# SPEC CPU®2017 Integer Rate Result

## Fujitsu

PRIMERGY TX1330 M4, Intel Xeon E-2276G, 3.80 GHz

<table>
<thead>
<tr>
<th>Test Sponsor</th>
<th>Fujitsu</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by</td>
<td>Fujitsu</td>
</tr>
<tr>
<td>Hardware Availability</td>
<td>Oct-2019</td>
</tr>
<tr>
<td>Software Availability</td>
<td>May-2019</td>
</tr>
<tr>
<td>Test Date</td>
<td>Jan-2020</td>
</tr>
</tbody>
</table>

### Hardware

<table>
<thead>
<tr>
<th>CPU Name</th>
<th>Intel Xeon E-2276G</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz</td>
<td>4900</td>
</tr>
<tr>
<td>Nominal</td>
<td>3800</td>
</tr>
<tr>
<td>Enabled</td>
<td>6 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2</td>
<td>256 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3</td>
<td>12 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x SATA M.2 SSD, 480 GB</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>OS</th>
<th>SUSE Linux Enterprise Server 15 4.12.14-25.28-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler</td>
<td>C/C++: Version 19.0.4.227 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.4.227 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Parallel</td>
<td>No</td>
</tr>
<tr>
<td>Firmware</td>
<td>Fujitsu BIOS Version V5.0.0.13 R1.12.0 for D3673-A1x. Released Sep-2019</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other</td>
<td>jemalloc memory allocator V5.0.1</td>
</tr>
<tr>
<td>Power Management</td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

### SPECrate®2017

| SPECrate®2017_int_base = 46.8 |
| SPECrate®2017_int_peak = 49.1 |

### SPECrate®2017_int_base (46.8) vs SPECrate®2017_int_peak (49.1)
## Fujitsu

PRIMERGY TX1330 M4, Intel Xeon E-2276G, 3.80 GHz

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>12</td>
<td>495</td>
<td>38.6</td>
<td>502</td>
<td>38.0</td>
<td>502</td>
<td>38.1</td>
<td>429</td>
<td>44.5</td>
<td>428</td>
<td>44.7</td>
<td>428</td>
<td>44.7</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>12</td>
<td>469</td>
<td>36.2</td>
<td>468</td>
<td>36.3</td>
<td>469</td>
<td>36.2</td>
<td>399</td>
<td>42.6</td>
<td>398</td>
<td>42.7</td>
<td>399</td>
<td>42.6</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>12</td>
<td>352</td>
<td>55.2</td>
<td>351</td>
<td>55.3</td>
<td>350</td>
<td>55.4</td>
<td>349</td>
<td>55.6</td>
<td>349</td>
<td>55.5</td>
<td>349</td>
<td>55.6</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>12</td>
<td>565</td>
<td>27.9</td>
<td>564</td>
<td>27.9</td>
<td>564</td>
<td>27.9</td>
<td>565</td>
<td>27.9</td>
<td>564</td>
<td>27.9</td>
<td>564</td>
<td>27.9</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>12</td>
<td>282</td>
<td>44.9</td>
<td>284</td>
<td>44.6</td>
<td>284</td>
<td>44.7</td>
<td>250</td>
<td>50.6</td>
<td>254</td>
<td>49.8</td>
<td>252</td>
<td>50.4</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>12</td>
<td>199</td>
<td>105</td>
<td>200</td>
<td>105</td>
<td>200</td>
<td>105</td>
<td>192</td>
<td>110</td>
<td>193</td>
<td>109</td>
<td>193</td>
<td>109</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>12</td>
<td>334</td>
<td>41.2</td>
<td>334</td>
<td>41.2</td>
<td>334</td>
<td>41.2</td>
<td>333</td>
<td>41.3</td>
<td>333</td>
<td>41.3</td>
<td>333</td>
<td>41.3</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>12</td>
<td>528</td>
<td>37.7</td>
<td>528</td>
<td>37.7</td>
<td>528</td>
<td>37.6</td>
<td>528</td>
<td>37.7</td>
<td>528</td>
<td>37.7</td>
<td>528</td>
<td>37.7</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>12</td>
<td>299</td>
<td>105</td>
<td>301</td>
<td>105</td>
<td>301</td>
<td>104</td>
<td>300</td>
<td>105</td>
<td>301</td>
<td>104</td>
<td>301</td>
<td>104</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>12</td>
<td>416</td>
<td>31.1</td>
<td>416</td>
<td>31.1</td>
<td>417</td>
<td>31.1</td>
<td>416</td>
<td>31.1</td>
<td>417</td>
<td>31.1</td>
<td>417</td>
<td>31.1</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

### Submit Notes

The taskset mechanism was used to bind copies to processors. The config file option 'submit' was used to generate taskset 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=1-15

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = 
"/home/Benchmark/speccpu2017-1.1.0/lib/intel64:/home/Benchmark/speccpu20
17-1.1.0/lib/ia32:/home/Benchmark/speccpu2017-1.1.0/je5.0.1-32"
```

### General Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = "/home/Benchmark/speccpu2017-1.1.0/lib/intel64"
```

Binaries compiled on a system with 1x Intel Core i9-7900X CPU + 32 GB 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:
**General Notes (Continued)**

```bash
sync; echo 3 > /proc/sys/vm/drop_caches
ejemalloc: configured and built at default for 32bit (i686) and 64bit (x86_64) targets
ejemalloc: built with the RedHat Enterprise 7.4, and the system compiler gcc 4.8.5
jemalloc: sources available via jemalloc.net
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.
```

