



# SPEC® CPU2017 Integer Rate Result

Copyright 2017-2018 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SR950  
(3.60 GHz, Intel Xeon Platinum 8156)

SPECrate2017\_int\_base = 221

SPECrate2017\_int\_peak = 234

CPU2017 License: 9017

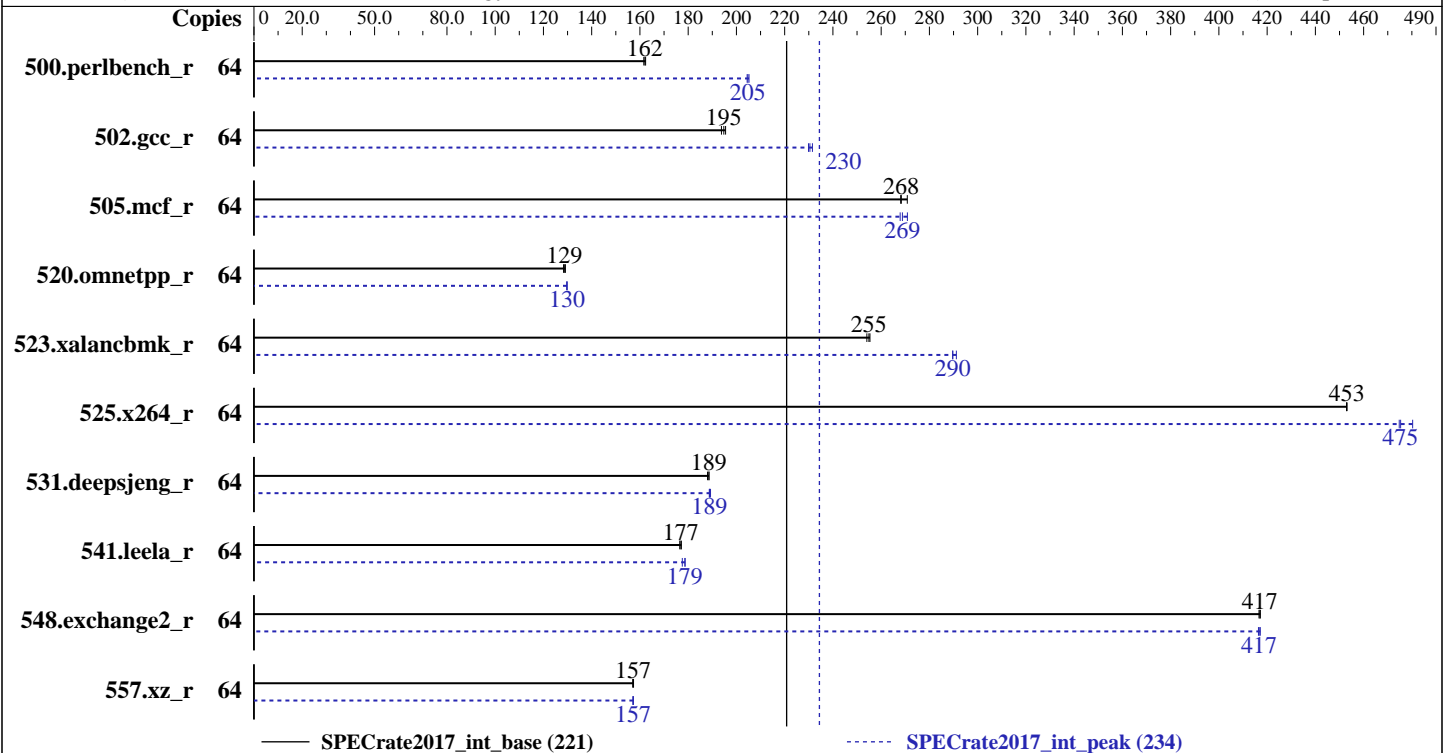
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jan-2018

Hardware Availability: Sep-2017

Software Availability: Sep-2017



### Hardware

CPU Name: Intel Xeon Platinum 8156  
 Max MHz.: 3700  
 Nominal: 3600  
 Enabled: 32 cores, 8 chips, 2 threads/core  
 Orderable: 2,4,8 chips  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 1 MB I+D on chip per core  
 L3: 16.5 MB I+D on chip per chip  
 Other: None  
 Memory: 3 TB (96 x 32 GB 2Rx4 PC4-2666V-R)  
 Storage: 800 GB tmpfs  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 12 SP2 (x86\_64)  
 Kernel 4.4.21-69-default  
 Compiler: C/C++: Version 18.0.0.128 of Intel C/C++  
 Compiler for Linux;  
 Fortran: Version 18.0.0.128 of Intel Fortran  
 Compiler for Linux  
 Parallel: No  
 Firmware: Lenovo BIOS Version PSE105X 1.00 released Aug-2017  
 File System: tmpfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit  
 Other: jemalloc: jemalloc memory allocator library  
 V5.0.1



