Lenovo Global Technology 
ThinkSystem SR650 V3 
(2.00 GHz, Intel Xeon Platinum 8480CL) 

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

SPECspeak®2017_fp_base = 351 
SPECspeak®2017_fp_peak = Not Run 

Test Date: Oct-2023 
Hardware Availability: Nov-2023 
Software Availability: May-2023 

603.bwaves_s 112 
607.cactuBSSN_s 112 
619.lbm_s 112 
621.wrf_s 112 
627.cam4_s 112 
628.pop2_s 112 
638.imagick_s 112 
644.nab_s 112 
649.fotonik3d_s 112 
654.roms_s 112 

--- SPECspeak®2017_fp_base (351) --- 

**Hardware** 
CPU Name: Intel Xeon Platinum 8480CL 
Max MHz: 3800 
Nominal: 2000 
Enabled: 112 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: 105 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: Red Hat Enterprise Linux 9.2 (Plow) (x86_64) 
Compiler: C/C++; Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler for Linux; 
Firmware: Lenovo BIOS Version ESE117F 2.22 released Aug-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**  
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(2.00 GHz, Intel Xeon Platinum 8480CL)

**SPECspeed®2017_fp_base = 351**  
**SPECspeed®2017_fp_peak = Not Run**

<table>
<thead>
<tr>
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## Results Table

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<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
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**SPECspeed®2017_fp_base = 351**  
**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/cpu2017-1.1.9-ic2023.0-2/lib/intel64:/home/cpu2017-1.1.9-ic2023.0-2/je5.0.1-64"
- 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.  
Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
CPU P-state Control set to Legacy
Hyper-Threading set to Disabled
AMP Prefetch set to Enable

Sysinfo program /home/cpu2017-1.1.9-lc2023.0-2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b9ed5c36ae2c92cc097bec197
running on localhost.localdomain Thu Oct 12 02:56:20 2023

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

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1. uname -a
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17. /sys/kernel/mm/transparent_hugepage
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21. /sys/devices/virtual/dmi/id
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Hardware Availability: Nov-2023
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Platform Notes (Continued)

scheduling priority        (-e) 0
file size                  (blocks, -f) unlimited
pending signals            (-i) 2062596
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, -g) 819200
real-time priority         (-r) 0
stack size                 (kbytes, -s) unlimited
cpu time                   (seconds, -t) unlimited
max user processes         (-u) 2062596
virtual memory             (kbytes, -v) unlimited
file locks                 (-x) unlimited

5. sysinfo process ancestry
/usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
login -- root
   -bash
   -bash
runcpu --nobuild --action validate --define default-platform-flags -c
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=112 --tune base -o all --define drop_caches
fpspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=112 --tune base --output_format all --define
drop_caches --nopower --runmode speed --tune base --size refspeed fpspeed --nopreenv --note-preenv
   --logfile $SPEC/tmp/CPU2017.045/templogs/preenv.fpspeed.045.0.log --lognum 045.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2023.0-2

6. /proc/cpuinfo
   model name      : Intel(R) Xeon(R) Platinum 8480CL
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 143
   stepping        : 7
   microcode       : 0x2b0004b1
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swaps eibrs_pbrsb
   cpu cores       : 56
   siblings        : 56
2 physical ids (chips)
112 processors (hardware threads)

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

7. lscpu
   From lscpu from util-linux 2.37.4:
   (Continued on next page)
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**SPEC CPU®2017 Floating Point Speed Result**

**Test Date:** Oct-2023  
**Hardware Availability:** Nov-2023  
**Software Availability:** May-2023

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

**SPECspeed®2017_fp_base =** 351  
**SPECspeed®2017_fp_peak =** Not Run

**Platform Notes (Continued)**

- **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):** 112
- **On-line CPU(s) list:** 0-111
- **Vendor ID:** GenuineIntel
- **BIOS Vendor ID:** Intel(R) Corporation
- **Model name:** Intel(R) Xeon(R) Platinum 8480CL
- **CPU family:** 6
- **Model:** 143
- **Thread(s) per core:** 1
- **Core(s) per socket:** 56
- **Socket(s):** 2
- **Stepping:** 7
- **CPU max MHz:** 3800.0000
- **CPU min MHz:** 800.0000
- **BogoMIPS:** 4000.00
- **Flags:** fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pmrs pse36
  - **L1d cache:** 5.3 MiB (112 instances)
  - **L1i cache:** 3.5 MiB (112 instances)
  - **L2 cache:** 224 MiB (112 instances)
  - **L3 cache:** 210 MiB (2 instances)
  - Vulnerability Itlb multihit: Not affected
  - Vulnerability Lft: Not affected
  - Vulnerability Mds: Not affected
  - Vulnerability Meltdown: Not affected
  - Vulnerability Mnio stale data: Not affected
  - Vulnerability Retbleed: Not affected
  - Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
  - Vulnerability Spectre v1: Mitigation; usercopy/swapps barriers and __user pointer sanitization
  - Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-eIBRS SW sequence
  - Vulnerability Srbds: Not affected
  - Vulnerability Tsa async abort: Not affected

