



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Fujitsu

PRIMERGY RX4770 M5, Intel Xeon Gold 6252, 2.10GHz

SPECrate®2017\_fp\_base = 476

SPECrate®2017\_fp\_peak = Not Run

CPU2017 License: 19

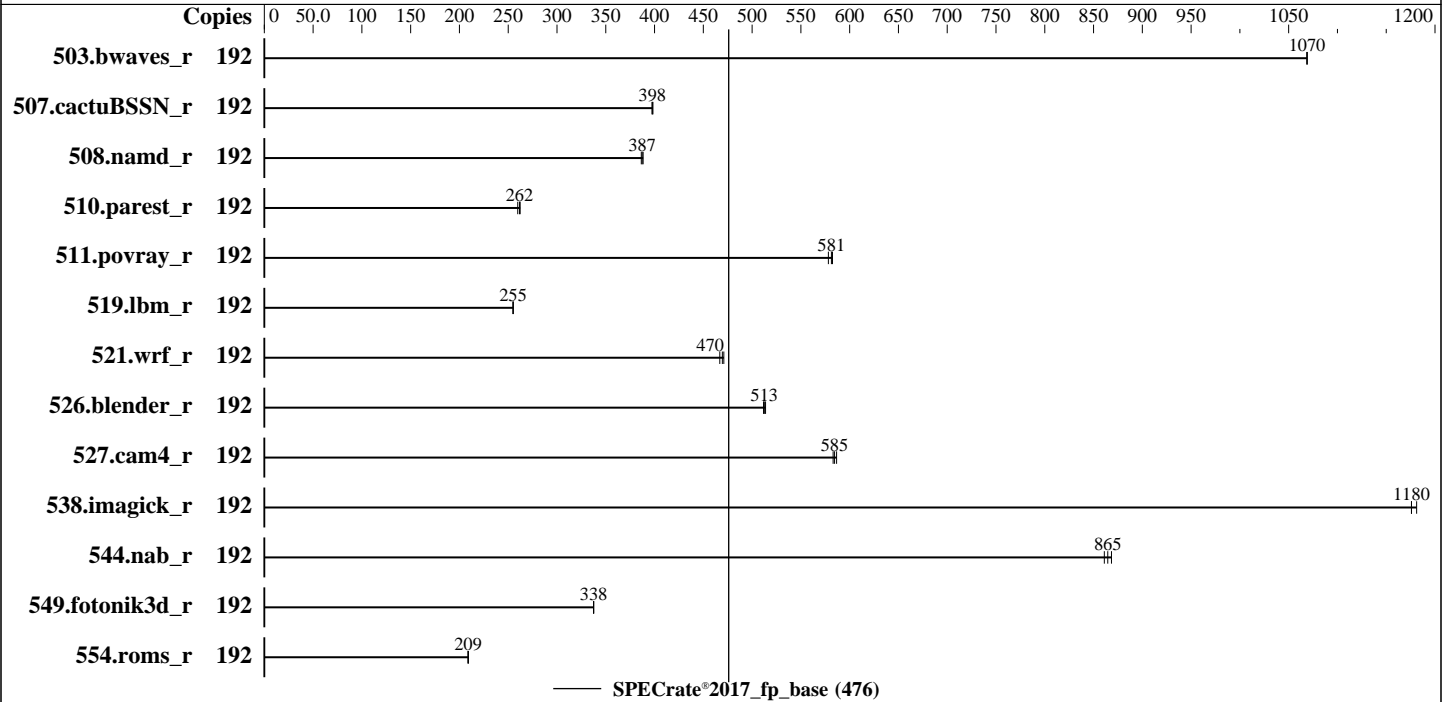
Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Jun-2018

Hardware Availability: Apr-2019

Software Availability: Feb-2019



### Hardware

CPU Name: Intel Xeon Gold 6252  
 Max MHz: 3700  
 Nominal: 2100  
 Enabled: 96 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: 35.75 MB I+D on chip per chip  
 Other: None  
 Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)  
 Storage: 1 x SATA M.2 SSD, 480 GB  
 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 for D3753-C1x  
 Version V5.0.0.14 R1.8.0 released Jun-2019  
 File System: btrfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: None  
 Power Management: --



