



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem SR860 V3
(2.10 GHz, Intel Xeon Platinum 8468H)

SPECrate®2017_fp_base = 1700

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017

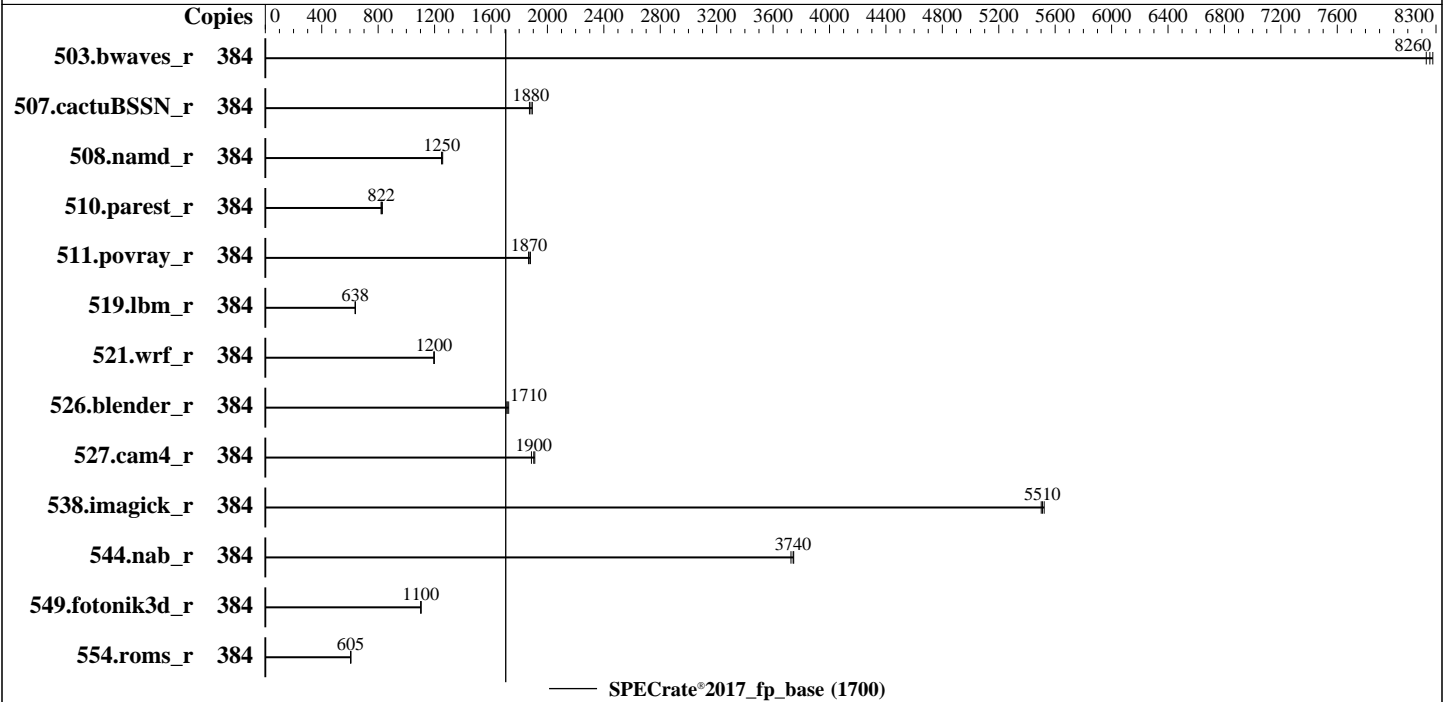
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Aug-2023

Hardware Availability: Jun-2023

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Platinum 8468H
 Max MHz: 3800
 Nominal: 2100
 Enabled: 192 cores, 4 chips, 2 threads/core
 Orderable: 2,4 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: 1 TB (32 x 32 GB 2Rx8 PC5-4800B-R)
 Storage: 1 x 480 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 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
 Parallel: No
 Firmware: Lenovo BIOS Version RSE105E 1.10 released May-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



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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	384	465	8280	466	8260	468	8230							
507.cactuBSSN_r	384	258	1880	257	1890	260	1870							
508.namd_r	384	292	1250	292	1250	290	1260							
510.parest_r	384	1223	822	1210	830	1222	822							
511.povray_r	384	477	1880	479	1870	480	1870							
519.lbm_r	384	634	639	635	638	635	637							
521.wrf_r	384	718	1200	719	1200	719	1200							
526.blender_r	384	341	1710	341	1710	339	1730							
527.cam4_r	384	353	1900	352	1910	356	1890							
538.imagick_r	384	173	5520	174	5500	173	5510							
544.nab_r	384	173	3750	173	3740	173	3730							
549.fotonik3d_r	384	1356	1100	1358	1100	1356	1100							
554.roms_r	384	1009	605	1009	605	1006	606							

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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-ic2023.0/lib/intel64:/home/cpu2017-1.1.9-ic2023.0/je5.0.1-64"
MALLOCONF = "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.

