



# SPEC® CPU2017 Floating Point Rate Result

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## Fujitsu

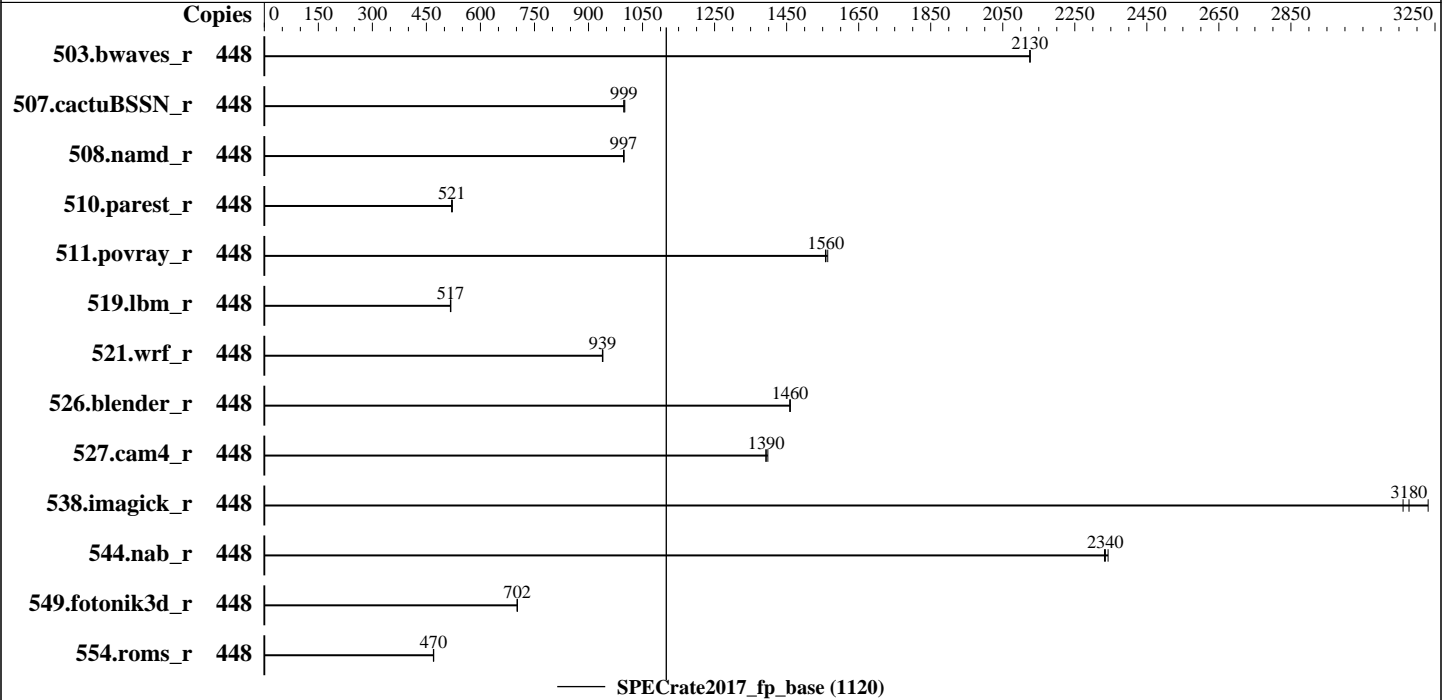
PRIMEQUEST 3800B2, Intel Xeon Platinum 8280L, 2.70GHz

SPECrate2017\_fp\_base = 1120

SPECrate2017\_fp\_peak = Not Run

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

Test Date: Mar-2019  
Hardware Availability: Apr-2019  
Software Availability: Feb-2019



### Hardware

CPU Name: Intel Xeon Platinum 8280L  
 Max MHz.: 4000  
 Nominal: 2700  
 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 19.0.0.117 of Intel C/C++  
 Compiler for Linux;  
 Fortran: Version 19.0.0.117 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 R91.11.0 for D3858-B1x Mar-2019  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: None