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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	192	1802	1070	<b><u>1801</u></b>	<b><u>1070</u></b>	1801	1070							
507.cactuBSSN_r	192	612	397	<b><u>611</u></b>	<b><u>398</u></b>	610	398							
508.namd_r	192	<b><u>471</u></b>	<b><u>387</u></b>	472	386	470	388							
510.parest_r	192	1915	262	1934	260	<b><u>1920</u></b>	<b><u>262</u></b>							
511.povray_r	192	770	582	775	578	<b><u>771</u></b>	<b><u>581</u></b>							
519.lbm_r	192	<b><u>793</u></b>	<b><u>255</u></b>	794	255	793	255							
521.wrf_r	192	913	471	<b><u>916</u></b>	<b><u>470</u></b>	921	467							
526.blender_r	192	571	512	569	514	<b><u>571</u></b>	<b><u>513</u></b>							
527.cam4_r	192	<b><u>575</u></b>	<b><u>585</u></b>	572	587	576	583							
538.imagick_r	192	<b><u>406</u></b>	<b><u>1180</u></b>	404	1180	406	1180							
544.nab_r	192	375	861	<b><u>374</u></b>	<b><u>865</u></b>	372	868							
549.fotonik3d_r	192	<b><u>2217</u></b>	<b><u>338</u></b>	2216	338	2217	337							
554.roms_r	192	1459	209	<b><u>1461</u></b>	<b><u>209</u></b>	1461	209							

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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=1-191  
Process tuning settings:  
echo 10000000 > /proc/sys/kernel/sched\_min\_granularity\_ns

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/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.:

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### General Notes (Continued)

numactl --interleave=all runcpu <etc>

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) is mitigated in the system as tested and documented.

### Platform Notes

BIOS configuration:

Fan Control = Full

HWPM = Native Mode with no legacy

LLC Dead Line Alloc = Disabled

LLC Prefetcher = Disabled

Local/Remote Threshold = Disable

Patrol Scrub = Disabled

WR CRC feature Control = Disabled

XPT Prefetch = Disabled

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

Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9

running on linux-z2gf Sat Jun 23 05:50:01 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 6252 CPU @ 2.10GHz

4 "physical id"s (chips)

192 "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 : 24

siblings : 48

physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 22 25 26 27 28 29

physical 1: cores 0 1 2 3 5 6 8 9 10 11 12 13 16 17 18 19 20 21 22 25 26 27 28 29

physical 2: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:

Architecture: x86\_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 192

On-line CPU(s) list: 0-191

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### Platform Notes (Continued)

```

Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 4
NUMA node(s): 8
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Gold 6252 CPU @ 2.10GHz
Stepping: 6
CPU MHz: 2100.000
CPU max MHz: 3700.0000
CPU min MHz: 1000.0000
BogoMIPS: 4200.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 36608K
NUMA node0 CPU(s): 0-3,6-8,12-14,19,20,96-99,102-104,108-110,115,116
NUMA node1 CPU(s): 4,5,9-11,15-18,21-23,100,101,105-107,111-114,117-119
NUMA node2 CPU(s): 24-27,30-32,36-38,43,44,120-123,126-128,132-134,139,140
NUMA node3 CPU(s): 28,29,33-35,39-42,45-47,124,125,129-131,135-138,141-143
NUMA node4 CPU(s): 48-51,55,56,60-62,66-68,144-147,151,152,156-158,162-164
NUMA node5 CPU(s): 52-54,57-59,63-65,69-71,148-150,153-155,159-161,165-167
NUMA node6 CPU(s): 72-75,79-81,85-87,91,92,168-171,175-177,181-183,187,188
NUMA node7 CPU(s): 76-78,82-84,88-90,93-95,172-174,178-180,184-186,189-191
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
aperfmpperf 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 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_l1d arch_capabilities

