SPEC® CPU2017 Integer Rate Result

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Lenovo Global Technology

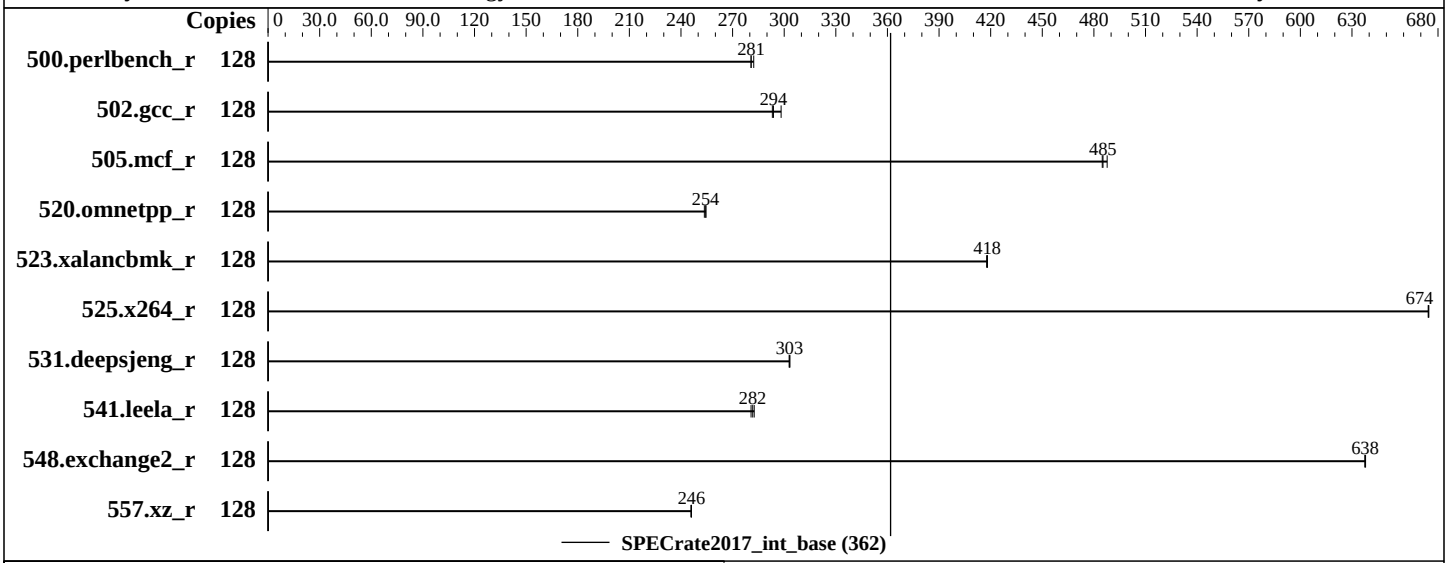
ThinkSystem SR950
(2.30 GHz, Intel Xeon Gold 5218)

SPECrate2017_int_base = 362

SPECrate2017_int_peak = Not Run

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

Test Date: May-2019
Hardware Availability: Apr-2019
Software Availability: Nov-2018



Hardware

CPU Name:	Intel Xeon Gold 5218
Max MHz.:	3900
Nominal:	2300
Enabled:	64 cores, 4 chips, 2 threads/core
Orderable:	2,3,4 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:	768 GB (48 x 16 GB 2Rx8 PC4-2666V-R)
Storage:	1 x 800 GB SATA SSD
Other:	None

Software

OS:	SUSE Linux Enterprise Server 15 (x86_64) Kernel 4.12.14-25.13-default
Compiler:	C/C++: Version 19.0.1.144 of Intel C/C++ Compiler Build 20181018 for Linux; Fortran: Version 19.0.1.144 of Intel Fortran Compiler Build 20181018 for Linux
Parallel:	No
Firmware:	Lenovo BIOS Version PSE122N 1.50 released May-2019 tested as PSE121I 1.50 Mar-2019
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	None

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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	726	281	**726**	**281**	722	282							
502.gcc_r	128	608	298	**617**	**294**	618	293							
505.mcf_r	128	424	488	427	485	**426**	**485**							
520.omnetpp_r	128	660	255	662	254	**660**	**254**							
523.xalancbmk_r	128	323	418	**323**	**418**	324	418							
525.x264_r	128	332	674	**332**	**674**	332	675							
531.deepsjeng_r	128	**484**	**303**	484	303	484	303							
541.leela_r	128	750	283	**752**	**282**	755	281							
548.exchange2_r	128	**526**	**638**	526	638	526	638							
557.xz_r	128	562	246	**562**	**246**	563	246							

