



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem ST250  
(3.40 GHz, Intel Xeon E-2224)

SPECrate®2017\_fp\_base = 32.4

SPECrate®2017\_fp\_peak = 32.8

CPU2017 License: 9017

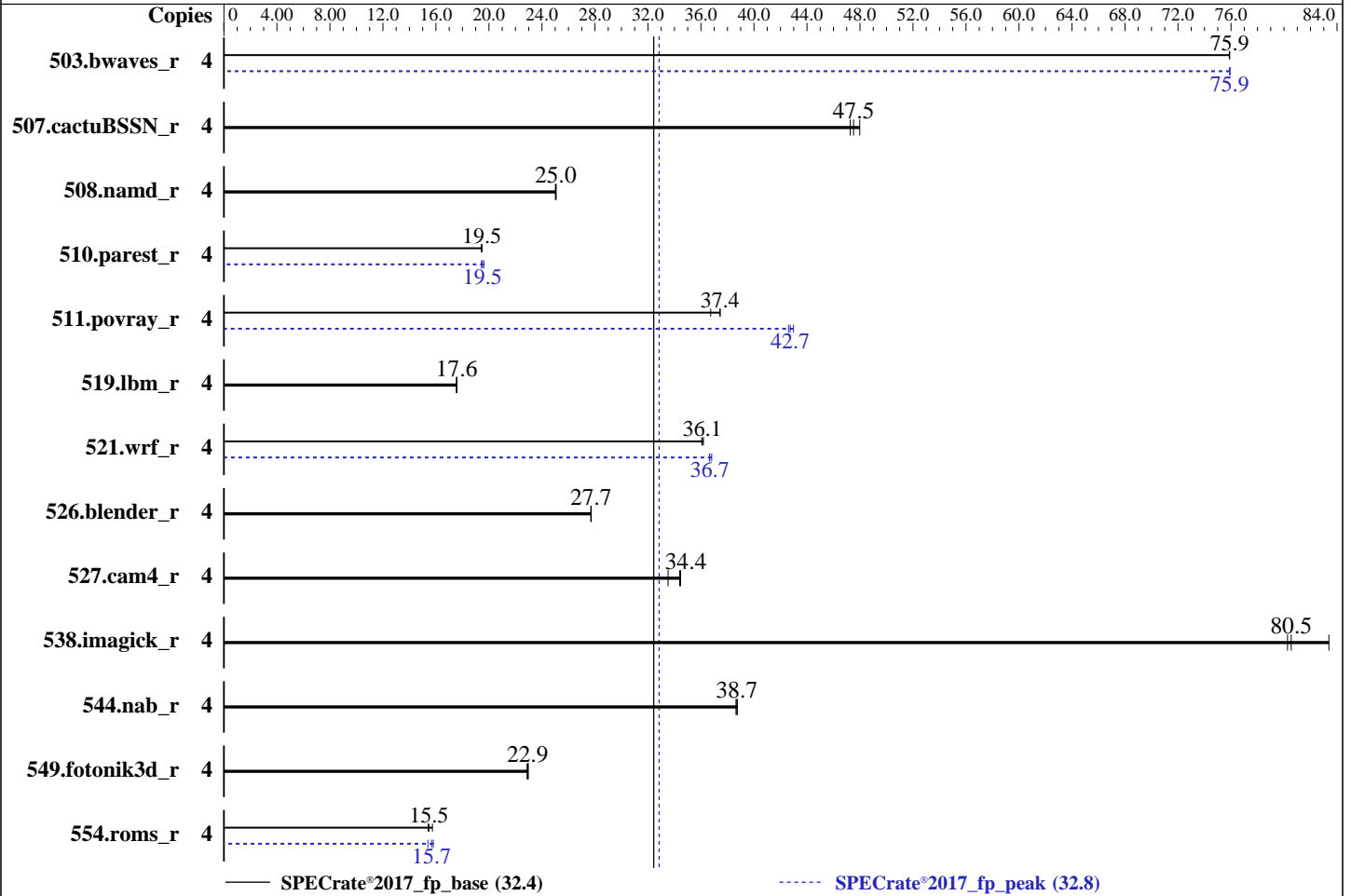
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jun-2020

Hardware Availability: Mar-2020

Software Availability: Apr-2020



### Hardware

CPU Name: Intel Xeon E-2224  
 Max MHz: 4600  
 Nominal: 3400  
 Enabled: 4 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: 8 MB I+D on chip per chip  
 Other: None  
 Memory: 128 GB (4 x 32 GB 2Rx4 PC4-2666V-E)  
 Storage: 1 x 960 GB SATA SSD  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 12 SP5 (x86\_64)  
 Kernel 4.12.14-120-default  
 Compiler: C/C++: Version 19.1.1.217 of Intel  
 C/C++ Compiler for Linux;  
 Fortran: Version 19.1.1.217 of Intel Fortran  
 Compiler for Linux  
 Parallel: No  
 Firmware: Lenovo BIOS Version ISE115D 2.10 released Apr-2020  
 File System: xfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: jemalloc memory allocator V5.0.1  
 Power Management: BIOS set to prefer performance at the cost of additional power usage