```

```
/proc/cpuinfo cache data
cache size : 36608 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 6 7 8 12 13 14 19 20 96 97 98 99 102 103 104 108 109 110 115 116
node 0 size: 191883 MB

```

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### Platform Notes (Continued)

```

node 0 free: 188431 MB
node 1 cpus: 4 5 9 10 11 15 16 17 18 21 22 23 100 101 105 106 107 111 112 113 114 117
118 119
node 1 size: 193531 MB
node 1 free: 192828 MB
node 2 cpus: 24 25 26 27 30 31 32 36 37 38 43 44 120 121 122 123 126 127 128 132 133
134 139 140
node 2 size: 193531 MB
node 2 free: 193276 MB
node 3 cpus: 28 29 33 34 35 39 40 41 42 45 46 47 124 125 129 130 131 135 136 137 138
141 142 143
node 3 size: 193531 MB
node 3 free: 193294 MB
node 4 cpus: 48 49 50 51 55 56 60 61 62 66 67 68 144 145 146 147 151 152 156 157 158
162 163 164
node 4 size: 193531 MB
node 4 free: 193324 MB
node 5 cpus: 52 53 54 57 58 59 63 64 65 69 70 71 148 149 150 153 154 155 159 160 161
165 166 167
node 5 size: 193531 MB
node 5 free: 193302 MB
node 6 cpus: 72 73 74 75 79 80 81 85 86 87 91 92 168 169 170 171 175 176 177 181 182
183 187 188
node 6 size: 193531 MB
node 6 free: 193314 MB
node 7 cpus: 76 77 78 82 83 84 88 89 90 93 94 95 172 173 174 178 179 180 184 185 186
189 190 191
node 7 size: 193282 MB
node 7 free: 193065 MB
node distances:
node 0 1 2 3 4 5 6 7
0: 10 11 21 21 21 21 21 21
1: 11 10 21 21 21 21 21 21
2: 21 21 10 11 21 21 21 21
3: 21 21 11 10 21 21 21 21
4: 21 21 21 21 10 11 21 21
5: 21 21 21 21 11 10 21 21
6: 21 21 21 21 21 21 10 11
7: 21 21 21 21 21 21 11 10

```

```

From /proc/meminfo
MemTotal: 1583466452 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:

```

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### Platform Notes (Continued)

```
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-z2gf 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 Jun 23 05:47
```

```
SPEC is set to: /home/Benchmark/speccpu2017-fp
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sda2       btrfs    445G   35G  409G   8% /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. V5.0.0.14 R1.8.0 for D3753-C1x
06/06/2019
```

```
Memory:
33x Micron 36ASF4G72PZ-2G9E2 32 GB 2 rank 2933, configured at 2934
15x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2934
```

(End of data from sysinfo program)

### 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 19.0.0.117 Build 20180804  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.
```

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### Compiler Version Notes (Continued)

=====  
C++ | 508.namd\_r(base) 510.parest\_r(base)  
=====

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.0.0.117 Build 20180804  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
-----

=====  
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 19.0.0.117 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,  
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Copyright (C) 1985-2018 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 19.0.0.117 Build 20180804  
Copyright (C) 1985-2018 Intel Corporation. All rights reserved.  
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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.  
-----

=====  
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 19.0.0.117 Build 20180804  
Copyright (C) 1985-2018 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)

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-----

## 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
```





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## Base Optimization Flags

C benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3
```

C++ benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3
```

Fortran benchmarks:

```
-xCORE-AVX512 -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-AVX512 -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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
-ffinite-math-only -qopt-mem-layout-trans=3
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX512 -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-RevE.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-RevE.xml>

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Tested with SPEC CPU®2017 v1.0.5 on 2018-06-22 16:50:00-0400.

Report generated on 2019-10-01 14:31:22 by CPU2017 PDF formatter v6255.

Originally published on 2019-10-01.