Lenovo Global Technology
ThinkSystem SR630 V3
(2.50 GHz, Intel Xeon Gold 6426Y)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
CPU Name: Intel Xeon Gold 6426Y
Max MHz: 4100
Nominal: 2500
Enabled: 32 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: 37.5 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

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>32</td>
<td>603.bwaves_s</td>
<td>607.cactuBSSN_s</td>
</tr>
<tr>
<td>32</td>
<td>619.lbm_s</td>
<td>621.wrf_s</td>
</tr>
<tr>
<td>32</td>
<td>627.cam4_s</td>
<td>628.pop2_s</td>
</tr>
<tr>
<td>32</td>
<td>638.imagick_s</td>
<td>644.nab_s</td>
</tr>
<tr>
<td>32</td>
<td>649.fotonik3d_s</td>
<td>654.roms_s</td>
</tr>
<tr>
<td>32</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hardware

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 ESE109L 1.10 released Jan-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage
### 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>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>66</td>
<td>893</td>
<td>65.8</td>
<td>896</td>
<td>66.3</td>
<td>889</td>
<td>65.9</td>
<td>895</td>
<td>66.3</td>
<td>890</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>60.5</td>
<td>275</td>
<td>59.3</td>
<td>281</td>
<td>60.4</td>
<td>276</td>
<td>60.5</td>
<td>281</td>
<td>60.4</td>
<td>276</td>
</tr>
<tr>
<td>619.libm_s</td>
<td>32</td>
<td>25.2</td>
<td>208</td>
<td>24.0</td>
<td>218</td>
<td>24.0</td>
<td>219</td>
<td>24.0</td>
<td>218</td>
<td>24.0</td>
<td>219</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>70.4</td>
<td>188</td>
<td>69.6</td>
<td>190</td>
<td>69.5</td>
<td>190</td>
<td>69.6</td>
<td>190</td>
<td>69.5</td>
<td>190</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>71.0</td>
<td>125</td>
<td>71.3</td>
<td>124</td>
<td>71.7</td>
<td>124</td>
<td>71.1</td>
<td>125</td>
<td>71.0</td>
<td>125</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>136</td>
<td>87.4</td>
<td>136</td>
<td>87.5</td>
<td>136</td>
<td>87.5</td>
<td>136</td>
<td>87.5</td>
<td>136</td>
<td>87.5</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>32.5</td>
<td>443</td>
<td>32.6</td>
<td>443</td>
<td>32.4</td>
<td>445</td>
<td>32.5</td>
<td>443</td>
<td>32.4</td>
<td>445</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>32</td>
<td>50.5</td>
<td>346</td>
<td>50.5</td>
<td>346</td>
<td>50.5</td>
<td>346</td>
<td>50.5</td>
<td>346</td>
<td>50.5</td>
<td>346</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>63.5</td>
<td>144</td>
<td>63.5</td>
<td>143</td>
<td>63.7</td>
<td>143</td>
<td>63.5</td>
<td>143</td>
<td>63.7</td>
<td>143</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td>56.2</td>
<td>280</td>
<td>55.9</td>
<td>281</td>
<td>56.2</td>
<td>280</td>
<td>56.2</td>
<td>280</td>
<td>56.2</td>
<td>280</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,compact"
- `LD_LIBRARY_PATH = "/home/cpu2017-1.1.8-ic2022.1/lib/intel64:/home/cpu2017-1.1.8-ic2022.1/jqu5.0.1-64"
- `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:

- `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)
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
Hyper-Threading set to Disabled
C-state set to Legacy

Sysinfo program /home/cpu2017-1.1.8-ic2022.1/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b5891ef0e16acaf64d
running on localhost Sat Jan 14 23:03:37 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 6426Y
  2  "physical id"s (chips)
 32 "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 : 16
  siblings : 16
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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):                32
On-line CPU(s) list:   0-31
Vendor ID:             GenuineIntel
Model name:            Intel(R) Xeon(R) Gold 6426Y
CPU family:            6
Model:                 143
Thread(s) per core:    1
Core(s) per socket:    16
Socket(s):             2
Stepping:              8
BogoMIPS:              5000.00
Lenovo Global Technology
ThinkSystem SR630 V3
(2.50 GHz, Intel Xeon Gold 6426Y)

