



SPEC CPU®2017 Floating Point Speed Result

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Lenovo Global Technology

ThinkSystem SR630 V4
(2.20 GHz, Intel Xeon 6780E)

SPECspeed®2017_fp_base = 326

SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 9017

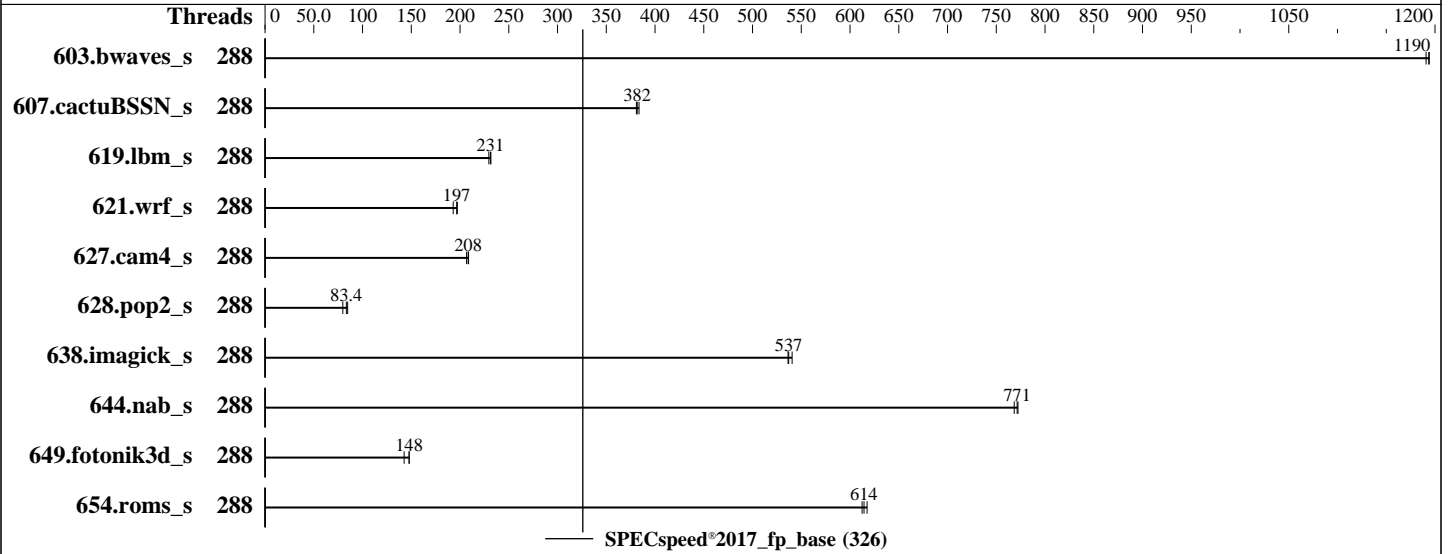
Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Aug-2024

Hardware Availability: Nov-2024

Software Availability: Aug-2024



Hardware

CPU Name: Intel Xeon 6780E
 Max MHz: 3000
 Nominal: 2200
 Enabled: 288 cores, 2 chips
 Orderable: 1,2 chips
 Cache L1: 64 KB I + 32 KB D on chip per core
 L2: 4 MB I+D on chip per core
 L3: 108 MB I+D on chip per chip
 Other: None
 Memory: 512 GB (16 x 32 GB 2Rx8 PC5-6400B-R)
 Storage: 1 x 3.84 TB NVME SSD
 Other: CPU Cooling: Air

Software

OS: Red Hat Enterprise Linux 9.4 (Plow)
 Kernel 5.14.0-427.13.1.el9_4.x86_64
 Compiler: C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;
 Parallel: Yes
 Firmware: Lenovo BIOS Version IHE1030 0.20 released Aug-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	288	49.5	1190	<u>49.4</u>	<u>1190</u>	49.4	1190							
607.cactuBSSN_s	288	43.8	381	<u>43.7</u>	<u>382</u>	43.5	384							
619.lbm_s	288	<u>22.7</u>	<u>231</u>	22.6	232	22.8	230							
621.wrf_s	288	<u>67.3</u>	<u>197</u>	68.5	193	67.1	197							
627.cam4_s	288	42.9	207	42.5	209	<u>42.6</u>	<u>208</u>							
628.pop2_s	288	149	79.8	140	84.7	<u>142</u>	<u>83.4</u>							
638.imagick_s	288	26.7	541	26.9	536	<u>26.9</u>	<u>537</u>							
644.nab_s	288	<u>22.6</u>	<u>771</u>	22.6	772	22.7	768							
649.fotonik3d_s	288	<u>61.7</u>	<u>148</u>	63.9	143	61.7	148							
654.roms_s	288	25.5	617	25.7	612	<u>25.6</u>	<u>614</u>							

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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,1,0"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-ic2024.1/lib/intel64:/home/cpu2017-1.1.9-ic2024.1/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.
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 Workload Profile set to General Computing - Max Performance

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Platform Notes (Continued)

DCU IP Prefetcher set to Disabled

Sysinfo program /home/cpu2017-1.1.9-ic2024.1/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Thu Aug 8 02:15:17 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 252 (252-32.el9_4)
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.localdomain 5.14.0-427.13.1.el9_4.x86_64 #1 SMP PREEMPT_DYNAMIC Wed Apr 10 10:29:16 EDT 2024 x86_64 x86_64 x86_64 GNU/Linux

