SPEC CPU®2017 Integer Speed Result

Lenovo Global Technology

$SPECspeed®2017\_int\_base =$ 10.9

ThinkSystem SR860 V2
(2.50 GHz, Intel Xeon Gold 5318H)

$SPECspeed®2017\_int\_peak =$ Not Run
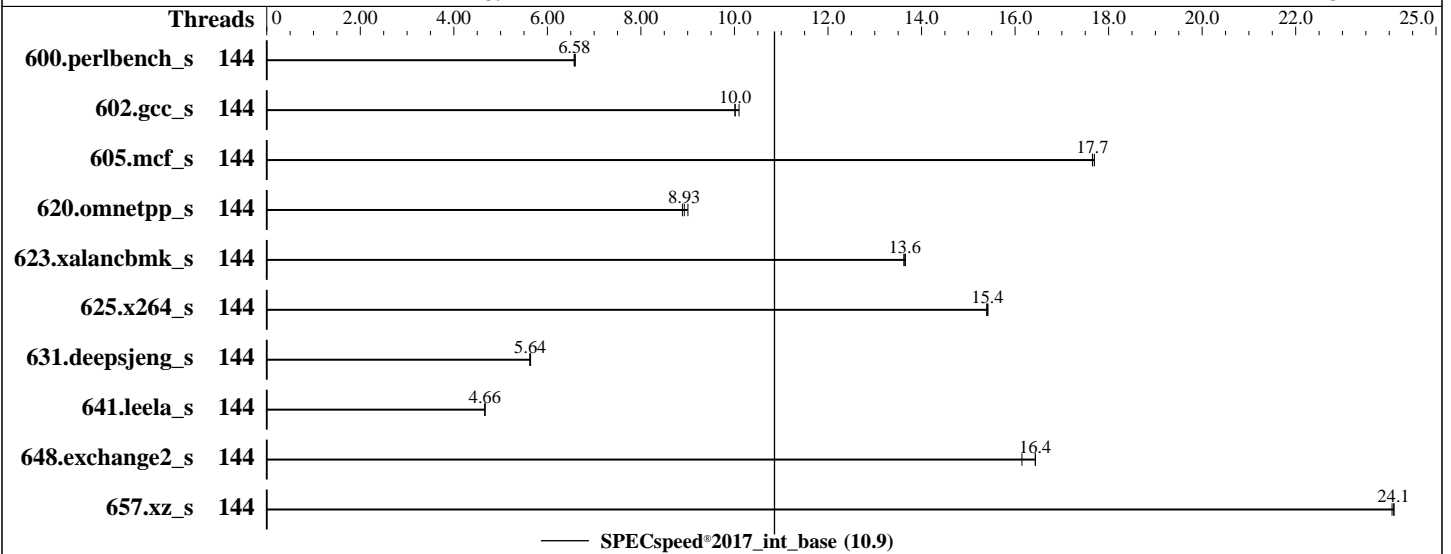
CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Nov-2020
Hardware Availability: Nov-2020
Software Availability: Aug-2020

Threads		
600.perlbench_s	144	6.58
602.gcc_s	144	10.0
605.mcf_s	144	17.7
620.omnetpp_s	144	8.93
623.xalancbmk_s	144	13.6
625.x264_s	144	15.4
631.deepsjeng_s	144	5.64
641.leela_s	144	4.66
648.exchange2_s	144	16.4
657.xz_s	144	24.1

Scale: 0 – 25.0

——— SPECspeed®2017_int_base (10.9)

Hardware

CPU Name: Intel Xeon Gold 5318H
 Max MHz: 3800
 Nominal: 2500
Enabled: 72 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 PC4-3200AA-R, running at 2666)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 8.2
 (Ootpa)
 Kernel 4.18.0-193.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: Yes
Firmware: Lenovo BIOS Version M5E107H 1.00 released Oct-2020
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	144	**270**	**6.58**	270	6.57	269	6.60							
602.gcc_s	144	**398**	**10.0**	398	10.0	394	10.1							
605.mcf_s	144	267	17.7	267	17.7	**267**	**17.7**							
620.omnetpp_s	144	184	8.89	**183**	**8.93**	181	9.01							
623.xalancbmk_s	144	104	13.6	104	13.7	**104**	**13.6**							
625.x264_s	144	115	15.4	**114**	**15.4**	114	15.4							
631.deepsjeng_s	144	**254**	**5.64**	254	5.64	255	5.62							
641.leela_s	144	366	4.66	**366**	**4.66**	366	4.67							
648.exchange2_s	144	182	16.1	179	16.4	**179**	**16.4**							
657.xz_s	144	256	24.1	**257**	**24.1**	257	24.1							

SPECspeed®2017_int_base =	**10.9**
SPECspeed®2017_int_peak =	**Not Run**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH =
     "/home/cpu2017-1.1.0-ic19.1u2/lib/intel64:/home/cpu2017-1.1.0-ic19.1u2/j
     e5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

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
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.
```

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

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General Notes (Continued)

```
  jemalloc, a general purpose malloc implementation
  built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
  sources available from jemalloc.net or https://github.com/jemalloc/jemalloc/releases
```

Platform Notes

```
 BIOS configuration:
 Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
 MONITOR/MWAIT set to Enabled

  Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo
  Rev: r6365 of 2019-08-21 295195f888a3d7edb1e6e46a485a0011
  running on localhost.localdomain Sun Nov 15 02:43:53 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 5318H CPU @ 2.50GHz
        4  "physical id"s (chips)
        144 "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
        physical 2: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
        physical 3: 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):              144
       On-line CPU(s) list: 0-143
       Thread(s) per core:  2
       Core(s) per socket:  18
       Socket(s):           4
       NUMA node(s):        4
       Vendor ID:           GenuineIntel
       CPU family:          6
       Model:               85
       Model name:          Intel(R) Xeon(R) Gold 5318H CPU @ 2.50GHz
       Stepping:            11
```

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Platform Notes (Continued)

```
         CPU MHz:                3316.909
         CPU max MHz:            3800.0000
         CPU min MHz:            1000.0000
         BogoMIPS:               5000.00
         Virtualization:         VT-x
         L1d cache:              32K
         L1i cache:              32K
         L2 cache:               1024K
         L3 cache:               25344K
         NUMA node0 CPU(s):      0-17,72-89
         NUMA node1 CPU(s):      18-35,90-107
         NUMA node2 CPU(s):      36-53,108-125
         NUMA node3 CPU(s):      54-71,126-143
         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 avx512_bf16 dtherm ida arat pln pts pku ospke avx512_vnni md_clear
     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 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 72 73 74 75 76 77 78 79 80 81
   82 83 84 85 86 87 88 89
   node 0 size: 193117 MB
   node 0 free: 192605 MB
   node 1 cpus: 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 90 91 92 93 94 95 96
   97 98 99 100 101 102 103 104 105 106 107
   node 1 size: 193528 MB
   node 1 free: 193308 MB
   node 2 cpus: 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 108 109 110 111 112
   113 114 115 116 117 118 119 120 121 122 123 124 125
   node 2 size: 193528 MB
   node 2 free: 192327 MB
   node 3 cpus: 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 126 127 128 129 130
   131 132 133 134 135 136 137 138 139 140 141 142 143
   node 3 size: 193498 MB
```

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Platform Notes (Continued)

```
   node 3 free: 193303 MB
   node distances:
   node   0   1   2   3
     0:  10  20  20  20
     1:  20  10  20  20
     2:  20  20  10  20
     3:  20  20  20  10

 From /proc/meminfo
    MemTotal:       792239836 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 /usr/bin/lsb_release -d
    Red Hat Enterprise Linux release 8.2 (Ootpa)

 From /etc/*release* /etc/*version*
    os-release:
       NAME="Red Hat Enterprise Linux"
       VERSION="8.2 (Ootpa)"
       ID="rhel"
       ID_LIKE="fedora"
       VERSION_ID="8.2"
       PLATFORM_ID="platform:el8"
       PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
       ANSI_COLOR="0;31"
    redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
    system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

 uname -a:
    Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 itlb_multihit:                       Not affected
 CVE-2018-3620 (L1 Terminal Fault):   Not affected
 Microarchitectural Data Sampling:    Not affected
 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: usercopy/swapgs barriers and __user
                                      pointer sanitization
 CVE-2017-5715 (Spectre variant 2):   Mitigation: Enhanced IBRS, IBPB: conditional,
                                      RSB filling
 tsx_async_abort:                     Not affected
```

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Platform Notes (Continued)

```
  run-level 3 Nov 15 00:32

  SPEC is set to: /home/cpu2017-1.1.0-ic19.1u2
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda3       xfs   892G   33G  860G   4% /

  From /sys/devices/virtual/dmi/id
     BIOS:    Lenovo M5E107H-1.00 10/18/2020
     Vendor:  Lenovo
     Product: ThinkSystem SR860 V2
     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 SK Hynix HMA82GR7CJR8N-XN 16 GB 2 rank 3200

  (End of data from sysinfo program)
Memory on this system run at 2666 MHz due to CPU limitation.
```

Compiler Version Notes

```
==============================================================================
C       | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base)
        | 625.x264_s(base) 657.xz_s(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++     | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base)
        | 641.leela_s(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 | 648.exchange2_s(base)
```

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Tested by:	Lenovo Global Technology	**Software Availability:**	Aug-2020

Compiler Version Notes (Continued)

```
-------------------------------------------------------------------------
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

600.perlbench_s: `-DSPEC_LP64 -DSPEC_LINUX_X64`
602.gcc_s: `-DSPEC_LP64`
605.mcf_s: `-DSPEC_LP64`
620.omnetpp_s: `-DSPEC_LP64`
623.xalancbmk_s: `-DSPEC_LP64 -DSPEC_LINUX`
625.x264_s: `-DSPEC_LP64`
631.deepsjeng_s: `-DSPEC_LP64`
641.leela_s: `-DSPEC_LP64`
648.exchange2_s: `-DSPEC_LP64`
657.xz_s: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-m64 -qnextgen -std=c11
-Wl,-plugin-opt=-x86-branches-within-32B-boundaries -Wl,-z,muldefs
-xCORE-AVX2 -O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fopenmp -DSPEC_OPENMP
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:
```
-m64 -qnextgen -Wl,-plugin-opt=-x86-branches-within-32B-boundaries
```

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Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-Wl,-z,muldefs -xCORE-AVX2 -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 -xCORE-AVX2
-O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-mbranches-within-32B-boundaries
```

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-Cooperlake-A.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-Cooperlake-A.xml

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

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