SPEC CPU®2017 Floating Point Rate Result

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Tyrone Systems

(Test Sponsor: Netweb Pte Ltd)

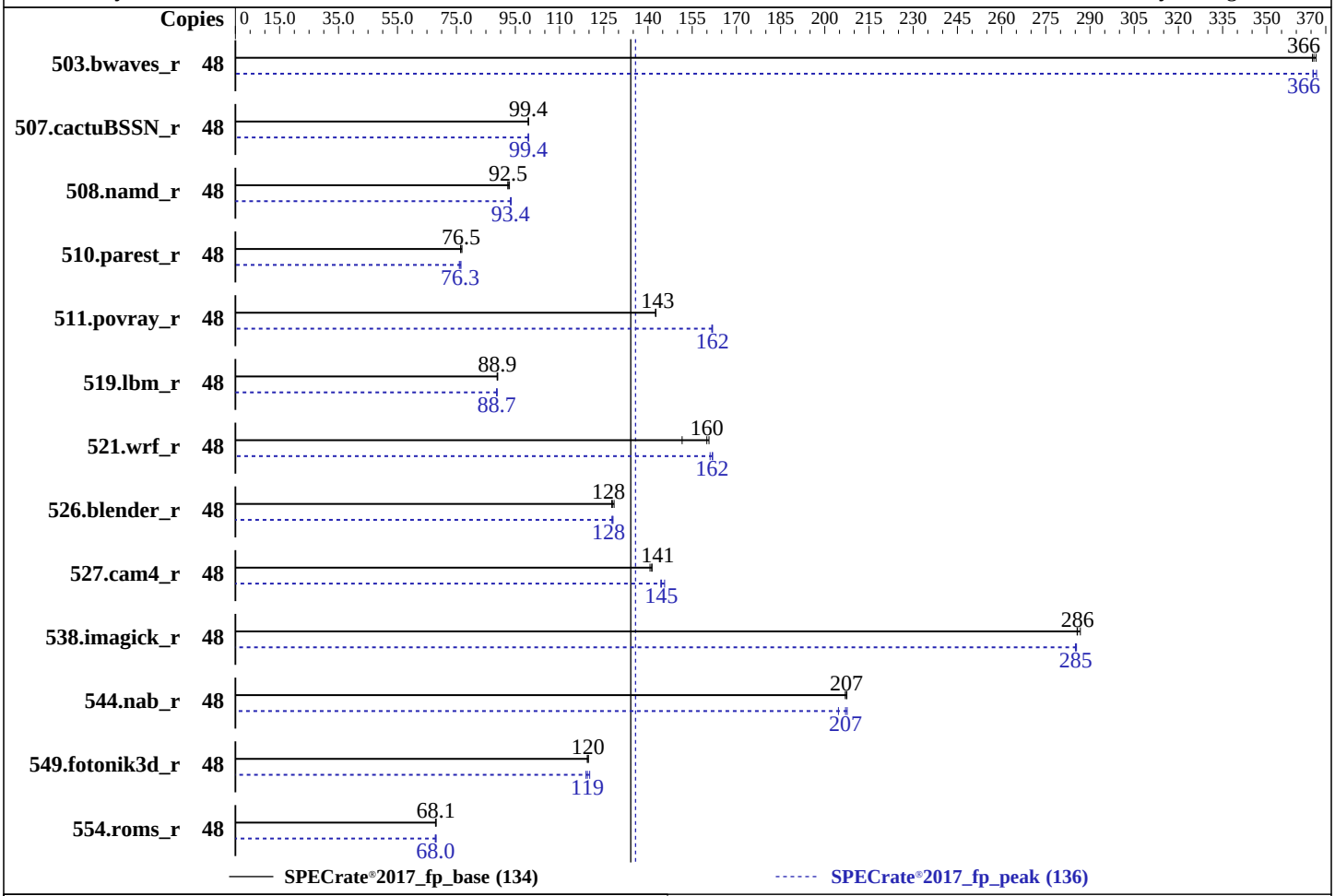
DIT400TR-48RL
(2.20 GHz, Intel Xeon Silver 4214)

