# SPEC CPU®2017 Integer Rate Result

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## Fujitsu

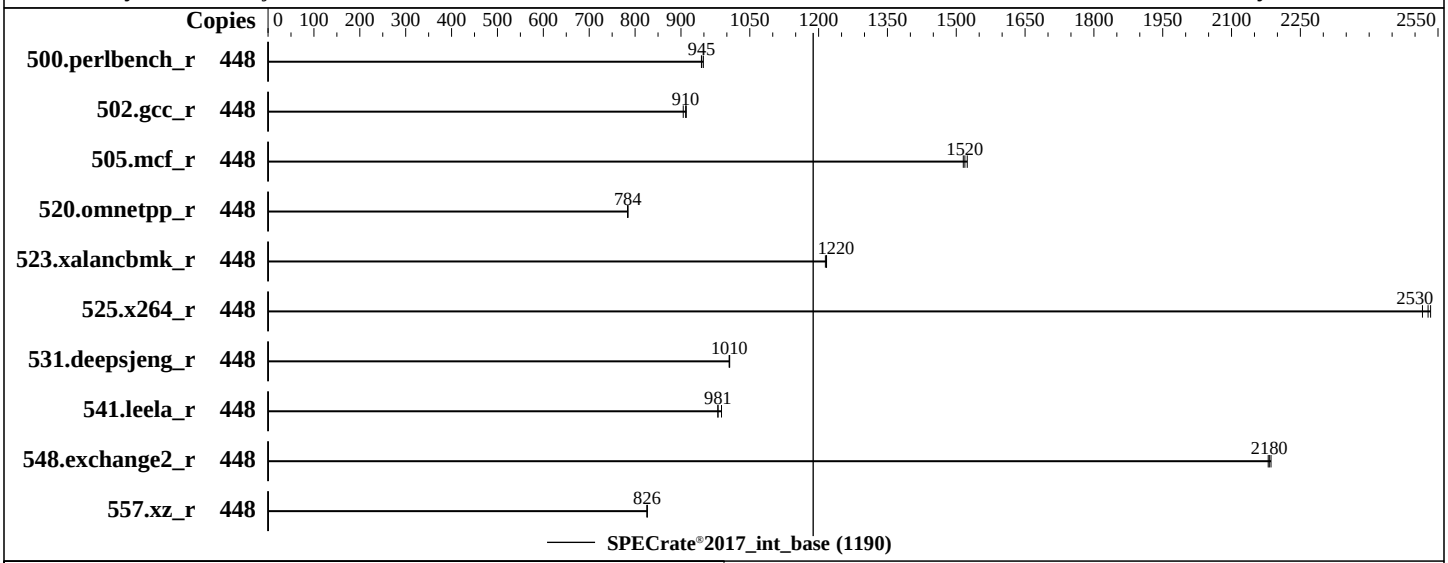
PRIMEQUEST 3800E2, Intel Xeon Platinum 8276L, 2.20GHz

SPECrate®2017_int_base = 1190

SPECrate®2017_int_peak = Not Run

**CPU2017 License:** 19
**Test Sponsor:** Fujitsu
**Tested by:** Fujitsu

**Test Date:** Jul-2019
**Hardware Availability:** Apr-2019
**Software Availability:** Feb-2019




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Platinum 8276L |
| Max MHz: | 4000 |
| Nominal: | 2200 |
| Enabled: | 224 cores, 8 chips, 2 threads/core |
| Orderable: | 2,4,6,8 chips |
| Cache L1: | 32 KB I + 32 KB D on chip per core |
| L2: | 1 MB I+D on chip per core |
| L3: | 38.5 MB I+D on chip per chip |
| Other: | None |
| Memory: | 3 TB (96 x 32 GB 2Rx4 PC4-2933Y-R) |
| Storage: | 1 x SAS HDD, 600GB, 10.5K RPM, SAS HDD |
| Other: | None |

