



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Fujitsu

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

SPECrate®2017\_fp\_base = 44.2

SPECrate®2017\_fp\_energy\_base = 363

SPECrate®2017\_fp\_peak = Not Run

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

CPU2017 License: 19

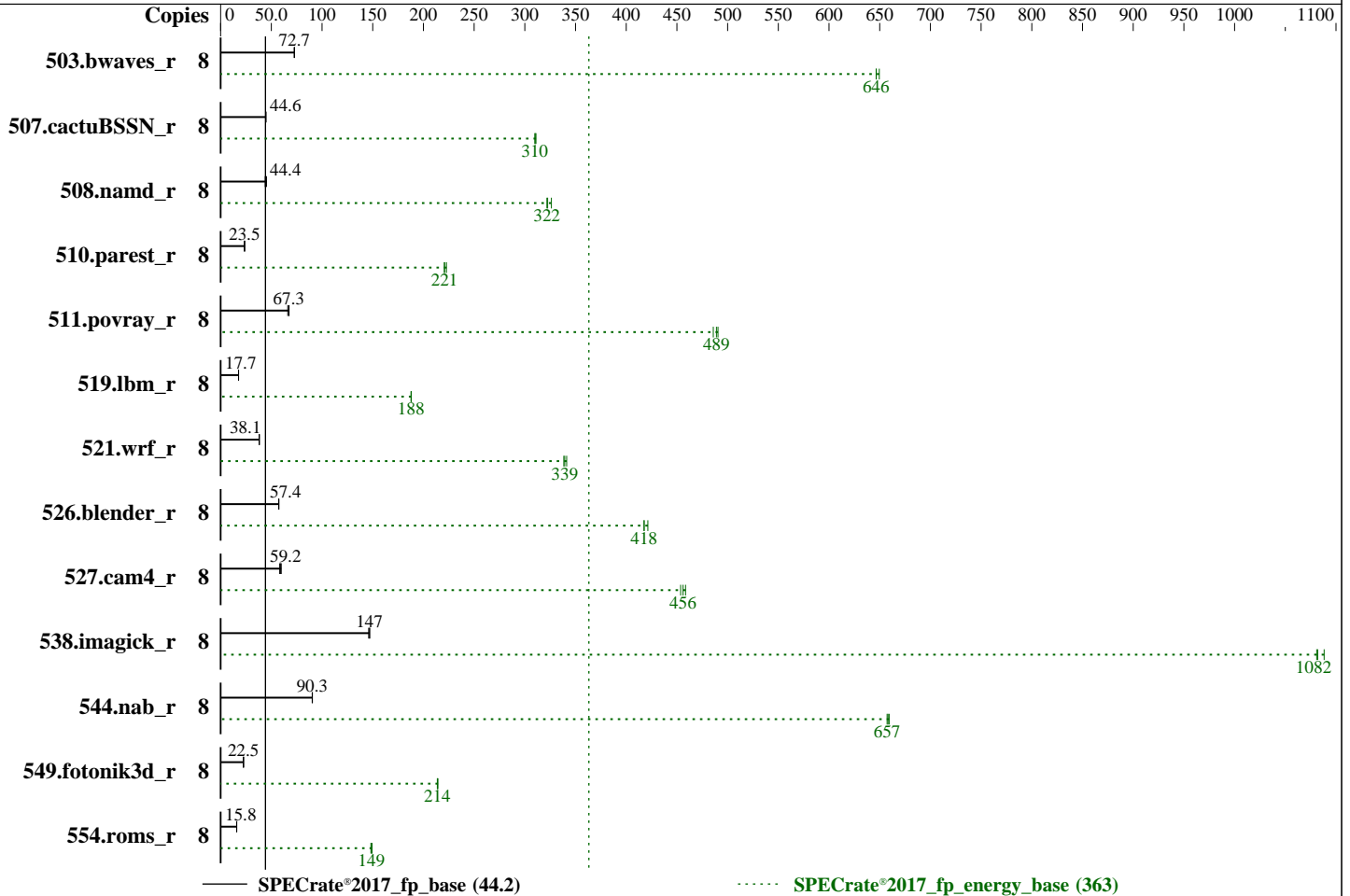
Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Oct-2019

Hardware Availability: Oct-2019

Software Availability: May-2019



### Hardware

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  
 Other: None  
 Memory: 64 GB (4 x 16 GB 2Rx8 PC4-2666V-E)  
 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 19.0.4.227 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: Enabled



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### Power

Max. Power (W): 192.52  
 Idle Power (W): 23.4  
 Min. Temperature (C): 20.56  
 Elevation (m): 11  
 Line Standard: 200 V / 50 Hz / 1 phase / 2 wires  
 Provisioning: Line-powered

#### Power Settings

Management FW: Version 1.60h for D3673-A1x of Fujitsu BMC Firmware  
 Memory Mode: Normal

