SPEC® CPU2017 Floating Point Rate Result

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Lenovo Global Technology

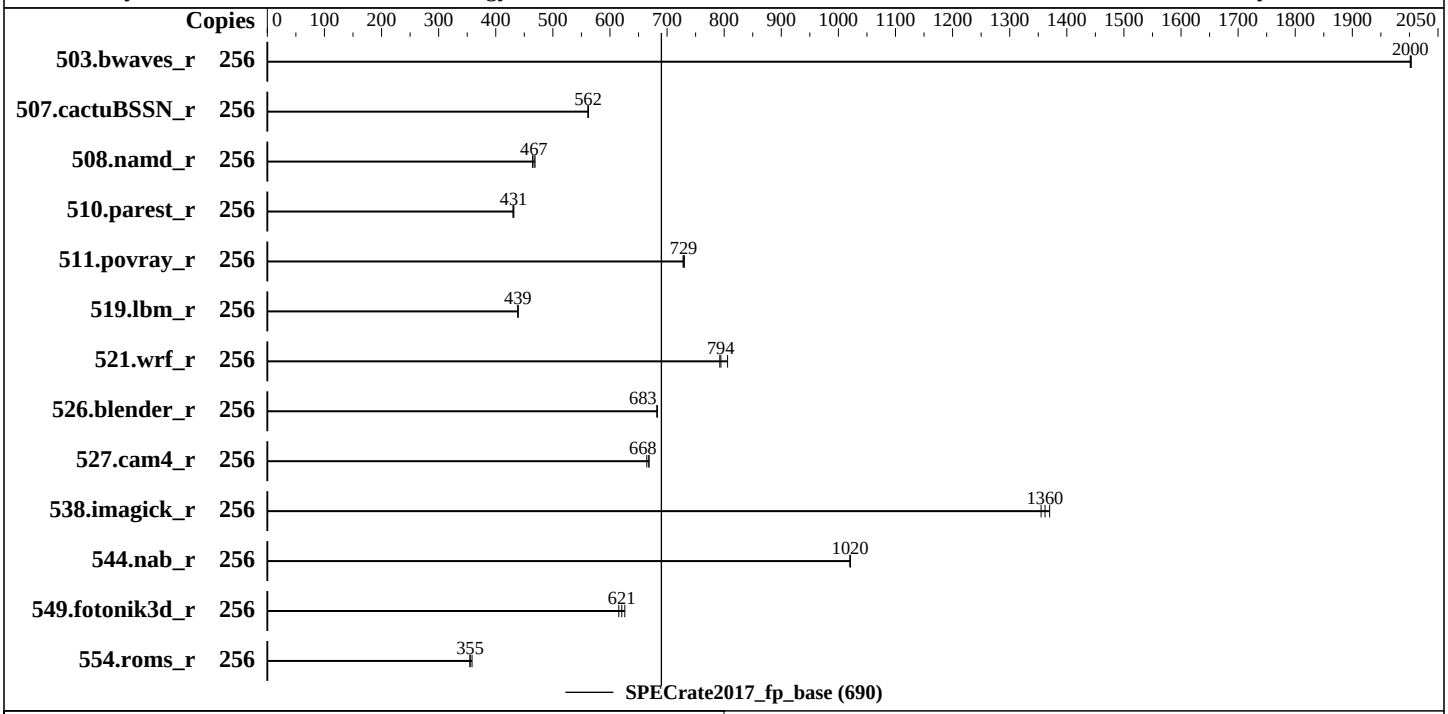
ThinkSystem SR950
(2.20 GHz, Intel Xeon Platinum 8253)

SPECrate2017_fp_base = 690

SPECrate2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Apr-2019
Hardware Availability: Apr-2019
Software Availability: Dec-2018



Hardware

CPU Name:	Intel Xeon Platinum 8253
Max MHz.:	3000
Nominal:	2200
Enabled:	128 cores, 8 chips, 2 threads/core
Orderable:	2,3,4,6,8 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	22 MB I+D on chip per chip
Other:	None
Memory:	3 TB (96 x 32 GB 2Rx4 PC4-2933Y-R)
Storage:	960 GB tmpfs
Other:	None

Software

OS:	SUSE Linux Enterprise Server 12 SP4 (x86_64) Kernel 4.12.14-94.41-default
Compiler:	C/C++: Version 19.0.0.117 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.0.117 of Intel Fortran Compiler for Linux
Parallel:	No
Firmware:	Lenovo BIOS Version PSE121C 1.50 released Jan-2019
File System:	tmpfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	256	1282	2000	1283	2000	**1283**	**2000**							
507.cactuBSSN_r	256	**577**	**562**	577	561	576	562							
508.namd_r	256	519	469	**521**	**467**	524	464							
510.parest_r	256	1552	432	**1553**	**431**	1557	430							
511.povray_r	256	819	730	821	728	**820**	**729**							
519.lbm_r	256	**615**	**439**	615	439	615	439							
521.wrf_r	256	**722**	**794**	724	792	711	806							
526.blender_r	256	571	683	**571**	**683**	571	682							
527.cam4_r	256	670	668	674	665	**670**	**668**							
538.imagick_r	256	465	1370	470	1350	**467**	**1360**							
544.nab_r	256	**422**	**1020**	422	1020	422	1020							
549.fotonik3d_r	256	**1607**	**621**	1621	615	1594	626							
554.roms_r	256	**1145**	**355**	1147	355	1135	358							