## Software

| | |
|---|---|
| OS: | SUSE Linux Enterprise Server 15 4.12.14-25.28-default |
| Compiler: | C/C++: Version 19.0.1.144 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler for Linux |
| Parallel: | No |
| Firmware: | Fujitsu BIOS Version V1.0.0.0 R1.21.0 for D3858-B1x. Released Jun-2019 tested as V1.0.0.0 R1.16.0 for D3858-B1x Apr-2019 |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |
| Base Pointers: | 64-bit |
| Peak Pointers: | Not Applicable |
| Other: | None |
| Power Management: | -- |

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## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 500.perlbench_r | 448 | 752 | 949 | 755 | 945 | **755** | **945** | | | | | | | |
| 502.gcc_r | 448 | 701 | 905 | 696 | 912 | **697** | **910** | | | | | | | |
| 505.mcf_r | 448 | **477** | **1520** | 478 | 1520 | 475 | 1520 | | | | | | | |
| 520.omnetpp_r | 448 | 749 | 784 | **750** | **784** | 750 | 784 | | | | | | | |
| 523.xalancbmk_r | 448 | **389** | **1220** | 389 | 1210 | 389 | 1220 | | | | | | | |
| 525.x264_r | 448 | **310** | **2530** | 310 | 2530 | 312 | 2520 | | | | | | | |
| 531.deepsjeng_r | 448 | **511** | **1010** | 511 | 1010 | 510 | 1010 | | | | | | | |
| 541.leela_r | 448 | **756** | **981** | 757 | 980 | 751 | 988 | | | | | | | |
| 548.exchange2_r | 448 | 538 | 2180 | 537 | 2190 | **538** | **2180** | | | | | | | |
| 557.xz_r | 448 | 586 | 826 | 585 | 827 | **586** | **826** | | | | | | | |

SPECrate®2017_int_base = **1190**

SPECrate®2017_int_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"
Kernel Boot Parameter set with : nohz_full=1-447
```

## General Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/Benchmark/speccpu2017-int/lib/intel64"

 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.
```

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## General Notes (Continued)

```
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:
 DCU Streamer Prefetcher = Disabled
 HWPM Support = Native Mode with no legacy
 Stale AtoS = Enabled
 Uncore Frequency Scaling = Disabled
 UPI Link L0p = Disabled
 XPT Prefetch = Enabled
 Fan Control = Full
 Sysinfo program /home/Benchmark/speccpu2017-int/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on linux-8r5c Sun Jul 14 22:14:23 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 8276L CPU @ 2.20GHz
       8  "physical id"s (chips)
       448 "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 : 28
       siblings  : 56
       physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 4: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 5: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 6: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
       physical 7: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
       28 29 30
```

