424 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 7 8 9 14 15 16 17 21 22 23 56 57 58 59 63 64 65 70 71 72 73 77 78
79
node 0 size: 192072 MB
node 0 free: 191601 MB
node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27 60 61 62 66 67 68 69 74 75 76 80 81
82 83
node 1 size: 193524 MB
node 1 free: 192817 MB
node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51 84 85 86 87 91 92 93 98 99 100
101 105 106 107
node 2 size: 193524 MB
node 2 free: 193100 MB
node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55 88 89 90 94 95 96 97 102 103 104

```

(Continued on next page)



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### Platform Notes (Continued)

```

108 109 110 111
node 3 size: 193522 MB
node 3 free: 193064 MB
node distances:
node  0  1  2  3
  0:  10  11  21  21
  1:  11  10  21  21
  2:  21  21  10  11
  3:  21  21  11  10

```

```

From /proc/meminfo
MemTotal:      791188124 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 3
  # 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"
  VERSION="12-SP3"
  VERSION_ID="12.3"
  PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
  ID="sles"
  ANSI_COLOR="0;32"
  CPE_NAME="cpe:/o:suse:sles:12:sp3"

```

```

uname -a:
Linux linux-pmm5 4.4.120-94.17-default #1 SMP Wed Mar 14 17:23:00 UTC 2018 (cf3a7bb)
x86_64 x86_64 x86_64 GNU/Linux

```

Kernel self-reported vulnerability status:

```

CVE-2017-5754 (Meltdown):      Mitigation: PTI
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB

```

run-level 3 Jun 29 14:07

```

SPEC is set to: /spec20171.0.5
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sda2        btrfs    203G   92G  110G  46% /

```

(Continued on next page)



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### Platform Notes (Continued)

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 American Megatrends Inc. 0905 03/07/2018

Memory:

24x 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, peak)  
-----

icc (ICC) 18.0.3 20180410

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

=====  
CC 519.lbm\_r(peak)  
-----

icc (ICC) 18.0.3 20180410

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

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

icpc (ICC) 18.0.3 20180410

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

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

icpc (ICC) 18.0.3 20180410

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

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

icpc (ICC) 18.0.3 20180410

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icc (ICC) 18.0.3 20180410

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### Compiler Version Notes (Continued)

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

icpc (ICC) 18.0.3 20180410

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

icc (ICC) 18.0.3 20180410

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

=====  
FC 507.cactuBSSN\_r(base)  
-----

icpc (ICC) 18.0.3 20180410

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

icc (ICC) 18.0.3 20180410

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

ifort (IFORT) 18.0.3 20180410

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

=====  
FC 507.cactuBSSN\_r(peak)  
-----

icpc (ICC) 18.0.3 20180410

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icc (ICC) 18.0.3 20180410

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ifort (IFORT) 18.0.3 20180410

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-----

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

ifort (IFORT) 18.0.3 20180410

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

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

ifort (IFORT) 18.0.3 20180410

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-----

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## Compiler Version Notes (Continued)

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

ifort (IFORT) 18.0.3 20180410  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.3 20180410  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
=====

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

ifort (IFORT) 18.0.3 20180410  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.3 20180410  
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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

## Base Portability Flags

503.bwaves\_r: -DSPEC\_LP64

507.cactuBSSN\_r: -DSPEC\_LP64

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## Base Portability Flags (Continued)

```

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 -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

```

## Peak Compiler Invocation

C benchmarks:

```

icc -m64 -std=c11

```

(Continued on next page)



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## Peak Compiler Invocation (Continued)

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: basepeak = yes
```

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:

(Continued on next page)



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## Peak Optimization Flags (Continued)

```
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:

```
-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++:

```
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: basepeak = yes

Benchmarks using Fortran, 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 -nostandard-realloc-lhs -align array32byte
```

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

<http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z11-V2.0-revD.html>

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.html>

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

<http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z11-V2.0-revD.xml>

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-12-21.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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