



# SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

## Lenovo Global Technology

ThinkSystem SD550 V3  
(3.20 GHz, Intel Xeon Gold 5515+)

SPECspeed®2017\_fp\_base = 182

SPECspeed®2017\_fp\_peak = Not Run

CPU2017 License: 9017

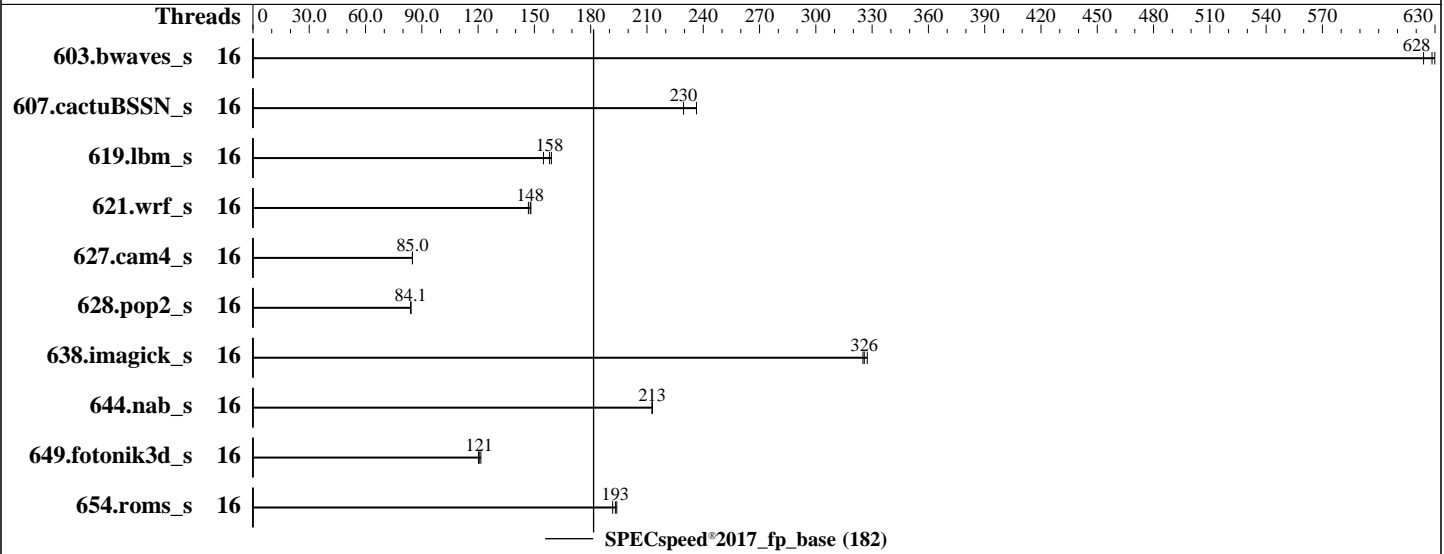
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Mar-2024

Hardware Availability: Mar-2024

Software Availability: Mar-2024



### Hardware

CPU Name: Intel Xeon Gold 5515+  
 Max MHz: 4100  
 Nominal: 3200  
 Enabled: 16 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: 22.5 MB I+D on chip per chip  
 Other: None  
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 4800)  
 Storage: 1 x 480 GB SATA SSD  
 Other: CPU Cooling: Air

### Software

OS: SUSE Linux Enterprise Server 15 SP5  
 Kernel 5.14.21-150500.53-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: Yes  
 Firmware: Lenovo BIOS Version FNE113F 2.20 released Jan-2024  
 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 set to prefer performance at the cost of additional power usage



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## Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	16	93.7	630	94.6	624	<b><u>93.9</u></b>	<b><u>628</u></b>							
607.cactuBSSN_s	16	<b><u>72.6</u></b>	<b><u>230</u></b>	72.6	229	70.5	236							
619.lbm_s	16	33.8	155	<b><u>33.1</u></b>	<b><u>158</u></b>	32.9	159							
621.wrf_s	16	<b><u>89.5</u></b>	<b><u>148</u></b>	90.1	147	89.3	148							
627.cam4_s	16	104	85.0	<b><u>104</u></b>	<b><u>85.0</u></b>	104	85.0							
628.pop2_s	16	141	84.0	141	84.2	<b><u>141</u></b>	<b><u>84.1</u></b>							
638.imagick_s	16	44.1	327	44.4	325	<b><u>44.3</u></b>	<b><u>326</u></b>							
644.nab_s	16	82.1	213	82.1	213	<b><u>82.1</u></b>	<b><u>213</u></b>							
649.fotonik3d_s	16	75.0	121	<b><u>75.6</u></b>	<b><u>121</u></b>	75.8	120							
654.roms_s	16	82.1	192	81.2	194	<b><u>81.5</u></b>	<b><u>193</u></b>							

