



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

## Fujitsu

PRIMERGY TX1330 M5, Intel Xeon E-2388G, 3.20GHz

SPECrate®2017\_fp\_base = 59.6

SPECrate®2017\_fp\_energy\_base = 541

SPECrate®2017\_fp\_peak = Not Run

SPECrate®2017\_fp\_energy\_peak = Not Run

CPU2017 License: 19

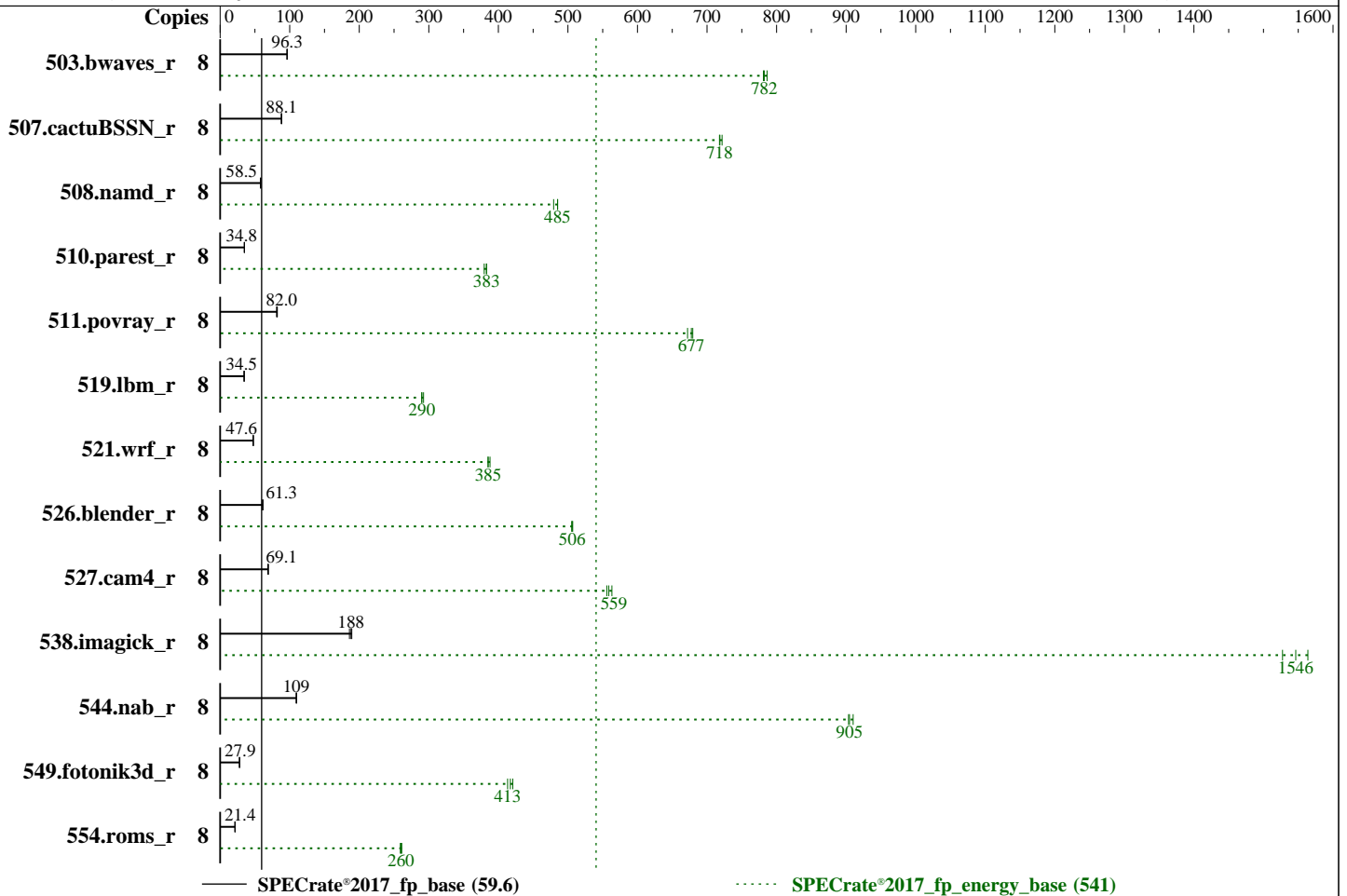
Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Dec-2021