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General Notes (Continued)

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.

jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
CPU P-state Control set to Autonomous
LLC Prefetch set to Disabled
SNC set to SNC4

Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Thu Aug 3 00:46:58 2023

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

Table of contents

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. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
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
00:46:58 up 3:22, 1 user, load average: 0.07, 0.02, 4.94
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 21:34 18.00s 1.55s 0.07s -bash

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Platform Notes (Continued)

3. Username

From environment variable \$USER: root

4. ulimit -a

```
core file size          (blocks, -c) unlimited
data seg size          (kbytes, -d) unlimited
scheduling priority    (-e) 0
file size              (blocks, -f) unlimited
pending signals        (-i) 4126456
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) 4126456
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=384 -c
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=192 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base -o all fprate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=384 --configfile
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=192 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
rate --tune base --size refrate fprate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.015/templogs/preenv.fprate.015.0.log --lognum 015.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2023.0
```

6. /proc/cpuinfo

```
model name      : Intel(R) Xeon(R) Platinum 8468H
vendor_id      : GenuineIntel
cpu family     : 6
model          : 143
stepping      : 8
microcode     : 0x2b0001b0
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores     : 48
siblings      : 96
4 physical ids (chips)
384 processors (hardware threads)
physical id 0: core ids 0-47
physical id 1: core ids 0-47
physical id 2: core ids 0-47
physical id 3: core ids 0-47
physical id 0: apicids 0-95
physical id 1: apicids 128-223
```

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Platform Notes (Continued)

physical id 2: apicids 256-351
physical id 3: apicids 384-479
Caution: /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 2.37.2:

```

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):                384
On-line CPU(s) list:   0-383
Vendor ID:             GenuineIntel
Model name:            Intel(R) Xeon(R) Platinum 8468H
CPU family:            6
Model:                 143
Thread(s) per core:    2
Core(s) per socket:    48
Socket(s):              4
Stepping:              8
BogoMIPS:              4200.00
Flags:                 fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                        clflush 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 cpuid aperfperf tsc_known_freq pni pclmulqdq dtes64 ds_cpl
                        vmx smx est tm2 ssse3 sdbg fma cx16 xtpr 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_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
                        flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2
                        erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
                        clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec
                        xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                        split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts
                        avx512vbmi umip pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq
                        avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid bus_lock_detect
                        cldemote movdiri movdir64b enqcmd fsrm md_clear serialize tsxldtrk pconfig
                        arch_lbr avx512_fp16 amx_tile flush_lld arch_capabilities
Virtualization:        VT-x
L1d cache:             9 MiB (192 instances)
L1i cache:             6 MiB (192 instances)
L2 cache:              384 MiB (192 instances)
L3 cache:              420 MiB (4 instances)
NUMA node(s):         16
NUMA node0 CPU(s):    0-11,192-203
NUMA node1 CPU(s):    12-23,204-215
NUMA node2 CPU(s):    24-35,216-227
NUMA node3 CPU(s):    36-47,228-239
NUMA node4 CPU(s):    48-59,240-251
NUMA node5 CPU(s):    60-71,252-263
NUMA node6 CPU(s):    72-83,264-275
NUMA node7 CPU(s):    84-95,276-287
NUMA node8 CPU(s):    96-107,288-299
NUMA node9 CPU(s):    108-119,300-311
NUMA node10 CPU(s):   120-131,312-323
NUMA node11 CPU(s):   132-143,324-335
NUMA node12 CPU(s):   144-155,336-347

```

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Platform Notes (Continued)

```

NUMA node13 CPU(s):          156-167,348-359
NUMA node14 CPU(s):          168-179,360-371
NUMA node15 CPU(s):          180-191,372-383
Vulnerability Itlb multihit: Not affected
Vulnerability Lltf:          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 Srbds:         Not affected
Vulnerability Tsx async abort: Not affected

```

From lscpu --cache:

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	9M	12	Data	1	64	1	64
L1i	32K	6M	8	Instruction	1	64	1	64
L2	2M	384M	16	Unified	2	2048	1	64
L3	105M	420M	15	Unified	3	114688	1	64

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

```

available: 16 nodes (0-15)
node 0 cpus: 0-11,192-203
node 0 size: 64167 MB
node 0 free: 62569 MB
node 1 cpus: 12-23,204-215
node 1 size: 64505 MB
node 1 free: 63674 MB
node 2 cpus: 24-35,216-227
node 2 size: 64505 MB
node 2 free: 63678 MB
node 3 cpus: 36-47,228-239
node 3 size: 64505 MB
node 3 free: 63669 MB
node 4 cpus: 48-59,240-251
node 4 size: 64505 MB
node 4 free: 63677 MB
node 5 cpus: 60-71,252-263
node 5 size: 64505 MB
node 5 free: 63695 MB
node 6 cpus: 72-83,264-275
node 6 size: 64471 MB
node 6 free: 63650 MB
node 7 cpus: 84-95,276-287
node 7 size: 64505 MB
node 7 free: 63687 MB
node 8 cpus: 96-107,288-299
node 8 size: 64505 MB
node 8 free: 63679 MB
node 9 cpus: 108-119,300-311
node 9 size: 64505 MB
node 9 free: 63499 MB
node 10 cpus: 120-131,312-323
node 10 size: 64505 MB
node 10 free: 63671 MB
node 11 cpus: 132-143,324-335
node 11 size: 64505 MB
node 11 free: 63673 MB