SPECrate®2017_fp_base = 134

SPECrate®2017_fp_peak = 136

CPU2017 License: 006042
Test Sponsor: Netweb Pte Ltd
Tested by: Netweb

Test Date: Feb-2020
Hardware Availability: Sep-2019
Software Availability: Aug-2019



Hardware

CPU Name:	Intel Xeon Silver 4214
Max MHz:	3200
Nominal:	2200
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:	16.5 MB I+D on chip per chip
Other:	None
Memory:	384 GB (12 x 32 GB 2Rx4 PC4-2933Y-R, running at 2400)
Storage:	1 x 480 GB SSD
Other:	None

Software

OS:	CentOS Linux release 7.7.1908 (Core) 3.10.0-1062.el7.x86_64
Compiler:	C/C++: Version 19.0.4.243 of Intel C/C++ Compiler Build 20190416 for Linux; Fortran: Version 19.0.4.243 of Intel Fortran Compiler Build 20190416 for Linux
Parallel:	No
Firmware:	Version V8.101 released Aug-2019
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	64-bit
Other:	None
Power Management:	Default

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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	48	**1315**	**366**	1313	367	1317	365	48	1316	366	**1316**	**366**	1312	367
507.cactuBSSN_r	48	611	99.4	611	99.5	**611**	**99.4**	48	611	99.4	**611**	**99.4**	611	99.4
508.namd_r	48	**493**	**92.5**	493	92.5	490	93.0	48	487	93.6	488	93.4	**488**	**93.4**
510.parest_r	48	1644	76.4	**1640**	**76.5**	1633	76.9	48	**1647**	**76.3**	1640	76.5	1653	76.0
511.povray_r	48	785	143	786	143	**786**	**143**	48	693	162	**692**	**162**	692	162
519.lbm_r	48	570	88.8	**569**	**88.9**	568	89.0	48	571	88.6	570	88.8	**570**	**88.7**
521.wrf_r	48	**672**	**160**	669	161	709	152	48	664	162	**664**	**162**	667	161
526.blender_r	48	**571**	**128**	569	129	572	128	48	**572**	**128**	570	128	572	128
527.cam4_r	48	597	141	**594**	**141**	594	141	48	576	146	582	144	**581**	**145**
538.imagick_r	48	416	287	418	286	**418**	**286**	48	418	285	**419**	**285**	419	285
544.nab_r	48	**390**	**207**	389	207	390	207	48	**390**	**207**	389	208	395	205
549.fotonik3d_r	48	1562	120	1567	119	**1563**	**120**	48	1556	120	1572	119	**1566**	**119**
554.roms_r	48	1120	68.1	**1120**	**68.1**	1123	67.9	48	1120	68.1	1125	67.8	**1122**	**68.0**

SPECrate®2017_fp_base = 134

SPECrate®2017_fp_peak = 136

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

SPEC has learned that this result, which used an evaluation compiler, was submitted contrary to the compiler license terms.
Intel has granted a one-time waiver for this result.

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/ia32:/home/cpu2017/lib/intel64"

General Notes

```
Binaries compiled on a system with 1x Intel Core i9-7900X 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>
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.
```

Platform Notes

```
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on NODE5 Sun Feb  9 21:49:43 2020

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 4214 CPU @ 2.20GHz
      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 2 3 4 5 8 9 10 11 12 13
      physical 1: cores 0 1 2 3 4 5 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
```

(Continued on next page)

