



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

## Lenovo Global Technology

SPECrate®2017\_fp\_base = 526

ThinkSystem SR850P  
(2.40 GHz, Intel Xeon Platinum 8260L)

SPECrate®2017\_fp\_peak = Not Run

CPU2017 License: 9017

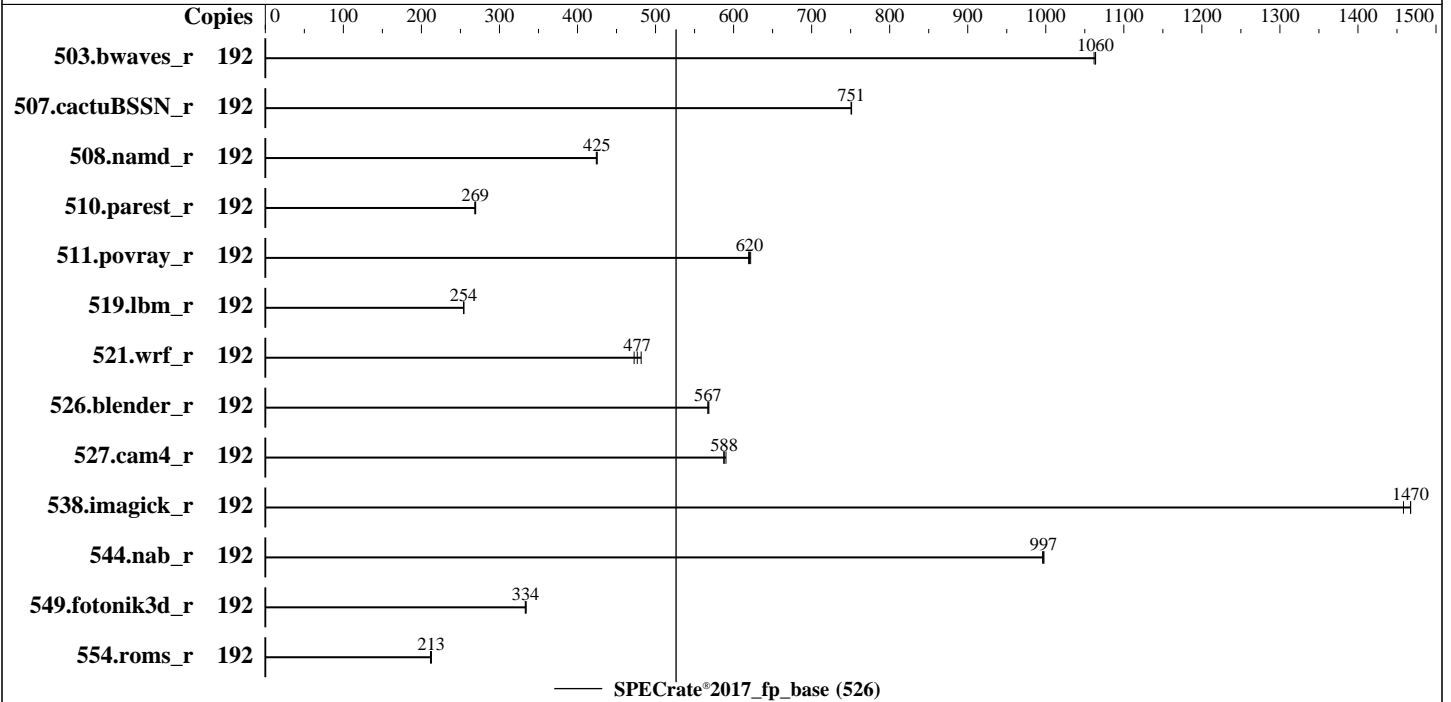
Test Date: Jan-2021

Test Sponsor: Lenovo Global Technology

Hardware Availability: Jan-2020

Tested by: Lenovo Global Technology

Software Availability: Aug-2020



### Hardware

CPU Name: Intel Xeon Platinum 8260L  
 Max MHz: 3900  
 Nominal: 2400  
 Enabled: 96 cores, 4 chips, 2 threads/core  
 Orderable: 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 960 GB SATA SSD  
 Other: None