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## Platform Notes (Continued)

```
 From lscpu:
      Architecture:          x86_64
      CPU op-mode(s):        32-bit, 64-bit
      Byte Order:            Little Endian
      CPU(s):                448
      On-line CPU(s) list:   0-447
      Thread(s) per core:    2
      Core(s) per socket:    28
      Socket(s):             8
      NUMA node(s):          16
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Platinum 8276L CPU @ 2.20GHz
      Stepping:              6
      CPU MHz:               2200.000
      CPU max MHz:           4000.0000
      CPU min MHz:           1000.0000
      BogoMIPS:              4400.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              39424K
      NUMA node0 CPU(s):     0-3,7-9,14-17,21-23,224-227,231-233,238-241,245-247
      NUMA node1 CPU(s):     4-6,10-13,18-20,24-27,228-230,234-237,242-244,248-251
      NUMA node2 CPU(s):     28-31,35-37,42-45,49-51,252-255,259-261,266-269,273-275
      NUMA node3 CPU(s):     32-34,38-41,46-48,52-55,256-258,262-265,270-272,276-279
      NUMA node4 CPU(s):     56-59,63-65,70-73,77-79,280-283,287-289,294-297,301-303
      NUMA node5 CPU(s):     60-62,66-69,74-76,80-83,284-286,290-293,298-300,304-307
      NUMA node6 CPU(s):     84-87,91-93,98-101,105-107,308-311,315-317,322-325,329-331
      NUMA node7 CPU(s):     88-90,94-97,102-104,108-111,312-314,318-321,326-328,332-335
     NUMA node8 CPU(s):    112-115,119-121,126-129,133-135,336-339,343-345,350-353,357-359
     NUMA node9 CPU(s):    116-118,122-125,130-132,136-139,340-342,346-349,354-356,360-363
     NUMA node10 CPU(s):   140-143,147-149,154-157,161-163,364-367,371-373,378-381,385-387
     NUMA node11 CPU(s):   144-146,150-153,158-160,164-167,368-370,374-377,382-384,388-391
     NUMA node12 CPU(s):   168-171,175-177,182-185,189-191,392-395,399-401,406-409,413-415
     NUMA node13 CPU(s):   172-174,178-181,186-188,192-195,396-398,402-405,410-412,416-419
     NUMA node14 CPU(s):   196-199,203-205,210-213,217-219,420-423,427-429,434-437,441-443
     NUMA node15 CPU(s):   200-202,206-209,214-216,220-223,424-426,430-433,438-440,444-447
     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 intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
```

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## Platform Notes (Continued)

```
      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 hwp hwp_act_window hwp_epp hwp_pkg_req pku
      ospke avx512_vnni flush_l1d arch_capabilities

 /proc/cpuinfo cache data
    cache size : 39424 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 14 15 16 17 21 22 23 224 225 226 227 231 232 233 238 239 240
   241 245 246 247
   node 0 size: 192269 MB
   node 0 free: 191480 MB
   node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27 228 229 230 234 235 236 237 242 243
   244 248 249 250 251
   node 1 size: 193529 MB
   node 1 free: 192909 MB
   node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51 252 253 254 255 259 260 261 266
   267 268 269 273 274 275
   node 2 size: 193529 MB
   node 2 free: 193299 MB
   node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55 256 257 258 262 263 264 265 270
   271 272 276 277 278 279
   node 3 size: 193529 MB
   node 3 free: 193226 MB
   node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79 280 281 282 283 287 288 289 294
   295 296 297 301 302 303
   node 4 size: 193529 MB
   node 4 free: 193317 MB
   node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83 284 285 286 290 291 292 293 298
   299 300 304 305 306 307
   node 5 size: 193529 MB
   node 5 free: 193317 MB
   node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107 308 309 310 311 315 316 317
   322 323 324 325 329 330 331
   node 6 size: 193529 MB
   node 6 free: 193335 MB
   node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111 312 313 314 318 319 320
   321 326 327 328 332 333 334 335
   node 7 size: 193500 MB
   node 7 free: 193311 MB
   node 8 cpus: 112 113 114 115 119 120 121 126 127 128 129 133 134 135 336 337 338 339
   343 344 345 350 351 352 353 357 358 359
   node 8 size: 193529 MB
```

