Lenovo Global Technology
ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Gold 6448Y)

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

Threads
603.bwaves_s  64
607.cactuBSSN_s  64
619.lbm_s  64
621.wrf_s  64
627.cam4_s  64
628.pop2_s  64
638.imagick_s  64
644.nab_s  64
649.fotonik3d_s  64
654.roms_s  64

SPECSpeed®2017_fp_base = 318
SPECspeed®2017_fp_peak = Not Run

Hardware
CPU Name: Intel Xeon Gold 6448Y
Max MHz: 4100
Nominal: 2100
Enabled: 64 cores, 2 chips
Orderable: 1.2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 60 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
SPEC CPU®2017 Floating Point Speed Result

Lenovo Global Technology
ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Gold 6448Y)

SPECspeed®2017_fp_base = 318
SPECspeed®2017_fp_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>53.0</td>
<td>1110</td>
<td></td>
<td>53.8</td>
<td>1100</td>
<td>53.0</td>
<td>1110</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>44.3</td>
<td>377</td>
<td></td>
<td>43.3</td>
<td>385</td>
<td>44.1</td>
<td>378</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
<td>19.3</td>
<td>272</td>
<td>19.4</td>
<td>270</td>
<td>19.9</td>
<td>263</td>
<td></td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>59.3</td>
<td>223</td>
<td></td>
<td>59.4</td>
<td>223</td>
<td>59.1</td>
<td>224</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>47.8</td>
<td>185</td>
<td>48.0</td>
<td>185</td>
<td></td>
<td>47.9</td>
<td>185</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
<td>128</td>
<td>93.0</td>
<td></td>
<td>127</td>
<td>93.2</td>
<td>128</td>
<td>92.9</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
<td>22.2</td>
<td>649</td>
<td></td>
<td>22.1</td>
<td>653</td>
<td>22.1</td>
<td>652</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
<td>31.5</td>
<td>555</td>
<td>31.5</td>
<td>555</td>
<td>31.5</td>
<td>555</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
<td>55.3</td>
<td>165</td>
<td></td>
<td>55.3</td>
<td>165</td>
<td>54.9</td>
<td>166</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
<td>38.5</td>
<td>408</td>
<td></td>
<td>38.8</td>
<td>405</td>
<td>38.5</td>
<td>409</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 318
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"
MALLOCONF = "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)
Lenovo Global Technology
ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Gold 6448Y)

SPECSpeed®2017_fp_base = 318
SPECSpeed®2017_fp_peak = Not Run

CPU2017 License: 9017
Test Date: Jan-2023
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Hardware Availability: Feb-2023
Software Availability: Jun-2022

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 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 982a61ec0915b55891ef0e16acaf64d
running on localhost Wed Jan 18 16:05:11 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) Gold 6448Y
  2 "physical id"s (chips)
  64 "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 : 32
siblings : 32
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
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

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): 64
On-line CPU(s) list: 0-63
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Gold 6448Y
CPU family: 6
Model: 143
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2

(Continued on next page)
Lenovo Global Technology
ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Gold 6448Y)

SPECspeed®2017_fp_base = 318
SPECspeed®2017_fp_peak = Not Run

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

Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Jun-2022

Platform Notes (Continued)

Stepping: 8
Frequency boost: enabled
CPU max MHz: 2101.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
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
pdpe1gb rdtscp lm 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 pcd 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_pni cdp_l2 ssbd mba ibrs ibp stibp
ibrs_enabled tpr_shadow vnmi flexpriority ept vpid ept_ad fsqsbas tsc_adjust bm1
hle avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt
xsave xgetbv1 xsaves cqm_llc cqm_occmap llc cqm_mbb_total cqm_mbb_local
split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm idaarat pln pts avx512vbmi
umip pku ospke waitpkg avx512_vbmi2 gfni vae vpclmulqdq avx512_vnni avx512_bitalg
tme avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b enqcmd
fsm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16 amx_tile flush_l1d
arch_capabilities
Virtualization: VT-x
L1d cache: 3 MIB (64 instances)
L1i cache: 2 MIB (64 instances)
L2 cache: 128 MIB (64 instances)
L3 cache: 128 MIB (64 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-31
NUMA node1 CPU(s): 32-63
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, IBFP conditional, RSB
filling
Vulnerability Srbds: Not affected
Vulnerability Tx5 async abort: Not affected

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>48K</td>
<td>3M</td>
<td>12</td>
<td>Data</td>
<td>64</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>2M</td>
<td>8</td>
<td>Instruction</td>
<td>64</td>
<td>64</td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td>2M</td>
<td>128M</td>
<td>16</td>
<td>Unified</td>
<td>2048</td>
<td>64</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued on next page)
Lenovo Global Technology
ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Gold 6448Y)

SPECspeed®2017_fp_base = 318
SPECspeed®2017_fp_peak = Not Run

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

Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Jun-2022

Platform Notes (Continued)

/proc/cpuinfo cache data
  cache size : 61440 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
    node 0 size: 257668 MB
    node 0 free: 256666 MB
    node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
      57 58 59 60 61 62 63
    node 1 size: 258011 MB
    node 1 free: 256796 MB
    node distances:
      node   0   1
    0:  10  21
    1:  21  10

From /proc/meminfo
  MemTotal:       528056316 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

(Continued on next page)
Lenovo Global Technology
ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Gold 6448Y)

| SPECspeed®2017_fp_base = | 318 |
| SPECspeed®2017_fp_peak = Not Run |

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

Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Jun-2022

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/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jan 18 16:04
SPEC is set to: /home/cpu2017-1.1.8-ic2022.1
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda3      xfs   889G   26G  863G   3% /

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

<table>
<thead>
<tr>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)</td>
</tr>
</tbody>
</table>

(Continued on next page)
Lenovo Global Technology
ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Gold 6448Y)

SPECspeed®2017_fp_base = 318
SPECspeed®2017_fp_peak = Not Run

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.

==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base)
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         | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
-----------------|------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

==============================================================================
Fortran, C      | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
-----------------|------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64,
Version 2022.1.0 Build 20220316
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks: icx

Fortran benchmarks: ifx
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 -fopenmp
-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 -fopenmp
   -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 -fopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs -align array32byte -auto
   -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

(Continued on next page)
Lenovo Global Technology  
ThinkSystem SD650 V3  
(2.10 GHz, Intel Xeon Gold 6448Y)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>318</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**Test Sponsor:** Lenovo Global Technology  
**Test Date:** Jan-2023  
**Hardware Availability:** Feb-2023  
**Tested by:** Lenovo Global Technology  
**Software Availability:** Jun-2022  

**CPU2017 License:** 9017

---

### 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 -fopenmp
- 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  

---

**SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.**

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

Tested with SPEC CPU®2017 v1.1.8 on 2023-01-18 03:05:10-0500.  
Report generated on 2023-02-15 10:38:24 by CPU2017 PDF formatter v6442.  
Originally published on 2023-02-14.