**SPECspeed®2017_fp_base = 242**

**SPECspeed®2017_fp_peak = 242**

---

**Platform Notes (Continued)**

Flags:  
fp mde pse pse36 cmov pat mca cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pge cmov pae mce cx8 apic sep mtrr pdpe1gb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good noplt xtopology nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrm 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_patin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi lexipriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invvpid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsaves xgetbv1 xsavec cmx128 intel_patin cmx128_legacy imcb_fpmi locked_mmio intel_bpf_perf intel_bpf traces profanity_field intel_pcat intel_setarch intel_image_base intel_papic_int ia32e_smm ia32e_st0 ia32e_st1 ia32e_st2 ia32e_st3 ia32e_st4 ia32e_st5 ia32e_st6 ia32e_st7  

Virtualization: VT-x  
L1d cache: 1.5 MiB (32 instances)  
L1i cache: 1 MiB (32 instances)  
L2 cache: 64 MiB (32 instances)  
L3 cache: 75 MiB (2 instances)  
NUMA node(s): 2  
NUMA node0 CPU(s): 0-15  
NUMA node1 CPU(s): 16-31  
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, IBPB conditional, RSB filling  
Vulnerability Srbd: Not affected  
Vulnerability Tlx 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>1.5M</td>
<td>12</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>1M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>2M</td>
<td>64M</td>
<td>16</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>37.5M</td>
<td>75M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>40960</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data  

cache size : 38400 KB

(Continued on next page)
Platform Notes (Continued)

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
   node 0 size: 257673 MB
   node 0 free: 255837 MB
   node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
   node 1 size: 258023 MB
   node 1 free: 257527 MB
   node distances:
     node 0   1
     0:  10  21
     1:  21  10

From /proc/meminfo
   MemTotal:       528073952 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

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
   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 sanitization
   CVE-2017-5753 (Spectre variant 1):
     Mitigation: Enhanced IBRS, IBPB:

(Continued on next page)
Lenovo Global Technology
ThinkSystem SR630 V3
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SPECspeed®2017_fp_base = 242
SPECspeed®2017_fp_peak = 242

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

Platform Notes (Continued)
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 14 22:50
SPEC is set to: /home/cpu2017-1.1.8-ic2022.1
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 xfs 894G 25G 870G 3% /

From /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR630 V3 MB, EGS, DDR5, NY, 1U
Product Family: ThinkSystem
Serial: 1234567890

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:
2x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800
14x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

BIOS:
BIOS Vendor: Lenovo
BIOS Version: ESE109L-1.10
BIOS Date: 01/07/2023
BIOS Revision: 1.10
Firmware Revision: 1.0

(End of data from sysinfo program)

Compiler Version Notes
C 619.lbm_s(base, peak) 638.imagick_s(base, peak)
644.nab_s(base, peak)

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, peak)
Lenovo Global Technology
ThinkSystem SR630 V3
(2.50 GHz, Intel Xeon Gold 6426Y)

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

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.

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.

Compiler Version Notes (Continued)

Base Compiler Invocation

C benchmarks:
icx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx
Lenovo Global Technology
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SPECspeed®2017_fp_peak = 242

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Tested by: Lenovo Global Technology
Test Date: Jan-2023
Hardware Availability: Feb-2023
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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 -W1,-z,мульдез -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 -W1,-z,мульдез -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 -W1,-z,мульдез -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

Benchmarks using Fortran, C, and C++:
-m64 -std=c11 -W1,-z,мульдез -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

Peak Compiler Invocation

C benchmarks:
 icx

(Continued on next page)
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Test Date: Jan-2023
Hardware Availability: Feb-2023
Software Availability: Jun-2022

Peak Compiler Invocation (Continued)

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

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

Peak Portability Flags
Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:
603.bwaves_s: -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
649.fotonik3d_s: basepeak = yes
654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:
621.wrf_s: basepeak = yes
627.cam4_s: -m64 -std=gnu11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP

(Continued on next page)
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Hardware Availability: Feb-2023
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Peak Optimization Flags (Continued)

627.cam4_s (continued):
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:
607.cactuBSSN_s: basepeak = yes

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.

Tested with SPEC CPU®2017 v1.1.8 on 2023-01-14 10:03:37-0500.
Report generated on 2023-02-01 18:26:48 by CPU2017 PDF formatter v6442.
Originally published on 2023-02-01.