**(Continued on next page)**

## Platform Notes (Continued)

```
node 8 free: 193235 MB
node 9 cpus: 116 117 118 122 123 124 125 130 131 132 136 137 138 139 340 341 342 346
347 348 349 354 355 356 360 361 362 363
node 9 size: 193529 MB
node 9 free: 193355 MB
node 10 cpus: 140 141 142 143 147 148 149 154 155 156 157 161 162 163 364 365 366 367
371 372 373 378 379 380 381 385 386 387
node 10 size: 193529 MB
node 10 free: 193338 MB
node 11 cpus: 144 145 146 150 151 152 153 158 159 160 164 165 166 167 368 369 370 374
375 376 377 382 383 384 388 389 390 391
node 11 size: 193529 MB
node 11 free: 193347 MB
node 12 cpus: 168 169 170 171 175 176 177 182 183 184 185 189 190 191 392 393 394 395
399 400 401 406 407 408 409 413 414 415
node 12 size: 193529 MB
node 12 free: 193321 MB
node 13 cpus: 172 173 174 178 179 180 181 186 187 188 192 193 194 195 396 397 398 402
403 404 405 410 411 412 416 417 418 419
node 13 size: 193529 MB
node 13 free: 193300 MB
node 14 cpus: 196 197 198 199 203 204 205 210 211 212 213 217 218 219 420 421 422 423
427 428 429 434 435 436 437 441 442 443
node 14 size: 193529 MB
node 14 free: 193347 MB
node 15 cpus: 200 201 202 206 207 208 209 214 215 216 220 221 222 223 424 425 426 430
431 432 433 438 439 440 444 445 446 447
node 15 size: 193326 MB
node 15 free: 193159 MB
node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
  0:  10  11  20  20  20  20  28  28  28  28  28  28  20  20  28  28
  1:  11  10  20  20  20  20  28  28  28  28  28  28  20  20  28  28
  2:  20  20  10  11  28  28  20  20  28  28  20  20  28  28  28  28
  3:  20  20  11  10  28  28  20  20  28  28  20  20  28  28  28  28
  4:  20  20  28  28  10  11  20  20  20  20  28  28  28  28  28  28
  5:  20  20  28  28  11  10  20  20  20  20  28  28  28  28  28  28
  6:  28  28  20  20  20  20  10  11  28  28  28  28  28  28  20  20
  7:  28  28  20  20  20  20  11  10  28  28  28  28  28  28  20  20
  8:  28  28  28  28  20  20  28  28  10  11  20  20  20  20  28  28
  9:  28  28  28  28  20  20  28  28  11  10  20  20  20  20  28  28
 10:  28  28  20  20  28  28  28  28  20  20  10  11  28  28  20  20
 11:  28  28  20  20  28  28  28  28  20  20  11  10  28  28  20  20
 12:  20  20  28  28  28  28  28  28  20  20  28  28  10  11  20  20
 13:  20  20  28  28  28  28  28  28  20  20  28  28  11  10  20  20
 14:  28  28  28  28  28  28  20  20  28  28  20  20  20  20  10  11
 15:  28  28  28  28  28  28  20  20  28  28  20  20  20  20  11  10
```

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## Platform Notes (Continued)

```
From /proc/meminfo
   MemTotal:       3169264456 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="SLES"
      VERSION="15"
      VERSION_ID="15"
      PRETTY_NAME="SUSE Linux Enterprise Server 15"
      ID="sles"
      ID_LIKE="suse"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:15"

uname -a:
   Linux linux-8r5c 4.12.14-25.28-default #1 SMP Wed Jan 16 20:00:47 UTC 2019 (dd6077c)
   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: Enhanced IBRS, IBPB: conditional, RSB
filling

run-level 3 Jul 14 22:08

SPEC is set to: /home/Benchmark/speccpu2017-int
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   142G   55G   87G  39% /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 FUJITSU V1.0.0.0 R1.16.0 for D3858-B1x            04/24/2019
  Memory:
   68x Micron 36ASF4G72PZ-2G9E2 32 GB 2 rank 2933
   28x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)
```

## Compiler Version Notes

```
==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)
        | 525.x264_r(base) 557.xz_r(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
        | 541.leela_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
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`

## Base Portability Flags

500.perlbench_r: `-DSPEC_LP64 -DSPEC_LINUX_X64`
502.gcc_r: `-DSPEC_LP64`
505.mcf_r: `-DSPEC_LP64`
520.omnetpp_r: `-DSPEC_LP64`

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## Base Portability Flags (Continued)

523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

## Base Optimization Flags

C benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

C++ benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/linux/compiler/lib/intel64
-lqkmalloc

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.html
http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-CSL-RevE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml
http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-CSL-RevE.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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