Hardware Availability: Mar-2022

Software Availability: Jun-2021



### Hardware

CPU Name: Intel Xeon E-2388G  
 Max MHz: 5100  
 Nominal: 3200  
 Enabled: 8 cores, 1 chip  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 512 KB I+D on chip per core  
 L3: 16 MB I+D on chip per chip  
 Other: None  
 Memory: 32 GB (2 x 16 GB 2Rx8 PC4-3200AA-E)  
 Storage: 1 x SATA M.2 SSD, 240GB  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP3 5.3.18-57-default  
 Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++ Compiler Build 20201113 for Linux;  
 Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;  
 Parallel: No  
 Firmware: Fujitsu BIOS Version V5.0.0.22 R1.30.0 for D3931-A1x. Released Mar-2022 tested as V5.0.0.22 R1.15.0 for D3931-A1x Dec-2021  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: Not Applicable  
 Other: jemalloc memory allocator V5.0.1  
 (Continued on next page)



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### Software (Continued)

Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

### Power

Max. Power (W): 165.61  
Idle Power (W): 26.41  
Min. Temperature (C): 23.13  
Elevation (m): 11  
Line Standard: 200 V / 50 Hz / 1 phase / 2 wires  
Provisioning: Line-powered

### Power Settings

Management FW: Version 1.00m for D3931-A1x of Fujitsu BMC Firmware  
Memory Mode: Normal

### Power-Relevant Hardware

Power Supply: 1 x 500 W (non-redundant)  
Details: Standard power supply part of base unit S26113-E627-V50-1  
Backplane: 4 x 2.5inch HDD back plane  
Other Storage: Embedded SATA Controller  
Storage Model #: S26361-F5787-E240  
NICs Installed: 2 x Intel I210 @ 1 Gb  
NICs Enabled (FW/OS): 2 / 2  
NICs Connected/Speed: 1 @ 1 Gb  
Other HW Model #: None

### Power Analyzer

Power Analyzer: 10.26.120.153:8888  
Hardware Vendor: Hioki  
Model: Hioki PW3336:1-Channel  
Serial Number: 170130930  
Input Connection: USB via USB-Serial CH340  
Metrology Institute: NICT  
Calibration By: HIOKI E.E. CORPORATION  
Calibration Label: H06400086  
Calibration Date: 08-Mar-2021  
PTDaemon® Version: 1.9.2 (3976349f; 2020-12-08)  
Setup Description: Connected to PSU 1  
Current Ranges Used: 1A  
Voltage Range Used: 300V

### Temperature Meter

Temperature Meter: 10.26.120.153:8889  
Hardware Vendor: Digi International Inc.  
Model: DigiWATCHPORT\_H  
Serial Number: W 633 91704  
Input Connection: USB  
PTDaemon Version: 1.9.2 (3976349f; 2020-12-08)  
Setup Description: 5 mm in front of SUT main air intake

## Base Results Table

Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
503.bwaves_r	8	832	96.4	111	786	134	136	<b>833</b>	<b>96.3</b>	<b>112</b>	<b>782</b>	<b>134</b>	<b>140</b>	835	96.1	112	781	134	138
507.cactuBSSN_r	8	<b>115</b>	<b>88.1</b>	<b>15.5</b>	<b>718</b>	<b>135</b>	<b>148</b>	114	88.5	15.4	722	135	149	115	87.9	15.5	719	135	152
508.namd_r	8	131	57.9	17.3	479	132	156	130	58.6	17.1	485	132	163	<b>130</b>	<b>58.5</b>	<b>17.1</b>	<b>485</b>	<b>131</b>	<b>162</b>
510.parest_r	8	<b>601</b>	<b>34.8</b>	<b>59.5</b>	<b>383</b>	<b>99.0</b>	<b>154</b>	602	34.7	59.5	383	98.7	155	599	35.0	60.0	380	100	158
511.povray_r	8	227	82.2	29.8	679	131	146	<b>228</b>	<b>82.0</b>	<b>29.9</b>	<b>677</b>	<b>131</b>	<b>158</b>	230	81.1	30.2	672	131	166
519.lbm_r	8	243	34.6	32.8	292	135	158	<b>245</b>	<b>34.5</b>	<b>33.0</b>	<b>290</b>	<b>135</b>	<b>154</b>	245	34.4	33.1	290	135	151

