



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## Fujitsu

PRIMERGY RX4770 M4, Intel Xeon Gold 5120, 2.20GHz

SPECrate2017\_fp\_base = 275

SPECrate2017\_fp\_peak = Not Run

CPU2017 License: 19

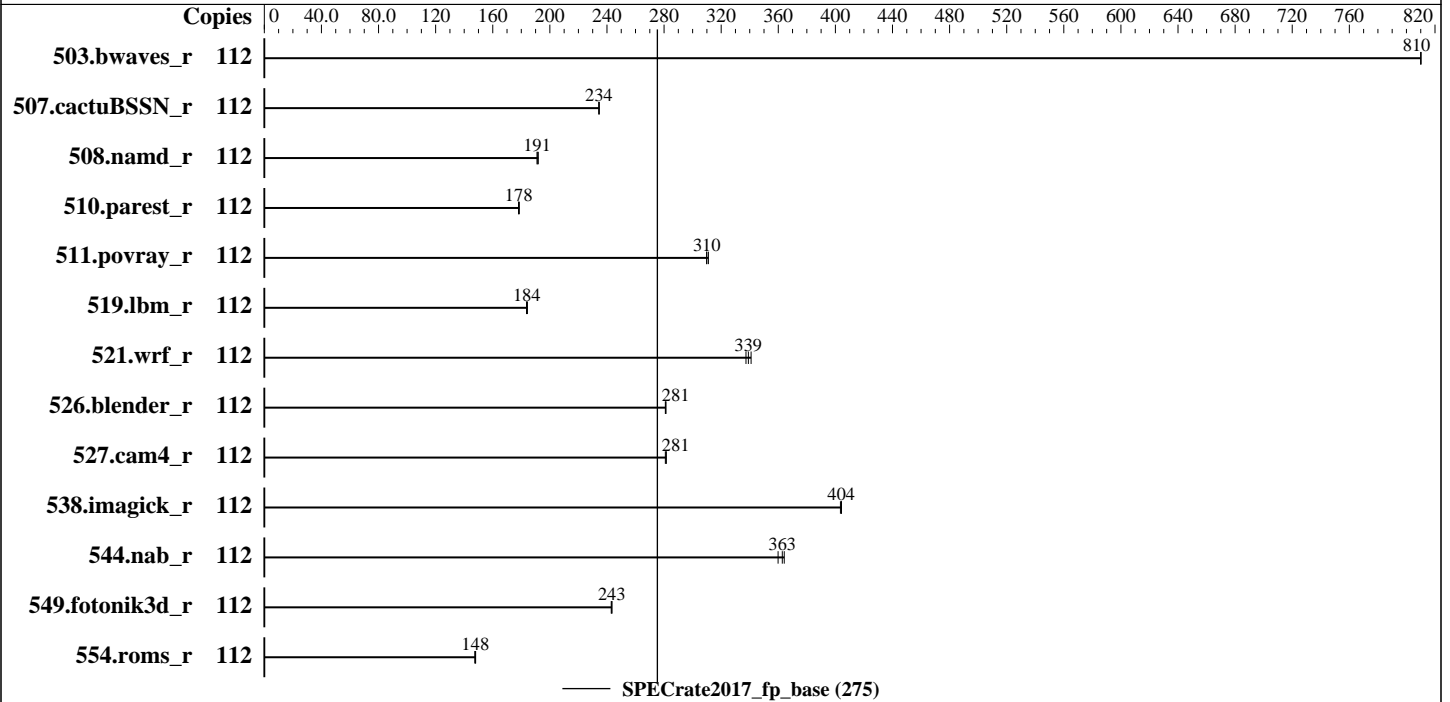
Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Apr-2018

Hardware Availability: Jul-2017

Software Availability: Mar-2018



### Hardware

CPU Name: Intel Xeon Gold 5120  
 Max MHz.: 3200  
 Nominal: 2200  
 Enabled: 56 cores, 4 chips, 2 threads/core  
 Orderable: 2,4 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 19.25 MB I+D on chip per chip  
 Other: None  
 Memory: 768 GB (48 x 16 GB 2Rx4 PC4-2666V-R, running at 2400)  
 Storage: 384 GB tmpfs  
 Other: 1 x SAS HDD, 1.2 TB, 10500 RPM, used for swap

