Lenovo Global Technology
ThinkSystem SR630 V3
(2.00 GHz, Intel Xeon Silver 4416+)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>232</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Algorithm</th>
<th>SPECspeed®2017_fp_base</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td></td>
<td></td>
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<tr>
<td>607.cactuBSSN_s</td>
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<td></td>
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<tr>
<td>619.lbm_s</td>
<td></td>
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<tr>
<td>621.wrf_s</td>
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<tr>
<td>627.cam4_s</td>
<td></td>
<td></td>
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<tr>
<td>628.pop2_s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>638.imagick_s</td>
<td></td>
<td></td>
</tr>
<tr>
<td>644.nab_s</td>
<td></td>
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</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>136</td>
<td></td>
</tr>
<tr>
<td>654.roms_s</td>
<td>239</td>
<td></td>
</tr>
</tbody>
</table>

### Hardware
- **CPU Name:** Intel Xeon Silver 4416+
- **Max MHz:** 3900
- **Nominal:** 2000
- **Enabled:** 40 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, running at 4000)
- **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 ESE109L 1.10 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
Lenovo Global Technology

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CPU2017 License: 9017
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
<th>Base Seconds</th>
<th>Base Ratio</th>
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<th>Peak Seconds</th>
<th>Peak Ratio</th>
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<tr>
<td>603.bwaves_s</td>
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<td>818</td>
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<tr>
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<td>59.3</td>
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<tr>
<td>627.cam4_s</td>
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<td>68.5</td>
<td>129</td>
<td>68.7</td>
<td>129</td>
<td>68.4</td>
<td>130</td>
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<tr>
<td>628.pop2_s</td>
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<td>83.2</td>
<td>143</td>
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<tr>
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</table>

SPECspeed®2017_fp_base = 232
SPECspeed®2017_fp_peak = Not Run

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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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 982a61ec0915b55891ef0e16acaf64d
running on localhost Fri Jan 13 02:36:45 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

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): 40
On-line CPU(s) list: 0-39
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Silver 4416+
CPU family: 6
Model: 143
Thread(s) per core: 1
Core(s) per socket: 20
Socket(s): 2
Stepping: 8
BogoMIPS: 4000.00

(Continued on next page)
### Lenovo Global Technology

**ThinkSystem SR630 V3**

(2.00 GHz, Intel Xeon Silver 4166+)

---

**SPECspeed®2017_fp_base** = 232

**SPECspeed®2017_fp_peak** = Not Run

---

**CPU2017 License:**  9017

**Test Sponsor:** Lenovo Global Technology

**Test Date:** Jan-2023

**Hardware Availability:** Feb-2023

**Tested by:** Lenovo Global Technology

**Software Availability:** Jun-2022

---

**Platform Notes (Continued)**

Flags:

- fpu
- vme
- de
- pse
- tsc
- mcr
- pae
- mce
- cx8
- apic
- sep
- mtrr
- pge
- mca
- cmov
- pat
- pse36
- clflush
- dts
- acpi
- mmx
- fxsr
- sse
- sse2
- ss
- ht
- tm
- pe
- syscall
- nx
- pdpe1gb
- rdtscp
- lm
- constant_tsc
- art
- arch_perfmon
- pebs
- bts
- rep_good
- nopl
- xtopology
- nonstop_tsc
- aperfmperf
- tsc_known_freq
- pclmulqdq
- dtes64
- monitor
- ds_cpl
- vmx
- smx
- est
- tm2
- ssse3
- sdbg
- fma
- cx16
- xtrig
- pdcm
- pcid
- dca
- sse4_1
- sse4_2
- x2apic
- movbe
- popcnt
- tsc_deadline_timer
- aes
- f16c
- rdrand
- lahf_lm
- abm
- 3dnowprefetch
- cpuid_fault
- ebp
- cat_l3
- cat_l2
- cdp_l3
- invpcid_single
- intel_pni
- cdp_l2
- ssbd
- mba
- ibrs
- stibp
- ibrs
- enhanced
- tpr
- shadow
- vmmi
- flexpriority
- ept
- vpid
- ept_ad
- mtrr
- pae
- mce
- cx8
- apic
- sep
- mtrr
- pge
- mca
- cmov
- pat
- pse36
- clflush
dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pde lb rdtscp lm constant_tsc art arch_perfmon pebs bts rep_good no p1 xtopology nonstop_tsc aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrig 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_pni cdp_l2 ssbd mba ibrs stibp ibrs enhanced tpr shadow vmmi flexpriority ept vpid ept_ad fsq_adjust tsq_adjust btm hle txv2 smep bni2 erms invpcid rtq cm rdta avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsave tcgetbv1 xsaves cmq_1lc cmq_occup_1lc cmq_mbb_total cmq_mbb_local split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts avx512vbmi umip pku ospe waitpkg avx512_vbmi2 qfni vaes vpclmulqdq avx512_vnmi avx512_bitalg tme avx512_vpocnctdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear serialize txslidptrk pconfig arch_lbr avx512_fp16 amx_tile flush_lld arch_capabilities

Virtualization:

- VT-x

**L1d cache:**

- 1.9 MiB (40 instances)

**L1i cache:**

- 1.3 MiB (40 instances)

**L2 cache:**

- 80 MiB (40 instances)

**L3 cache:**

- 75 MiB (2 instances)

**NUMA node(s):**

- 2

**NUMA node0 CPU(s):**

- 0-19

**NUMA node1 CPU(s):**

- 20-39

**Vulnerability Itlb multihit:**

- Not affected

**Vulnerability L1tf:**

- Not affected

**Vulnerability Msds:**

- 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 Tsk async abort:**

- Not affected

---

From lscpu --cache:

<table>
<thead>
<tr>
<th>NAME ONE-SIZE ALL-SIZE WAYS TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
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</thead>
<tbody>
<tr>
<td>L1d 48K 1.9M 12 Data</td>
<td>1</td>
<td>64</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>L1i 32K 1.3M 8 Instruction</td>
<td>1</td>
<td>64</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>L2 2M 80M 16 Unified</td>
<td>2</td>
<td>2048</td>
<td>64</td>
<td></td>
</tr>
<tr>
<td>L3 37.5M 75M 15 Unified</td>
<td>3</td>
<td>40960</td>
<td>64</td>
<td></td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

- cache size : 38400 KB

(Continued on next page)
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SPECspeed®2017_fp_peak = Not Run

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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 16 17 18 19
node 0 size: 257706 MB
node 0 free: 256989 MB
node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
node 1 size: 257988 MB
node 1 free: 257347 MB
node distances:
node 0 1
0: 10 21
1: 21 10

From /proc/meminfo
MemTotal: 528071928 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):
Not affected

CVE-2017-5753 (Spectre variant 1):
Mitigation: usercopy/swaps barriers and __user pointer sanitization

CVE-2017-5715 (Spectre variant 2):
Mitigation: Enhanced IBRS, IBPB:

(Continued on next page)
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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 13 02:31

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, configured at 4000
14x Samsung M321R4GA3BB0-CQKV G 32 GB 2 rank 4800, configured at 4000

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) 638.imagick_s(base) 644.nab_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.
==============================================================================

C++, C, Fortran | 607.cactuBSSN_s(base)

(Continued on next page)
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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.

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

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

Benchmarks using both Fortran and C:
ifx icx

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

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 -fiopenmp
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-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
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ThinkSystem SR630 V3
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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 2023-01-12 13:36:45-0500.
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