Table continues on next page. Results appear in the order in which they were run. Bold underlined text indicates a median measurement.



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Benchmark	Copies	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power	Seconds	Ratio	Energy (kJ)	Energy Ratio	Average Power	Maximum Power
521.wrf_r	8	376	47.7	50.4	388	134	142	<u>377</u>	<u>47.6</u>	<u>50.8</u>	<u>385</u>	<u>135</u>	<u>141</u>	377	47.5	50.8	385	135	139
526.blender_r	8	199	61.1	26.0	507	131	154	199	61.3	26.1	505	131	158	<u>199</u>	<u>61.3</u>	<u>26.1</u>	<u>506</u>	<u>131</u>	<u>161</u>
527.cam4_r	8	202	69.3	27.1	563	134	155	<u>203</u>	<u>69.1</u>	<u>27.3</u>	<u>559</u>	<u>135</u>	<u>152</u>	204	68.6	27.4	556	134	155
538.imagick_r	8	105	189	13.8	1560	131	164	107	186	14.1	1530	132	164	<u>106</u>	<u>188</u>	<u>13.9</u>	<u>1550</u>	<u>132</u>	<u>164</u>
544.nab_r	8	<u>123</u>	<u>109</u>	<u>16.1</u>	<u>905</u>	<u>131</u>	<u>160</u>	123	109	16.2	903	131	158	122	110	16.0	910	131	155
549.fotonik3d_r	8	1118	27.9	83.2	417	74.4	162	<u>1119</u>	<u>27.9</u>	<u>84.0</u>	<u>413</u>	<u>75.1</u>	<u>162</u>	1119	27.9	82.5	421	73.8	155
554.roms_r	8	594	21.4	53.7	261	90.4	122	595	21.4	54.1	259	91.0	118	<u>594</u>	<u>21.4</u>	<u>53.9</u>	<u>260</u>	<u>90.7</u>	<u>118</u>

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## 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"  
echo madvise > /sys/kernel/mm/transparent\_hugepage/enabled

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH =  
"/home/PVT/speccpu-1.1.8\_b/lib/intel64:/home/PVT/speccpu-1.1.8\_b/je5.0.1-64"  
MALLOC\_CONF = "retain:true"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1  
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>  
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)

(Continued on next page)



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Software Availability: Jun-2021

## General Notes (Continued)

is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

jemalloc, a general purpose malloc implementation

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

## Platform Notes

BIOS configuration:

Hyper Threading = Disabled

C-States Auto Demotion = Disabled

C-States Un Demotion = Disabled

DDR Speed Control = Auto

DMI Gen3 ASPM = ASPM L0s

Sysinfo program /home/PVT/speccpu-1.1.8\_b/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d

running on localhost Mon Dec 20 19:02:06 2021

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-2388G CPU @ 3.20GHz

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 from util-linux 2.36.2:

