SPEC® CPU2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SD530
(2.20 GHz, Intel Xeon Gold 5220)

SPECrate2017_int_base =   200
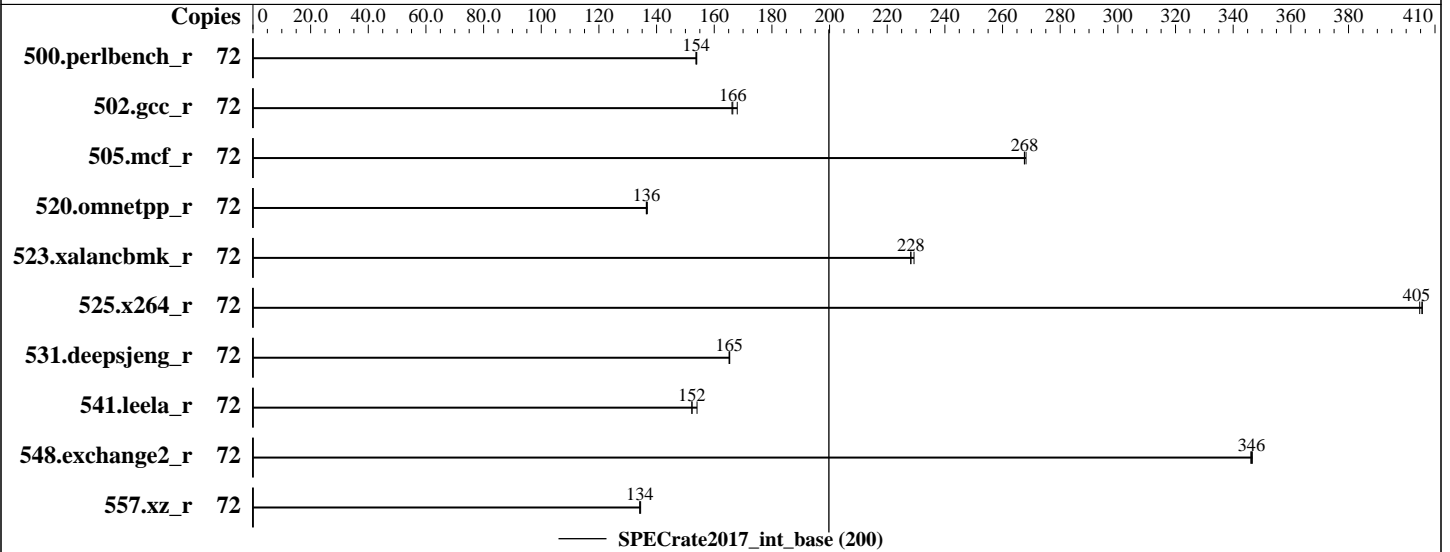
SPECrate2017_int_peak = Not Run

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

Benchmark	Copies	Result
500.perlbench_r	72	154
502.gcc_r	72	166
505.mcf_r	72	268
520.omnetpp_r	72	136
523.xalancbmk_r	72	228
525.x264_r	72	405
531.deepsjeng_r	72	165
541.leela_r	72	152
548.exchange2_r	72	346
557.xz_r	72	134

—— SPECrate2017_int_base (200)

Hardware

CPU Name: Intel Xeon Gold 5220
 Max MHz.:   3900
 Nominal: 2200
Enabled: 36 cores, 2 chips, 2 threads/core
Orderable: 1,2 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: 192 GB (12 x 16 GB 2Rx8 PC4-2933Y-R, running at 2666)
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 TEE135R 2.10 released Feb-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	72	745	154	746	154	**745**	**154**							
502.gcc_r	72	614	166	607	168	**613**	**166**							
505.mcf_r	72	**435**	**268**	434	268	435	268							
520.omnetpp_r	72	692	136	**692**	**136**	691	137							
523.xalancbmk_r	72	333	228	332	229	**333**	**228**							
525.x264_r	72	**311**	**405**	311	406	312	405							
531.deepsjeng_r	72	499	165	500	165	**499**	**165**							
541.leela_r	72	**783**	**152**	783	152	774	154							
548.exchange2_r	72	**545**	**346**	545	346	544	347							
557.xz_r	72	**579**	**134**	578	134	580	134							
SPECrate2017_int_base =	**200**													
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)

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

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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-xd43 Tue May 28 15:40:28 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 5220 CPU @ 2.20GHz
       2  "physical id"s (chips)
       72 "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 : 18
       siblings  : 36
       physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
       physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27

 From lscpu:
      Architecture:        x86_64
      CPU op-mode(s):      32-bit, 64-bit
      Byte Order:          Little Endian
      CPU(s):              72
      On-line CPU(s) list: 0-71
      Thread(s) per core:  2
      Core(s) per socket:  18
      Socket(s):           2
      NUMA node(s):        4
      Vendor ID:           GenuineIntel
      CPU family:          6
      Model:               85
```

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Platform Notes (Continued)

```
        Model name:             Intel(R) Xeon(R) Gold 5220 CPU @ 2.20GHz
        Stepping:               6
        CPU MHz:                2200.000
        CPU max MHz:            3900.0000
        CPU min MHz:            1000.0000
        BogoMIPS:               4400.00
        Virtualization:         VT-x
        L1d cache:              32K
        L1i cache:              32K
        L2 cache:               1024K
        L3 cache:               25344K
        NUMA node0 CPU(s):      0-2,5,6,9,10,14,15,36-38,41,42,45,46,50,51
        NUMA node1 CPU(s):      3,4,7,8,11-13,16,17,39,40,43,44,47-49,52,53
        NUMA node2 CPU(s):      18-20,23,24,27,28,32,33,54-56,59,60,63,64,68,69
        NUMA node3 CPU(s):      21,22,25,26,29-31,34,35,57,58,61,62,65-67,70,71
        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 : 25344 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0 1 2 5 6 9 10 14 15 36 37 38 41 42 45 46 50 51
   node 0 size: 47981 MB
   node 0 free: 44484 MB
   node 1 cpus: 3 4 7 8 11 12 13 16 17 39 40 43 44 47 48 49 52 53
   node 1 size: 48370 MB
   node 1 free: 48084 MB
   node 2 cpus: 18 19 20 23 24 27 28 32 33 54 55 56 59 60 63 64 68 69
   node 2 size: 48341 MB
   node 2 free: 48107 MB
   node 3 cpus: 21 22 25 26 29 30 31 34 35 57 58 61 62 65 66 67 70 71
   node 3 size: 48367 MB
   node 3 free: 48087 MB
   node distances:
   node   0   1   2   3
```

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Platform Notes (Continued)

```
     0:  10  11  21  21
     1:  11  10  21  21
     2:  21  21  10  11
     3:  21  21  11  10

From /proc/meminfo
   MemTotal:       197694328 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-xd43 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

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 28 15:39

SPEC is set to: /home/cpu2017-1.0.5-ic19.0u1
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/md126p3    xfs   743G   38G  705G   6% /

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 -[TEE135R-2.10]- 02/26/2019
   Memory:
    4x NO DIMM NO DIMM
    12x SK Hynix HMA82GR7CJR8N-WM 16 GB 2 rank 2933, configured at 2666
```

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Platform Notes (Continued)

```
(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)
------------------------------------------------------------------------------
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
```

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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_2019.1.144/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_2019.1.144/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-A.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-A.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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