SPECrate2017_fp_base = 690

SPECrate2017_fp_peak = Not Run

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"
Tmpfs filesystem can be set with:
 mount -t tmpfs -o size=960g tmpfs /home
Process tuning setting:
 echo 50000     > /proc/sys/kernel/sched_cfs_bandwidth_slice_us
 echo 240000000 > /proc/sys/kernel/sched_latency_ns
 echo 5000000   > /proc/sys/kernel/sched_migration_cost_ns
 echo 100000000 > /proc/sys/kernel/sched_min_granularity_ns
 echo 150000000 > /proc/sys/kernel/sched_wakeup_granularity_ns
```

General Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19/lib/intel64"

 Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.5
```

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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>
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.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a)
is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4)
is mitigated in the system as tested and documented.
```

Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
MONITOR/MWAIT set to Enable
SNC set to Enable
Patrol Scrub set to Disable
Stale AtoS set to Enable
LLC dead line alloc set to Disable
 Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on sles12sp4 Wed Apr 17 08:15:14 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) Platinum 8253 CPU @ 2.20GHz
       8  "physical id"s (chips)
       256 "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 : 16
       siblings  : 32
       physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

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Platform Notes (Continued)

```
       physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 4: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 5: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 6: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
       physical 7: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

 From lscpu:
      Architecture:          x86_64
      CPU op-mode(s):        32-bit, 64-bit
      Byte Order:            Little Endian
      CPU(s):                256
      On-line CPU(s) list:   0-255
      Thread(s) per core:    2
      Core(s) per socket:    16
      Socket(s):             8
      NUMA node(s):          16
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Platinum 8253 CPU @ 2.20GHz
      Stepping:              6
      CPU MHz:               2200.000
      CPU max MHz:           3000.0000
      CPU min MHz:           1000.0000
      BogoMIPS:              4400.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              22528K
      NUMA node0 CPU(s):     0-3,8-11,128-131,136-139
      NUMA node1 CPU(s):     4-7,12-15,132-135,140-143
      NUMA node2 CPU(s):     16-19,24-27,144-147,152-155
      NUMA node3 CPU(s):     20-23,28-31,148-151,156-159
      NUMA node4 CPU(s):     32-35,40-43,160-163,168-171
      NUMA node5 CPU(s):     36-39,44-47,164-167,172-175
      NUMA node6 CPU(s):     48-51,56-59,176-179,184-187
      NUMA node7 CPU(s):     52-55,60-63,180-183,188-191
      NUMA node8 CPU(s):     64-67,72-75,192-195,200-203
      NUMA node9 CPU(s):     68-71,76-79,196-199,204-207
      NUMA node10 CPU(s):    80-83,88-91,208-211,216-219
      NUMA node11 CPU(s):    84-87,92-95,212-215,220-223
      NUMA node12 CPU(s):    96-99,104-107,224-227,232-235
      NUMA node13 CPU(s):    100-103,108-111,228-231,236-239
      NUMA node14 CPU(s):    112-115,120-123,240-243,248-251
      NUMA node15 CPU(s):    116-119,124-127,244-247,252-255
      Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
```

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Platform Notes (Continued)

```
      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 cpuid
      aperfmperf 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 cpuid_fault epb cat_l3 cdp_l3
      invpcid_single 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 intel_pt avx512cd avx512bw avx512vl
      xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
      dtherm ida arat pln pts pku ospke avx512_vnni flush_l1d arch_capabilities

