SPEC® CPU2017 Floating Point Rate Result

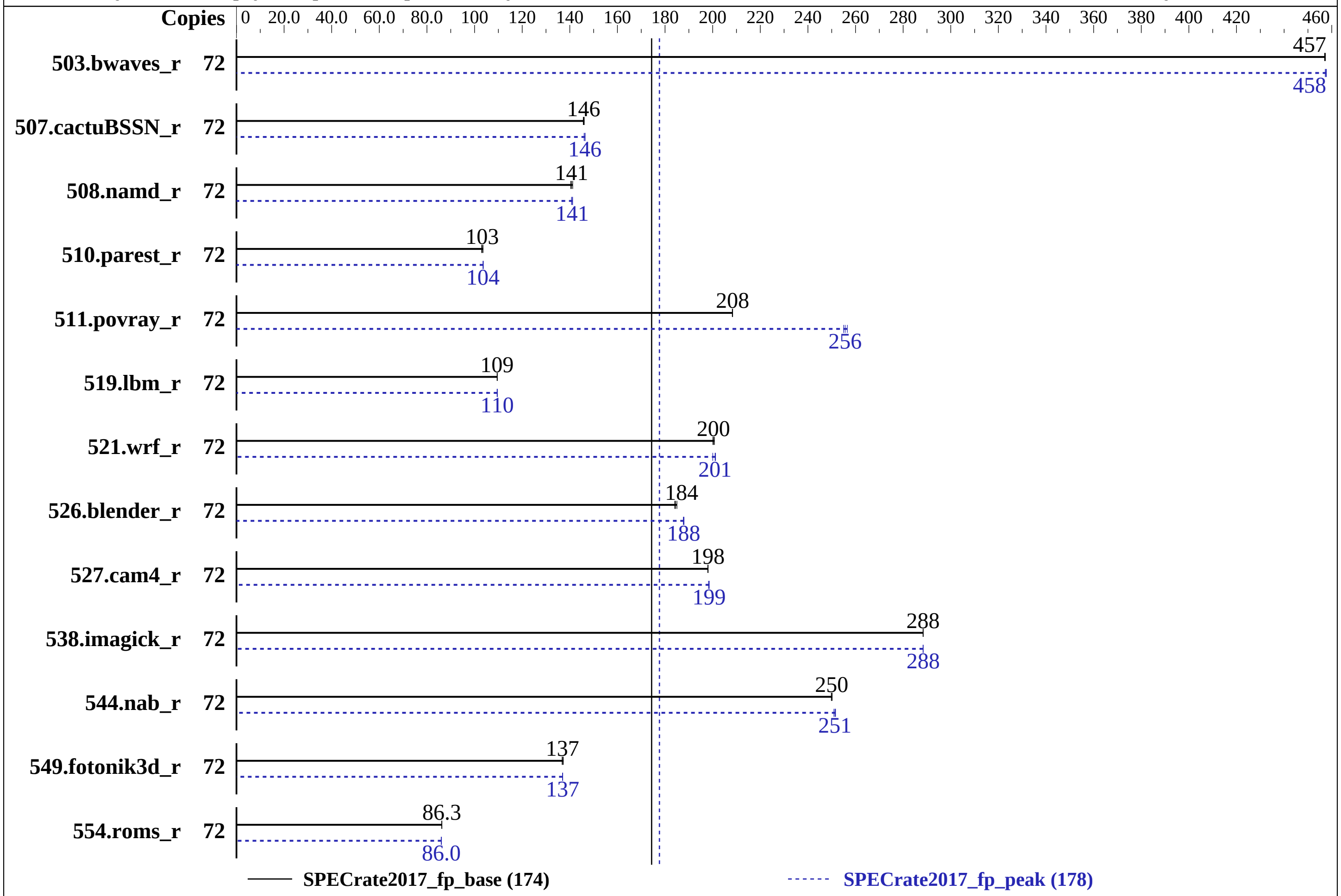
Epsylon Sp. z o.o. Sp. Komandytowa

eterio 220 RA1 (Intel Xeon Gold 6140, 2.30 GHz)

SPECrate2017_fp_base = 174

SPECrate2017_fp_peak = 178

CPU2017 License: 9081
Test Sponsor: Epsylon Sp. z o.o. Sp. Komandytowa
Tested by: Epsylon Sp. z o.o. Sp. Komandytowa
Test Date: Mar-2019
Hardware Availability: Sep-2017
Software Availability: Jul-2018



Hardware

CPU Name:	Intel Xeon Gold 6140
Max MHz.:	3700
Nominal:	2300
Enabled:	36 cores, 2 chips, 2 threads/core
Orderable:	1,2 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	24.75 MB I+D on chip per chip
Other:	None
Memory:	768 GB (24 x 32 GB 2Rx4 PC4-2666V-R)
Storage:	1 x 1200 GB SSD SATA III
Other:	None

