SPEC® CPU2017 Floating Point Rate Result

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Lenovo Global Technology

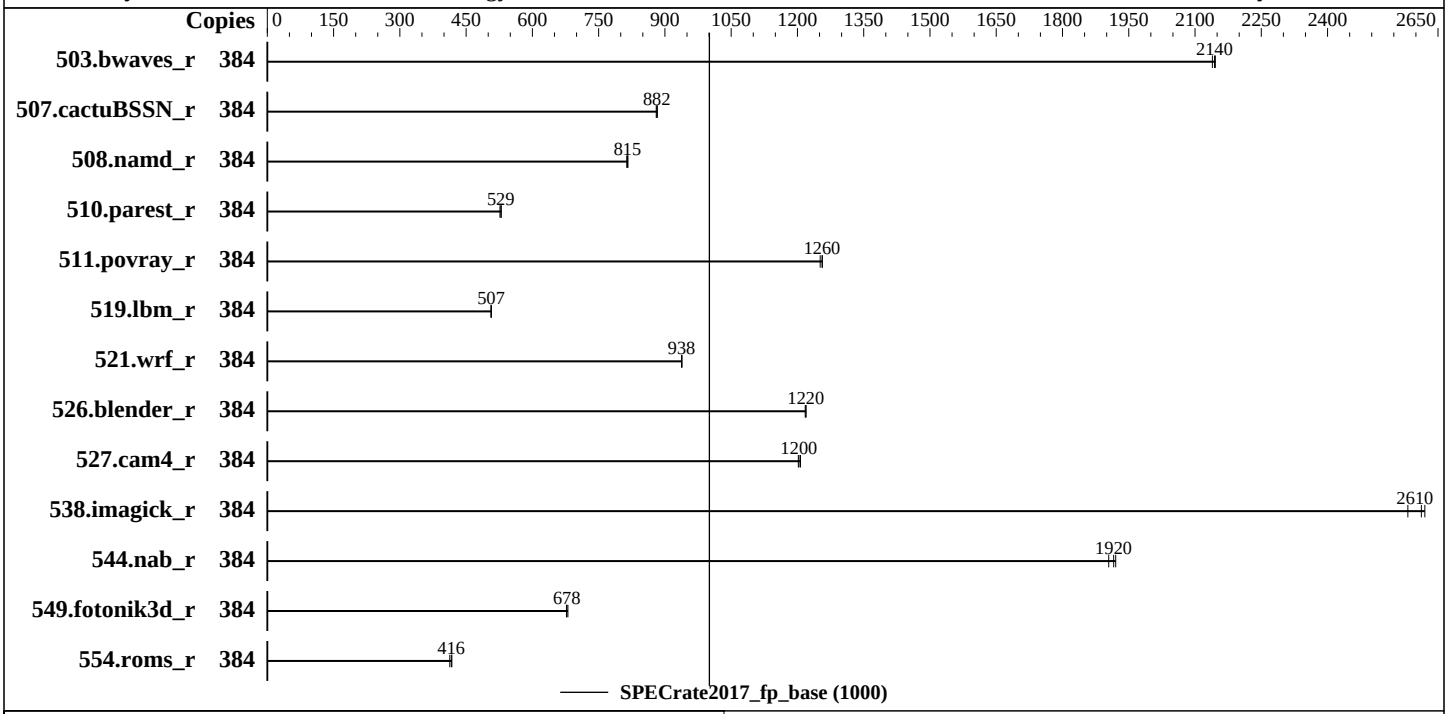
ThinkSystem SR950
(2.40 GHz, Intel Xeon Platinum 8260L)

SPECrate2017_fp_base = 1000

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 8260L
Max MHz.:	3900
Nominal:	2400
Enabled:	192 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:	35.75 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	384	1800	2140	1794	2150	**1796**	**2140**							
507.cactuBSSN_r	384	551	883	**551**	**882**	552	880							
508.namd_r	384	447	816	**447**	**815**	448	814							
510.parest_r	384	1897	530	1908	527	**1900**	**529**							
511.povray_r	384	716	1250	**714**	**1260**	714	1260							
519.lbm_r	384	799	506	**799**	**507**	798	507							
521.wrf_r	384	**917**	**938**	916	939	917	938							
526.blender_r	384	480	1220	**480**	**1220**	480	1220							
527.cam4_r	384	559	1200	556	1210	**558**	**1200**							
538.imagick_r	384	**366**	**2610**	370	2580	364	2620							
544.nab_r	384	**337**	**1920**	339	1900	337	1920							
549.fotonik3d_r	384	**2207**	**678**	2210	677	2199	680							
554.roms_r	384	**1465**	**416**	1461	418	1477	413							

SPECrate2017_fp_base = 1000

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 Sat Apr 27 05:54:57 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 8260L CPU @ 2.40GHz
       8  "physical id"s (chips)
       384 "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 : 24
       siblings  : 48
       physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
       physical 1: cores 0 1 2 3 4 5 6 8 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
       physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
```

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Platform Notes (Continued)

```
      physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
      physical 4: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
      physical 5: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
      physical 6: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
      physical 7: cores 0 1 2 3 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 25 26 27 28 29