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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-ic2024.0.2/lib/intel64:/home/cpu2017-1.1.9-ic2024.0.2/je5.0.1-64"  
MALLOCONF = "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.  
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>



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## Platform Notes

BIOS configuration:

Choose Operating Mode set to Maximum Performance

Hyper-Threading set to Disabled

Adjacent Cache Prefetch set to Disabled

AMP Prefetch set to Enable

Sysinfo program /home/cpu2017-1.1.9-ic2024.0.2/bin/sysinfo  
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197  
running on localhost Wed Mar 20 16:52:56 2024

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 (249.16+suse.171.gdad0071f15)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. sysctl
17. /sys/kernel/mm/transparent\_hugepage
18. /sys/kernel/mm/transparent\_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS

-----  
1. uname -a  
Linux localhost 5.14.21-150500.53-default #1 SMP PREEMPT\_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)  
x86\_64 x86\_64 x86\_64 GNU/Linux  
-----

-----  
2. w  
16:52:56 up 1:07, 1 user, load average: 11.35, 14.39, 14.09  
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT  
root tty1 - 16:07 44:16 0.84s 0.00s sh  
Run553-compliant-ic2024.0.2-lin-sapphirerapids-speedfp-base-smt-off-20231213.sh  
-----

-----  
3. Username  
From environment variable \$USER: root  
-----

-----  
4. ulimit -a  
core file size (blocks, -c) unlimited  
data seg size (kbytes, -d) unlimited  
-----

(Continued on next page)



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### Platform Notes (Continued)

```

scheduling priority      (-e) 0
file size                (blocks, -f) unlimited
pending signals         (-i) 4127118
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) 4127118
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
/bin/bash ./run_SD550V3_EMR_new.sh
sh Run553-compliant-ic2024.0.2-lin-sapphirerapids-speedfp-base-smt-off-20231213.sh
runcpu --nobuild --action validate --define default-platform-flags -c
  ic2024.0.2-lin-sapphirerapids-speed-20231213.cfg --define cores=16 --tune base -o all --define drop_caches
  fpspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
  ic2024.0.2-lin-sapphirerapids-speed-20231213.cfg --define cores=16 --tune base --output_format all
  --define drop_caches --nopower --runmode speed --tune base --size refspeed fpspeed --nopreenv
  --note-preenv --logfile $SPEC/tmp/CPU2017.085/templogs/preenv.fpspeed.085.0.log --lognum 085.0
  --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2024.0.2

```

```

-----
6. /proc/cpuinfo
model name      : INTEL(R) XEON(R) GOLD 5515+
vendor_id      : GenuineIntel
cpu family     : 6
model          : 207
stepping       : 2
microcode      : 0x21000200
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
cpu cores      : 8
siblings       : 8
2 physical ids (chips)
16 processors (hardware threads)
physical id 0: core ids 0-7
physical id 1: core ids 0-7
physical id 0: apicids 0,2,4,6,8,10,12,14
physical id 1: apicids 128,130,132,134,136,138,140,142
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 2.37.4:
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Address sizes:          46 bits physical, 57 bits virtual

```

(Continued on next page)



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### Platform Notes (Continued)

```

Byte Order:                Little Endian
CPU(s):                    16
On-line CPU(s) list:      0-15
Vendor ID:                 GenuineIntel
Model name:                INTEL(R) XEON(R) GOLD 5515+
CPU family:                6
Model:                     207
Thread(s) per core:       1
Core(s) per socket:       8
Socket(s):                 2
Stepping:                  2
BogoMIPS:                  6400.00
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 aperfmperf 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
                           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 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_l1d arch_capabilities

Virtualization:           VT-x
L1d cache:                768 KiB (16 instances)
L1i cache:                512 KiB (16 instances)
L2 cache:                 32 MiB (16 instances)
L3 cache:                 45 MiB (2 instances)
NUMA node(s):             2
NUMA node0 CPU(s):        0-7
NUMA node1 CPU(s):        8-15
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:        Not affected
Vulnerability Mds:         Not affected
Vulnerability Meltdown:    Not affected
Vulnerability Mmio stale data: Not affected
Vulnerability Retbleed:    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, PBRSE-eIBRS SW
                           sequence
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	768K	12	Data	1	64	1	64
L1i	32K	512K	8	Instruction	1	64	1	64
L2	2M	32M	16	Unified	2	2048	1	64
L3	22.5M	45M	15	Unified	3	24576	1	64

8. numactl --hardware

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

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### Platform Notes (Continued)

