# SPEC CPU®2017 Floating Point Speed Result

## Fujitsu

**PRIMERGY TX1330 M4, Intel Xeon E-2224G, 3.50 GHz**

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### SPECspeed®2017_fp_base = 27.4

### SPECspeed®2017_fp_peak = 27.8

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**CPU2017 License:** 19  
**Test Sponsor:** Fujitsu  
**Tested by:** Fujitsu  
**Test Date:** Dec-2019  
**Hardware Availability:** Oct-2019  
**Software Availability:** Sep-2019

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### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>4</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>4</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>4</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>4</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>4</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>4</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>4</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>4</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>4</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>4</td>
</tr>
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### SPECspeed®2017_fp_base (27.4)  
### SPECspeed®2017_fp_peak (27.8)

---

### Hardware

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon E-2224G</td>
</tr>
<tr>
<td>Max MHz</td>
<td>4700</td>
</tr>
<tr>
<td>Nominal MHz</td>
<td>3500</td>
</tr>
<tr>
<td>Enabled Cores</td>
<td>4 cores, 1 chip</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>Cache L2</td>
<td>256 KB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3</td>
<td>8 MB I+D on chip per chip</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>Feature</th>
<th>Specification</th>
</tr>
</thead>
</table>
| OS                       | Red Hat Enterprise Linux Server release 7.6  
(Maipo) 3.10.0-957.el7.x86_64 |
| Compiler                 | C/C++: Version 19.0.5.281 of Intel C/C++ Compiler for Linux;  
Fortran: Version 19.0.5.281 of Intel Fortran Compiler for Linux |
| Parallel                 | Yes                                                |
| 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            | 64-bit                                             |
| Other                    | None                                               |
| Power Management         | BIOS set to prefer performance at the cost of additional power usage |
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>4</td>
<td>744</td>
<td>79.3</td>
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<td>79.3</td>
<td>744</td>
<td>79.3</td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td>409</td>
<td>40.7</td>
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<td>40.7</td>
<td>409</td>
<td>40.7</td>
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<tr>
<td>619.lbm_s</td>
<td>4</td>
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<td>16.1</td>
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<td>16.1</td>
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<td>621.wrf_s</td>
<td>4</td>
<td>415</td>
<td>31.9</td>
<td>415</td>
<td>31.8</td>
<td>416</td>
<td>31.8</td>
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<tr>
<td>627.cam4_s</td>
<td>4</td>
<td>457</td>
<td>19.4</td>
<td>459</td>
<td>19.3</td>
<td>458</td>
<td>19.4</td>
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<td>628.pop2_s</td>
<td>4</td>
<td>363</td>
<td>32.7</td>
<td>363</td>
<td>32.7</td>
<td>364</td>
<td>32.7</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>4</td>
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<td>21.1</td>
<td>684</td>
<td>21.1</td>
<td>684</td>
<td>21.1</td>
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<tr>
<td>644.nab_s</td>
<td>4</td>
<td>447</td>
<td>39.1</td>
<td>447</td>
<td>39.1</td>
<td>447</td>
<td>39.1</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>4</td>
<td>511</td>
<td>17.8</td>
<td>511</td>
<td>17.8</td>
<td>511</td>
<td>17.8</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>4</td>
<td>1024</td>
<td>15.4</td>
<td>1023</td>
<td>15.4</td>
<td>1025</td>
<td>15.4</td>
</tr>
</tbody>
</table>

### Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

### Environment Variables Notes

Environment variables set by runcpu before the start of the run:
- KMP_AFFINITY = "granularity=fine,compact"
- LD_LIBRARY_PATH = "/home/Benchmark/speccpu2017-1.1.0/lib/intel64"
- OMP_STACKSIZE = "192M"

### General Notes

Environment variables set by runcpu before the start of the run:
- KMP_AFFINITY = "granularity=fine,compact"
- LD_LIBRARY_PATH = "/home/Benchmark/speccpu2017-1.1.0/lib/intel64"
- OMP_STACKSIZE = "192M"
- echo 1000000000 > sched_min_granularity_ns
- echo 1500000000 > sched_wakeup_granularity_ns
- echo 2400000000 > sched_latency_ns

Binaries compiled on a system with 1x Intel Xeon E-2288G CPU + 64 GB RAM memory using Redhat Enterprise Linux 7.6

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

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
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:
Energy Efficient Turbo = Disabled
Fan Control = Full

Sysinfo program /home/Benchmark/speccpu2017-1.1.0/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edeb1e6e46a485a0011
running on localhost.localdomain Sun Dec 8 20:30:29 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-2224G CPU @ 3.50GHz
       1 "physical id"s (chips)
       4 "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 : 4
       siblings : 4
       physical 0: cores 0 1 2 3