 From lscpu:
      Architecture:          x86_64
      CPU op-mode(s):        32-bit, 64-bit
      Byte Order:            Little Endian
      CPU(s):                384
      On-line CPU(s) list:   0-383
      Thread(s) per core:    2
      Core(s) per socket:    24
      Socket(s):             8
      NUMA node(s):          16
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Platinum 8260L CPU @ 2.40GHz
      Stepping:              6
      CPU MHz:               2400.000
      CPU max MHz:           3900.0000
      CPU min MHz:           1000.0000
      BogoMIPS:              4800.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              36608K
      NUMA node0 CPU(s):     0-3,7-9,13-15,19,20,192-195,199-201,205-207,211,212
      NUMA node1 CPU(s):     4-6,10-12,16-18,21-23,196-198,202-204,208-210,213-215
      NUMA node2 CPU(s):     24-27,31,32,36-38,42-44,216-219,223,224,228-230,234-236
      NUMA node3 CPU(s):     28-30,33-35,39-41,45-47,220-222,225-227,231-233,237-239
      NUMA node4 CPU(s):     48-51,55-57,61-63,67,68,240-243,247-249,253-255,259,260
      NUMA node5 CPU(s):     52-54,58-60,64-66,69-71,244-246,250-252,256-258,261-263
      NUMA node6 CPU(s):     72-75,79-81,85-87,91,92,264-267,271-273,277-279,283,284
      NUMA node7 CPU(s):     76-78,82-84,88-90,93-95,268-270,274-276,280-282,285-287
      NUMA node8 CPU(s):     96-99,103-105,109-111,115,116,288-291,295-297,301-303,307,308
      NUMA node9 CPU(s):
      100-102,106-108,112-114,117-119,292-294,298-300,304-306,309-311
      NUMA node10 CPU(s):
      120-123,127-129,133-135,139,140,312-315,319-321,325-327,331,332
      NUMA node11 CPU(s):
      124-126,130-132,136-138,141-143,316-318,322-324,328-330,333-335
      NUMA node12 CPU(s):
      144-147,151,152,156-158,162-164,336-339,343,344,348-350,354-356
```


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Platform Notes (Continued)

```
      NUMA node13 CPU(s):
      148-150,153-155,159-161,165-167,340-342,345-347,351-353,357-359
      NUMA node14 CPU(s):
      168-171,174-176,180-182,187,188,360-363,366-368,372-374,379,380
      NUMA node15 CPU(s):
      172,173,177-179,183-186,189-191,364,365,369-371,375-378,381-383
      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 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 : 36608 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 7 8 9 13 14 15 19 20 192 193 194 195 199 200 201 205 206 207 211
    212
    node 0 size: 193120 MB
    node 0 free: 192349 MB
    node 1 cpus: 4 5 6 10 11 12 16 17 18 21 22 23 196 197 198 202 203 204 208 209 210 213
    214 215
    node 1 size: 193501 MB
    node 1 free: 193165 MB
    node 2 cpus: 24 25 26 27 31 32 36 37 38 42 43 44 216 217 218 219 223 224 228 229 230
    234 235 236
    node 2 size: 193530 MB
    node 2 free: 193260 MB
    node 3 cpus: 28 29 30 33 34 35 39 40 41 45 46 47 220 221 222 225 226 227 231 232 233
    237 238 239
    node 3 size: 193530 MB
    node 3 free: 193252 MB
    node 4 cpus: 48 49 50 51 55 56 57 61 62 63 67 68 240 241 242 243 247 248 249 253 254
    255 259 260
    node 4 size: 193530 MB
    node 4 free: 193363 MB
    node 5 cpus: 52 53 54 58 59 60 64 65 66 69 70 71 244 245 246 250 251 252 256 257 258
    261 262 263
    node 5 size: 193530 MB
```

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Platform Notes (Continued)

```
node 5 free: 193370 MB
node 6 cpus: 72 73 74 75 79 80 81 85 86 87 91 92 264 265 266 267 271 272 273 277 278
279 283 284
node 6 size: 193530 MB
node 6 free: 193280 MB
node 7 cpus: 76 77 78 82 83 84 88 89 90 93 94 95 268 269 270 274 275 276 280 281 282
285 286 287
node 7 size: 193530 MB
node 7 free: 193265 MB
node 8 cpus: 96 97 98 99 103 104 105 109 110 111 115 116 288 289 290 291 295 296 297
301 302 303 307 308
node 8 size: 193530 MB
node 8 free: 193281 MB
node 9 cpus: 100 101 102 106 107 108 112 113 114 117 118 119 292 293 294 298 299 300
304 305 306 309 310 311
node 9 size: 193530 MB
node 9 free: 193274 MB
node 10 cpus: 120 121 122 123 127 128 129 133 134 135 139 140 312 313 314 315 319 320
321 325 326 327 331 332
node 10 size: 193530 MB
node 10 free: 193359 MB
node 11 cpus: 124 125 126 130 131 132 136 137 138 141 142 143 316 317 318 322 323 324
328 329 330 333 334 335
node 11 size: 193530 MB
node 11 free: 193367 MB
node 12 cpus: 144 145 146 147 151 152 156 157 158 162 163 164 336 337 338 339 343 344
348 349 350 354 355 356
node 12 size: 193530 MB
node 12 free: 176629 MB
node 13 cpus: 148 149 150 153 154 155 159 160 161 165 166 167 340 341 342 345 346 347
351 352 353 357 358 359
node 13 size: 193530 MB
node 13 free: 193356 MB
node 14 cpus: 168 169 170 171 174 175 176 180 181 182 187 188 360 361 362 363 366 367
368 372 373 374 379 380
node 14 size: 193530 MB
node 14 free: 193349 MB
node 15 cpus: 172 173 177 178 179 183 184 185 186 189 190 191 364 365 369 370 371 375
376 377 378 381 382 383
node 15 size: 193527 MB
node 15 free: 193363 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
```

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Platform Notes (Continued)

```
     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:       3170352916 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
        # 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 27 05:52
```

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Platform Notes (Continued)

```
 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.
------------------------------------------------------------------------------

==============================================================================
 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)
------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
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)
  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`

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Base Compiler Invocation (Continued)

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

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Base Optimization Flags (Continued)

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.

Tested with SPEC CPU2017 v1.0.5 on 2019-04-26 17:54:57-0400.
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