Software

OS:	CentOS Linux release 7.6.1810 3.10.0-862.9.1.el7.x86_64
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 BIOS R0016 released Feb-2019
File System:	ext4
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	64-bit
Other:	None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	72	1579	457	**1579**	**457**	1580	457	72	1579	457	**1578**	**458**	1577	458
507.cactuBSSN_r	72	**625**	**146**	624	146	626	146	72	622	146	**623**	**146**	624	146
508.namd_r	72	**486**	**141**	484	141	487	140	72	**485**	**141**	486	141	484	141
510.parest_r	72	1818	104	**1825**	**103**	1829	103	72	1816	104	1819	104	**1819**	**104**
511.povray_r	72	**807**	**208**	807	208	807	208	72	655	257	659	255	**658**	**256**
519.lbm_r	72	693	110	693	109	**693**	**109**	72	692	110	**693**	**110**	693	109
521.wrf_r	72	806	200	**805**	**200**	803	201	72	**802**	**201**	806	200	802	201
526.blender_r	72	**595**	**184**	596	184	593	185	72	**584**	**188**	583	188	584	188
527.cam4_r	72	636	198	**636**	**198**	636	198	72	635	198	**634**	**199**	634	199
538.imagick_r	72	621	288	**621**	**288**	621	288	72	**621**	**288**	621	288	621	288
544.nab_r	72	485	250	484	250	**485**	**250**	72	**482**	**251**	482	252	483	251
549.fotonik3d_r	72	**2048**	**137**	2052	137	2044	137	72	2049	137	**2048**	**137**	2047	137
554.roms_r	72	**1326**	**86.3**	1326	86.3	1327	86.2	72	1329	86.1	**1330**	**86.0**	1330	86.0

SPECrate2017_fp_base = 174

SPECrate2017_fp_peak = 178

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/aflinta/cpu2017.1.0/lib/intel64:
/home/aflinta/cpu2017.1.0/je5.0.1-32:/home/aflinta/cpu2017.1.0/je5.0.1-64"
 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32 GB RAM
 memory using Redhat Enterprise Linux 7.4

 Yes: 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.
```

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General Notes (Continued)

```
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>
```

Platform Notes

```
BIOS Settings:
Intel(R) Hyper-Threading Tech = Enabled
CPU Power and Performance Policy = Performance
Intel(R) Turbo Boost Technology = Enabled
C1E = Disabled
Processor C6 = Disabled
IMC Interleaving = Auto
Sub_NUMA Cluster = Disabled
Set FAN Profile = Performance
Patrol Scrub = Disabled

Sysinfo program /home/aflinta/cpu2017.1.0/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on node306 Tue Mar 12 01:29:53 2019

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 6140 CPU @ 2.30GHz
      2  "physical id"s (chips)
      72 "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 : 18
      siblings  : 36
      physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
      physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

From lscpu:
     Architecture:          x86_64
     CPU op-mode(s):        32-bit, 64-bit
     Byte Order:            Little Endian
     CPU(s):                72
     On-line CPU(s) list:   0-71
```

(Continued on next page)

Platform Notes (Continued)

```
      Thread(s) per core:    2
      Core(s) per socket:    18
      Socket(s):             2
      NUMA node(s):          2
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Gold 6140 CPU @ 2.30GHz
      Stepping:              4
      CPU MHz:               2610.943
      CPU max MHz:           3700.0000
      CPU min MHz:           1000.0000
      BogoMIPS:              4600.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              25344K
      NUMA node0 CPU(s):     0-17,36-53
      NUMA node1 CPU(s):     18-35,54-71
      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 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 spec_ctrl intel_stibp

 /proc/cpuinfo cache data
    cache size : 25344 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 12 13 14 15 16 17 36 37 38 39 40 41 42 43 44 45
   46 47 48 49 50 51 52 53
   node 0 size: 391878 MB
   node 0 free: 382688 MB
   node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 54 55 56 57 58 59 60
   61 62 63 64 65 66 67 68 69 70 71
   node 1 size: 393216 MB
   node 1 free: 384299 MB
   node distances:
```

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Platform Notes (Continued)

```
    node   0   1
      0:  10  21
      1:  21  10

  From /proc/meminfo
     MemTotal:       791229532 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  /usr/bin/lsb_release -d
     CentOS Linux release 7.6.1810 (Core)

  From /etc/*release* /etc/*version*
     centos-release: CentOS Linux release 7.6.1810 (Core)
     centos-release-upstream: Derived from Red Hat Enterprise Linux 7.6 (Source)
     cm-release:
        Cluster Manager v8.1
        slave
     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 7.6.1810 (Core)
     system-release: CentOS Linux release 7.6.1810 (Core)
     system-release-cpe: cpe:/o:centos:centos:7

  uname -a:
     Linux node306 3.10.0-862.9.1.el7.x86_64 #1 SMP Mon Jul 16 16:29:36 UTC 2018 x86_64
     x86_64 x86_64 GNU/Linux

  run-level 3 Mar 11 15:12

  SPEC is set to: /home/aflinta/cpu2017.1.0
     Filesystem     Type  Size  Used Avail Use% Mounted on
     master:/home   nfs   1.5T  830G  563G  60% /home

  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 Intel Corporation SE5C620.86B.00.01.0016.020120190930 02/01/2019
    Memory:
```

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Platform Notes (Continued)

```
    24x Micron 36ASF4G72PZ-2G6D1 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.
------------------------------------------------------------------------------

==============================================================================
CC   511.povray_r(peak) 526.blender_r(peak)
------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

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

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Compiler Version Notes (Continued)

```
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.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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX512 -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-AVX512 -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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -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

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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:

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=3

538.imagick_r: -xCORE-AVX512 -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-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3

Fortran benchmarks:

503.bwaves_r: -xCORE-AVX512 -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-AVX512 -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-AVX512 -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-AVX512 -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=3

Benchmarks using Fortran, C, 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=3 -nostandard-realloc-lhs -align array32byte

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-linux64.2017-10-19.html
http://www.spec.org/cpu2017/flags/Epsylon-Platform-Flags-RevA-Feb-2018-For-Intel-Platform.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml
http://www.spec.org/cpu2017/flags/Epsylon-Platform-Flags-RevA-Feb-2018-For-Intel-Platform.xml

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