# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Lenovo Global Technology

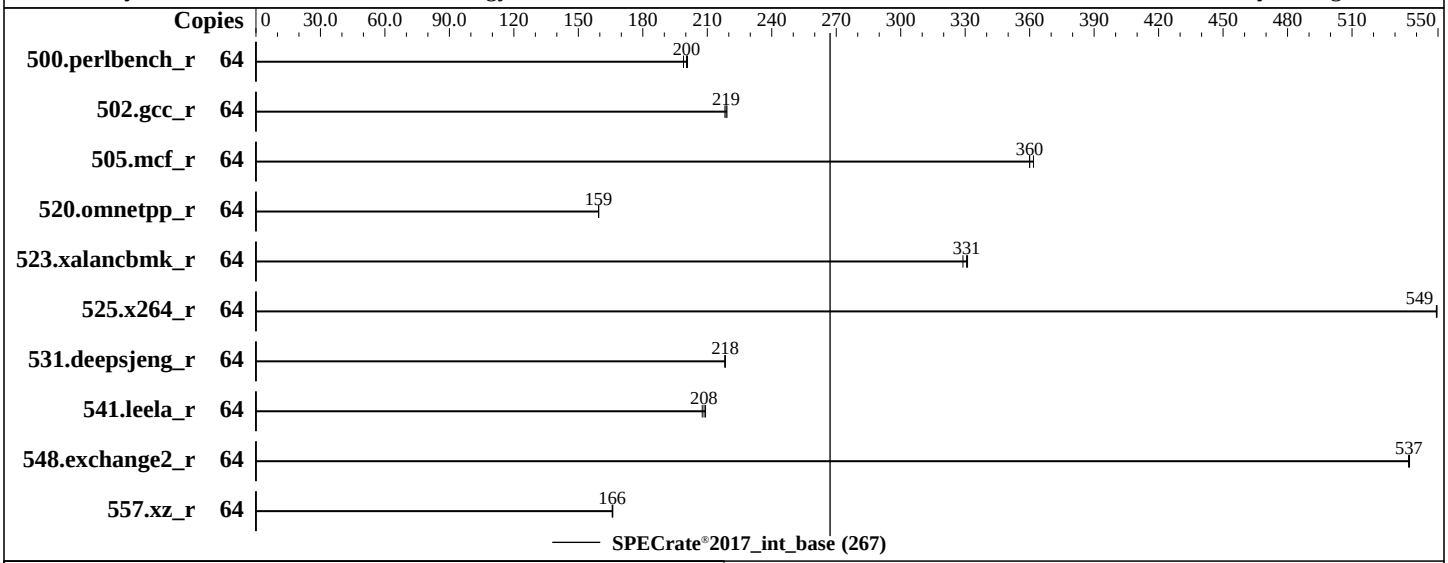
ThinkSystem SN850
(3.60 GHz, Intel Xeon Gold 6244)

SPECrate®2017_int_base = 267

SPECrate®2017_int_peak = Not Run

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

**Test Date:** Oct-2019
**Hardware Availability:** Apr-2019
**Software Availability:** Aug-2019




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Gold 6244 |
| Max MHz: | 4400 |
| Nominal: | 3600 |
| Enabled: | 32 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: | 24.75 MB I+D on chip per chip |
| Other: | None |
| Memory: | 768 GB (48 x 16 GB 2Rx8 PC4-2933Y-R) |
| Storage: | 800 GB tmpfs |
| Other: | None |

### Software

| | |
|---|---|
| OS: | SUSE Linux Enterprise Server 12 SP4 (x86_64)<br>Kernel 4.12.14-94.41-default |
| Compiler: | C/C++: Version 19.0.4.227 of Intel C/C++<br>Compiler for Linux;<br>Fortran: Version 19.0.4.227 of<br>Intel Fortran<br>Compiler for Linux |
| Parallel: | No |
| Firmware: | Lenovo BIOS Version IVE142E 2.30 released Aug-2019<br>tested as IVE141E 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 |

