Lenovo Global Technology
ThinkSystem SR650 V3 (2.00 GHz, Intel Xeon Silver 4510T)

SPECrate®2017_int_base = 210
SPECrate®2017_int_peak = Not Run

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

Hardware
CPU Name: Intel Xeon Silver 4510T
Max MHz: 3700
Nominal: 2000
Enabled: 24 cores, 2 chips, 2 threads/core
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: 30 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 4400)
Storage: 1 x 960 GB SATA SSD
Other: CPU Cooling: Air

Software
OS: SUSE Linux Enterprise Server 15 SP4
Kernel 5.14.21-150400.22-default
Compiler: C/C++: Version 2024.0.2 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2024.0.2 of Intel Fortran Compiler for Linux;
Parallel: No
Firmware: Lenovo BIOS Version ESE123B 3.11 released Jan-2024
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: None
Power Management: BIOS set to prefer performance at the cost of additional power usage

Test Date: Mar-2024
Hardware Availability: Mar-2024
Software Availability: Mar-2024
SPEC CPU®2017 Integer Rate Result

Lenovo Global Technology
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(2.00 GHz, Intel Xeon Silver 4510T)

SPECrated®2017_int_base = 210
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Results Table

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<th>Benchmark</th>
<th>Copies</th>
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<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>48</td>
<td>513</td>
<td>101</td>
<td>514</td>
<td>101</td>
<td>517</td>
<td>100</td>
</tr>
</tbody>
</table>

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

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:
LD_LIBRARY_PATH =
"/home/cpu2017-1.1.9-ic2024.0.2/lib/intel64:/home/cpu2017-1.1.9-ic2024.0.2/lib/ia32:
/home/cpu2017-1.1.9-ic2024.0.2/lib/je5.0.1-32"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
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.

(Continued on next page)
**SPEC CPU®2017 Integer Rate Result**

Lenovo Global Technology

ThinkSystem SR650 V3
(2.00 GHz, Intel Xeon Silver 4510T)

---

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

**General Notes (Continued)**

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.

---

**Platform Notes**

**BIOS configuration:**
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode  
C-States set to Legacy  
UPI Link Disable set to Minimum Number of Links Enabled  
SNC set to SNC2  
LLC Prefetch set to Disabled

Sysinfo program /home/cpu2017-1.1.9-ic2024.0.2/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c0b7edc36ae2c92cc097bec197  
running on localhost Tue Mar 19 08:58:57 2024

SUT (System Under Test) info as seen by some common utilities.

---

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1. `uname -a`
2. `w`
3. Username
4. `ulimit -a`
5. sysinfo process ancestry
6. `/proc/cpuinfo`
7. `lscpu`
8. `numactl --hardware`
9. `/proc/meminfo`
10. `who -r`
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from `/proc/cmdline`
14. cpupower frequency-info
15. tuned-adm active
16. `sysctl`
17. `/sys/kernel/mm/transparent_hugepage`
18. `/sys/kernel/mm/transparent_hugepage/klhugepaged`
19. OS release
20. Disk information
21. `/sys/devices/virtual/dmi/id`
22. dmidecode
23. BIOS

---

1. `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

2. `w`  
   08:58:57 up 15:11,  1 user,  load average: 0.07, 0.02, 0.00  
   USER    TTY     FROM   LOGIN@   IDLE   JCPU   PCPU WHAT
   root    tty1     -    Mon17   9.00s  0.90s  0.01s -bash

3. Username

(Continued on next page)
Platform Notes (Continued)