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## Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	64	630	162	<b><u>629</u></b>	<b><u>162</u></b>	628	162	64	496	205	498	204	<b><u>498</u></b>	<b><u>205</u></b>
502.gcc_r	64	468	194	464	196	<b><u>465</u></b>	<b><u>195</u></b>	64	394	230	<b><u>393</u></b>	<b><u>230</u></b>	391	232
505.mcf_r	64	382	271	<b><u>385</u></b>	<b><u>268</u></b>	386	268	64	<b><u>385</u></b>	<b><u>269</u></b>	386	268	382	271
520.omnetpp_r	64	654	128	650	129	<b><u>652</u></b>	<b><u>129</u></b>	64	647	130	<b><u>647</u></b>	<b><u>130</u></b>	647	130
523.xalancbmk_r	64	265	255	<b><u>265</u></b>	<b><u>255</u></b>	266	254	64	232	291	<b><u>233</u></b>	<b><u>290</u></b>	233	290
525.x264_r	64	247	453	247	453	<b><u>247</u></b>	<b><u>453</u></b>	64	236	475	<b><u>236</u></b>	<b><u>475</u></b>	233	480
531.deepsjeng_r	64	390	188	389	189	<b><u>389</u></b>	<b><u>189</u></b>	64	<b><u>388</u></b>	<b><u>189</u></b>	389	189	388	189
541.leela_r	64	600	176	598	177	<b><u>599</u></b>	<b><u>177</u></b>	64	593	179	<b><u>593</u></b>	<b><u>179</u></b>	597	178
548.exchange2_r	64	402	417	<b><u>402</u></b>	<b><u>417</u></b>	402	417	64	402	417	<b><u>402</u></b>	<b><u>417</u></b>	403	416
557.xz_r	64	<b><u>440</u></b>	<b><u>157</u></b>	440	157	439	157	64	440	157	439	157	<b><u>440</u></b>	<b><u>157</u></b>

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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=800g 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/cpu2017.1.0.2.ic18.0/lib/ia32:/home/cpu2017.1.0.2.ic18.0/lib/intel64"  
LD\_LIBRARY\_PATH = "\$LD\_LIBRARY\_PATH:/home/cpu2017.1.0.2.ic18.0/je5.0.1-32:/home/cpu2017.1.0.2.ic18.0/je5.0.1-64"  
Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM  
memory using Redhat Enterprise Linux 7.4  
Transparent Huge Pages enabled by default  
Prior to runcpu invocation  
Filesystem page cache synced and cleared with:

(Continued on next page)



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## General Notes (Continued)

```
sync; echo 3> /proc/sys/vm/drop_caches
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
jemalloc: configured and built at default for
32bit (i686) and 64bit (x86_64) targets;
jemalloc: built with the RedHat Enterprise 7.4,
and the system compiler gcc 4.8.5;
jemalloc: sources available from jemalloc.net or
https://github.com/jemalloc/jemalloc/releases
No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
No: 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.
No: 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.
This benchmark result is intended to provide perspective on
past performance using the historical hardware and/or
software described on this result page.
The system as described on this result page was formerly
generally available. At the time of this publication, it may
not be shipping, and/or may not be supported, and/or may fail
to meet other tests of General Availability described in the
SPEC OSG Policy document, http://www.spec.org/osg/policy.html
This measured result may not be representative of the result
that would be measured were this benchmark run with hardware
and software available as of the publication date.
```

## Platform Notes

BIOS configuration:  
Choose Operating Mode set to Maximum Performance  
SNC set to Enable  
DCU Streamer Prefetcher set to Disable  
MONITORM/WAIT set to Enable  
Execute Disable Bit set to Disable  
Trusted Execution Technology set to Enable  
Per Core Pstate set to Disable  
XPT Prefetcher set to Enable  
Stale AtoS set to Enable  
LLC Deadline Alloc set to Enable  
Sysinfo program /home/cpu2017.1.0.2.ic18.0/bin/sysinfo  
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f  
running on linux-boxi Mon Jan 15 17:49:08 2018

SUT (System Under Test) info as seen by some common utilities.  
For more information on this section, see

(Continued on next page)



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### Platform Notes (Continued)

<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

model name : Intel(R) Xeon(R) Platinum 8156 CPU @ 3.60GHz

8 "physical id"s (chips)

64 "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 : 8

physical 0: cores 1 5 9 13

physical 1: cores 1 2 5 11

physical 2: cores 1 5 9 13

physical 3: cores 1 2 5 11

physical 4: cores 1 2 5 11

physical 5: cores 2 3 4 9

physical 6: cores 1 5 9 13

physical 7: cores 1 5 9 13

From lscpu:

