SPEC CPU®2017 Integer Rate Result

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Lenovo Global Technology

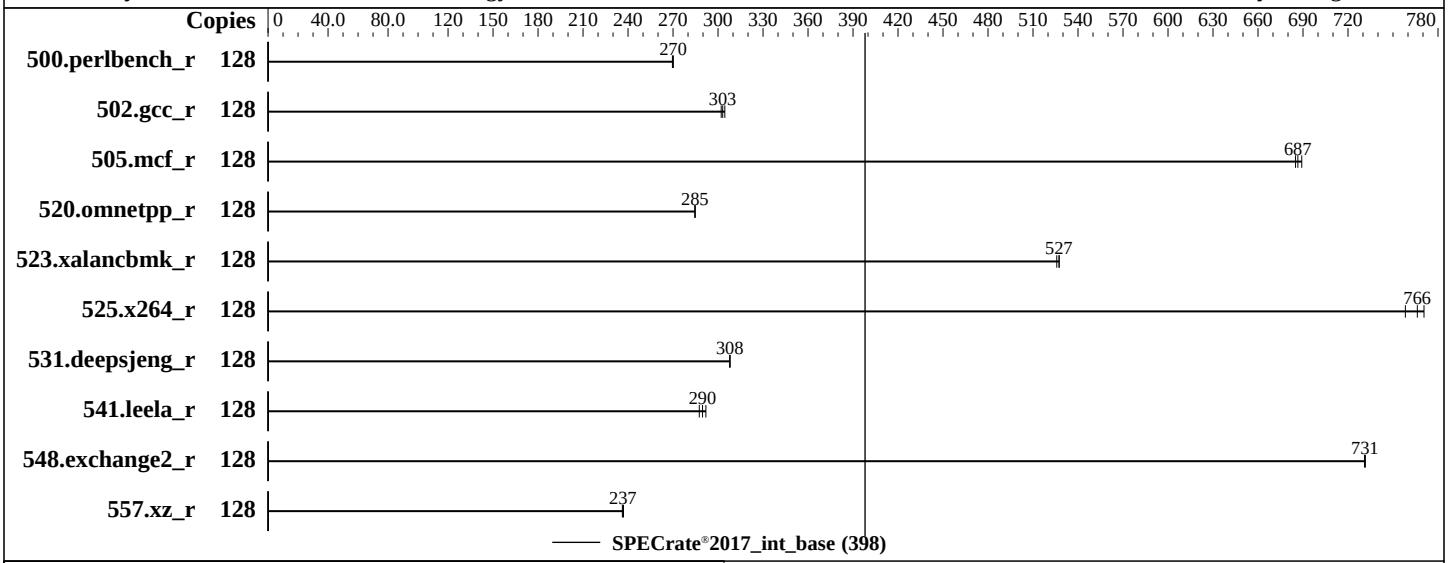
ThinkSystem SR850P
(2.30 GHz, Intel Xeon Gold 5218B)

SPECrate®2017_int_base = 398

SPECrate®2017_int_peak = Not Run

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

Test Date: Dec-2020
Hardware Availability: Jun-2020
Software Availability: Aug-2020



Hardware

CPU Name:	Intel Xeon Gold 5218B
Max MHz:	3900
Nominal:	2300
Enabled:	64 cores, 4 chips, 2 threads/core
Orderable:	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:	1 x 960 GB SATA SSD
Other:	None

Software

OS:	Red Hat Enterprise Linux 8.0 (Ootpa) Kernel 4.18.0-80.el8.x86_64
Compiler:	C/C++: Version 19.1.2.275 of Intel C/C++ Compiler for Linux; Fortran: Version 19.1.2.275 of Intel Fortran Compiler for Linux
Parallel:	No
Firmware:	Lenovo BIOS Version TEE156L 2.61 released May-2020
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	None
Power Management:	BIOS set to prefer performance at the cost of additional power usage

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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	754	270	**755**	**270**	756	270							
502.gcc_r	128	600	302	**598**	**303**	595	305							
505.mcf_r	128	**301**	**687**	300	689	302	685							
520.omnetpp_r	128	590	285	**590**	**285**	590	285							
523.xalancbmk_r	128	257	526	256	527	**256**	**527**							
525.x264_r	128	296	758	**293**	**766**	291	771							
531.deepsjeng_r	128	477	308	476	308	**476**	**308**							
541.leela_r	128	737	288	726	292	**732**	**290**							
548.exchange2_r	128	459	731	458	732	**459**	**731**							
557.xz_r	128	**584**	**237**	585	236	583	237							