**Platform Notes**

BIOS configuration:
- Adjacent Cache Line Prefetch = Disabled
- C-States = Disabled
- Fan Control = Full
- Hardware Prefetcher = Disabled
- Intel Virtualization Technology = Disabled
- Intel(R) Speed Shift Technology = Disabled

Sysinfo program /home/Benchmark/speccpu2017-1.1.0/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7ed1b66e46a485a0011
running on SLES15-BMT Wed Jan 8 17:30:11 2020

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

```bash
model name : Intel(R) Xeon(R) E-2276G CPU @ 3.80GHz
  1 "physical id"s (chips)
  12 "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 : 6
  siblings : 12
  physical 0: cores 0 1 2 3 4 5
```

From lscpu:

```bash
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 12
On-line CPU(s) list: 0-11
Thread(s) per core: 2
```

(Continued on next page)
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CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu
Test Date: Jan-2020
Hardware Availability: Oct-2019
Software Availability: May-2019

Platform Notes (Continued)

Core(s) per socket: 6
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2276G CPU @ 3.80GHz
Stepping: 10
CPU MHz: 3800.000
CPU max MHz: 4900.0000
CPU min MHz: 800.0000
BogoMIPS: 7584.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 12288K
NUMA node0 CPU(s): 0-11
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 arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aperfperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3
sdbg fma cx16 xtrouter pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer
aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invvpcl_single
pti ssbd ibrs ibpb stibp tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust
bmi1 hel avx2 smep bmi2 ibrn invpcid rtm mpx rdseed adx smap clflushopt intel_pt
xsaves xsaveopt xgetbv1 xsaves dtherm ida arat pln pts hwp hwp_notify hwp_act_window
hwp_epp flush_l1d

From /proc/cpuinfo cache data
  cache size : 12288 KB

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
  available: 1 nodes (0)
  node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
  node 0 size: 63767 MB
  node 0 free: 63272 MB
  node distances:
  node 0
  0: 10

From /proc/meminfo
  MemTotal: 65297984 kB
  HugePages_Total: 0
  Hugepagesize: 2048 kB

(Continued on next page)
Platform Notes (Continued)

---
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 SLES15-BMT 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-2018-3620 (L1 Terminal Fault): Mitigation: PTE Inversion
Microarchitectural Data Sampling: No status reported
CVE-2017-5754 (Meltdown): Mitigation: PTI
CVE-2018-3639 (Speculative Store Bypass): Vulnerable
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted
    Speculation, IBPB: conditional, IBRS_FW, STIBP:
    conditional, RSB filling

run-level 3 Jan 8 17:12

SPEC is set to: /home/Benchmark/speccpu2017-1.1.0
  Filesystem Type  Size  Used Avail Use% Mounted on
  /dev/sda5      xfs  343G  66G  278G  20% /home

From /sys/devices/virtual/dmi/id
  BIOS: FUJITSU // American Megatrends Inc. V5.0.0.13 R1.12.0 for D3673-A1x
        09/06/2019
  Vendor: FUJITSU
  Product: PRIMERGY TX1330 M4
  Product Family: SERVER
  Serial: YMJLXXXXXX

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.
  Memory:
    4x SK Hynix HMA82GU7CJR8N-VK 16 GB 2 rank 2667
Fujitsu
PRIMERGY TX1330 M4, Intel Xeon E-2276G, 3.80 GHz

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Test Sponsor: Fujitsu
Test Date: Jan-2020
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Hardware Availability: Oct-2019
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Platform Notes (Continued)
(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 502.gcc_r(peak)
Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================

C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak) 557.xz_r(base, peak)
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================

C       | 502.gcc_r(peak)
Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================

C++     | 523.xalancbmk_r(peak)
Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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<tr>
<th>SPECrate®2017_int_base = 46.8</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak = 49.1</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 19  
**Test Date:** Jan-2020  
**Test Sponsor:** Fujitsu  
**Hardware Availability:** Oct-2019  
**Tested by:** Fujitsu  
**Software Availability:** May-2019

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**Compiler Version Notes (Continued)**

```
C++   | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)  
      | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

```
C++   | 523.xalancbmk_r(peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

```
C++   | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)  
      | 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)
```

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

```
Fortran | 548.exchange2_r(base, peak)
```

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.4.227 Build 20190416  
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

---

**Base Compiler Invocation**

C benchmarks:  
```nc -m64 -std=c11```

C++ benchmarks:  
```icpc -m64```

Fortran benchmarks:  
```ifort -m64```
SPEC CPU®2017 Integer Rate Result

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

Test Date: Jan-2020
Hardware Availability: Oct-2019
Software Availability: May-2019

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
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:
- W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=4
- L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- lqkmalloc

C++ benchmarks:
- W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=4
- L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- lqkmalloc

Fortran benchmarks:
- W1,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
- qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
- L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
- lqkmalloc

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m64 -std=c11


C++ benchmarks (except as noted below):
icpc -m64
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Tested by: Fujitsu

Test Date: Jan-2020
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Software Availability: May-2019

Peak Compiler Invocation (Continued)

523.xalancbmk_r: icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin
Fortran benchmarks:
ifort -m64

Peak Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -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

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-fno-strict-overflow
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

502.gcc_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

525.x264_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

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Test Date: Jan-2020  
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Peak Optimization Flags (Continued)

557.xz_r: basepeak = yes

C++ benchmarks:

520.omnetpp_r: basepeak = yes

523.xalancbnk_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

531.deepsjeng_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64 -lqkmalloc

541.leela_r: basepeak = yes

Fortran benchmarks:
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/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/Fujitsu-Platform-Settings-V1.0.2-CFL-RevD.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0.2-CFL-RevD.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 CPU®2017 v1.1.0 on 2020-01-08 03:30:10-0500.  
Originally published on 2020-02-04.