Architecture: x86\_64

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

Byte Order: Little Endian

CPU(s): 64

On-line CPU(s) list: 0-63

Thread(s) per core: 2

Core(s) per socket: 4

Socket(s): 8

NUMA node(s): 16

Vendor ID: GenuineIntel

CPU family: 6

Model: 85

Model name: Intel(R) Xeon(R) Platinum 8156 CPU @ 3.60GHz

Stepping: 4

CPU MHz: 3591.576

BogoMIPS: 7183.15

Virtualization: VT-x

L1d cache: 32K

L1i cache: 32K

L2 cache: 1024K

L3 cache: 16896K

NUMA node0 CPU(s): 0,2,32,34

NUMA node1 CPU(s): 1,3,33,35

NUMA node2 CPU(s): 4,5,36,37

NUMA node3 CPU(s): 6,7,38,39

NUMA node4 CPU(s): 8,10,40,42

NUMA node5 CPU(s): 9,11,41,43

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### Platform Notes (Continued)

```

NUMA node6 CPU(s):      12,13,44,45
NUMA node7 CPU(s):      14,15,46,47
NUMA node8 CPU(s):      16,17,48,49
NUMA node9 CPU(s):      18,19,50,51
NUMA node10 CPU(s):     20,23,52,55
NUMA node11 CPU(s):     21,22,53,54
NUMA node12 CPU(s):     24,26,56,58
NUMA node13 CPU(s):     25,27,57,59
NUMA node14 CPU(s):     28,30,60,62
NUMA node15 CPU(s):     29,31,61,63

```

```

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
aperfperf eagerfpu 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 ida arat epb pln pts dtherm intel_pt
tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt clwb avx512cd
avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc

```

```

/proc/cpuinfo cache data
cache size : 16896 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 2 32 34
node 0 size: 192984 MB
node 0 free: 192502 MB
node 1 cpus: 1 3 33 35
node 1 size: 193528 MB
node 1 free: 193046 MB
node 2 cpus: 4 5 36 37
node 2 size: 193528 MB
node 2 free: 193076 MB
node 3 cpus: 6 7 38 39
node 3 size: 193528 MB
node 3 free: 193067 MB
node 4 cpus: 8 10 40 42
node 4 size: 193528 MB
node 4 free: 193082 MB
node 5 cpus: 9 11 41 43
node 5 size: 193528 MB
node 5 free: 187968 MB
node 6 cpus: 12 13 44 45
node 6 size: 193528 MB
node 6 free: 193061 MB

```

(Continued on next page)



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### Platform Notes (Continued)

```

node 7 cpus: 14 15 46 47
node 7 size: 193528 MB
node 7 free: 186747 MB
node 8 cpus: 16 17 48 49
node 8 size: 193528 MB
node 8 free: 193078 MB
node 9 cpus: 18 19 50 51
node 9 size: 193528 MB
node 9 free: 193082 MB
node 10 cpus: 20 23 52 55
node 10 size: 193528 MB
node 10 free: 193060 MB
node 11 cpus: 21 22 53 54
node 11 size: 193528 MB
node 11 free: 190928 MB
node 12 cpus: 24 26 56 58
node 12 size: 193528 MB
node 12 free: 193085 MB
node 13 cpus: 25 27 57 59
node 13 size: 193528 MB
node 13 free: 193049 MB
node 14 cpus: 28 30 60 62
node 14 size: 193528 MB
node 14 free: 193087 MB
node 15 cpus: 29 31 61 63
node 15 size: 193523 MB
node 15 free: 193073 MB

```

node distances:

node	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0:	10	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
1:	20	10	20	20	20	20	20	20	20	20	20	20	20	20	20	20
2:	20	20	10	20	20	20	20	20	20	20	20	20	20	20	20	20
3:	20	20	20	10	20	20	20	20	20	20	20	20	20	20	20	20
4:	20	20	20	20	10	20	20	20	20	20	20	20	20	20	20	20
5:	20	20	20	20	20	10	20	20	20	20	20	20	20	20	20	20
6:	20	20	20	20	20	20	10	20	20	20	20	20	20	20	20	20
7:	20	20	20	20	20	20	20	10	20	20	20	20	20	20	20	20
8:	20	20	20	20	20	20	20	20	10	20	20	20	20	20	20	20
9:	20	20	20	20	20	20	20	20	20	10	20	20	20	20	20	20
10:	20	20	20	20	20	20	20	20	20	20	10	20	20	20	20	20
11:	20	20	20	20	20	20	20	20	20	20	20	10	20	20	20	20
12:	20	20	20	20	20	20	20	20	20	20	20	20	10	20	20	20
13:	20	20	20	20	20	20	20	20	20	20	20	20	20	10	20	20
14:	20	20	20	20	20	20	20	20	20	20	20	20	20	20	10	20
15:	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	10

