



# SPEC® CPU2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR950  
(2.20 GHz, Intel Xeon Platinum 8253)

SPECrate2017\_fp\_base = 690

SPECrate2017\_fp\_peak = Not Run

CPU2017 License: 9017

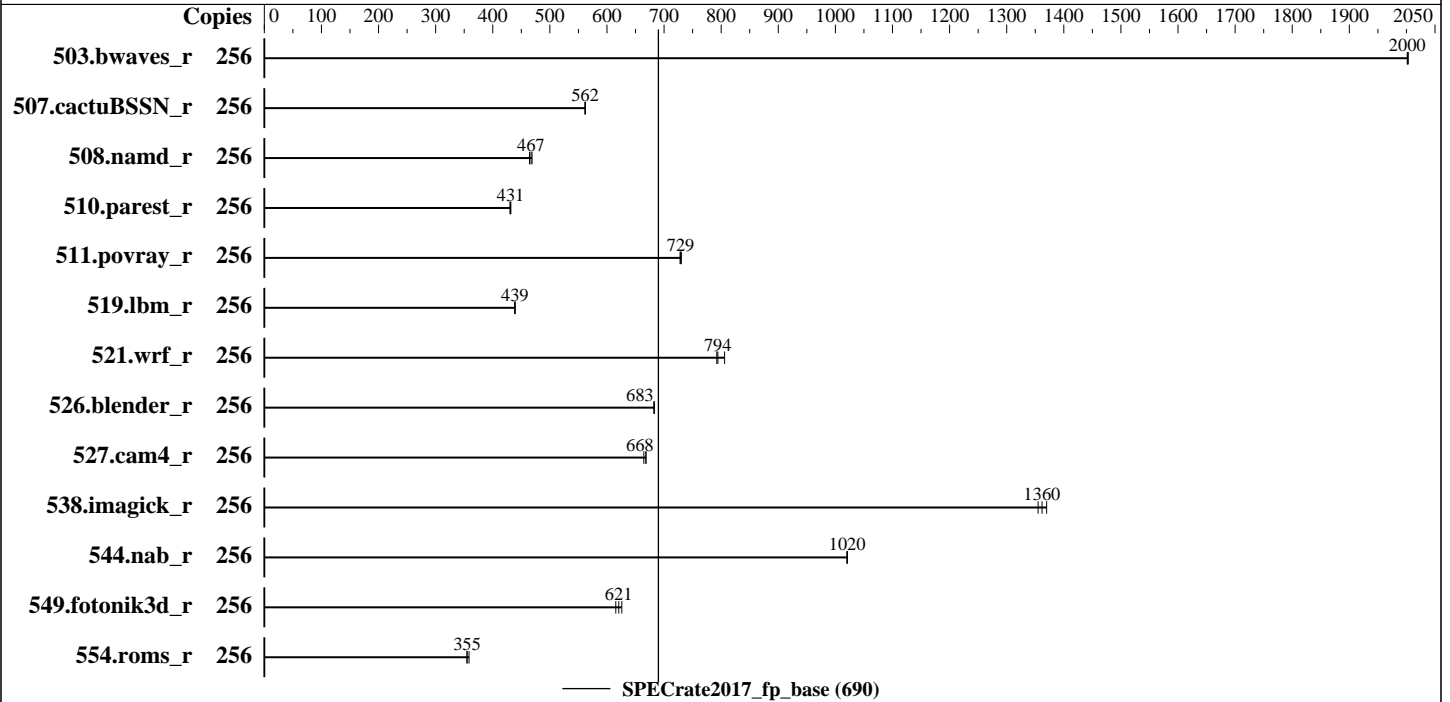
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Apr-2019

Hardware Availability: Apr-2019

Software Availability: Dec-2018



### Hardware

CPU Name: Intel Xeon Platinum 8253  
 Max MHz.: 3000  
 Nominal: 2200  
 Enabled: 128 cores, 8 chips, 2 threads/core  
 Orderable: 2,3,4,6,8 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 22 MB I+D on chip per chip  
 Other: None  
 Memory: 3 TB (96 x 32 GB 2Rx4 PC4-2933Y-R)  
 Storage: 960 GB tmpfs  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 12 SP4 (x86\_64)  
 Kernel 4.12.14-94.41-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: Lenovo BIOS Version PSE121C 1.50 released Jan-2019  
 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	256	1282	2000	1283	2000	<b>1283</b>	<b>2000</b>							
507.cactuBSSN_r	256	<b>577</b>	<b>562</b>	577	561	576	562							
508.namd_r	256	519	469	<b>521</b>	<b>467</b>	524	464							
510.parest_r	256	1552	432	<b>1553</b>	<b>431</b>	1557	430							
511.povray_r	256	819	730	821	728	<b>820</b>	<b>729</b>							
519.lbm_r	256	<b>615</b>	<b>439</b>	615	439	615	439							
521.wrf_r	256	<b>722</b>	<b>794</b>	724	792	711	806							
526.blender_r	256	571	683	<b>571</b>	<b>683</b>	571	682							
527.cam4_r	256	670	668	674	665	<b>670</b>	<b>668</b>							
538.imagick_r	256	465	1370	470	1350	<b>467</b>	<b>1360</b>							
544.nab_r	256	<b>422</b>	<b>1020</b>	422	1020	422	1020							
549.fotonik3d_r	256	<b>1607</b>	<b>621</b>	1621	615	1594	626							
554.roms_r	256	<b>1145</b>	<b>355</b>	1147	355	1135	358							

