Lenovo Global Technology

ThinkSystem SR850P (2.40 GHz, Intel Xeon Platinum 8260)

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

Test Date: Jan-2021
Hardware Availability: Jan-2020
Software Availability: Aug-2020

600.perlbench_s 96 6.70
602.gcc_s 96 10.3
605.mcf_s 96 18.2
620.omnetpp_s 96 10.9
623.xalancbmk_s 96 16.1
625.x264_s 96 5.78
631.deepsjeng_s 96 4.82
641.leela_s 96 16.5
648.exchange2_s 96 25.0
657.xz_s 96

Hardware
CPU Name: Intel Xeon Platinum 8260
Max MHz: 3900
Nominal: 2400
Enabled: 96 cores, 4 chips
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: 35.75 MB I+D on chip per chip
Other: None
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)
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: Yes
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: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost of additional power usage
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SPECspeed®2017_int_base = 11.3
SPECspeed®2017_int_peak = Not Run

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>382</td>
<td>10.4</td>
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<td>10.3</td>
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<td>13.9</td>
<td>103</td>
<td>13.8</td>
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<td>5.78</td>
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<td>5.78</td>
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<td>641.leela_s</td>
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<td>4.82</td>
<td>354</td>
<td>4.81</td>
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<td>657.xz_s</td>
<td>96</td>
<td>247</td>
<td>25.0</td>
<td>247</td>
<td>25.0</td>
<td>247</td>
<td>25.0</td>
</tr>
</tbody>
</table>

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.

(Continued on next page)
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SPECSpeed®2017_int_base = 11.3
SPECSpeed®2017_int_peak = Not Run

General Notes (Continued)
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
MONITOR/MWAIT set to Enable
Hyper-Threading set to Disable
DCU Streamer Prefetcher set to Disable
Patrol Scrub set to Disable
LLC dead line alloc set to Disable

Sysinfo program /home/cpu2017-1.1.0-ic19.1u2/bin/sysinfo
Rev: r6365 of 2019-08-21 295195f888a3d7edble6e46a485a0011
running on localhost.localdomain Mon Jan  4 18:34:39 2021

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) Platinum 8260 CPU @ 2.40GHz
 4 "physical id"s (chips)
 96 "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 : 24
siblings : 24
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29
  physical 1: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
  physical 2: cores 0 1 2 3 4 5 6 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
  physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 16 17 18 19 20 21 25 26 27 28 29

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
CPU(s): 96
On-line CPU(s) list: 0-95
Thread(s) per core: 1
Core(s) per socket: 24
Socket(s): 4
NUMA node(s): 4
Vendor ID: GenuineIntel

(Continued on next page)
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<table>
<thead>
<tr>
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Platform Notes (Continued)

| CPU family: | 6 |
| Model: | 85 |
| Model name: | Intel(R) Xeon(R) Platinum 8260 CPU @ 2.40GHz |
| Stepping: | 7 |
| CPU MHz: | 2279.424 |
| CPU max MHz: | 3900.0000 |
| CPU min MHz: | 1000.0000 |
| BogoMIPS: | 4800.00 |
| Virtualization: | VT-x |
| L1d cache: | 32K |
| L1i cache: | 32K |
| L2 cache: | 1024K |
| L3 cache: | 36608K |
| NUMA node0 CPU(s): | 0-23 |
| NUMA node1 CPU(s): | 24-47 |
| NUMA node2 CPU(s): | 48-71 |
| NUMA node3 CPU(s): | 72-95 |
| 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 dcm dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm ablp smep bmi1 hle avx2 smep bmi2 iberms invpcid rtm cqm mxp rdt_a avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavecap xatenv xsavec cqm_llc cqm_occu_p1 cqm_mbm_total cqm_mbm_local dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities |

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 18 19 20 21 22 23
node 0 size: 386658 MB
node 0 free: 385926 MB
node 1 cpus: 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47
node 1 size: 387066 MB
node 1 free: 386172 MB
node 2 cpus: 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71
node 2 size: 387066 MB
node 2 free: 386736 MB
node 3 cpus: 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95
node 3 size: 387066 MB

(Continued on next page)
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Platform Notes (Continued)

node 3 free: 386691 MB
node distances:
node 0 1 2 3
 0: 10 21 21 21
 1: 21 10 21 21
 2: 21 21 10 21
 3: 21 21 21 10

From /proc/meminfo
MemTotal: 1585007892 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)"
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 Jan 4 18:30

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

(Continued on next page)
## Platform Notes (Continued)

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)

## Compiler Version Notes

<table>
<thead>
<tr>
<th>Language</th>
<th>Test Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)</td>
</tr>
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<td></td>
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<tr>
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</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Fortran</td>
<td>648.exchange2_s(base)</td>
</tr>
</tbody>
</table>

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.

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.

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.
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### Base Compiler Invocation

C benchmarks:
- icc

C++ benchmarks:
- icpc

Fortran benchmarks:
- ifort

### Base Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
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<tr>
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<td>-DSPEC_LP64 -DSPEC_LINUX_X64</td>
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### 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 -fopenmp -DSPEC_OPENMP
- L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

**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 -xCORE-AVX512
- O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
- nostandard-realloc-lhs -align array32byte

(Continued on next page)
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**Base Optimization Flags (Continued)**

Fortran benchmarks (continued):
-mbranches-within-32B-boundaries

The flags files that were used to format this result can be browsed at
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

**SPEC CPU®2017 Integer Speed Result**

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