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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	448	2114	2130	<b><u>2114</u></b>	<b><u>2130</u></b>	2113	2130							
507.cactuBSSN_r	448	<b><u>568</u></b>	<b><u>999</u></b>	567	1000	568	998							
508.namd_r	448	<b><u>427</u></b>	<b><u>997</u></b>	427	997	426	999							
510.parest_r	448	2245	522	<b><u>2251</u></b>	<b><u>521</u></b>	2253	520							
511.povray_r	448	669	1560	<b><u>671</u></b>	<b><u>1560</u></b>	671	1560							
519.lbm_r	448	914	517	<b><u>913</u></b>	<b><u>517</u></b>	912	518							
521.wrf_r	448	<b><u>1068</u></b>	<b><u>939</u></b>	1069	939	1068	940							
526.blender_r	448	468	1460	467	1460	<b><u>467</u></b>	<b><u>1460</u></b>							
527.cam4_r	448	561	1400	563	1390	<b><u>562</u></b>	<b><u>1390</u></b>							
538.imagick_r	448	<b><u>351</u></b>	<b><u>3180</u></b>	345	3230	352	3160							
544.nab_r	448	322	2340	323	2330	<b><u>323</u></b>	<b><u>2340</u></b>							
549.fotonik3d_r	448	<b><u>2486</u></b>	<b><u>702</u></b>	2486	702	2486	702							
554.roms_r	448	1517	469	<b><u>1515</u></b>	<b><u>470</u></b>	1514	470							

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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-fp/lib/ia32:/home/Benchmark/speccpu2017-fp/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-799X 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>
```

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)

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### General Notes (Continued)

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

BIOS configuration:  
DCU Streamer Prefetcher = Disabled  
Hardware Prefetcher = Disabled  
LLC Dead Line Alloc = Enabled  
Uncore Frequency Scaling = Disabled  
UPI Link L0p = Disabled  
Fan Control = Full  
Sysinfo program /home/Benchmark/speccpu2017-fp/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on linux-8r5c Sun Mar 17 17:24:49 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 8280L CPU @ 2.70GHz
 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)

28 29 30

From lspcu:

```

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 8280L CPU @ 2.70GHz
Stepping:          6
CPU MHz:           2700.000
CPU max MHz:       4000.0000
CPU min MHz:       1000.0000
BogoMIPS:          5400.00
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
aperfperf 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

```

(Continued on next page)



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### Platform Notes (Continued)

avx fl6c 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  
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\_lld 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: 192151 MB
node 0 free: 191341 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: 193180 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: 193289 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: 193224 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: 193328 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: 193334 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: 193359 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: 193529 MB
node 7 free: 193256 MB
node 8 cpus: 112 113 114 115 119 120 121 126 127 128 129 133 134 135 336 337 338 339
```

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### Platform Notes (Continued)

```

343 344 345 350 351 352 353 357 358 359
node 8 size: 193529 MB
node 8 free: 193363 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: 193500 MB
node 9 free: 193329 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: 193364 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: 193374 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: 193338 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: 193252 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: 193353 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

```

(Continued on next page)



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### Platform Notes (Continued)

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

From /proc/meminfo

MemTotal: 3169142820 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 Mar 17 17:18

SPEC is set to: /home/Benchmark/speccpu2017-fp

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda3	xf	142G	17G	125G	12%	/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 R91.11.0 for D3858-B1x 03/15/2019
Memory:
80x Micron 36ASF4G72PZ-2G9E2 32 GB 2 rank 2933
16x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933
```

(End of data from sysinfo program)



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### 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)  
-----

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.

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## Compiler Version Notes (Continued)

=====  
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

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

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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-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/Fujitsu-Platform-Settings-V1.0-CSL-RevA.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/Fujitsu-Platform-Settings-V1.0-CSL-RevA.xml>



# SPEC CPU2017 Floating Point Rate Result

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**Fujitsu**

PRIMEQUEST 3800B2, Intel Xeon Platinum 8280L,  
2.70GHz

SPECrate2017\_fp\_base = 1120

SPECrate2017\_fp\_peak = Not Run

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

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

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

Tested with SPEC CPU2017 v1.0.5 on 2019-03-17 04:24:48-0400.  
Report generated on 2019-04-02 17:02:07 by CPU2017 PDF formatter v6067.  
Originally published on 2019-04-02.