#### Power-Relevant Hardware

Power Supply: 1 x 450 W (non-redundant)  
 Details: Standard power supply part of base unit S26361-K1639-V101  
 Backplane: 4 x 2.5inch HDD back plane  
 Other Storage: Embedded SATA Controller  
 Storage Model #: S26361-F5706  
 NICs Installed: 2 x Intel I210 Springville @ 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: 170134584  
 Input Connection: USB via USB-Serial CH340  
 Metrology Institute: NICT  
 Calibration By: HIOKI E.E. CORPORATION  
 Calibration Label: H06400087-1901T  
 Calibration Date: 1-Jan-2019  
 PTDaemon™ Version: 1.9.1 (a2d19f26; 2019-07-17)  
 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 640 45112  
 Input Connection: USB  
 PTDaemon Version: 1.9.1 (a2d19f26; 2019-07-17)  
 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	1102	72.8	135	650	122	125	1104	72.7	135	647	122	126	<b>1103</b>	<b>72.7</b>	<b>135</b>	<b>646</b>	<b>123</b>	<b>126</b>
507.cactuBSSN_r	8	227	44.6	35.8	311	158	192	<b>227</b>	<b>44.6</b>	<b>35.9</b>	<b>310</b>	<b>158</b>	<b>192</b>	227	44.5	35.9	310	158	193
508.namd_r	8	168	45.2	25.4	326	151	187	<b>171</b>	<b>44.4</b>	<b>25.7</b>	<b>322</b>	<b>151</b>	<b>187</b>	173	44.0	25.7	323	149	184
510.parest_r	8	<b>890</b>	<b>23.5</b>	<b>103</b>	<b>221</b>	<b>116</b>	<b>162</b>	882	23.7	102	223	116	162	892	23.5	103	221	116	163
511.povray_r	8	<b>278</b>	<b>67.3</b>	<b>41.4</b>	<b>489</b>	<b>149</b>	<b>160</b>	277	67.5	41.3	491	149	159	282	66.2	41.7	486	148	159
519.lbm_r	8	<b>477</b>	<b>17.7</b>	<b>51.0</b>	<b>188</b>	<b>107</b>	<b>125</b>	477	17.7	51.0	188	107	114	477	17.7	50.9	188	107	121
521.wrf_r	8	470	38.1	57.3	341	122	131	472	38.0	57.8	338	123	132	<b>470</b>	<b>38.1</b>	<b>57.7</b>	<b>339</b>	<b>123</b>	<b>133</b>
526.blender_r	8	213	57.3	31.6	418	149	160	<b>212</b>	<b>57.4</b>	<b>31.6</b>	<b>418</b>	<b>149</b>	<b>161</b>	212	57.4	31.3	421	147	161
527.cam4_r	8	240	58.2	33.6	454	140	156	<b>236</b>	<b>59.2</b>	<b>33.4</b>	<b>456</b>	<b>141</b>	<b>158</b>	234	59.7	33.2	459	142	157
538.imagick_r	8	135	147	19.8	1090	146	159	<b>136</b>	<b>147</b>	<b>19.9</b>	<b>1080</b>	<b>147</b>	<b>161</b>	136	146	19.9	1080	146	161

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

## Base Results Table (Continued)

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
544.nab_r	8	149	90.5	22.1	659	149	174	149	90.3	22.2	658	149	173	<b>149</b>	<b>90.3</b>	<b>22.2</b>	<b>657</b>	<b>149</b>	<b>174</b>
549.fotonik3d_r	8	1384	22.5	163	214	117	159	<b>1384</b>	<b>22.5</b>	<b>162</b>	<b>214</b>	<b>117</b>	<b>158</b>	1384	22.5	162	214	117	159
554.roms_r	8	800	15.9	93.9	149	117	128	<b>802</b>	<b>15.8</b>	<b>94.2</b>	<b>149</b>	<b>117</b>	<b>125</b>	806	15.8	94.6	148	117	128

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## 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"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
 LD\_LIBRARY\_PATH = "/home/Benchmark/speccpu2017-1.1.0/lib/intel64"

## 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) is mitigated in the system as tested and documented.



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Test Date: Oct-2019

Hardware Availability: Oct-2019

Software Availability: May-2019

## 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/speccpu2017-1.1.0/bin/sysinfo

Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011

running on TX1320M4 Mon Oct 14 16:06:36 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

BogoMIPS: 7392.00

Virtualization: VT-x

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### Platform Notes (Continued)

```

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 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 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
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 fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm mpx rdseed adx smap clflushopt
intel_pt xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts hwp hwp_notify
hwp_act_window hwp_epp flush_llid arch_capabilities

```

```

/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: 63413 MB
node distances:
node    0
0:     10

```

From /proc/meminfo

```

MemTotal:          65420032 kB
HugePages_Total:    0
Hugepagesize:      2048 kB

```

From /etc/\*release\* /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"

```

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## 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-2018-3620 (L1 Terminal Fault):      Not affected
Microarchitectural Data Sampling:      No status reported
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: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):      Mitigation: Enhanced IBRS, IBPB: conditional,
RSB filling
```

run-level 3 Oct 14 16:03

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

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb4       xfs   191G   79G  113G  42% /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 TX1320 M4
Product Family: SERVER
Serial: YMJKXXXXXX
```

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)

## Power Settings Notes

PTDaemon to measure power and temperature was run on a PRIMERGY RX2530 M5 as a controller with 2x Intel Xeon Platinum 8280 CPU and 768 GB of memory using Windows Server 2012 R2. Power management in the BIOS was default except for any settings mentioned in BIOS Configuration. No power management settings were set in the management firmware.

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### Power Settings Notes (Continued)

The optional optical drive was not installed.

The run was started and observed through the management firmware.

### 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.  
-----

=====  
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)  
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## Compiler Version Notes (Continued)

-----  
=====

```
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  
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.

## 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
```





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## 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
-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

```



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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.html>

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0.2-CFL-RevB.2019-11-01.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.xml>

<http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0.2-CFL-RevB.2019-11-01.xml>

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Tested with SPEC CPU®2017 v1.1.0 on 2019-10-14 03:06:36-0400.

Report generated on 2019-11-01 10:43:52 by CPU2017 PDF formatter v6255.

Originally published on 2019-11-01.