SPEC® CPU2017 Floating Point Rate Result

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ASUSTeK Computer Inc.

ASUS RS720Q-E9(Z11PH-D12) Server System
(2.60 GHz, Intel Xeon Gold 6126)

SPECrate2017_fp_base = 170

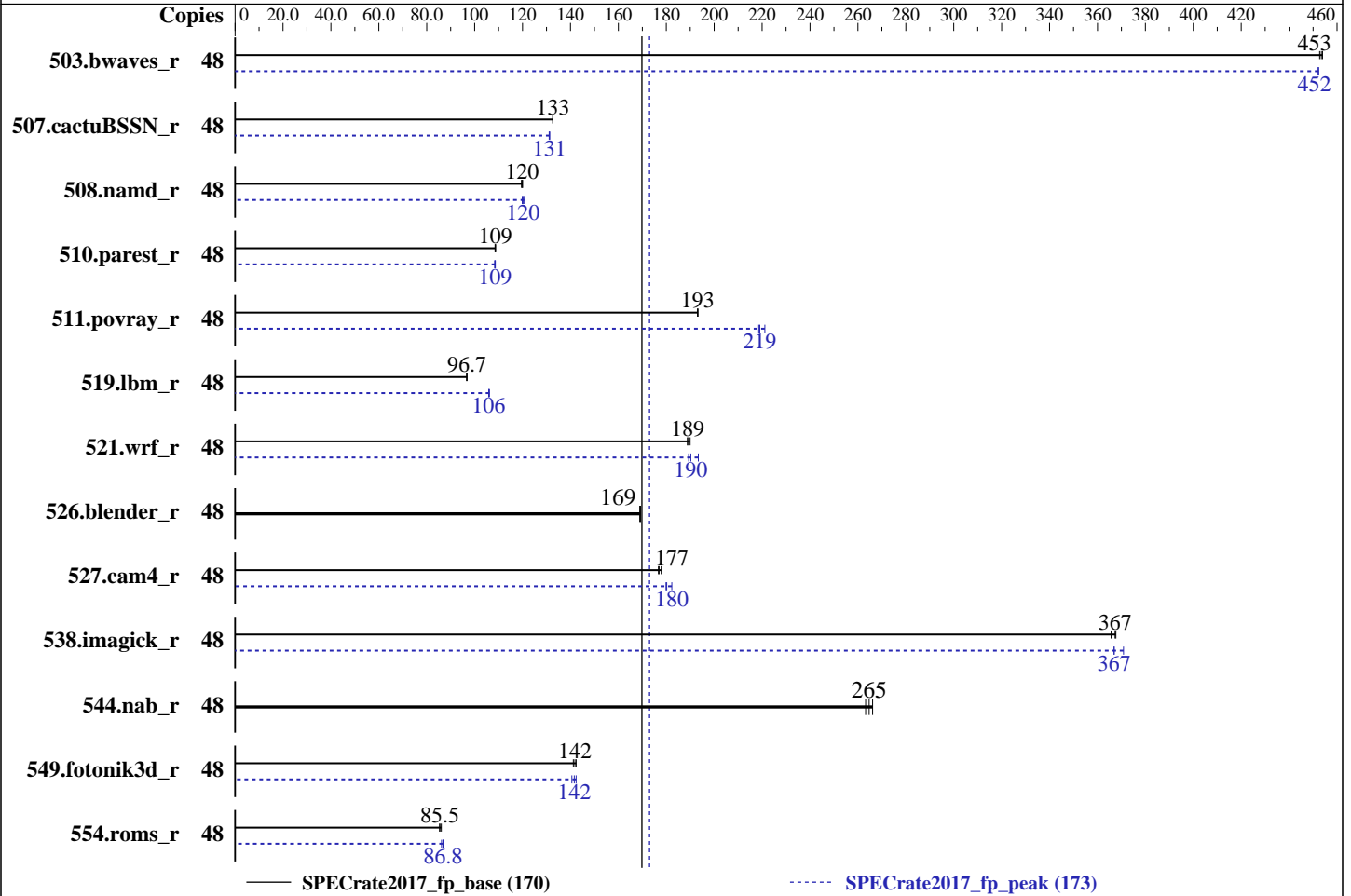SPECrate2017_fp_peak = 173

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Jul-2018
Hardware Availability: Mar-2018
Software Availability: Mar-2018

Benchmark	Copies	base	peak
503.bwaves_r	48	453	452
507.cactuBSSN_r	48	133	131
508.namd_r	48	120	120
510.parest_r	48	109	109
511.povray_r	48	193	219
519.lbm_r	48	96.7	106
521.wrf_r	48	189	190
526.blender_r	48	169	
527.cam4_r	48	177	180
538.imagick_r	48	367	367
544.nab_r	48	265	
549.fotonik3d_r	48	142	142
554.roms_r	48	85.5	86.8

SPECrate2017_fp_base (170)　　　　SPECrate2017_fp_peak (173)