### Software

OS: SUSE Linux Enterprise Server 12 SP2 4.4.114-92.64-default  
 Compiler: C/C++: Version 18.0.0.128 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 18.0.0.128 of Intel Fortran Compiler for Linux  
 Parallel: No  
 Firmware: Fujitsu BIOS Version V5.0.0.12 R1.9.0 for D3753-A1x. Released Mar-2018  
 File System: tmpfs  
 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	112	<b>1386</b>	<b>810</b>	1386	810	1386	810							
507.cactuBSSN_r	112	<b>605</b>	<b>234</b>	604	235	605	234							
508.namd_r	112	557	191	554	192	<b>557</b>	<b>191</b>							
510.parest_r	112	1641	179	<b>1644</b>	<b>178</b>	1645	178							
511.povray_r	112	841	311	844	310	<b>844</b>	<b>310</b>							
519.lbm_r	112	641	184	643	184	<b>642</b>	<b>184</b>							
521.wrf_r	112	736	341	744	337	<b>740</b>	<b>339</b>							
526.blender_r	112	<b>607</b>	<b>281</b>	606	281	607	281							
527.cam4_r	112	<b>696</b>	<b>281</b>	696	282	697	281							
538.imagick_r	112	<b>689</b>	<b>404</b>	690	404	689	404							
544.nab_r	112	524	360	<b>520</b>	<b>363</b>	518	364							
549.fotonik3d_r	112	<b>1793</b>	<b>243</b>	1793	243	1796	243							
554.roms_r	112	<b>1204</b>	<b>148</b>	1202	148	1207	147							

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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"
Set Kernel Boot Parameter: nohz_full=1-111
Set CPU frequency governor to maximum performance with:
cpupower -c all frequency-set -g performance
Set tmpfs filesystem with:
mkdir /home/memory
mount -t tmpfs -o size=384g,rw tmpfs /home/memory
cpu idle state set with:
cpupower idle-set -d 1
cpupower idle-set -d 2
```

## General Notes

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

```
LD_LIBRARY_PATH = "/home/memory/speccpu/lib/ia32:/home/memory/speccpu/lib/intel64"
LD_LIBRARY_PATH = "$LD_LIBRARY_PATH:/home/memory/speccpu/je5.0.1-32"
```

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### General Notes (Continued)

LD\_LIBRARY\_PATH = "\$LD\_LIBRARY\_PATH:/home/memory/speccpu/je5.0.1-64"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.4  
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) 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  
Intel Virtualization Technology = Disabled  
HWPM Support = Disabled  
Package C State limit = C0  
LLC Dead Line Alloc = Disabled  
Stale AtoS = Enabled  
Patrol Scrub = Disabled  
IMC Interleaving = 1-way  
Sub NUMA Clustering = Enabled  
Fan Control = Full  
Sysinfo program /home/memory/speccpu/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on RX4770M4 Tue Apr 17 02:21:37 2018

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) Gold 5120 CPU @ 2.20GHz  
4 "physical id"s (chips)  
112 "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 : 14

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### Platform Notes (Continued)

```
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
```

From lscpu:

```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 14
Socket(s): 4
NUMA node(s): 8
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 5120 CPU @ 2.20GHz
Stepping: 4
CPU MHz: 2201.000
CPU max MHz: 2201.0000
CPU min MHz: 1000.0000
BogoMIPS: 4389.69
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 19712K
NUMA node0 CPU(s): 0-3,7-9,56-59,63-65
NUMA node1 CPU(s): 4-6,10-13,60-62,66-69
NUMA node2 CPU(s): 14-17,21-23,70-73,77-79
NUMA node3 CPU(s): 18-20,24-27,74-76,80-83
NUMA node4 CPU(s): 28-31,35-37,84-87,91-93
NUMA node5 CPU(s): 32-34,38-41,88-90,94-97
NUMA node6 CPU(s): 42-45,49-51,98-101,105-107
NUMA node7 CPU(s): 46-48,52-55,102-104,108-111
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
aperfmpperf eagerfpu 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 ida arat epb invpcid_single pln pts
dtherm intel_pt rsb_ctxsw spec_ctrl retpoline kaiser tpr_shadow vnmi flexpriority
ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx
avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd avx512bw avx512vl xsaveopt
```

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### Platform Notes (Continued)

```
xsavvec xgetbv1 cqm_llc cqm_occup_llc
```

```
/proc/cpuinfo cache data  
cache size : 19712 KB
```

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