# SPEC CPU®2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SN850
(3.60 GHz, Intel Xeon Gold 6244)

SPECrate®2017_int_base = 267

SPECrate®2017_int_peak = Not Run

**CPU2017 License:** 9017
**Test Sponsor:** Lenovo Global Technology
**Tested by:** Lenovo Global Technology

**Test Date:** Oct-2019
**Hardware Availability:** Apr-2019
**Software Availability:** Aug-2019

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 500.perlbench_r | 64 | 512 | 199 | **509** | **200** | 507 | 201 | | | | | | | |
| 502.gcc_r | 64 | **414** | **219** | 415 | 218 | 414 | 219 | | | | | | | |
| 505.mcf_r | 64 | 286 | 362 | **287** | **360** | 287 | 360 | | | | | | | |
| 520.omnetpp_r | 64 | 526 | 159 | 527 | 159 | **527** | **159** | | | | | | | |
| 523.xalancbmk_r | 64 | **204** | **331** | 205 | 329 | 204 | 331 | | | | | | | |
| 525.x264_r | 64 | **204** | **549** | 204 | 550 | 204 | 549 | | | | | | | |
| 531.deepsjeng_r | 64 | 336 | 218 | 336 | 218 | **336** | **218** | | | | | | | |
| 541.leela_r | 64 | 510 | 208 | 507 | 209 | **508** | **208** | | | | | | | |
| 548.exchange2_r | 64 | 312 | 537 | 313 | 536 | **313** | **537** | | | | | | | |
| 557.xz_r | 64 | 417 | 166 | **417** | **166** | 416 | 166 | | | | | | | |

**SPECrate®2017_int_base = 267**

**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
 echo 0 > /proc/sys/kernel/numa_balancing
```

## 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"
```

## 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
Trusted Execution Technology set to Enable
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-uwth Fri Oct 25 21:59:52 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 6244 CPU @ 3.60GHz
       4  "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 : 8
       siblings  : 16
       physical 0: cores 4 8 17 18 19 24 25 27
       physical 1: cores 2 3 4 8 17 20 24 26
       physical 2: cores 2 4 9 20 24 25 26 27
       physical 3: cores 2 3 17 18 19 20 24 25
```

**(Continued on next page)**

## Platform Notes (Continued)

```
 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:    8
      Socket(s):             4
      NUMA node(s):          8
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Gold 6244 CPU @ 3.60GHz
      Stepping:              6
      CPU MHz:               3600.000
      CPU max MHz:           4400.0000
      CPU min MHz:           1200.0000
      BogoMIPS:              7200.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              25344K
      NUMA node0 CPU(s):     0,2,5,6,33,34,37,38
      NUMA node1 CPU(s):     1,3,4,7,32,35,36,39
      NUMA node2 CPU(s):     8,11,12,14,40,43,44,46
      NUMA node3 CPU(s):     9,10,13,15,41,42,45,47
      NUMA node4 CPU(s):     16,18,20,21,48,50,52,53
      NUMA node5 CPU(s):     17,19,22,23,49,51,54,55
      NUMA node6 CPU(s):     24,26,30,31,56,58,62,63
      NUMA node7 CPU(s):     25,27-29,57,59-61
      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 : 25344 KB
```

**(Continued on next page)**

## 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 2 5 6 33 34 37 38
  node 0 size: 96369 MB
  node 0 free: 95048 MB
  node 1 cpus: 1 3 4 7 32 35 36 39
  node 1 size: 96761 MB
  node 1 free: 92415 MB
  node 2 cpus: 8 11 12 14 40 43 44 46
  node 2 size: 96732 MB
  node 2 free: 96586 MB
  node 3 cpus: 9 10 13 15 41 42 45 47
  node 3 size: 96761 MB
  node 3 free: 96564 MB
  node 4 cpus: 16 18 20 21 48 50 52 53
  node 4 size: 96761 MB
  node 4 free: 96598 MB
  node 5 cpus: 17 19 22 23 49 51 54 55
  node 5 size: 96761 MB
  node 5 free: 96463 MB
  node 6 cpus: 24 26 30 31 56 58 62 63
  node 6 size: 96761 MB
  node 6 free: 96507 MB
  node 7 cpus: 25 27 28 29 57 59 60 61
  node 7 size: 96758 MB
  node 7 free: 89265 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:       792234332 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

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

(Continued on next page)

## 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-uwth 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 Oct 25 21:58

  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 -[IVE141E-2.30]- 07/02/2019
      Vendor:  Lenovo
      Product: Lenovo ThinkSystem SN850  -[7X15NVz000]-
      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:
      48x Samsung M393A2K43CB2-CVF 16 GB 2 rank 2933
```

**(Continued on next page)**

## Platform Notes (Continued)

```
 (End of data from sysinfo program)
```

## 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
```

## 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

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 2019-10-25 09:59:51-0400.
Report generated on 2019-11-12 14:58:23 by CPU2017 PS formatter v6255.
Originally published on 2019-11-12.