Hardware

CPU Name: Intel Xeon Gold 6126
 Max MHz.: 3700
 Nominal: 2600
Enabled: 24 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: 19.25 MB I+D on chip per chip
 Other: None
Memory: 384 GB (12 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	Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
503.bwaves_r	48	1060	454	**1062**	**453**	1063	453	48	**1064**	**452**	1064	452	1065	452
507.cactuBSSN_r	48	458	133	458	133	**458**	**133**	48	463	131	464	131	**463**	**131**
508.namd_r	48	381	120	**380**	**120**	380	120	48	**379**	**120**	380	120	378	121
510.parest_r	48	**1156**	**109**	1154	109	1157	109	48	1156	109	1159	108	**1157**	**109**
511.povray_r	48	**580**	**193**	580	193	580	193	48	507	221	513	219	**512**	**219**
519.lbm_r	48	523	96.7	**523**	**96.7**	523	96.8	48	476	106	478	106	**478**	**106**
521.wrf_r	48	**569**	**189**	569	189	566	190	48	**565**	**190**	568	189	556	193
526.blender_r	48	**432**	**169**	433	169	432	169	48	**432**	**169**	433	169	432	169
527.cam4_r	48	472	178	475	177	**474**	**177**	48	467	180	461	182	**466**	**180**
538.imagick_r	48	**325**	**367**	326	366	325	368	48	**325**	**367**	322	371	325	367
544.nab_r	48	307	263	304	266	**305**	**265**	48	307	263	304	266	**305**	**265**
549.fotonik3d_r	48	**1319**	**142**	1325	141	1314	142	48	**1321**	**142**	1331	141	1314	142
554.roms_r	48	894	85.4	886	86.1	**892**	**85.5**	48	885	86.2	**879**	**86.8**	879	86.8

SPECrate2017_fp_base =	**170**
SPECrate2017_fp_peak =	**173**

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 = "/spec2017/lib/ia32:/spec2017/lib/intel64:/spec2017/je5.0.1-32:/spec2017/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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https://www.spec.org/

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CPU2017 License:	9016	**Test Date:**	Jul-2018
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Mar-2018
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Mar-2018

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 /spec2017/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on linux-pmm5 Wed Jul  4 17:21:21 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
       2  "physical id"s (chips)
       48 "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 5 6 8 9 10 11 12 13 14
       physical 1: 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):              48
      On-line CPU(s) list: 0-47
      Thread(s) per core:  2
      Core(s) per socket:  12
      Socket(s):           2
      NUMA node(s):        4
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
```

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Platform Notes (Continued)

```
        Model name:            Intel(R) Xeon(R) Gold 6126 CPU @ 2.60GHz
        Stepping:              4
        CPU MHz:               2601.000
        CPU max MHz:           2601.0000
        CPU min MHz:           1000.0000
        BogoMIPS:              5356.19
        Virtualization:        VT-x
        L1d cache:             32K
        L1i cache:             32K
        L2 cache:              1024K
        L3 cache:              19712K
        NUMA node0 CPU(s):     0-2,5-7,24-26,29-31
        NUMA node1 CPU(s):     3,4,8-11,27,28,32-35
        NUMA node2 CPU(s):     12-14,18-20,36-38,42-44
        NUMA node3 CPU(s):     15-17,21-23,39-41,45-47
        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
    aperfmperf 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 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 pku ospke

 /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: 4 nodes (0-3)
   node 0 cpus: 0 1 2 5 6 7 24 25 26 29 30 31
   node 0 size: 95306 MB
   node 0 free: 95078 MB
   node 1 cpus: 3 4 8 9 10 11 27 28 32 33 34 35
   node 1 size: 96759 MB
   node 1 free: 96543 MB
   node 2 cpus: 12 13 14 18 19 20 36 37 38 42 43 44
   node 2 size: 96759 MB
   node 2 free: 96556 MB
   node 3 cpus: 15 16 17 21 22 23 39 40 41 45 46 47
   node 3 size: 96756 MB
   node 3 free: 96539 MB
   node distances:
   node   0   1   2   3
     0:  10  11  21  21
```

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Platform Notes (Continued)

```
     1:  11  10  21  21
     2:  21  21  10  11
     3:  21  21  11  10


From /proc/meminfo
   MemTotal:       394835376 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 Jul 4 17:21

SPEC is set to: /spec2017
   Filesystem      Type   Size   Used Avail Use% Mounted on
   /dev/sda2       btrfs  203G   85G  118G  42% /

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 03/19/2018
   Memory:
```

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Platform Notes (Continued)

```
     12x Kingston D4-26662R4-32G 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
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    511.povray_r(peak)
------------------------------------------------------------------------------
```

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


==============================================================================
 CC   521.wrf_r(base) 527.cam4_r(base)
------------------------------------------------------------------------
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Compiler Version Notes (Continued)

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

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`
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`

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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:
-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

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

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Peak Compiler Invocation (Continued)

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:

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`

(Continued on next page)

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Peak Optimization Flags (Continued)

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

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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