Architecture: x86\_64

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

Byte Order: Little Endian

Address sizes: 39 bits physical, 48 bits virtual

CPU(s): 8

On-line CPU(s) list: 0-7

Thread(s) per core: 1

Core(s) per socket: 8

Socket(s): 1

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### Platform Notes (Continued)

```

NUMA node(s): 1
Vendor ID: GenuineIntel
CPU family: 6
Model: 167
Model name: Intel(R) Xeon(R) E-2388G CPU @ 3.20GHz
Stepping: 1
CPU MHz: 991.568
CPU max MHz: 5100.0000
CPU min MHz: 800.0000
BogoMIPS: 6384.00
Virtualization: VT-x
L1d cache: 384 KiB
L1i cache: 256 KiB
L2 cache: 4 MiB
L3 cache: 16 MiB
NUMA node0 CPU(s): 0-7
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected
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 aperfperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx
smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt
tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault
epb invpcid_single ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority
ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid mpx avx512f
avx512dq rdseed adx smap avx512ifma clflushopt intel_pt avx512cd sha_ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts hwp hwp_notify
hwp_act_window hwp_epp hwp_pkg_req avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes
vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid fsrm md_clear flush_l1d
arch_capabilities

```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	384K	12	Data	1	64	1	64

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### Platform Notes (Continued)

L1i	32K	256K	8 Instruction	1	64	1	64
L2	512K	4M	8 Unified	2	1024	1	64
L3	16M	16M	16 Unified	3	16384	1	64

```
/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: 31515 MB
node 0 free: 31059 MB
node distances:
node    0
0:    10
```

```
From /proc/meminfo
```

```
MemTotal:      32272268 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has
powersave
```

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

```
os-release:
NAME="SLES"
VERSION="15-SP3"
VERSION_ID="15.3"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp3"
```

```
uname -a:
```

```
Linux localhost 5.3.18-57-default #1 SMP Wed Apr 28 10:54:41 UTC 2021
(ba3c2e9/lp-5d9e8aa) x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):	Not affected
CVE-2018-3620 (L1 Terminal Fault):	Not affected
Microarchitectural Data Sampling:	Not affected

(Continued on next page)



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### Platform Notes (Continued)

CVE-2017-5754 (Meltdown):	Not affected
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swaps barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

run-level 3 Dec 20 19:00

```
SPEC is set to: /home/PVT/speccpu-1.1.8_b
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   180G  41G  140G  23% /home
```

```
From /sys/devices/virtual/dmi/id
Vendor:          FUJITSU
Product:         PRIMERGY TX1330 M5
Product Family: SERVER
Serial:          EWBUxxxxxx
```

Additional information from dmidecode 3.2 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:
  2x Samsung M391A2K43DB1-CWE 16 GB 2 rank 3200
```

```
BIOS:
  BIOS Vendor:    FUJITSU // American Megatrends International, LLC.
  BIOS Version:   V5.0.0.22 R1.15.0 for D3931-Alx
  BIOS Date:      12/03/2021
  BIOS Revision:  1.15
```

(End of data from sysinfo program)

### Compiler Version Notes

```
=====
C          | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
-----
```

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### Compiler Version Notes (Continued)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====  
C++, C | 511.povray\_r(base) 526.blender\_r(base)  
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

=====  
C++, C, Fortran | 507.cactuBSSN\_r(base)  
=====

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
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Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on  
Intel(R) 64, Version 2021.1 Build 20201112\_000000  
Copyright (C) 1985-2020 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 Classic for applications running on  
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## Compiler Version Notes (Continued)

```

=====
Fortran, C      | 521.wrf_r(base) 527.cam4_r(base)
-----
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
-----

```

## Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx 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

```

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## Base Portability Flags (Continued)

```
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:

```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

### C++ benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

### Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

### Benchmarks using both Fortran and C:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

### Benchmarks using both C and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries -ljemalloc
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Rate Result

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## Fujitsu

PRIMERGY TX1330 M5, Intel Xeon E-2388G, 3.20GHz

SPECrate®2017\_fp\_base = 59.6

SPECrate®2017\_fp\_energy\_base = 541

SPECrate®2017\_fp\_peak = Not Run

SPECrate®2017\_fp\_energy\_peak = Not Run

**CPU2017 License:** 19

**Test Sponsor:** Fujitsu

**Tested by:** Fujitsu

**Test Date:** Dec-2021

**Hardware Availability:** Mar-2022

**Software Availability:** Jun-2021

## Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):

```
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -O3
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

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-RKL-RevC.html>

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.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-RKL-RevC.xml>

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml)

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