(Continued on next page)
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Platform Notes (Continued)

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<tr>
<th>L2</th>
<th>2M</th>
<th>224M</th>
<th>16 Unified</th>
<th>2</th>
<th>2048</th>
<th>1</th>
<th>64</th>
</tr>
</thead>
<tbody>
<tr>
<td>L3</td>
<td>105M</td>
<td>210M</td>
<td>15 Unified</td>
<td>3</td>
<td>114688</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)
node 0 cpus: 0-55
node 0 size: 257699 MB
node 0 free: 256979 MB
node 1 cpus: 56-111
node 1 size: 257991 MB
node 1 free: 256947 MB
node distances:
node  0  1
0:  10  21
1:  21  10

9. /proc/meminfo
MemTotal: 528067944 kB

10. who -r
run-level 3 Oct 12 02:53

11. Systemd service manager version: systemd 252 (252-13.el9_2)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE   UNIT FILES
enabled  NetworkManager NetworkManager-dispatcher NetworkManager-wait-online atd auditd bluetooth
cronyd crond dBus-broker firewalld getty@ insights-client-boot irqbalance iscsi
iscsi-onboot kdump libstoragegmtd low-memory-monitor lvm2-monitor mdmonitor
microcode multipathd nis-domainname nvme-fc-boot-connections rshcsrcd rsyslog rtkit-daemon
selinux-autorelabel-mark smartd sshd sssd systemd-boot-update systemd-network-generator
systemd-remount-fs

disabled-runtime

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd3,gpt2)/vmlinuz-5.14.0-284.11.1.el9_2.x86_64
root=/dev/mapper/rhel-root
ro
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap
rhgb
quiet

(Continued on next page)
Platform Notes (Continued)

14. cpupower frequency-info
   analyzing CPU 0:
   current policy: frequency should be within 3.80 GHz and 3.80 GHz.
   The governor "performance" may decide which speed to use
   within this range.
   boost state support:
   Supported: yes
   Active: yes

15. tuned-adm active
   Current active profile: throughput-performance

16. sysctl
   kernel.numa_balancing               1
   kernel.randomize_va_space           2
   vm.compartment_proactive            0
   vm.dirty_background_bytes          10
   vm.dirty_background_ratio          0
   vm.dirty_bytes                     3000
   vm.dirty_ratio                     0
   vm.dirty_writeback_centisecs       500
   vm.dirtytime_expire_seconds        10
   vm.extratime_expire_seconds        30000
   vm筏frag.threshold                500
   vm.min_unmapped_ratio              0
   vm.nv_hugepages                    0
   vm.nv_hugepages.mempolicy          0
   vm.nv_overcommit_hugepages         0
   vm.swappiness                      10
   vm.nv_watermark_boost_factor       15000
   vm.nv_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/hugepaged
   alloc_sleep_millisecs 600000
   defrag 1
   max_pges_non 511
   max_pges.shared 256
   max_pges.swap 64
   pages_to.scan 4096
   scan.sleep_millisecs 10000

19. OS release
   From /etc/*-release /etc/*-version
   os-release Red Hat Enterprise Linux 9.4 (Flow)
   redhat-release Red Hat Enterprise Linux release 9.4 (Flow)
   system-release Red Hat Enterprise Linux release 9.4 (Flow)

(Continued on next page)


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20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.0-2
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 819G 22G 797G 3% /home

---

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

---

22. dmidecode
Additional information from dmidecode 3.3 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 M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
8x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

---

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: Lenovo
BIOS Version: ESE117F-2.22
BIOS Date: 08/29/2023
BIOS Revision: 2.22
Firmware Revision: 3.13

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Compiler Version Notes

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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 2023.0.0 Build 20221201
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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
---

Fortran | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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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

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactusBSSN_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 -xsaphirerapids -Ofast -ffast-math
-ffloto -ffpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp

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Base Optimization Flags (Continued)

C benchmarks (continued):
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsapphirerapids -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 -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Benchmarks using Fortran, C, and C++:
-m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-mprefer-vector-width=512 -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-AA.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