### Software

OS: Red Hat Enterprise Linux 8.0 (Ootpa)  
 Kernel 4.18.0-80.el8.x86\_64  
 Compiler: C/C++: Version 19.1.2.275 of Intel C/C++ Compiler for Linux;  
 Fortran: Version 19.1.2.275 of Intel Fortran Compiler for Linux  
 Parallel: No  
 Firmware: Lenovo BIOS Version TEE156L 2.61 released May-2020  
 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  
 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	192	1813	1060	1810	1060	<b>1810</b>	<b>1060</b>							
507.cactuBSSN_r	192	<b>324</b>	<b>751</b>	324	751	324	751							
508.namd_r	192	430	424	<b>429</b>	<b>425</b>	429	425							
510.parest_r	192	1871	268	<b>1867</b>	<b>269</b>	1863	270							
511.povray_r	192	<b>723</b>	<b>620</b>	721	622	724	619							
519.lbm_r	192	796	254	<b>796</b>	<b>254</b>	796	254							
521.wrf_r	192	910	473	<b>902</b>	<b>477</b>	893	482							
526.blender_r	192	516	567	514	568	<b>515</b>	<b>567</b>							
527.cam4_r	192	<b>571</b>	<b>588</b>	572	587	569	590							
538.imagick_r	192	<b>325</b>	<b>1470</b>	325	1470	327	1460							
544.nab_r	192	<b>324</b>	<b>997</b>	324	996	324	997							
549.fotonik3d_r	192	2247	333	2239	334	<b>2243</b>	<b>334</b>							
554.roms_r	192	1442	212	<b>1435</b>	<b>213</b>	1434	213							

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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"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH =  
"/home/cpu2017-1.1.0-ic19.lu2/lib/intel64:/home/cpu2017-1.1.0-ic19.lu2/j  
e5.0.1-64"  
MALLOC\_CONF = "retain:true"

## General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM  
memory using Redhat Enterprise Linux 8.0  
Transparent Huge Pages enabled by default

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### General Notes (Continued)

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) 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:

Choose Operating Mode set to Maximum Performance and then set it to Custom Mode

MONITOR/MWAIT set to Enable

CPU P-state Control set to Cooperative

SNC set to Enable

Sysinfo program /home/cpu2017-1.1.0-ic19.lu2/bin/sysinfo  
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011  
running on localhost.localdomain Sat Jan 2 18:36:23 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) Platinum 8260L CPU @ 2.40GHz

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 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

physical 1: 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

physical 2: 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

physical 3: 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

From lscpu:

