## SPEC CPU®2017 Integer Rate Result

**Lenovo Global Technology**  
ThinkSystem SR650 V3  
(2.00 GHz, Intel Xeon Silver 4514Y)

<table>
<thead>
<tr>
<th>Specrate®2017_int_base = 266</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specrate®2017_int_peak = Not Run</td>
</tr>
</tbody>
</table>

- **CPU2017 License:** 9017  
- **Test Sponsor:** Lenovo Global Technology  
- **Tested by:** Lenovo Global Technology  
- **Test Date:** Jan-2024  
- **Hardware Availability:** Feb-2024  
- **Software Availability:** Dec-2023

### Hardware

- **CPU Name:** Intel Xeon Silver 4514Y  
- **Max MHz:** 3400  
- **Nominal:** 2000  
- **Enabled:** 32 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:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP4  
  Kernel 5.14.21-150400.22-default  
- **Compiler:** C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux;  
  Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;  
- **Parallel:** No  
- **Firmware:** Lenovo BIOS Version ESE121V 3.10 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

### Benchmarks

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SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR650 V3
(2.00 GHz, Intel Xeon Silver 414Y)

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

SPECrater®2017_int_base = 266
SPECrater®2017_int_peak = Not Run

Test Date: Jan-2024
Hardware Availability: Feb-2024
Software Availability: Dec-2023

Results Table

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</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-ic2023.2.3/lib/intel64:/home/cpu2017-1.1.9-ic2023.2.3/lib/ia32:/home/cpu2017-1.1.9-ic2023.2.3/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)
**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

```
Sysinfo program /home/cpu2017-1.1.9-ic2023.2.3/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c6ae2c92cc097bec197
running on localhost Tue Jan 30 17:57:52 2024
```

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

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- 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`
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- 18. `OS release`
- 19. `Disk information`
- 20. `/sys/devices/virtual/dmi/id`
- 21. `dmidecode`
- 22. `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`
```
```
17:57:52 up 3:09, 1 user, load average: 0.02, 7.11, 17.25
USER TTY     FROM     LOGIN@  IDLE   JCPU   PCPU WHAT
root tty1    -        14:49  6.00s  1.21s  0.02s -bash
```

```
3. `Username`
```
```
From environment variable $USER: root
```

```
4. `ulimit -a`
```
```
core file size (blocks, -c) unlimited
```

(Continued on next page)
Lenovo Global Technology

ThinkSystem SR650 V3
(2.00 GHz, Intel Xeon Silver 4514Y)

<table>
<thead>
<tr>
<th>CPU2017 License</th>
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<td>Lenovo Global Technology</td>
<td>Software Availability: Dec-2023</td>
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</tbody>
</table>

SPECrate®2017_int_base = 266
SPECrate®2017_int_peak = Not Run

Platform Notes (Continued)

- data seg size (kbytes, -d) unlimited
- scheduling priority (-e) 0
- file size (blocks, -f) unlimited
- pending signals (-l) 4127007
- max locked memory (kbytes, -l) 64
- max memory size (kbytes, -m) unlimited
- open files (-n) 1024
- pipe size (512 bytes, -p) 8
- POSIX message queues (bytes, -q) 819200
- real-time priority (-r) 0
- stack size (kbytes, -s) unlimited
- cpu time (seconds, -t) unlimited
- max user processes (-u) 4127007
- virtual memory (kbytes, -v) unlimited
- file locks (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   login -- root
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 -c
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=32 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base --o all intrate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 --configfile
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=32 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
   rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.088/templogs/preenv.intrate.088.0.log --lognum 088.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017-1.1.9-ic2023.2.3

6. /proc/cpuinfo
   model name: INTEL(R) XEON(R) SILVER 4514Y
   vendor_id: GenuineIntel
   cpu family: 6
   model: 207
   stepping: 2
   microcode: 0x21000200
   bugs: spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores: 16
   siblings: 32
   2 physical ids (chips)
   64 processors (hardware threads)
   physical id 0: core ids 0-15
   physical id 1: core ids 0-15
   physical id 0: apicids 0-31
   physical id 1: apicids 128-159
   Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
   virtualized systems. Use the above data carefully.

7. Iscpu

From Iscpu 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

(Continued on next page)
Platform Notes (Continued)

Byte Order: Little Endian
CPU(s): 64
On-line CPU(s) list: 0-63
Model name: INTEL(R) XEON(R) SILVER 4514Y
CPU family: 6
Model: 207
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
Stepping: 2
BogoMIPS: 4000.00
Flags:

Virtualization: VT-x
L1d cache: 1.5 MiB (32 instances)
L1i cache: 1 MiB (32 instances)
L2 cache: 64 MiB (32 instances)
L3 cache: 60 MiB (2 instances)
NUMA node(s): 2
NUMA node0 CPU(s): 0-15,32-47
NUMA node1 CPU(s): 16-31,48-63
Vulnerability Itlb multihit: Not affected
Vulnerability L1t: 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/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srvbds: Not affected
Vulnerability Tsa async abort: Not affected

From lscpu --cache:

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<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>PHYS-LINE</th>
<th>COHERENCY-SIZE</th>
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<td>1.5MiB</td>
<td>12</td>
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<td>64</td>
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<td>L1i</td>
<td>32K</td>
<td>1MiB</td>
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Vulnerability: Not affected

NOTE: a numacl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0-15,32-47
node 0 size: 515751 MB

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

