SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

$SPECrate^{®}2017_int_base = $ **369**

ThinkSystem SR860
(2.30 GHz, Intel Xeon Gold 5218B)

$SPECrate^{®}2017_int_peak = $ Not Run

CPU2017 License: 9017	**Test Date:** Nov-2019
Test Sponsor: Lenovo Global Technology	**Hardware Availability:** Apr-2019
Tested by: Lenovo Global Technology	**Software Availability:** May-2019

Copies scale: 0 30.0 70.0 100 130 160 190 220 250 280 310 340 370 400 430 460 490 520 550 580 610 640 670 700 740

Benchmark	Copies	Result
500.perlbench_r	128	282
502.gcc_r	128	296
505.mcf_r	128	501
520.omnetpp_r	128	252
523.xalancbmk_r	128	426
525.x264_r	128	686
531.deepsjeng_r	128	304
541.leela_r	128	276
548.exchange2_r	128	731
557.xz_r	128	246

SPECrate®2017_int_base (369)

Hardware

CPU Name: Intel Xeon Gold 5218B
 Max MHz: 3900
 Nominal: 2300
Enabled: 64 cores, 4 chips, 2 threads/core
Orderable: 2,4 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: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R, running at 2666)
Storage: 800 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 19.0.4.227 of Intel C/C++
 Compiler for Linux;
 Fortran: Version 19.0.4.227 of Intel Fortran
 Compiler for Linux
Parallel: No
Firmware: Lenovo BIOS Version TEE142E 2.30 released Aug-2019 tested as TEE141E 2.30 Jul-2019
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: Disable

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CPU2017 License: 9017
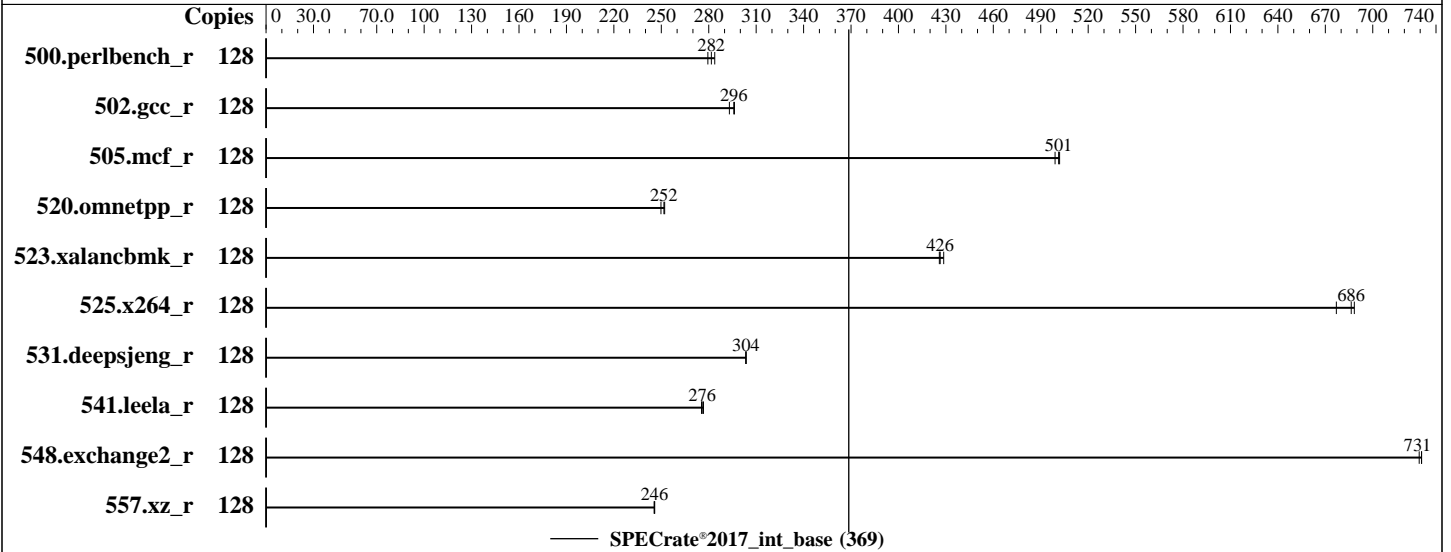**Test Sponsor:** Lenovo Global Technology
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Test Date: Nov-2019
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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	128	**723**	**282**	729	279	718	284							
502.gcc_r	128	618	293	**613**	**296**	612	296							
505.mcf_r	128	412	502	**413**	**501**	414	499							
520.omnetpp_r	128	**667**	**252**	666	252	672	250							
523.xalancbmk_r	128	315	429	317	426	**317**	**426**							
525.x264_r	128	326	688	**327**	**686**	331	677							
531.deepsjeng_r	128	483	304	483	303	**483**	**304**							
541.leela_r	128	**768**	**276**	770	275	766	277							
548.exchange2_r	128	460	729	459	731	**459**	**731**							
557.xz_r	128	562	246	563	245	**563**	**246**							
SPECrate®2017_int_base =	**369**													
SPECrate®2017_int_peak =	**Not Run**													

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
```

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

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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Software Availability: May-2019

General Notes

```
 Binaries compiled on a system with 1x Intel Core i9-799X 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
 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.
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
DCU Streamer Prefetcher set to Disable
SNC set to Enable

 Sysinfo program /home/cpu2017-1.1.0-ic19.0u4/bin/sysinfo
 Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
 running on linux-6lsv Sat Nov  9 16:22:37 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) Gold 5218 CPU @ 2.30GHz
       4  "physical id"s (chips)
       128 "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
       physical 3: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
```

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Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	Apr-2019
Tested by:	Lenovo Global Technology	**Software Availability:**	May-2019

Platform Notes (Continued)