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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	4	529	75.9	<u>529</u>	<u>75.9</u>	529	75.9	4	<u>528</u>	<u>75.9</u>	528	75.9	528	75.9
507.cactuBSSN_r	4	<u>107</u>	<u>47.5</u>	107	47.3	106	48.0	4	<u>107</u>	<u>47.5</u>	107	47.3	106	48.0
508.namd_r	4	<u>152</u>	<u>25.0</u>	152	25.1	152	25.0	4	<u>152</u>	<u>25.0</u>	152	25.1	152	25.0
510.parest_r	4	<u>538</u>	<u>19.5</u>	538	19.5	538	19.4	4	538	19.4	533	19.6	<u>536</u>	<u>19.5</u>
511.povray_r	4	249	37.4	<u>249</u>	<u>37.4</u>	254	36.7	4	<u>219</u>	<u>42.7</u>	217	43.0	219	42.6
519.lbm_r	4	240	17.6	240	17.6	<u>240</u>	<u>17.6</u>	4	240	17.6	240	17.6	<u>240</u>	<u>17.6</u>
521.wrf_r	4	248	36.1	248	36.2	<u>248</u>	<u>36.1</u>	4	<u>244</u>	<u>36.7</u>	245	36.6	243	36.8
526.blender_r	4	<u>220</u>	<u>27.7</u>	220	27.7	220	27.7	4	<u>220</u>	<u>27.7</u>	220	27.7	220	27.7
527.cam4_r	4	<u>203</u>	<u>34.4</u>	209	33.5	203	34.5	4	<u>203</u>	<u>34.4</u>	209	33.5	203	34.5
538.imagick_r	4	119	83.4	124	80.3	<u>124</u>	<u>80.5</u>	4	119	83.4	124	80.3	<u>124</u>	<u>80.5</u>
544.nab_r	4	174	38.7	<u>174</u>	<u>38.7</u>	174	38.6	4	174	38.7	<u>174</u>	<u>38.7</u>	174	38.6
549.fotonik3d_r	4	679	23.0	681	22.9	<u>680</u>	<u>22.9</u>	4	679	23.0	681	22.9	<u>680</u>	<u>22.9</u>
554.roms_r	4	412	15.4	404	15.7	<u>411</u>	<u>15.5</u>	4	402	15.8	413	15.4	<u>406</u>	<u>15.7</u>

SPECrate®2017\_fp\_base = **32.4**

SPECrate®2017\_fp\_peak = **32.8**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Compiler Notes

The inconsistent Compiler version information under Compiler Version section is due to a discrepancy in Intel Compiler. The correct version of C/C++ compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux. The correct version of Fortran compiler is: Version 19.1.1.217 Build 20200306 Compiler for Linux.

## 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/cpu2017-1.1.0-ic19.1.1/lib/intel64:/home/cpu2017-1.1.0-ic19.1.1/j  
e5.0.1-64"  
MALLOC\_CONF = "retain:true"



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### General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0  
 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) 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.  
 Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.  
 Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) 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:  
 Choose Operating Mode set to Maximum Performance

Sysinfo program /home/cpu2017-1.1.0-ic19.1.1/bin/sysinfo  
 Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011  
 running on linux-tzna Thu Jun 4 22:20:46 2020

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-2224 CPU @ 3.40GHz  
 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

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### Platform Notes (Continued)

```

Byte Order:                Little Endian
Address sizes:             39 bits physical, 48 bits virtual
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-2224 CPU @ 3.40GHz
Stepping:                  10
CPU MHz:                   3400.000
CPU max MHz:               4600.0000
CPU min MHz:               800.0000
BogoMIPS:                  6816.00
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 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
aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single
pti ssbd ibrs ibpb stibp 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 md_clear flush_lld

```

```
/proc/cpuinfo cache data
cache size : 8192 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
node 0 size: 128867 MB
node 0 free: 128359 MB
node distances:
node 0
0: 10

```

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### Platform Notes (Continued)

```

From /proc/meminfo
MemTotal:      131960060 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 5
# 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-SP5"
VERSION_ID="12.5"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP5"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp5"

uname -a:
Linux linux-tzna 4.12.14-120-default #1 SMP Thu Nov 7 16:39:09 UTC 2019 (fd9dc36)
x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

itlb_multihit:                KVM: Mitigation: Split huge pages
CVE-2018-3620 (L1 Terminal Fault):  Mitigation: PTE Inversion; VMX: conditional
cache flushes, SMT disabled
Microarchitectural Data Sampling:  Mitigation: Clear CPU buffers; SMT disabled
CVE-2017-5754 (Meltdown):          Mitigation: PTI
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: Full generic retpoline, IBPB:
conditional, IBRS_FW, STIBP: disabled, RSB
filling
tsx_async_abort:                Mitigation: Clear CPU buffers; SMT disabled

run-level 3 Jun 4 22:20

SPEC is set to: /home/cpu2017-1.1.0-ic19.1.1
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb3        xfs   893G  64G  829G   8% /