```

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Platform Notes (Continued)

```

node 12 cpus: 144-155,336-347
node 12 size: 64505 MB
node 12 free: 63596 MB
node 13 cpus: 156-167,348-359
node 13 size: 64505 MB
node 13 free: 63680 MB
node 14 cpus: 168-179,360-371
node 14 size: 64505 MB
node 14 free: 63684 MB
node 15 cpus: 180-191,372-383
node 15 size: 64422 MB
node 15 free: 63600 MB
node distances:
node  0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15
0: 10 12 12 12 21 21 21 21 21 21 21 21 21 21 21 21
1: 12 10 12 12 21 21 21 21 21 21 21 21 21 21 21 21
2: 12 12 10 12 21 21 21 21 21 21 21 21 21 21 21 21
3: 12 12 12 10 21 21 21 21 21 21 21 21 21 21 21 21
4: 21 21 21 21 10 12 12 12 21 21 21 21 21 21 21 21
5: 21 21 21 21 12 10 12 12 21 21 21 21 21 21 21 21
6: 21 21 21 21 12 12 12 10 12 21 21 21 21 21 21 21
7: 21 21 21 21 12 12 12 10 21 21 21 21 21 21 21 21
8: 21 21 21 21 21 21 21 10 12 12 12 21 21 21 21 21
9: 21 21 21 21 21 21 21 12 10 12 12 21 21 21 21 21
10: 21 21 21 21 21 21 21 12 12 10 12 21 21 21 21 21
11: 21 21 21 21 21 21 21 12 12 12 10 21 21 21 21 21
12: 21 21 21 21 21 21 21 21 21 21 21 10 12 12 12 12
13: 21 21 21 21 21 21 21 21 21 21 21 12 10 12 12 12
14: 21 21 21 21 21 21 21 21 21 21 21 12 12 10 12 12
15: 21 21 21 21 21 21 21 21 21 21 21 12 12 12 10 12

```

```

-----
9. /proc/meminfo
   MemTotal:      1056397424 kB

```

```

-----
10. who -r
    run-level 3 Aug 2 21:26

```

```

-----
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 cron getty@ haveged irqbalance
issue-generator kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info
firewalld gpm grub2-once haveged-switch-root ipmi ipmievd issue-add-ssh-keys kexec-load
lunmask man-db-create multipathd nfs nfs-blkmap rdisc rpcbind rpmconfigcheck rsyncd
serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
systemd-network-generator systemd-sysexit systemd-time-wait-sync systemd-timesyncd
indirect wickedd

```

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Platform Notes (Continued)

13. Linux kernel boot-time arguments, from /proc/cmdline

```
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=07b494b8-a782-4eba-84f2-ef5cae789da8
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_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
```

16. /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
```

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
```

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Platform Notes (Continued)

19. Disk information

SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 445G 12G 434G 3% /

20. /sys/devices/virtual/dmi/id

Vendor: Lenovo
Product: ThinkSystem SR860 V3
Product Family: ThinkSystem
Serial: None

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:

19x Samsung M321R4GA3BB0-CQKDG 32 GB 2 rank 4800
6x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
4x Samsung M321R4GA3BB0-CQKMG 32 GB 2 rank 4800
3x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

22. BIOS

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

BIOS Vendor: Lenovo
BIOS Version: RSE105E-1.10
BIOS Date: 05/12/2023
BIOS Revision: 1.10
Firmware Revision: 1.10

Compiler Version Notes

C | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(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++ | 508.namd_r(base) 510.parest_r(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 | 511.povray_r(base) 526.blender_r(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
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Lenovo Global Technology

ThinkSystem SR860 V3
(2.10 GHz, Intel Xeon Platinum 8468H)

SPECrate®2017_fp_base = 1700

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Aug-2023

Hardware Availability: Jun-2023

Software Availability: Dec-2022

Compiler Version Notes (Continued)

=====
C++, C, Fortran | 507.cactuBSSN_r(base)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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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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=====
Fortran | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)

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, C | 521.wrf_r(base) 527.cam4_r(base)

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx



SPEC CPU®2017 Floating Point Rate Result

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Base Portability Flags

```

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

```

Base Optimization Flags

C benchmarks:

```

-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

```

C++ benchmarks:

```

-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

```

Fortran benchmarks:

```

-w -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

```

Benchmarks using both Fortran and C:

```

-w -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

```

Benchmarks using both C and C++:

```

-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512

```

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Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):

```
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsaphirerapids -Ofast  
-ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512  
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc  
-L/usr/local/jemalloc64-5.0.1/lib
```

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-W.html>

<http://www.spec.org/cpu2017/flags/Intel-ic2023-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-W.xml>

<http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml>

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Tested with SPEC CPU®2017 v1.1.9 on 2023-08-02 12:46:57-0400.

Report generated on 2023-08-30 09:42:44 by CPU2017 PDF formatter v6716.

Originally published on 2023-08-29.