```
From lscpu:
     Architecture:          x86_64
     CPU op-mode(s):        32-bit, 64-bit
     Byte Order:            Little Endian
     CPU(s):                128
     On-line CPU(s) list:   0-127
     Thread(s) per core:    2
     Core(s) per socket:    16
     Socket(s):             4
     NUMA node(s):          8
     Vendor ID:             GenuineIntel
     CPU family:            6
     Model:                 85
     Model name:            Intel(R) Xeon(R) Gold 5218 CPU @ 2.30GHz
     Stepping:              6
     CPU MHz:               2300.000
     CPU max MHz:           3900.0000
     CPU min MHz:           1000.0000
     BogoMIPS:              4600.00
     Virtualization:        VT-x
     L1d cache:             32K
     L1i cache:             32K
     L2 cache:              1024K
     L3 cache:              22528K
     NUMA node0 CPU(s):     0-3,8-11,64-67,72-75
     NUMA node1 CPU(s):     4-7,12-15,68-71,76-79
     NUMA node2 CPU(s):     16-19,24-27,80-83,88-91
     NUMA node3 CPU(s):     20-23,28-31,84-87,92-95
     NUMA node4 CPU(s):     32-35,40-43,96-99,104-107
     NUMA node5 CPU(s):     36-39,44-47,100-103,108-111
     NUMA node6 CPU(s):     48-51,56-59,112-115,120-123
     NUMA node7 CPU(s):     52-55,60-63,116-119,124-127
     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
     aperfmperf pni pclmulqdq dtes64 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
     intel_ppin 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_l1d arch_capabilities

/proc/cpuinfo cache data
   cache size : 22528 KB
```

(Continued on next page)

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Software Availability: May-2019

Platform Notes (Continued)

```
From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
physical chip.
  available: 8 nodes (0-7)
  node 0 cpus: 0 1 2 3 8 9 10 11 64 65 66 67 72 73 74 75
  node 0 size: 193135 MB
  node 0 free: 190865 MB
  node 1 cpus: 4 5 6 7 12 13 14 15 68 69 70 71 76 77 78 79
  node 1 size: 193527 MB
  node 1 free: 182494 MB
  node 2 cpus: 16 17 18 19 24 25 26 27 80 81 82 83 88 89 90 91
  node 2 size: 193527 MB
  node 2 free: 193349 MB
  node 3 cpus: 20 21 22 23 28 29 30 31 84 85 86 87 92 93 94 95
  node 3 size: 193527 MB
  node 3 free: 193357 MB
  node 4 cpus: 32 33 34 35 40 41 42 43 96 97 98 99 104 105 106 107
  node 4 size: 193527 MB
  node 4 free: 193325 MB
  node 5 cpus: 36 37 38 39 44 45 46 47 100 101 102 103 108 109 110 111
  node 5 size: 193498 MB
  node 5 free: 193270 MB
  node 6 cpus: 48 49 50 51 56 57 58 59 112 113 114 115 120 121 122 123
  node 6 size: 193527 MB
  node 6 free: 193347 MB
  node 7 cpus: 52 53 54 55 60 61 62 63 116 117 118 119 124 125 126 127
  node 7 size: 193525 MB
  node 7 free: 193340 MB
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  11  21  21  21  21  31  31
    1:  11  10  21  21  21  21  31  31
    2:  21  21  10  11  31  31  21  21
    3:  21  21  11  10  31  31  21  21
    4:  21  21  31  31  10  11  21  21
    5:  21  21  31  31  11  10  21  21
    6:  31  31  21  21  21  21  10  11
    7:  31  31  21  21  21  21  11  10

From /proc/meminfo
   MemTotal:       1584945232 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
```

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Platform Notes (Continued)

```
     VERSION = 12
     PATCHLEVEL = 4
     # 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 linux-6lsv 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-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: Indirect Branch Restricted
                                          Speculation, IBPB, IBRS_FW


run-level 3 Nov 9 16:18

SPEC is set to: /home/cpu2017-1.1.0-ic19.0u4
   Filesystem      Type    Size  Used Avail Use% Mounted on
   tmpfs           tmpfs   800G  8.3G  792G   2% /home

From /sys/devices/virtual/dmi/id
   BIOS:    Lenovo -[TEE141E-2.30]- 07/02/2019
   Vendor:  Lenovo
   Product: ThinkSystem SR860 -[7X7025Z000]-
   Product Family: ThinkSystem
   Serial:  none


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:
     48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933, configured at 2666
```

(Continued on next page)

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Platform Notes (Continued)

```
  (End of data from sysinfo program)
The marketing name for the processor in this result, which appears in the CPU name and hardware
model areas, is different from sysinfo because a pre-production processor was used. The
pre-production processor differs from the production processor in name only.
```

Compiler Version Notes

```
==============================================================================
C        | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base)
         | 525.x264_r(base) 557.xz_r(base)
------------------------------------------------------------------------------
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++      | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
         | 541.leela_r(base)
------------------------------------------------------------------------------
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)
------------------------------------------------------------------------------
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`

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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=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.4.227/linux/compiler/lib/intel64
-lqkmalloc
```

C++ benchmarks:
```
-Wl,-z,muldefs -xCORE-AVX512 -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-AVX512 -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-ic19.0u1-official-linux64.2019-07-09.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.0u1-official-linux64.2019-07-09.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-F.xml

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

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