```

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### Platform Notes (Continued)

```
From /sys/devices/virtual/dmi/id
  BIOS:      Lenovo -[ISE115D-2.10]- 04/24/2020
  Vendor:    Lenovo
  Product:   ThinkSystem ST250 -[7Y45CT00WW]-
  Product Family: ThinkSystem
  Serial:    1234567890
```

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 HMAA4GU7AJR8N-VK 32767 MB 2 rank 2666

(End of data from sysinfo program)

### Compiler Version Notes

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

Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1  
NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

```
=====  
C++       | 508.namd_r(base, peak) 510.parest_r(base, peak)  
=====
```

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1  
NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

```
=====  
C++, C    | 511.povray_r(base) 526.blender_r(base, peak)  
=====
```

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version 2021.1  
NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
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### Compiler Version Notes (Continued)

=====  
C++, C | 511.povray\_r(peak)  
-----

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

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

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-----

=====  
C++, C | 511.povray\_r(peak)  
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

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

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NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1  
NextGen Build 20200304  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
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### Compiler Version Notes (Continued)

```

=====
Fortran          | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
                  | 554.roms_r(base, peak)
=====

```

```

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

```

```

=====
Fortran, C       | 521.wrf_r(base) 527.cam4_r(base, peak)
=====

```

```

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

```

```

=====
Fortran, C       | 521.wrf_r(peak)
=====

```

```

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.1.1.217 Build 20200306
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

```

```

=====
Fortran, C       | 521.wrf_r(base) 527.cam4_r(base, peak)
=====

```

```

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
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Intel(R) C Compiler for applications running on Intel(R) 64, Version 2021.1
NextGen Build 20200304
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

```

```

=====
Fortran, C       | 521.wrf_r(peak)
=====

```

```

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.1.1.217 Build 20200306
=====

```

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## Compiler Version Notes (Continued)

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,  
Version 19.1.1.217 Build 20200306  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

## 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



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## Base Optimization Flags

### C benchmarks:

```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

### C++ benchmarks:

```
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX2 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

### Fortran benchmarks:

```
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -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
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

### Benchmarks using both Fortran and C:

```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -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 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

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

```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -Ofast -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

### Benchmarks using Fortran, C, and C++:

```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-fuse-ld=gold -xCORE-AVX2 -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 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
```

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# SPEC CPU®2017 Floating Point Rate Result

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**Lenovo Global Technology**

ThinkSystem ST250  
(3.40 GHz, Intel Xeon E-2224)

SPECrate®2017\_fp\_base = 32.4

SPECrate®2017\_fp\_peak = 32.8

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Jun-2020

**Hardware Availability:** Mar-2020

**Software Availability:** Apr-2020

## Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):

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

## Peak 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`

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

`519.lbm_r: basepeak = yes`

`538.imagick_r: basepeak = yes`

`544.nab_r: basepeak = yes`

C++ benchmarks:

(Continued on next page)



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## Peak Optimization Flags (Continued)

508.namd\_r: basepeak = yes

510.parest\_r: -m64 -qnextgen

-Wl,-plugin-opt=-x86-branches-within-32B-boundaries  
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX2 -Ofast  
-ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -L/usr/local/jemalloc64-5.0.1/lib  
-ljemalloc

Fortran benchmarks:

503.bwaves\_r: -m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries  
-Wl,-z,muldefs -fuse-ld=gold -xCORE-AVX2 -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  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

549.fotonik3d\_r: basepeak = yes

554.roms\_r: Same as 503.bwaves\_r

Benchmarks using both Fortran and C:

521.wrf\_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -O3 -ipo  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-multiple-gather-scatter-by-shuffles  
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries  
-nostandard-realloc-lhs -align array32byte -auto  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

527.cam4\_r: basepeak = yes

Benchmarks using both C and C++:

511.povray\_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2 -O3 -ipo  
-no-prec-div -qopt-prefetch -ffinite-math-only  
-qopt-multiple-gather-scatter-by-shuffles  
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

526.blender\_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

(Continued on next page)



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**Test Date:** Jun-2020

**Hardware Availability:** Mar-2020

**Software Availability:** Apr-2020

## Peak Optimization Flags (Continued)

507.cactuBSSN\_r: basepeak = yes

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

[http://www.spec.org/cpu2017/flags/Intel-ic19.1ul-official-linux64\\_revA.html](http://www.spec.org/cpu2017/flags/Intel-ic19.1ul-official-linux64_revA.html)

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-J.html>

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

[http://www.spec.org/cpu2017/flags/Intel-ic19.1ul-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic19.1ul-official-linux64_revA.xml)

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-J.xml>

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