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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"
Tmpfs filesystem can be set with:
mount -t tmpfs -o size=960g tmpfs /home
Process tuning setting:
echo 50000 > /proc/sys/kernel/sched_cfs_bandwidth_slice_us
echo 240000000 > /proc/sys/kernel/sched_latency_ns
echo 5000000 > /proc/sys/kernel/sched_migration_cost_ns
echo 100000000 > /proc/sys/kernel/sched_min_granularity_ns
echo 150000000 > /proc/sys/kernel/sched_wakeup_granularity_ns
```

## General Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH = "/home/cpu2017-1.0.5-ic19/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM memory using Redhat Enterprise Linux 7.5

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## General Notes (Continued)

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.
- 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.

## Platform Notes

BIOS configuration:  
Choose Operating Mode set to Maximum Performance  
Choose Operating Mode set to Custom Mode  
MONITOR/MWAIT set to Enable  
SNC set to Enable  
Patrol Scrub set to Disable  
Stale AtoS set to Enable  
LLC dead line alloc set to Disable  
Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo  
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9  
running on sles12sp4 Wed Apr 17 08:15:14 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) Platinum 8253 CPU @ 2.20GHz  
8 "physical id"s (chips)  
256 "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 : 16  
siblings : 32  
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
physical 2: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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### Platform Notes (Continued)

```
physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 4: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 5: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 6: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 7: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

From lscpu:

```
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                256
On-line CPU(s) list:  0-255
Thread(s) per core:   2
Core(s) per socket:   16
Socket(s):             8
NUMA node(s):         16
Vendor ID:             GenuineIntel
CPU family:            6
Model:                 85
Model name:            Intel(R) Xeon(R) Platinum 8253 CPU @ 2.20GHz
Stepping:              6
CPU MHz:               2200.000
CPU max MHz:           3000.0000
CPU min MHz:           1000.0000
BogoMIPS:              4400.00
Virtualization:        VT-x
L1d cache:             32K
L1i cache:             32K
L2 cache:              1024K
L3 cache:              22528K
NUMA node0 CPU(s):    0-3,8-11,128-131,136-139
NUMA node1 CPU(s):    4-7,12-15,132-135,140-143
NUMA node2 CPU(s):    16-19,24-27,144-147,152-155
NUMA node3 CPU(s):    20-23,28-31,148-151,156-159
NUMA node4 CPU(s):    32-35,40-43,160-163,168-171
NUMA node5 CPU(s):    36-39,44-47,164-167,172-175
NUMA node6 CPU(s):    48-51,56-59,176-179,184-187
NUMA node7 CPU(s):    52-55,60-63,180-183,188-191
NUMA node8 CPU(s):    64-67,72-75,192-195,200-203
NUMA node9 CPU(s):    68-71,76-79,196-199,204-207
NUMA node10 CPU(s):   80-83,88-91,208-211,216-219
NUMA node11 CPU(s):   84-87,92-95,212-215,220-223
NUMA node12 CPU(s):   96-99,104-107,224-227,232-235
NUMA node13 CPU(s):   100-103,108-111,228-231,236-239
NUMA node14 CPU(s):   112-115,120-123,240-243,248-251
NUMA node15 CPU(s):   116-119,124-127,244-247,252-255
Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov
```

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### Platform Notes (Continued)

```

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 f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb cat_l3 cdp_l3
invpcid_single ssbd mba ibrs ibpb stibp 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 pku ospke avx512_vnni flush_lld arch_capabilities

