**CPU 2017 License:** 19  
**Test Sponsor:** Fujitsu  
**Tested by:** Fujitsu  
**Test Date:** Oct-2019  
**Hardware Availability:** Oct-2019  
**Software Availability:** May-2019

### CPU Name:
Intel Xeon E-2288G

- **Max MHz:** 5000
- **Nominal:** 3700
- **Enabled:** 8 cores, 1 chip
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 32 KB D on chip per core
- **L2:** 256 KB I+D on chip per core
- **L3:** 16 MB I+D on chip per chip
- **Memory:** 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)
- **Storage:** 1 x SATA M.2 SSD, 480 GB
- **Other:** None

### OS:
SUSE Linux Enterprise Server 15

- **Compiler:** 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
- **Parallel:** No
- **Firmware:** Fujitsu BIOS Version V5.0.0.13 R1.12.0 for D3673-A1x. Released Sep-2019
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
- **Base Pointers:** 64-bit
- **Peak Pointers:** Not Applicable
- **Other:** None
- **Power Management:** --

### Hardware

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
</tr>
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<tbody>
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<td>44.6</td>
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<table>
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<th>SPECrate®2017_fp_base (44.6)</th>
<th>Test Sponsor: Fujitsu</th>
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<tbody>
<tr>
<td>Fujitsu TX1320 M4, Intel Xeon E-2288G, 3.70GHz</td>
<td>Test Date: Oct-2019</td>
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**Hardware Availability:** Oct-2019  
**Software Availability:** May-2019
## Results Table

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<th>Benchmark</th>
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<th>Seconds</th>
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<tr>
<td>503.bwaves_r</td>
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<td>22.5</td>
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<td>554.roms_r</td>
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<td></td>
</tr>
</tbody>
</table>

**SPECrate®2017_fp_base =** 44.6

**SPECrate®2017_fp_peak =** Not Run

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"

## General Notes

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

LD_LIBRARY_PATH = "/home/Benchmark/speccpu2017/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`

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.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

Fujitsu
PRIMERGY TX1320 M4, Intel Xeon E-2288G, 3.70GHz

SPECrater®2017_fp_base = 44.6
SPECrater®2017_fp_peak = Not Run

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

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

General Notes (Continued)

is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
AES = Disabled
DCU Stream Prefetcher = Disabled
Fan Control = Full
Hyper-Threading = Disabled
Package C-State Limit = C0
Sysinfo program /home/Benchmark/speccpu2017-1.0.5/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on TX1320M4 Sat Oct 12 12:45:51 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) E-2288G CPU @ 3.70GHz
  1 "physical id"s (chips)
  8 "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 : 8
siblings : 8
physical 0: cores 0 1 2 3 4 5 6 7

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 8
On-line CPU(s) list: 0-7
Thread(s) per core: 1
Core(s) per socket: 8
Socket(s): 1
NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 158
Model name: Intel(R) Xeon(R) E-2288G CPU @ 3.70GHz
Stepping: 13
CPU MHz: 3700.000
CPU max MHz: 5000.0000
CPU min MHz: 800.0000

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

**Fujitsu**

PRIMERGY TX1320 M4, Intel Xeon E-2288G, 3.70GHz

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</table>

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

### Platform Notes (Continued)

- **BogoMIPS:** 7392.00
- **Virtualization:** VT-x
- **L1d cache:** 32K
- **L1i cache:** 32K
- **L2 cache:** 256K
- **L3 cache:** 16384K
- **NUMA node0 CPU(s):** 0-7
- **Flags:** fpu vme de pse tsc msr pae mca cmov pat pse36 clflush dtsc 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 tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpre pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpclid_single ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vnumi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt intel_pt xsaveopt xsavec xgetbv1 xsavec dtherm ida arat pln pts hwp hwp_notif hwp_act_window hwp_cap

```
/proc/cpuinfo cache data
    cache size : 16384 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
- **node 0 size:** 63886 MB
- **node 0 free:** 63416 MB
- **node distances:**
  - **node 0:** 0
  - **0:** 10

From `/proc/meminfo`

- **MemTotal:** 65420032 kB
- **HugePages_Total:** 0
- **Hugepagesize:** 2048 kB

From `/etc/*release*/etc/*version`/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

*(Continued on next page)*
Platform Notes (Continued)

uname -a:
    Linux TX1320M4 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 Oct 12 12:38

SPEC is set to: /home/Benchmark/speccpu2017-1.0.5
    Filesystem   Type  Size  Used  Avail  Use%  Mounted on
    /dev/sdb4    xfs   191G  73G   119G  38%   /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 // American Megatrends Inc. V5.0.0.13 R1.12.0 for D3673-A1x
    09/06/2019
Memory:
    4x SK Hynix HMA82GU7CJR8N-VK 16 GB 2 rank 2667

Compiler Version Notes

----------------------------------
C         | 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
----------------------------------
C++       | 508.namd_r(base) 510.parest_r(base)
----------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
    Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
(Continued on next page)
Fujitsu
PRIMERGY TX1320 M4, Intel Xeon E-2288G, 3.70GHz

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

Compiler Version Notes (Continued)

==============================================================================
C++, C          | 511.povray_r(base) 526.blender_r(base)
==============================================================================
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
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++, C, Fortran | 507.cactuBSSN_r(base)
==============================================================================
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.
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.
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.
==============================================================================
Fortran         | 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 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
==============================================================================
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base)
==============================================================================
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.4.227 Build 20190416
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Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
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Fujitsu
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Test Date: Oct-2019
Hardware Availability: Oct-2019
Software Availability: May-2019

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=4

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

Fujitsu
PRIMERGY TX1320 M4, Intel Xeon E-2288G, 3.70GHz

SPECrate®2017_fp_base = 44.6
SPECrate®2017_fp_peak = Not Run

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

Base Optimization Flags (Continued)

C++ benchmarks (continued):
-qopt-mem-layout-trans=4

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -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=4 -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=4

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -auto -nostandard-realloc-lhs
-align array32byte

The flags files that were used to format this result can be browsed at

You can also download the XML flags sources by saving the following links:

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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