Platform Notes (Continued)

```
      NUMA node(s):          2
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Silver 4214 CPU @ 2.20GHz
      Stepping:              7
      CPU MHz:               1000.366
      CPU max MHz:           3200.0000
      CPU min MHz:           1000.0000
      BogoMIPS:              4400.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              16896K
      NUMA node0 CPU(s):     0-11,24-35
      NUMA node1 CPU(s):     12-23,36-47
      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 epb cat_l3 cdp_l3 intel_ppin
      intel_pt ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept
      vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
      avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
      xsavec xgetbv1 cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local dtherm ida arat pln
      pts hwp hwp_act_window hwp_epp hwp_pkg_req pku ospke avx512_vnni md_clear spec_ctrl
      intel_stibp flush_l1d arch_capabilities

  /proc/cpuinfo cache data
     cache size : 16896 KB

  From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
    available: 2 nodes (0-1)
    node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 24 25 26 27 28 29 30 31 32 33 34 35
    node 0 size: 195228 MB
    node 0 free: 176318 MB
    node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23 36 37 38 39 40 41 42 43 44 45 46 47
    node 1 size: 196608 MB
    node 1 free: 179982 MB
    node distances:
    node   0   1
      0:  10  21
      1:  21  10
```

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Platform Notes (Continued)

```
From /proc/meminfo
   MemTotal:       394674156 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   centos-release: CentOS Linux release 7.7.1908 (Core)
   centos-release-upstream: Derived from Red Hat Enterprise Linux 7.7 (Source)
   os-release:
      NAME="CentOS Linux"
      VERSION="7 (Core)"
      ID="centos"
      ID_LIKE="rhel fedora"
      VERSION_ID="7"
      PRETTY_NAME="CentOS Linux 7 (Core)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:centos:centos:7"
   redhat-release: CentOS Linux release 7.7.1908 (Core)
   system-release: CentOS Linux release 7.7.1908 (Core)
   system-release-cpe: cpe:/o:centos:centos:7

uname -a:
   Linux NODE5 3.10.0-1062.el7.x86_64 #1 SMP Wed Aug 7 18:08:02 UTC 2019 x86_64 x86_64
   x86_64 GNU/Linux

Kernel self-reported vulnerability status:

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: Load fences, __user pointer
                                          sanitization
CVE-2017-5715 (Spectre variant 2):        Mitigation: Full retpoline, IBPB

run-level 3 Feb 9 11:56

SPEC is set to: /home/cpu2017
   Filesystem              Type  Size  Used Avail Use% Mounted on
   /dev/mapper/centos-home xfs   392G  142G  251G  37% /home

From /sys/devices/virtual/dmi/id
    BIOS:    American Megatrends Inc. V8.101 08/02/2019
    Vendor:  Tyrone Systems
    Product: DIT400TR-48RL
    Serial:  empty
```

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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.
   Memory:
     12x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)
                | 544.nab_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

==============================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

==============================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
```

(Continued on next page)

Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icpc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

==============================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                | 554.roms_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------

==============================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
ifort: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.243 Build 20190416
Copyright (C) 1985-2019 Intel Corporation.  All rights reserved.
icc: NOTE: The evaluation period for this product ends on 2-nov-2019 UTC.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icc -m64 -std=c11`

C++ benchmarks:
`icpc -m64`

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Base Compiler Invocation (Continued)

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
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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

C++ benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

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Base Optimization Flags (Continued)

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

Benchmarks using both C and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte

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-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`

538.imagick_r: `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`

544.nab_r: `Same as 538.imagick_r`

C++ benchmarks:

508.namd_r: `-prof-gen`(pass 1) `-prof-use`(pass 2) `-ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`

510.parest_r: `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`

Fortran benchmarks:

503.bwaves_r: `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -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-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte`

Benchmarks using both Fortran and C:
`-prof-gen`(pass 1) `-prof-use`(pass 2) `-ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs -align array32byte`

Benchmarks using both C and C++:

511.povray_r: `-prof-gen`(pass 1) `-prof-use`(pass 2) `-ipo -xCORE-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`

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Peak Optimization Flags (Continued)

526.blender_r: `-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4`

Benchmarks using Fortran, C, and C++:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -auto -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/TyroneIT-Platform-Settings-V1-CLX-revA.html
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-15.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/TyroneIT-Platform-Settings-V1-CLX-revA.xml
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-15.xml

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

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