From environment variable $USER: root

4. ulimit -a

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>core file size</td>
<td>(blocks, -c) unlimited</td>
</tr>
<tr>
<td>data seg size</td>
<td>(kbytes, -d) unlimited</td>
</tr>
<tr>
<td>scheduling priority</td>
<td>(-e) 0</td>
</tr>
<tr>
<td>file size</td>
<td>(blocks, -f) unlimited</td>
</tr>
<tr>
<td>pending signals</td>
<td>(-l) 4127057</td>
</tr>
<tr>
<td>max locked memory</td>
<td>(kbytes, -l) 64</td>
</tr>
<tr>
<td>max memory size</td>
<td>(kbytes, -m) unlimited</td>
</tr>
<tr>
<td>open files</td>
<td>(-n) 1024</td>
</tr>
<tr>
<td>pipe size</td>
<td>(512 bytes, -p) 8</td>
</tr>
<tr>
<td>POSIX message queues</td>
<td>(bytes, -q) 819200</td>
</tr>
<tr>
<td>real-time priority</td>
<td>(-r) 0</td>
</tr>
<tr>
<td>stack size</td>
<td>(kbytes, -s) unlimited</td>
</tr>
<tr>
<td>cpu time</td>
<td>(seconds, -t) unlimited</td>
</tr>
<tr>
<td>max user processes</td>
<td>(-u) 4127057</td>
</tr>
<tr>
<td>virtual memory</td>
<td>(kbytes, -v) unlimited</td>
</tr>
<tr>
<td>file locks</td>
<td>(-x) unlimited</td>
</tr>
</tbody>
</table>

5. sysinfo process ancestry

```
/home/cpu2017-1.1.9-ic2024.02
```

6. /proc/cpuinfo

```
model name: INTEL(R) XEON(R) SILVER 4510T
```

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

7. Iscput
Platform Notes (Continued)

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): 48
On-line CPU(s) list: 0-47
Vendor ID: GenuineIntel
Model name: INTEL(R) XEON(R) SILVER 4510T
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 2
Socket(s): 2
Stepping: 8
BogoMIPS: 4000.00
Flags:
  fpu  vme de pse tsc msr pae mca cmov pat pse36
  clflush dtsc acpi mmx fxsr sse ss ht tm pbe syscall nx pdpe1gb rdtscp
  lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
  nonstop_tsc tscikut perf tsc_known_freq pni pclmulqdq dtes64 monitor
  mtrr pge mca cmov pat pse36
  cx8 apic sep good nopl stpmi stp good nopl stpmi
  clflushopt 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 tscikut perf tsc_known_freq pni pclmulqdq dtes64 monitor
  mtrr pge mca cmov pat pse36
  cx8 apic sep good nopl stpmi stp good nopl stpmi

Virtualization: VT-x
L1d cache: 1.1 MiB (24 instances)
L1i cache: 768 KiB (24 instances)
L2 cache: 48 MiB (24 instances)
L3 cache: 60 MiB (2 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0-5,24-29
NUMA node1 CPU(s): 6-11,30-35
NUMA node2 CPU(s): 12-17,36-41
NUMA node3 CPU(s): 18-23,42-47
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Md: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbd: Not affected
Vulnerability T三x async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 1.1M 12 Data 1 64 1 64
L1i 32K 768K 8 Instruction 1 64 1 64
L2 2M 48M 16 Unified 2 2048 1 64
L3 30M 60M 15 Unified 3 32768 1 64

(Continued on next page)
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Tested by: Lenovo Global Technology
Test Date: Mar-2024
Hardware Availability: Feb-2024
Software Availability: Mar-2024

Platform Notes (Continued)

8. numactl --hardware
   NOTE: a numactl 'node' might or might not correspond to a physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0-5,24-29
   node 0 size: 257708 MB
   node 0 free: 256607 MB
   node 1 cpus: 6-11,30-35
   node 1 size: 258044 MB
   node 1 free: 257417 MB
   node 2 cpus: 12-17,36-41
   node 2 size: 258044 MB
   node 2 free: 257442 MB
   node 3 cpus: 18-23,42-47
   node 3 size: 257990 MB
   node 3 free: 257233 MB
   node distances:
     node   0   1   2   3
     0:  10  12  21  21
     1:  12  10  21  21
     2:  21  21  10  12
     3:  21  21  12  10