```
node 0 free: 514286 MB
node 1 cpus: 16-31,48-63
node 1 size: 516024 MB
node 1 free: 513455 MB
node distances:
node   0   1
 0:  10  21
 1:  21  10
```

9. /proc/meminfo
   MemTotal: 1056538316 kB

10. who -r
    run-level 3 Jan 30 14:48

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
            iscsi issue-generator kbdsettings klog lvm2-monitor nsd postfix purge-kernels rollback
            rsyslog smartd sshd wicked wicked-auto4 wicked-dhcp4 wicked-dhcp6 wickedd-nanny
    enabled-runtime systemd-remount-fs
    disabled autofs autoyast-Initscripts blk-availability boot-sysctl ca-certificates chrony-wait
            console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info firewall-id gpm
            grub2-once haveged-switch-root ipmi ipmielvd iscsi-init iscsid iiscsiuio issue-add-ssh-keys
            kexec-load ksm kvm_stat lunmask man-db-create multipathd nfs nfs-blkmap mmb ntp-wait nttd
            rdisc rpcbind rpmconfigcheck /rsyncd serial-getty@ smartd_generate_opts smb snmpd snmptrapd
            svnmigrate systemd-boot-check-no-failures systemd-network-generator systemd-sysxext
            systemd-time-wait-sync systemd-timesyncd udisks2
    indirect wicked

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
    security=apparmor

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

15. sysctl
    kernel.numa_balancing  1
    kernel.randomize_va_space 2
    vm.compaction_proactive 20
```

(Continued on next page)
Platform Notes (Continued)

```
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

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

17. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleep_millisecs        60000
   defrag                      1
   max_ptes_none               511
   max_ptes_shared             256
   max_ptes_swap               64
   pages_to_scan               4096
   scan_sleep_millisecs        10000

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

19. Disk information
   SPEC is set to: /home/cpu2017-1.1.9-ic2023.2.3
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      xfs   892G   84G  808G  10% /

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

21. 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 M321R8GA0PB0-CWMKH 64 GB 2 rank 5600, configured at 4400
```

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

8x Samsung M321R8GA0PB0-CWMXH 64 GB 2 rank 5600, configured at 4400

---

22. BIOS
(This section combines info from /sys/devices and dmidecode.)

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<th>BIOS Vendor</th>
<th>Lenovo</th>
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<td>BIOS Revision</td>
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<tr>
<td>Firmware Revision</td>
<td>3.90</td>
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### 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 2023.2.3 Build x
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 2023.2.3 Build x
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 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

---

### Base Compiler Invocation

C benchmarks:
- icx

C++ benchmarks:
- icpx

Fortran benchmarks:
- ifx

---

### Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

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

Copyright 2017-2024 Standard Performance Evaluation Corporation

Lenovo Global Technology
ThinkSystem SR650 V3 (2.00 GHz, Intel Xeon Silver 4514Y)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>266</th>
</tr>
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<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology
Test Date: Jan-2024
Hardware Availability: Feb-2024
Software Availability: Dec-2023

Base Portability Flags (Continued)

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
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/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-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/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-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/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

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-AA.html
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.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-AA.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml
## Lenovo Global Technology

Spec CPU®2017 Integer Rate Result

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<thead>
<tr>
<th>CPU2017 License: 9017</th>
<th>Test Date: Jan-2024</th>
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</table>

ThinkSystem SR650 V3
(2.00 GHz, Intel Xeon Silver 4514Y)

SPECTrate®2017_int_base = 266
SPECTrate®2017_int_peak = Not Run

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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 v1.1.9 on 2024-01-30 04:57:52-0500.
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