SPECrate®2017_int_base = 398

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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
     "/home/cpu2017-1.1.0-ic19.1u2/lib/intel64:/home/cpu2017-1.1.0-ic19.1u2/l
     ib/ia32:/home/cpu2017-1.1.0-ic19.1u2/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM
memory using Redhat Enterprise Linux 8.0
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
```

(Continued on next page)

General Notes (Continued)

```
 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.
```

Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enable
CPU P-state Control set to Legacy
Adjacent Cache Prefetch set to Disable
DCU Streamer Prefetcher set to Disable
SNC set to Enable

 Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo
 Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
 running on localhost.localdomain Fri Dec 18 01:25:53 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) 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
```

(Continued on next page)

Platform Notes (Continued)

```
      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:             3224.602
      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 intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced 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: 193125 MB
```

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Platform Notes (Continued)

```
   node 0 free: 192868 MB
   node 1 cpus: 4 5 6 7 12 13 14 15 68 69 70 71 76 77 78 79
   node 1 size: 193532 MB
   node 1 free: 193276 MB
   node 2 cpus: 16 17 18 19 24 25 26 27 80 81 82 83 88 89 90 91
   node 2 size: 193532 MB
   node 2 free: 193346 MB
   node 3 cpus: 20 21 22 23 28 29 30 31 84 85 86 87 92 93 94 95
   node 3 size: 193532 MB
   node 3 free: 193271 MB
   node 4 cpus: 32 33 34 35 40 41 42 43 96 97 98 99 104 105 106 107
   node 4 size: 193532 MB
   node 4 free: 193322 MB
   node 5 cpus: 36 37 38 39 44 45 46 47 100 101 102 103 108 109 110 111
   node 5 size: 193532 MB
   node 5 free: 193343 MB
   node 6 cpus: 48 49 50 51 56 57 58 59 112 113 114 115 120 121 122 123
   node 6 size: 193532 MB
   node 6 free: 193316 MB
   node 7 cpus: 52 53 54 55 60 61 62 63 116 117 118 119 124 125 126 127
   node 7 size: 193532 MB
   node 7 free: 192520 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:       1585001804 kB
     HugePages_Total:       0
     Hugepagesize:       2048 kB

  From /etc/*release* /etc/*version*
     os-release:
        NAME="Red Hat Enterprise Linux"
        VERSION="8.0 (Ootpa)"
        ID="rhel"
        ID_LIKE="fedora"
        VERSION_ID="8.0"
        PLATFORM_ID="platform:el8"
        PRETTY_NAME="Red Hat Enterprise Linux 8.0 (Ootpa)"
```

(Continued on next page)

Platform Notes (Continued)

```
       ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.0 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.0:ga

  uname -a:
    Linux localhost.localdomain 4.18.0-80.el8.x86_64 #1 SMP Wed Mar 13 12:02:46 UTC 2019
    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: Enhanced IBRS, IBPB: conditional,
                                            RSB filling

  run-level 3 Dec 18 01:22

  SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2
     Filesystem     Type  Size  Used Avail Use% Mounted on
     /dev/sda4      xfs   839G   65G  774G   8% /home

  From /sys/devices/virtual/dmi/id
      BIOS:    Lenovo -[TEE156L-2.61]- 05/20/2020
      Vendor:  Lenovo
      Product: ThinkSystem SR850P -[7D2HCTO1WW]-
      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 M393A4K40CB2-CVF 32 GB 2 rank 2933

  (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 Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 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++ Compiler for applications running on Intel(R) 64, Version
  19.1.2.275 Build 20200604
Copyright (C) 1985-2020 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 19.1.2.275 Build 20200623
Copyright (C) 1985-2020 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icc

C++ benchmarks:
icpc

Fortran benchmarks:
ifort

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

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Base Portability Flags (Continued)

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:
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
-Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-m64 -Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries
-L/usr/local/IntelCompiler19/compilers_and_libraries_2020.3.275/linux/compiler/lib/intel64_lin
-lqkmalloc

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.html
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic19.1u1-official-linux64_revA.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-I.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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