## Lenovo Global Technology

**ThinkSystem SD650 V3**
(2.70 GHz, Intel Xeon Platinum 8458P)

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

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### Hardware

- **CPU Name:** Intel Xeon Platinum 8458P  
- **Max MHz:** 3800  
- **Nominal:** 2700  
- **Enabled:** 88 cores, 2 chips  
- **Orderable:** 2 chips  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 2 MB I+D on chip per core  
- **L3:** 82.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP4 (x86_64)  
  Kernel 5.14.21-150400.22-default  
- **Compiler:** C/C++: Version 2022.1 of Intel oneAPI DPC++/C++ Compiler for Linux;  
  Fortran: Version 2022.1 of Intel Fortran Compiler for Linux;  
- **Parallel:** Yes  
- **Firmware:** Lenovo BIOS Version USE109N 1.12 released Jan-2023  
- **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 and OS set to prefer performance at the cost of additional power usage

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**Threads**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>88</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>88</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>88</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>88</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>88</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>88</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>88</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>88</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>88</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>88</td>
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</tbody>
</table>

**SPECspeed®2017_fp_base** = 330  
**SPECspeed®2017_fp_peak** = Not Run

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**Test Date:** Jan-2023  
**Hardware Availability:** Feb-2023  
**Software Availability:** Jun-2022
SPEC CPU®2017 Floating Point Speed Result

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SPECspeed®2017_fp_base = 330
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
<td>603.bwaves_s</td>
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<tr>
<td>619.lbm_s</td>
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<td>19.1</td>
<td>274</td>
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<td>621.wrf_s</td>
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<td>63.3</td>
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<td>209</td>
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<td>63.3</td>
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<td>627.cam4_s</td>
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<td>193</td>
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<td>654.roms_s</td>
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<td></td>
<td>410</td>
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<td>38.7</td>
<td>407</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 330
SPECspeed®2017_fp_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,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.8-ic2022.1/lib/intel64:/home/cpu2017-1.1.8-ic2022.1/j
e5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB 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_fp_base = 330
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General Notes (Continued)

ejemalloc, 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 Custom Mode
Hyper-Threading set to Disabled
CPU P-state Control set to Legacy

Sysinfo program /home/cpu2017-1.1.8-ic2022.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost Mon Jan 16 05:48:18 2023

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 8458P
  2 "physical id"s (chips)
  88 "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 : 44
siblings : 44
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
  25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
  25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43

From lscpu from util-linux 2.37.2:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 46 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 88
On-line CPU(s) list: 0-87
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8458P
CPU family: 6
Model: 143
Thread(s) per core: 1
Core(s) per socket: 44
Socket(s): 2

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Platform Notes (Continued)

Stepping: 8
Frequency boost: enabled
CPU max MHz: 2701.0000
CPU min MHz: 800.0000
BogoMIPS: 5400.00
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
pdpesigb rtstscmp 1m constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
nonstop_tsc cpuid aperfmperf tsc_known_freq 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 cat_l2 cdp_l3 invpcid_single intel_pmm cd_p12 ssbd mba ibrs ibpb stibp
ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmid
hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
avx512ifma clflushopt clwb intel_pt avx512cd sha_1 avx512bw avx512vl xsaveopt
xsave xgetbv1 xsavec cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local
split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts avx512vbmi
umip pkp ospe waitpkg avx512_vbmi2 gfnj vaes vpclmulqdq avx512_vnni avx512_bitalg
tme avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b enqcmd
fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16 amx_tile flush_l1d
arch_capabilities
Virtualization: VT-x
L1d cache: 4.1 MiB (88 instances)
L1i cache: 2.8 MiB (88 instances)
L2 cache: 176 MiB (88 instances)
L3 cache: 165 MiB (2 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-43
NUMA node1 CPU(s): 44-87
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via
prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user
pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBFB conditional, RSB
filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:

NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 4.1M 12 Data 1 64 1 64
L1i 32K 2.8M 8 Instruction 1 64 1 64
L2 2M 176M 16 Unified 2 2048 1 64

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Platform Notes (Continued)

L3  82.5M  165M  15 Unified  3 90112  1  64

/proc/cpuinfo cache data
  cache size : 84480 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
    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 24 25 26 27
    28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43
    node 0 size: 257700 MB
    node 0 free: 256431 MB
    node 1 cpus: 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68
    69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87
    node 1 size: 257973 MB
    node 1 free: 256926 MB
    node distances:
    node  0   1
    0:  10  21
    1:  21  10

From /proc/meminfo
  MemTotal:       528050736 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has ondemand

From /etc/*release* /etc/*version*
  os-release:
    NAME="SLES"
    VERSION="15-SP4"
    VERSION_ID="15.4"
    PRETTY_NAME="SUSE Linux Enterprise Server 15 SP4"
    ID="sles"
    ID_LIKE="suse"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:15:sp4"

uname -a:
  Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18
  UTC 2022 (49db222) x86_64 x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected

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Platform Notes (Continued)

- CVE-2018-3620 (L1 Terminal Fault): Not affected
- Microarchitectural Data Sampling: Not affected
- CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
- CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swaps barriers and __user pointer sanitation
- CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- CVE-2017-5715 (Spectre variant 2): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
- CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
- CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jan 16 05:43

SPEC is set to: /home/cpu2017-1.1.8-ic2022.1

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SD650 V3
Product Family: ThinkSystem
Serial: 9999999999

Additional information from dmidecode 3.2 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:
16x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

BIOS:
BIOS Vendor: Lenovo
BIOS Version: USE109N-1.12
BIOS Date: 01/09/2023
BIOS Revision: 1.12
Firmware Revision: 0.90

(End of data from sysinfo program)

Compiler Version Notes

```
C               | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
```
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Compiler Version Notes (Continued)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

Fortran benchmarks:
603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)

Fortran, C benchmarks:
621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)

Base Compiler Invocation

C benchmarks:
icx

Fortran benchmarks:
ifx

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Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
   -assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -Wl,-z,muldefs -xcORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xcORE-AVX512 -Ofast -ffast-math
   -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
   -nostandard-realloc-lhs -align array32byte -auto
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using both Fortran and C:
-m64 -std=c11 -Wl,-z,muldefs -xcORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -flto
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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-Eaglestream-N.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-N.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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