```

```

/proc/cpuinfo cache data
cache size : 22528 KB

```

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

```

available: 16 nodes (0-15)
node 0 cpus: 0 1 2 3 8 9 10 11 128 129 130 131 136 137 138 139
node 0 size: 193121 MB
node 0 free: 180873 MB
node 1 cpus: 4 5 6 7 12 13 14 15 132 133 134 135 140 141 142 143
node 1 size: 193530 MB
node 1 free: 188104 MB
node 2 cpus: 16 17 18 19 24 25 26 27 144 145 146 147 152 153 154 155
node 2 size: 193530 MB
node 2 free: 193303 MB
node 3 cpus: 20 21 22 23 28 29 30 31 148 149 150 151 156 157 158 159
node 3 size: 193501 MB
node 3 free: 193271 MB
node 4 cpus: 32 33 34 35 40 41 42 43 160 161 162 163 168 169 170 171
node 4 size: 193530 MB
node 4 free: 193366 MB
node 5 cpus: 36 37 38 39 44 45 46 47 164 165 166 167 172 173 174 175
node 5 size: 193530 MB
node 5 free: 193381 MB
node 6 cpus: 48 49 50 51 56 57 58 59 176 177 178 179 184 185 186 187
node 6 size: 193530 MB
node 6 free: 193305 MB
node 7 cpus: 52 53 54 55 60 61 62 63 180 181 182 183 188 189 190 191
node 7 size: 193530 MB
node 7 free: 193294 MB
node 8 cpus: 64 65 66 67 72 73 74 75 192 193 194 195 200 201 202 203
node 8 size: 193530 MB
node 8 free: 193309 MB
node 9 cpus: 68 69 70 71 76 77 78 79 196 197 198 199 204 205 206 207
node 9 size: 193530 MB
node 9 free: 193335 MB

```

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### Platform Notes (Continued)

```

node 10 cpus: 80 81 82 83 88 89 90 91 208 209 210 211 216 217 218 219
node 10 size: 193530 MB
node 10 free: 193360 MB
node 11 cpus: 84 85 86 87 92 93 94 95 212 213 214 215 220 221 222 223
node 11 size: 193530 MB
node 11 free: 193353 MB
node 12 cpus: 96 97 98 99 104 105 106 107 224 225 226 227 232 233 234 235
node 12 size: 193530 MB
node 12 free: 193365 MB
node 13 cpus: 100 101 102 103 108 109 110 111 228 229 230 231 236 237 238 239
node 13 size: 193530 MB
node 13 free: 193373 MB
node 14 cpus: 112 113 114 115 120 121 122 123 240 241 242 243 248 249 250 251
node 14 size: 193530 MB
node 14 free: 193358 MB
node 15 cpus: 116 117 118 119 124 125 126 127 244 245 246 247 252 253 254 255
node 15 size: 193527 MB
node 15 free: 193241 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
 0:  10  11  21  21  31  31  21  21  21  21  31  31  31  31  31  31
 1:  11  10  21  21  31  31  21  21  21  21  31  31  31  31  31  31
 2:  21  21  10  11  21  21  31  31  31  31  21  21  31  31  31  31
 3:  21  21  11  10  21  21  31  31  31  31  21  21  31  31  31  31
 4:  31  31  21  21  10  11  21  21  31  31  31  31  21  21  31  31
 5:  31  31  21  21  11  10  21  21  31  31  31  31  21  21  31  31
 6:  21  21  31  31  21  21  10  11  31  31  31  31  31  31  21  21
 7:  21  21  31  31  21  21  11  10  31  31  31  31  31  31  21  21
 8:  21  21  31  31  31  31  31  31  10  11  21  21  21  21  31  31
 9:  21  21  31  31  31  31  31  31  11  10  21  21  21  21  31  31
10:  31  31  21  21  31  31  31  31  21  21  10  11  31  31  21  21
11:  31  31  21  21  31  31  31  31  21  21  11  10  31  31  21  21
12:  31  31  31  31  21  21  31  31  21  21  31  31  10  11  21  21
13:  31  31  31  31  21  21  31  31  21  21  31  31  11  10  21  21
14:  31  31  31  31  31  31  21  21  31  31  21  21  21  21  10  11
15:  31  31  31  31  31  31  21  21  31  31  21  21  21  21  11  10

```

```

From /proc/meminfo
MemTotal:      3170354252 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 4

```

(Continued on next page)



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## Platform Notes (Continued)

# 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-SP4"
VERSION_ID="12.4"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"
```

uname -a:

```
Linux sles12sp4 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901)
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: Indirect Branch Restricted Speculation,
IBPB, IBRS_FW
```

run-level 3 Apr 17 08:11

SPEC is set to: /home/cpu2017-1.0.5-ic19

```
Filesystem Type Size Used Avail Use% Mounted on
tmpfs tmpfs 960G 11G 950G 2% /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 Lenovo -[PSE121C-1.50]- 01/16/2019

Memory:

96x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(End of data from sysinfo program)

## Compiler Version Notes

=====  
CC 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)

=====  
CXXC 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.

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

=====  
FC 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.  
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) 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.

=====  
FC 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.

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

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

Fortran benchmarks:

```
-xCORE-AVX2 -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-AVX2 -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-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 -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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.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/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-A.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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