```
available: 2 nodes (0-1)
node 0 cpus: 0-7
node 0 size: 515757 MB
node 0 free: 514292 MB
node 1 cpus: 8-15
node 1 size: 516051 MB
node 1 free: 515064 MB
node distances:
node 0 1
0: 10 21
1: 21 10
```

```
-----
9. /proc/meminfo
MemTotal: 1056573132 kB
```

```
-----
10. who -r
run-level 3 Mar 20 15:45
```

```
-----
11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
Default Target Status
multi-user degraded
```

```
-----
12. Failed units, from systemctl list-units --state=failed
UNIT LOAD ACTIVE SUB DESCRIPTION
* ntp_sync.service loaded failed failed ntp_sync.service
```

```
-----
13. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron getty@ irqbalance issue-generator
kbdsettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd
systemd-pstore wickedd-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
firewallld gpm grub2-once haveged haveged-switch-root ipmi ipmievd issue-add-ssh-keys
kexec-load lunmask man-db-create multipathd nfs nfs-blkmap rpcbind rpmconfigcheck rsyncd
serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd
generated ntp_sync
indirect wickedd
```

```
-----
14. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
root=UUID=1f1165ee-d57c-4884-9a69-769de0319f56
splash=silent
mitigations=auto
quiet
security=apparmor
```

```
-----
15. cpupower frequency-info
analyzing CPU 0:
Unable to determine current policy
boost state support:
```

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### Platform Notes (Continued)

Supported: yes  
Active: yes

```

-----
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+madvise [madvise] never
enabled     [always] madvise never
hpage_pmd_size 2097152
shmem_enabled always within_size advise [never] deny force

```

```

-----
18. /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

```

```

-----
19. OS release
From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP5

```

```

-----
20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2024.0.2
Filesystem  Type  Size  Used Avail Use% Mounted on
/dev/sda3   xfs   446G  69G  377G  16% /

```

```

-----
21. /sys/devices/virtual/dmi/id
Vendor:      Lenovo
Product:     ThinkSystem SD550 V3
Product Family: ThinkSystem
Serial:      1234567890

```

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### Platform Notes (Continued)

#### 22. dmidecode

Additional information from dmidecode 3.4 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:

9x Samsung M321R8GA0PB0-CWMKH 64 GB 2 rank 5600, configured at 4800  
7x Samsung M321R8GA0PB0-CWMXH 64 GB 2 rank 5600, configured at 4800

#### 23. BIOS

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

BIOS Vendor: Lenovo  
BIOS Version: FNE113F-2.20  
BIOS Date: 01/02/2024  
BIOS Revision: 2.20  
Firmware Revision: 1.10

### 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 2024.0.2 Build 20231213  
Copyright (C) 1985-2023 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 2024.0.2 Build 20231213  
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.  
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.  
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.  
=====

=====  
Fortran | 603.bwaves\_s(base) 649.fotonik3d\_s(base) 654.roms\_s(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.  
=====

=====  
Fortran, C | 621.wrf\_s(base) 627.cam4\_s(base) 628.pop2\_s(base)  
=====

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213  
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## 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.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:

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

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsaphirerapids -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:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xsaphirerapids -Ofast -ffast-math
```

(Continued on next page)



# SPEC CPU®2017 Floating Point Speed Result

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## Lenovo Global Technology

SPECspeed®2017\_fp\_base = 182

ThinkSystem SD550 V3  
(3.20 GHz, Intel Xeon Gold 5515+)

SPECspeed®2017\_fp\_peak = Not Run

**CPU2017 License:** 9017

**Test Date:** Mar-2024

**Test Sponsor:** Lenovo Global Technology

**Hardware Availability:** Mar-2024

**Tested by:** Lenovo Global Technology

**Software Availability:** Mar-2024

## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-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++:

```
-w -std=c++14 -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
```

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-ic2024-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-ic2024-official-linux64.xml>

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