/proc/cpuinfo cache data
   cache size : 22528 KB

From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 16 nodes (0-15)
  node 0 cpus: 0 1 2 3 8 9 10 11 128 129 130 131 136 137 138 139
  node 0 size: 193121 MB
  node 0 free: 180873 MB
  node 1 cpus: 4 5 6 7 12 13 14 15 132 133 134 135 140 141 142 143
  node 1 size: 193530 MB
  node 1 free: 188104 MB
  node 2 cpus: 16 17 18 19 24 25 26 27 144 145 146 147 152 153 154 155
  node 2 size: 193530 MB
  node 2 free: 193303 MB
  node 3 cpus: 20 21 22 23 28 29 30 31 148 149 150 151 156 157 158 159
  node 3 size: 193501 MB
  node 3 free: 193271 MB
  node 4 cpus: 32 33 34 35 40 41 42 43 160 161 162 163 168 169 170 171
  node 4 size: 193530 MB
  node 4 free: 193366 MB
  node 5 cpus: 36 37 38 39 44 45 46 47 164 165 166 167 172 173 174 175
  node 5 size: 193530 MB
  node 5 free: 193381 MB
  node 6 cpus: 48 49 50 51 56 57 58 59 176 177 178 179 184 185 186 187
  node 6 size: 193530 MB
  node 6 free: 193305 MB
  node 7 cpus: 52 53 54 55 60 61 62 63 180 181 182 183 188 189 190 191
  node 7 size: 193530 MB
  node 7 free: 193294 MB
  node 8 cpus: 64 65 66 67 72 73 74 75 192 193 194 195 200 201 202 203
  node 8 size: 193530 MB
  node 8 free: 193309 MB
  node 9 cpus: 68 69 70 71 76 77 78 79 196 197 198 199 204 205 206 207
  node 9 size: 193530 MB
  node 9 free: 193335 MB
```

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Platform Notes (Continued)

```
   node 10 cpus: 80 81 82 83 88 89 90 91 208 209 210 211 216 217 218 219
   node 10 size: 193530 MB
   node 10 free: 193360 MB
   node 11 cpus: 84 85 86 87 92 93 94 95 212 213 214 215 220 221 222 223
   node 11 size: 193530 MB
   node 11 free: 193353 MB
   node 12 cpus: 96 97 98 99 104 105 106 107 224 225 226 227 232 233 234 235
   node 12 size: 193530 MB
   node 12 free: 193365 MB
   node 13 cpus: 100 101 102 103 108 109 110 111 228 229 230 231 236 237 238 239
   node 13 size: 193530 MB
   node 13 free: 193373 MB
   node 14 cpus: 112 113 114 115 120 121 122 123 240 241 242 243 248 249 250 251
   node 14 size: 193530 MB
   node 14 free: 193358 MB
   node 15 cpus: 116 117 118 119 124 125 126 127 244 245 246 247 252 253 254 255
   node 15 size: 193527 MB
   node 15 free: 193241 MB
   node distances:
   node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
     0:  10  11  21  21  31  31  21  21  21  21  31  31  31  31  31  31
     1:  11  10  21  21  31  31  21  21  21  21  31  31  31  31  31  31
     2:  21  21  10  11  21  21  31  31  31  31  21  21  31  31  31  31
     3:  21  21  11  10  21  21  31  31  31  31  21  21  31  31  31  31
     4:  31  31  21  21  10  11  21  21  31  31  31  31  21  21  31  31
     5:  31  31  21  21  11  10  21  21  31  31  31  31  21  21  31  31
     6:  21  21  31  31  21  21  10  11  31  31  31  31  31  31  21  21
     7:  21  21  31  31  21  21  11  10  31  31  31  31  31  31  21  21
     8:  21  21  31  31  31  31  31  31  10  11  21  21  21  21  31  31
     9:  21  21  31  31  31  31  31  31  11  10  21  21  21  21  31  31
    10:  31  31  21  21  31  31  31  31  21  21  10  11  31  31  21  21
    11:  31  31  21  21  31  31  31  31  21  21  11  10  31  31  21  21
    12:  31  31  31  31  21  21  31  31  21  21  31  31  10  11  21  21
    13:  31  31  31  31  21  21  31  31  21  21  31  31  11  10  21  21
    14:  31  31  31  31  31  31  21  21  31  31  21  21  21  21  10  11
    15:  31  31  31  31  31  31  21  21  31  31  21  21  21  21  11  10

  From /proc/meminfo
     MemTotal:       3170354252 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  From /etc/*release* /etc/*version*
     SuSE-release:
        SUSE Linux Enterprise Server 12 (x86_64)
        VERSION = 12
        PATCHLEVEL = 4
```

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Platform Notes (Continued)

```
       # 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-SP4"
       VERSION_ID="12.4"
       PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
       ID="sles"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:12:sp4"

 uname -a:
    Linux sles12sp4 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901)
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2017-5754 (Meltdown):          Not affected
 CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
 CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation,
 IBPB, IBRS_FW

 run-level 3 Apr 17 08:11

 SPEC is set to: /home/cpu2017-1.0.5-ic19
    Filesystem     Type   Size  Used Avail Use% Mounted on
    tmpfs          tmpfs  960G   11G  950G   2% /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 Lenovo -[PSE121C-1.50]- 01/16/2019
   Memory:
    96x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
 CC  519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
```

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Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------

==============================================================================
 CXXC 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 CC  511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  507.cactuBSSN_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 CC  521.wrf_r(base) 527.cam4_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
```

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Compiler Version Notes (Continued)

```
  64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
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`
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 -auto -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 -auto -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 -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/Intel-ic19.0-official-linux64.2019-01-15.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.0-official-linux64.2019-01-15.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.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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