



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

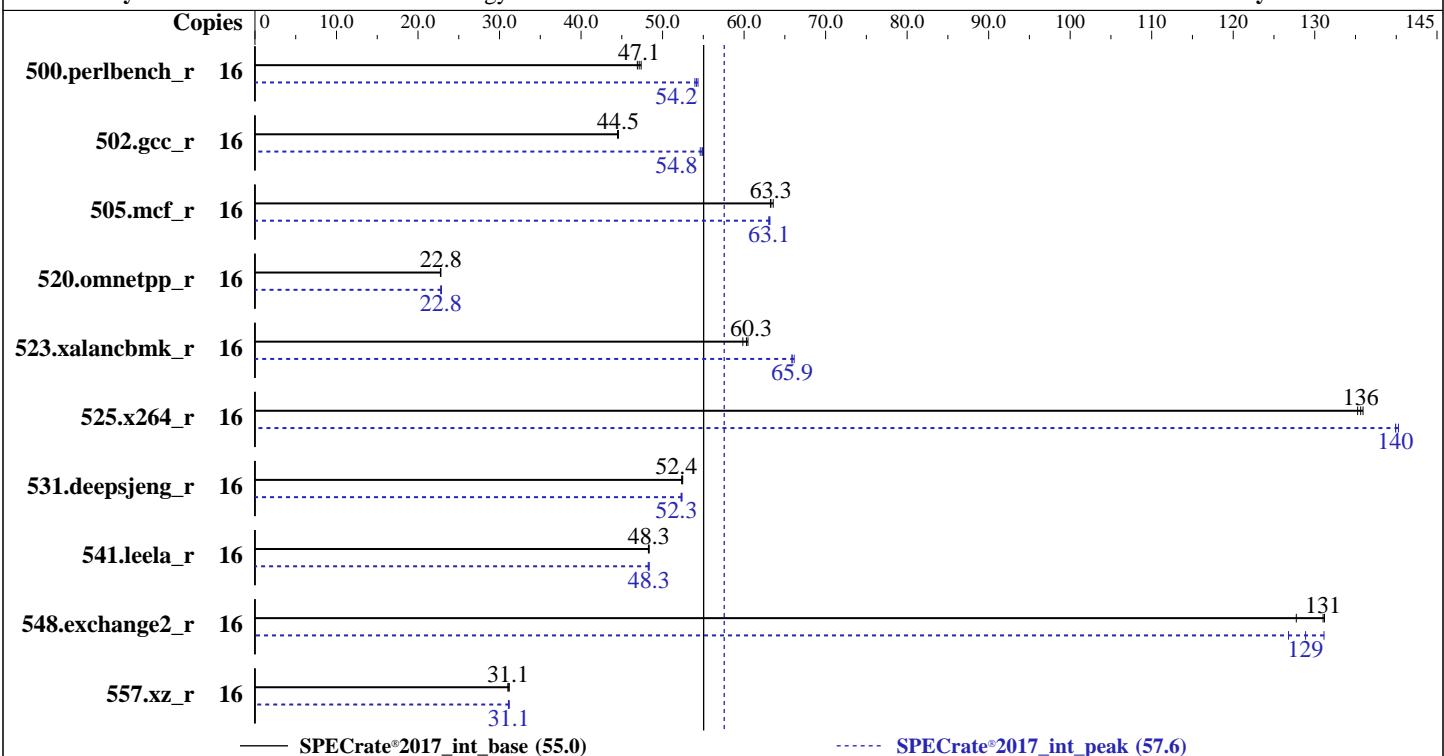
Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019



Hardware		Software	
CPU Name:	Intel Xeon E-2288G	OS:	SUSE Linux Enterprise Server 15 SP1 (x86_64)
Max MHz:	5000		Kernel 4.12.14-195-default
Nominal:	3700	Compiler:	C/C++: Version 19.0.4.227 of Intel
Enabled:	8 cores, 1 chip, 2 threads/core		C/C++ Compiler for Linux;
Orderable:	1 chip		Fortran: Version 19.0.4.227 of
Cache L1:	32 KB I + 32 KB D on chip per core		Intel Fortran
L2:	256 KB I+D on chip per core		Compiler for Linux
L3:	16 MB I+D on chip per chip	Parallel:	No
Other:	None	Firmware:	Lenovo BIOS Version ISE113H 2.00 released Dec-2019
Memory:	64 GB (2 x 32 GB 2Rx8 PC4-2666V-E)	File System:	xfs
Storage:	1 x 480 GB SATA SSD	System State:	Run level 3 (multi-user)
Other:	None	Base Pointers:	64-bit
		Peak Pointers:	32/64-bit
		Other:	jemalloc memory allocator V5.0.1
		Power Management:	BIOS set to prefer performance at the cost of additional power usage



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	16	538	47.4	540	47.1	543	46.9	16	469	54.4	472	54.0	470	54.2
502.gcc_r	16	508	44.6	509	44.5	509	44.5	16	413	54.8	413	54.9	415	54.6
505.mcf_r	16	409	63.3	409	63.2	407	63.6	16	410	63.1	409	63.2	410	63.0
520.omnetpp_r	16	921	22.8	921	22.8	923	22.8	16	921	22.8	920	22.8	917	22.9
523.xalancbmk_r	16	279	60.5	280	60.3	282	59.8	16	255	66.1	256	65.9	256	65.9
525.x264_r	16	206	136	207	136	207	135	16	200	140	200	140	200	140
531.deepsjeng_r	16	350	52.4	349	52.5	350	52.3	16	351	52.3	351	52.3	350	52.4
541.leela_r	16	548	48.3	549	48.3	548	48.3	16	549	48.2	548	48.3	548	48.4
548.exchange2_r	16	328	128	320	131	320	131	16	320	131	325	129	331	127
557.xz_r	16	554	31.2	557	31.1	557	31.1	16	556	31.1	554	31.2	555	31.1