From lscpu:
   Architecture: x86_64
   CPU op-mode(s): 32-bit, 64-bit
   Byte Order: Little Endian
   CPU(s): 4
   On-line CPU(s) list: 0-3
   Thread(s) per core: 1
   Core(s) per socket: 4
   Socket(s): 1
   NUMA node(s): 1
   Vendor ID: GenuineIntel
   CPU family: 6
   Model: 158
   Model name: Intel(R) Xeon(R) E-2224G CPU @ 3.50GHz
   Stepping: 10
   CPU MHz: 4599.517

(Continued on next page)
CPU max MHz: 4700.0000
CPU min MHz: 800.0000
BogoMIPS:    7008.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 8192K
NUMA node0 CPU(s): 0-3
Flags:    fpu vme de pse tsc msr pae mca cmov
          pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpes gb rdtscp
          lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc
          aperfmperf eagerfpu pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg
          fma cx16 xtpmr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
          xsave avx flc xrc ldm vt_mdl aim枋_mcr adb dsmc xsaveopt xsavec xgetbv1 dtherm ida
          arat pin pts hwp hwp_notify hwp_act_window hwp_epp spec_ctrl intel_stibp flush_l1d

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

From /proc/meminfo
MemTotal: 65725668 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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

os-release:
NAME="Red Hat Enterprise Linux Server"
VERSION="7.6 (Maipo)"
ID="rhel"
ID_LIKE="fedora"
VARIANT="Server"
VARIANT_ID="server"
VERSION_ID="7.6"
PRETTY_NAME="Red Hat Enterprise Linux Server 7.6 (Maipo)"
redhat-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.6 (Maipo)

uname -a:
Linux localhost.localdomain 3.10.0-957.el7.x86_64 #1 SMP Thu Oct 4 20:48:51 UTC 2018
ox86_64 x86_64 x86_64 GNU/Linux

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

Kernel self-reported vulnerability status:

- **CVE-2018-3620 (L1 Terminal Fault):** Mitigation: PTE Inversion; VMX: SMT disabled, L1D conditional cache flushes
- **Microarchitectural Data Sampling:** No status reported
- **CVE-2018-3639 (Meltdown):** Mitigation: PTI
- **CVE-2017-5754 (Meltdown):** Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- **CVE-2017-5753 (Spectre variant 1):** Mitigation: Load fences, __user pointer sanitization
- **CVE-2017-5715 (Spectre variant 2):** Mitigation: IBRS (kernel)

run-level 3 Dec 8 20:28

SPEC is set to: `/home/Benchmark/speccpu2017-1.1.0`

Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 392G 33G 359G 9% /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
- **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

(End of data from sysinfo program)

### Compiler Version Notes

```
==============================================================================
| C              | 619.lbm_s(base, peak) 638.imagick_s(base, peak) |
|                | 644.nab_s(base, peak) |
==============================================================================
```

Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64, Version 19.0.5.281 Build 20190815

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Fujitsu
PRIMERGY TX1330 M4, Intel Xeon E-2224G, 3.50 GHz

SPECspeed®2017_fp_base = 27.4
SPECspeed®2017_fp_peak = 27.8

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

Compiler Version Notes (Continued)

C++, C, Fortran | 607.cactuBSSN_s (base, peak)

Intel (R) C++ Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran | 603.bwaves_s (base, peak) 649.fotonik3d_s (base, peak)
654.roms_s (base, peak)

Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Fortran, C | 621.wrf_s (base, peak) 627.cam4_s (base, peak)
628.pop2_s (base, peak)

Intel (R) Fortran Intel (R) 64 Compiler for applications running on Intel (R)
64, Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel (R) C Intel (R) 64 Compiler for applications running on Intel (R) 64,
Version 19.0.5.281 Build 20190815
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:
icc -m64 -std=c11

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
ifort -m64 icc -m64 -std=c11

(Continued on next page)
Fujitsu PRIMERGY TX1330 M4, Intel Xeon E-2224G, 3.50 GHz

SPECspeed®2017_fp_base = 27.4
SPECspeed®2017_fp_peak = 27.8

Base Compiler Invocation (Continued)

Benchmarks using Fortran, C, and C++:
icpc -m64 icc -m64 -std=c11 ifort -m64

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

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

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

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs

Benchmarks using Fortran, C, and C++:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs
Peak Compiler Invocation

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

Fortran benchmarks:
```
ifort -m64
```

Benchmarks using both Fortran and C:
```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes
654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

```
621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX2
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs
```

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

Fujitsu
PRIMERGY TX1330 M4, Intel Xeon E-2224G, 3.50 GHz

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>27.4</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>27.8</td>
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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Test Date</th>
<th>Dec-2019</th>
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<tbody>
<tr>
<td>Hardware Availability</td>
<td>Oct-2019</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Sep-2019</td>
</tr>
</tbody>
</table>

**Peak Optimization Flags (Continued)**

627.cam4_s: basepeak = yes

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs
```

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:

- [http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0.2-CFL-RevD.xml](http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0.2-CFL-RevD.xml)

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