Architecture: x86\_64

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### Platform Notes (Continued)

```

CPU op-mode(s):      32-bit, 64-bit
Byte Order:          Little Endian
CPU(s):              192
On-line CPU(s) list: 0-191
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) Platinum 8260L CPU @ 2.40GHz
Stepping:            6
CPU MHz:             1276.894
CPU max MHz:         3900.0000
CPU min MHz:         1000.0000
BogoMIPS:            4800.00
Virtualization:      VT-x
L1d cache:           32K
L1i cache:           32K
L2 cache:            1024K
L3 cache:            36608K
NUMA node0 CPU(s):  0-3,7-9,13-15,19,20,96-99,103-105,109-111,115,116
NUMA node1 CPU(s):  4-6,10-12,16-18,21-23,100-102,106-108,112-114,117-119
NUMA node2 CPU(s):  24-27,31-33,37-39,43,44,120-123,127-129,133-135,139,140
NUMA node3 CPU(s):  28-30,34-36,40-42,45-47,124-126,130-132,136-138,141-143
NUMA node4 CPU(s):  48-51,55-57,61-63,67,68,144-147,151-153,157-159,163,164
NUMA node5 CPU(s):  52-54,58-60,64-66,69-71,148-150,154-156,160-162,165-167
NUMA node6 CPU(s):  72-75,79,80,84-86,90-92,168-171,175,176,180-182,186-188
NUMA node7 CPU(s):  76-78,81-83,87-89,93-95,172-174,177-179,183-185,189-191
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
aperfperf 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

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### Platform Notes (Continued)

physical chip.

available: 8 nodes (0-7)

node 0 cpus: 0 1 2 3 7 8 9 13 14 15 19 20 96 97 98 99 103 104 105 109 110 111 115 116

node 0 size: 193147 MB

node 0 free: 192891 MB

node 1 cpus: 4 5 6 10 11 12 16 17 18 21 22 23 100 101 102 106 107 108 112 113 114 117 118 119

node 1 size: 193506 MB

node 1 free: 193265 MB

node 2 cpus: 24 25 26 27 31 32 33 37 38 39 43 44 120 121 122 123 127 128 129 133 134 135 139 140

node 2 size: 193531 MB

node 2 free: 193305 MB

node 3 cpus: 28 29 30 34 35 36 40 41 42 45 46 47 124 125 126 130 131 132 136 137 138 141 142 143

node 3 size: 193531 MB

node 3 free: 193321 MB

node 4 cpus: 48 49 50 51 55 56 57 61 62 63 67 68 144 145 146 147 151 152 153 157 158 159 163 164

node 4 size: 193531 MB

node 4 free: 193260 MB

node 5 cpus: 52 53 54 58 59 60 64 65 66 69 70 71 148 149 150 154 155 156 160 161 162 165 166 167

node 5 size: 193531 MB

node 5 free: 193235 MB

node 6 cpus: 72 73 74 75 79 80 84 85 86 90 91 92 168 169 170 171 175 176 180 181 182 186 187 188

node 6 size: 193531 MB

node 6 free: 192452 MB

node 7 cpus: 76 77 78 81 82 83 87 88 89 93 94 95 172 173 174 177 178 179 183 184 185 189 190 191

node 7 size: 193528 MB

node 7 free: 193250 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: 1584986420 kB

HugePages\_Total: 0

(Continued on next page)



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### Platform Notes (Continued)

Hugepagesize: 2048 kB

From /etc/\*release\* /etc/\*version\*

```
os-release:
  NAME="Red Hat Enterprise Linux"
  VERSION="8.0 (Ootpa)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="8.0"
  PLATFORM_ID="platform:el8"
  PRETTY_NAME="Red Hat Enterprise Linux 8.0 (Ootpa)"
  ANSI_COLOR="0;31"
```

```
redhat-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.0:ga
```

uname -a:

```
Linux localhost.localdomain 4.18.0-80.el8.x86_64 #1 SMP Wed Mar 13 12:02:46 UTC 2019
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 Jan 2 18:34

SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   839G   65G  774G   8% /home
```

From /sys/devices/virtual/dmi/id

```
BIOS:      Lenovo  -[TEE156L-2.61]- 05/20/2020
Vendor:    Lenovo
Product:   ThinkSystem SR850P  -[7D2HCT01WW]-
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

(Continued on next page)



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### Platform Notes (Continued)

frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933

(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 Compiler for applications running on Intel(R) 64, Version  
19.1.2.275 Build 20200604  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

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

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version  
19.1.2.275 Build 20200604  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

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

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version  
19.1.2.275 Build 20200604  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) C Compiler for applications running on Intel(R) 64, Version  
19.1.2.275 Build 20200604  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----

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

Intel(R) C++ Compiler for applications running on Intel(R) 64, Version  
19.1.2.275 Build 20200604  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) C Compiler for applications running on Intel(R) 64, Version  
19.1.2.275 Build 20200604  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)  
64, Version 19.1.2.275 Build 20200623  
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## Compiler Version Notes (Continued)

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 for applications running on Intel(R)  
64, Version 19.1.2.275 Build 20200623

Copyright (C) 1985-2020 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 19.1.2.275 Build 20200623

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

Intel(R) C Compiler for applications running on Intel(R) 64, Version  
19.1.2.275 Build 20200604

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





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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:

```

-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -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 -xCORE-AVX512 -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
-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
-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
-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
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib

```

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

-ljemalloc

Benchmarks using both C and C++:

```
-m64 -qnextgen -std=c11  
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs  
-xCORE-AVX512 -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  
-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  
-nostandard-realloc-lhs -align array32byte -auto  
-mbranches-within-32B-boundaries -L/usr/local/jemalloc64-5.0.1/lib  
-ljemalloc
```

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-CLX-I.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-CLX-I.xml>

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