SPECrate2017_int_base = 362

SPECrate2017_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"
```

General Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u1/lib/intel64"

 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
 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)
```

(Continued on next page)

General Notes (Continued)

```
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
Choose Operating Mode set to Custom Mode
DCU Streamer Prefetcher set to Disable
MONITOR/MWAIT set to Enable
SNC set to Enable
 Sysinfo program /home/cpu2017-1.0.5-ic19.0u1/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on linux-u1b8 Fri May 31 09:59:15 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

 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
```

(Continued on next page)

Platform Notes (Continued)

```
      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 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 cpuid_fault epb cat_l3 cdp_l3
      invpcid_single 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

  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: 96332 MB
    node 0 free: 96042 MB
    node 1 cpus: 4 5 6 7 12 13 14 15 68 69 70 71 76 77 78 79
    node 1 size: 96757 MB
    node 1 free: 93582 MB
    node 2 cpus: 16 17 18 19 24 25 26 27 80 81 82 83 88 89 90 91
    node 2 size: 96757 MB
```

(Continued on next page)

Platform Notes (Continued)

```
   node 2 free: 96327 MB
   node 3 cpus: 20 21 22 23 28 29 30 31 84 85 86 87 92 93 94 95
   node 3 size: 96757 MB
   node 3 free: 96574 MB
   node 4 cpus: 32 33 34 35 40 41 42 43 96 97 98 99 104 105 106 107
   node 4 size: 96757 MB
   node 4 free: 96598 MB
   node 5 cpus: 36 37 38 39 44 45 46 47 100 101 102 103 108 109 110 111
   node 5 size: 96757 MB
   node 5 free: 96587 MB
   node 6 cpus: 48 49 50 51 56 57 58 59 112 113 114 115 120 121 122 123
   node 6 size: 96757 MB
   node 6 free: 96583 MB
   node 7 cpus: 52 53 54 55 60 61 62 63 116 117 118 119 124 125 126 127
   node 7 size: 96754 MB
   node 7 free: 96591 MB
   node distances:
   node   0   1   2   3   4   5   6   7
     0:  10  11  31  31  21  21  21  21
     1:  11  10  31  31  21  21  21  21
     2:  31  31  10  11  21  21  21  21
     3:  31  31  11  10  21  21  21  21
     4:  21  21  21  21  10  11  31  31
     5:  21  21  21  21  11  10  31  31
     6:  21  21  21  21  31  31  10  11
     7:  21  21  21  21  31  31  11  10

 From /proc/meminfo
    MemTotal:       792199468 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

 From /etc/*release* /etc/*version*
    os-release:
       NAME="SLES"
       VERSION="15"
       VERSION_ID="15"
       PRETTY_NAME="SUSE Linux Enterprise Server 15"
       ID="sles"
       ID_LIKE="suse"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:15"

 uname -a:
    Linux linux-u1b8 4.12.14-25.13-default #1 SMP Tue Aug 14 15:07:35 UTC 2018 (947aa51)
    x86_64 x86_64 x86_64 GNU/Linux
```


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Platform Notes (Continued)

```
 Kernel self-reported vulnerability status:

 CVE-2017-5754 (Meltdown):          Not affected
 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 May 31 09:54

 SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda2      xfs   744G   23G  722G   3% /

 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 -[PSE121I-1.50]- 03/01/2019
   Memory:
    48x NO DIMM NO DIMM
    48x Samsung M393A2K43BB1-CTD 16 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) 525.x264_r(base)
      557.xz_r(base)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 CXXC 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 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
 FC  548.exchange2_r(base)
```

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Compiler Version Notes (Continued)

```
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 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_2019.1.144/linux/compiler/lib/intel64`
`-lqkmalloc`

C++ benchmarks:
`-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`
`-qopt-mem-layout-trans=4`

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Base Optimization Flags (Continued)

C++ benchmarks (continued):
-L/usr/local/IntelCompiler19/compilers_and_libraries_2019.1.144/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_2019.1.144/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-ic18.0-official-linux64.2019-04-02.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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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