9. /proc/meminfo
   MemTotal: 1056551232 kB

10. who -r
   run-level 3 Mar 18 17:47

11. Systemd service manager version:
    systemd 249 (249.11+suse.124.g2bc0b2c447)
    Default Target Status
      multi-user running

12. Services, from systemctl list-unit-files
    STATE UNIT FILES
    enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd chronyd cron getty@ haveged irqbalance
    iisscsi issue-generator kbsessions klog lvmd-monitor nscd postfix purge-kernels rollback
    rsyslog systemctl sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
    systemctl-remount-fs
    enabled-runtime
    disabled

13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=d68daf13-caf1-4614-b0e5-f766f243d7c8
    splash=silent
    mitigations=auto
    quiet

(Continued on next page)
Platform Notes (Continued)

security=apparmor

14. cpupower frequency-info
analyzing CPU 0:
Unable to determine current policy
boost state support:
  Supported: yes
  Active: yes

15. tuned-adm active
It seems that tuned daemon is not running, preset profile is not activated.
  Preset profile: throughput-performance

16. sysctl
   kernel.numa_balancing               1
   kernel.randomize_va_space           2
   vm.compaction_proactiveness        20
   vm.dirty_background_bytes          0
   vm.dirty_background_ratio          10
   vm.dirty_bytes                     0
   vm.dirty_expire_centisecs          3000
   vm.dirty_ratio                     20
   vm.dirty_writeback_centisecs       500
   vm.dirtytime_expire_seconds        43200
   vm.extfrag_threshold               500
   vm.min_unmapped_ratio              1
   vm.nr_hugepages                    0
   vm.nr_hugepages_mempolicy          0
   vm.nr_overcommit_hugepages         0
   vm.swappiness                      60
   vm.watermark_boost_factor          15000
   vm.watermark_scale_factor          10
   vm.zone_reclaim_mode               0

17. /sys/kernel/mm/transparent_hugepage
   defrag  always defer defer+madvice [madvice] never
   enabled  [always] madvice never
   hpage_pmd_size  2097152
   shmem_enabled  always within_size advise [never] deny force

18. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleepMillisecs  60000
   defrag  1
   max_ptes_none       511
   max_ptes_shared     256
   max_ptes_swap       64
   pages_to_scan       4096
   scan_sleepMillisecs 10000

19. OS release
   From /etc/*-release /etc/*-version
   os-release SUSE Linux Enterprise Server 15 SP4

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

20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2024.0.2
Filesystem     Type  Size  Used  Avail  Use%  Mounted on
/dev/sda2      xfs   892G  118G  775G  14%  /

21. /sys/devices/virtual/dmi/id
Vendor:         Lenovo
Product:        ThinkSystem SR650 V3, EGS, DDR5, SH, 2U
Product Family: ThinkSystem
Serial:         1234567890

22. dmidecode
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:
8x Samsung M321R8GA0PBO-CHMKH 64 GB 2 rank 5600, configured at 4400
8x Samsung M321R8GA0PBO-CHMKH 64 GB 2 rank 5600, configured at 4400

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:       Lenovo
BIOS Version:      ESE123B-3.11
BIOS Date:         01/25/2024
BIOS Revision:     3.11
Firmware Revision: 3.90

---

**Compiler Version Notes**

---

C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

---

C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

---

Fortran | 548.exchange2_r(base)
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
SPEC CPU®2017 Integer Rate Result
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Software Availability: Mar-2024

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64 -DSPEC_LINUX
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/opt/intel/oneapi/compiler/2024.0/lib -lqkmalloc

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/opt/intel/oneapi/compiler/2024.0/lib -lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/opt/intel/oneapi/compiler/2024.0/lib -lqkmalloc
## Lenovo Global Technology

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<tr>
<td>Hardware Availability:</td>
<td>Feb-2024</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Mar-2024</td>
</tr>
</tbody>
</table>

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


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-AA.xml](http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-AA.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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