```
available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 7 8 9 56 57 58 59 63 64 65
node 0 size: 95018 MB
node 0 free: 94484 MB
node 1 cpus: 4 5 6 10 11 12 13 60 61 62 66 67 68 69
node 1 size: 96760 MB
node 1 free: 96487 MB
node 2 cpus: 14 15 16 17 21 22 23 70 71 72 73 77 78 79
node 2 size: 96760 MB
node 2 free: 90367 MB
node 3 cpus: 18 19 20 24 25 26 27 74 75 76 80 81 82 83
node 3 size: 96760 MB
node 3 free: 94574 MB
node 4 cpus: 28 29 30 31 35 36 37 84 85 86 87 91 92 93
node 4 size: 96760 MB
node 4 free: 95739 MB
node 5 cpus: 32 33 34 38 39 40 41 88 89 90 94 95 96 97
node 5 size: 96760 MB
node 5 free: 96579 MB
node 6 cpus: 42 43 44 45 49 50 51 98 99 100 101 105 106 107
node 6 size: 96760 MB
node 6 free: 96579 MB
node 7 cpus: 46 47 48 52 53 54 55 102 103 104 108 109 110 111
node 7 size: 96609 MB
node 7 free: 96420 MB
node distances:
node  0  1  2  3  4  5  6  7
  0:  10 11 21 21 31 31 21 21
  1:  11 10 21 21 31 31 21 21
  2:  21 21 10 11 21 21 31 31
  3:  21 21 11 10 21 21 31 31
  4:  31 31 21 21 10 11 21 21
  5:  31 31 21 21 11 10 21 21
  6:  21 21 31 31 21 21 10 11
  7:  21 21 31 31 21 21 11 10
```

```
From /proc/meminfo
MemTotal: 790723368 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

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### Platform Notes (Continued)

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP2
```

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

```
SuSE-release:
```

```
SUSE Linux Enterprise Server 12 (x86_64)
```

```
VERSION = 12
```

```
PATCHLEVEL = 2
```

```
# This file is deprecated and will be removed in a future service pack or release.
```

```
# Please check /etc/os-release for details about this release.
```

```
os-release:
```

```
NAME="SLES"
```

```
VERSION="12-SP2"
```

```
VERSION_ID="12.2"
```

```
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
```

```
ID="sles"
```

```
ANSI_COLOR="0;32"
```

```
CPE_NAME="cpe:/o:suse:sles:12:sp2"
```

```
uname -a:
```

```
Linux RX4770M4 4.4.114-92.64-default #1 SMP Thu Feb 1 19:18:19 UTC 2018 (c6ce5db)
x86_64 x86_64 x86_64 GNU/Linux
```

```
run-level 3 Apr 16 20:22
```

```
SPEC is set to: /home/memory/speccpu
```

```
Filesystem      Type      Size  Used Avail Use% Mounted on
tmpfs            tmpfs     384G   8.9G  376G   3% /home/memory
```

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. V5.0.0.12 R1.9.0 for D3753-A1x
03/29/2018
```

```
Memory:
```

```
48x Samsung M393A2G40EB2-CTD 16 GB 2 rank 2666, configured at 2400
```

```
(End of data from sysinfo program)
```

### Compiler Version Notes

```
=====  
CC 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)  
=====
```

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### Compiler Version Notes (Continued)

icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CXXC 508.namd\_r(base) 510.parest\_r(base)

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CC 511.povray\_r(base) 526.blender\_r(base)

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
FC 507.cactuBSSN\_r(base)

-----  
icpc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
FC 503.bwaves\_r(base) 549.fotonik3d\_r(base) 554.roms\_r(base)

-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CC 521.wrf\_r(base) 527.cam4\_r(base)

-----  
ifort (IFORT) 18.0.0 20170811  
Copyright (C) 1985-2017 Intel Corporation. All rights reserved.  
icc (ICC) 18.0.0 20170811  
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## Base Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using both C and C++:

icpc icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

## 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=3

C++ benchmarks:

-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only

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## Base Optimization Flags (Continued)

C++ benchmarks (continued):

`-qopt-mem-layout-trans=3`

Fortran benchmarks:

`-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-mem-layout-trans=3 -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 -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 -nostandard-realloc-lhs -align array32byte`

## Base Other Flags

C benchmarks:

`-m64 -std=c11`

C++ benchmarks:

`-m64`

Fortran benchmarks:

`-m64`

Benchmarks using both Fortran and C:

`-m64 -std=c11`

Benchmarks using both C and C++:

`-m64 -std=c11`

Benchmarks using Fortran, C, and C++:

`-m64 -std=c11`

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.html>

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.2-SKL-RevE.html>



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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2017-10-19.xml>

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.2-SKL-RevE.xml>

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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).

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