From /proc/meminfo

(Continued on next page)



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### Platform Notes (Continued)

MemTotal: 3170207908 kB  
HugePages\_Total: 0  
Hugepagesize: 2048 kB

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

SuSE-release:

SUSE Linux Enterprise Server 12 (x86\_64)  
VERSION = 12  
PATCHLEVEL = 2

# 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-SP2"  
VERSION\_ID="12.2"  
PRETTY\_NAME="SUSE Linux Enterprise Server 12 SP2"  
ID="sles"  
ANSI\_COLOR="0;32"  
CPE\_NAME="cpe:/o:suse:sles:12:sp2"

uname -a:

Linux linux-boxi 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016 (9464f67)  
x86\_64 x86\_64 x86\_64 GNU/Linux

run-level 3 Jan 15 17:43

SPEC is set to: /home/cpu2017.1.1.0.2.ic18.0

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
tmpfs	tmpfs	800G	11G	790G	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 -[PSE105X-1.00]- 08/17/2017

Memory:

96x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666

(End of data from sysinfo program)

### Compiler Version Notes

=====  
CC 500.perlbench\_r(base) 502.gcc\_r(base) 505.mcf\_r(base, peak)  
525.x264\_r(base, peak) 557.xz\_r(base, peak)  
=====

(Continued on next page)



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## Compiler Version Notes (Continued)

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CC 500.perlbench\_r(peak) 502.gcc\_r(peak)

icc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CXXC 520.omnetpp\_r(base) 523.xalanbmk\_r(base) 531.deepsjeng\_r(base)  
541.leela\_r(base)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
CXXC 520.omnetpp\_r(peak) 523.xalanbmk\_r(peak) 531.deepsjeng\_r(peak)  
541.leela\_r(peak)

icpc (ICC) 18.0.0 20170811

Copyright (C) 1985-2017 Intel Corporation. All rights reserved.

=====  
FC 548.exchange2\_r(base, peak)

ifort (IFORT) 18.0.0 20170811

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## Base Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort





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## Base Portability Flags

```
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502 gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

## Base Optimization Flags

C benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

C++ benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib -ljemalloc
```

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

## Base Other Flags

C benchmarks:

```
-m64 -std=c11
```

C++ benchmarks:

```
-m64
```

Fortran benchmarks:

```
-m64
```



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## Peak Compiler Invocation

C benchmarks:

icc

C++ benchmarks:

icpc

Fortran benchmarks:

ifort

## Peak Portability Flags

```
500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -D_FILE_OFFSET_BITS=64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -D_FILE_OFFSET_BITS=64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64
```

## Peak Optimization Flags

C benchmarks:

```
500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-fno-strict-overflow -L/usr/local/je5.0.1-64/lib
-ljemalloc
```

```
502.gcc_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3
-L/usr/local/je5.0.1-32/lib -ljemalloc
```

```
505.mcf_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -L/usr/local/je5.0.1-64/lib
-ljemalloc
```

```
525.x264_r: -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=3 -fno-alias
```

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## Peak Optimization Flags (Continued)

525.x264\_r (continued):

```
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

557.xz\_r: Same as 505.mcf\_r

C++ benchmarks:

```
520.omnetpp_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

```
523.xalancbmk_r: -L/opt/intel/compilers_and_libraries_2018/linux/lib/ia32  
-Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo  
-xCORE-AVX512 -O3 -no-prec-div -qopt-mem-layout-trans=3  
-L/usr/local/je5.0.1-32/lib -ljemalloc
```

531.deepsjeng\_r: Same as 520.omnetpp\_r

541.leela\_r: Same as 520.omnetpp\_r

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div  
-qopt-mem-layout-trans=3 -nostandard-realloc-lhs -align array32byte  
-L/usr/local/je5.0.1-64/lib -ljemalloc
```

## Peak Other Flags

C benchmarks (except as noted below):

```
-m64 -std=c11
```

502.gcc\_r: -m32 -std=c11

C++ benchmarks (except as noted below):

```
-m64
```

523.xalancbmk\_r: -m32

Fortran benchmarks:

```
-m64
```

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.html>

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



# SPEC CPU2017 Integer Rate Result

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**Lenovo Global Technology**

ThinkSystem SR950  
(3.60 GHz, Intel Xeon Platinum 8156)

SPECrate2017\_int\_base = 221

SPECrate2017\_int\_peak = 234

**CPU2017 License:** 9017

**Test Sponsor:** Lenovo Global Technology

**Tested by:** Lenovo Global Technology

**Test Date:** Jan-2018

**Hardware Availability:** Sep-2017

**Software Availability:** Sep-2017

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

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.xml>

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

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