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

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

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-ic19.0u4/lib/intel64:/home/cpu2017-1.1.0-ic19.0u4/1
ib/ia32:/home/cpu2017-1.1.0-ic19.0u4/je5.0.1-32"
```

General Notes

Binaries compiled on a system with 1x Intel Core i9-7900X 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.

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

General Notes (Continued)

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-ic19.0u4/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
running on linux-jecn Wed Jan  8 18:44:17 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-2288G CPU @ 3.70GHz
  1 "physical id"s (chips)
  16 "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   : 16
  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
Address sizes:         39 bits physical, 48 bits virtual
CPU(s):                16
On-line CPU(s) list:  0-15
Thread(s) per core:   2
Core(s) per socket:   8
Socket(s):             1
NUMA node(s):          1
```

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

Platform Notes (Continued)

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
L1d cache: 32K
L1i cache: 32K
L2 cache: 256K
L3 cache: 16384K
NUMA node0 CPU(s): 0-15
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 aperfmpf perf 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 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 md_clear flush_l1d 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 8 9 10 11 12 13 14 15
node 0 size: 64352 MB
node 0 free: 63832 MB
node distances:
node 0
0: 10

From /proc/meminfo
MemTotal: 65896496 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
NAME="SLES"

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

Platform Notes (Continued)

```
VERSION="15-SP1"
VERSION_ID="15.1"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP1"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp1"
```

uname -a:

```
Linux linux-jecn 4.12.14-195-default #1 SMP Tue May 7 10:55:11 UTC 2019 (8fba516)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2018-3620 (L1 Terminal Fault):	Not affected
Microarchitectural Data Sampling:	Not affected
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 8 18:42

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u4

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/sda2	xfs	446G	27G	419G	6%	/

From /sys/devices/virtual/dmi/id

```
BIOS: Lenovo -[ISE113H-2.00]- 12/27/2019
Vendor: Lenovo
Product: ThinkSystem SR250 -[7Y51CTO0WW]-
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:

```
2x Not Specified Not Specified
2x SK Hynix HMAA4GU7AJR8N-VK 32767 MB 2 rank 2666
```

(End of data from sysinfo program)



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

Compiler Version Notes

=====

C | 502.gcc_r(peak)

=====

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====

C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base, peak)

=====

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 | 502.gcc_r(peak)

=====

Intel(R) C Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====

C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base, peak)

=====

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++ | 523.xalancbmk_r(peak)

=====

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====

C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

=====

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

Compiler Version Notes (Continued)

Version 19.0.4.227 Build 20190416

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====

C++ | 523.xalancbmk_r(peak)

=====

Intel(R) C++ Intel(R) 64 Compiler for applications running on IA-32, Version
19.0.4.227 Build 20190416

Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====

C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
| 531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

=====

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.

=====

Fortran | 548.exchange2_r(base, peak)

=====

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.

Base Compiler Invocation

C benchmarks:

icc -m64 -std=c11

C++ benchmarks:

icpc -m64

Fortran benchmarks:

ifort -m64

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

Base Portability Flags (Continued)

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-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

C++ benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

Fortran benchmarks:

```
-Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

Peak Compiler Invocation

C benchmarks (except as noted below):

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

502.gcc_r: icc -m32 -std=c11 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin

C++ benchmarks (except as noted below):

```
icpc -m64
```

523.xalancbmk_r: icpc -m32 -L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/ia32_lin

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

Peak Compiler Invocation (Continued)

Fortran benchmarks:

ifort -m64

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-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-fno-strict-overflow
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

502.gcc_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-L/usr/local/je5.0.1-32/lib -ljemalloc

505.mcf_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

525.x264_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -fno-alias
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc

557.xz_r: Same as 505.mcf_r

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2020 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR250
(3.70 GHz, Intel Xeon E-2288G)

SPECrate®2017_int_base = 55.0

SPECrate®2017_int_peak = 57.6

CPU2017 License: 9017

Test Date: Jan-2020

Test Sponsor: Lenovo Global Technology

Hardware Availability: Mar-2020

Tested by: Lenovo Global Technology

Software Availability: Jun-2019

Peak Optimization Flags (Continued)

C++ benchmarks:

```
520.omnetpp_r: -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

```
523.xalancbmk_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2) -ipo
-xCORE-AVX2 -O3 -no-prec-div -qopt-mem-layout-trans=4
-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-AVX2 -ipo -O3 -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0ul-official-linux64.2019-07-09.html>
<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-I.html>

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

<http://www.spec.org/cpu2017/flags/Intel-ic19.0ul-official-linux64.2019-07-09.xml>
<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-SKL-I.xml>

SPEC CPU and SPECrate are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.0 on 2020-01-08 05:44:17-0500.

Report generated on 2020-02-11 10:03:27 by CPU2017 PDF formatter v6255.

Originally published on 2020-02-11.