2. w
02:15:17 up 11:35, 1 user, load average: 8.88, 126.20, 192.97
USER TTY LOGIN@ IDLE JCPU PCPU WHAT
root tty1 14:40 8:50m 1.29s 0.00s /bin/bash ./speccpu_hydra.sh

3. Username
From environment variable \$USER: root

4. ulimit -a
real-time non-blocking time (microseconds, -R) unlimited
core file size (blocks, -c) 0
data seg size (kbytes, -d) unlimited
scheduling priority (-e) 0
file size (blocks, -f) unlimited
pending signals (-i) 2062363
max locked memory (kbytes, -l) unlimited

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Platform Notes (Continued)

```

max memory size          (kbytes, -m) unlimited
open files                (-n) 102400
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) 2062363
virtual memory            (kbytes, -v) unlimited
file locks                (-x) unlimited

```

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 3l
login -- root
-bash
/bin/bash ./speccpu_hydra.sh
/bin/bash ./speccpu_hydra.sh
runcpu --nobuild --action validate --define default-platform-flags -c
ic2024.1-lin-sierraforest-speed-20240308.cfg --define cores=288 --tune base -o all --define smt-on
--define drop_caches fpspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
ic2024.1-lin-sierraforest-speed-20240308.cfg --define cores=288 --tune base --output_format all --define
smt-on --define drop_caches --nopower --runmode speed --tune base --size refspeed fpspeed --nopreenv
--note-preenv --logfile $SPEC/tmp/CPU2017.335/templogs/preenv.fpspeed.335.0.log --lognum 335.0
--from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2024.1

```

```

-----
6. /proc/cpuinfo
model name      : Intel(R) Xeon(R) 6780E
vendor_id      : GenuineIntel
cpu family     : 6
model          : 175
stepping       : 3
microcode      : 0x3000211
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores      : 144
siblings       : 144
2 physical ids (chips)
288 processors (hardware threads)
physical id 0: core ids 0-143
physical id 1: core ids 0-143
physical id 0: apicids
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110,112,114,116,118,120,122,124,126,128,130,1
32,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,180,182,18
4,186,188,190,192,194,196,198,200,202,204,206,208,210,212,214,216,218,220,222,224,226,228,230,232,234,236
,238,240,242,244,246,248,250,252,254,256,258,260,262,264,266,268,270,272,274,276,278,280,282,284,286
physical id 1: apicids
512,514,516,518,520,522,524,526,528,530,532,534,536,538,540,542,544,546,548,550,552,554,556,558,560,562,5
64,566,568,570,572,574,576,578,580,582,584,586,588,590,592,594,596,598,600,602,604,606,608,610,612,614,61
6,618,620,622,624,626,628,630,632,634,636,638,640,642,644,646,648,650,652,654,656,658,660,662,664,666,668
,670,672,674,676,678,680,682,684,686,688,690,692,694,696,698,700,702,704,706,708,710,712,714,716,718,720,
722,724,726,728,730,732,734,736,738,740,742,744,746,748,750,752,754,756,758,760,762,764,766,768,770,772,7
74,776,778,780,782,784,786,788,790,792,794,796,798
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
virtualized systems. Use the above data carefully.

```

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Platform Notes (Continued)

7. lscpu

From lscpu from util-linux 2.37.4:

```

Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Address sizes:        52 bits physical, 48 bits virtual
Byte Order:           Little Endian
CPU(s):               288
On-line CPU(s) list: 0-287
Vendor ID:            GenuineIntel
BIOS Vendor ID:      Intel(R) Corporation
Model name:           Intel(R) Xeon(R) 6780E
BIOS Model name:     Intel(R) Xeon(R) 6780E
CPU family:           6
Model:                175
Thread(s) per core:  1
Core(s) per socket:  144
Socket(s):            2
Stepping:             3
BogoMIPS:             4400.00
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
                    cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow flexpriority
                    ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid
                    cqm rdt_a rdseed adx smap clflushopt clwb intel_pt sha_ni xsaveopt
                    xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
                    split_lock_detect avx_vnni lam wbnoinvd dtherm ida arat pln pts vmmi
                    umip pku ospke waitpkg gfni vaes vpclmulqdq tme rdpid bus_lock_detect
                    cldemote movdiri movdir64b enqcmd fsrm md_clear serialize pconfig
                    arch_lbr ibt flush_lld arch_capabilities

Virtualization:       VT-x
L1d cache:           9 MiB (288 instances)
L1i cache:           18 MiB (288 instances)
L2 cache:            288 MiB (72 instances)
L3 cache:            216 MiB (2 instances)
NUMA node(s):        2
NUMA node0 CPU(s):  0-143
NUMA node1 CPU(s):  144-287
Vulnerability Gather data sampling: Not affected
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 rstack overflow: Not affected
Vulnerability Spec store bypass:    Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1:           Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2:           Mitigation; Enhanced / Automatic IBRS, IBPB conditional, RSB filling,
                    PBRSE-eIBRS Not affected
Vulnerability Srbds:                Not affected
Vulnerability Tsx async abort:      Not affected

```

From lscpu --cache:

(Continued on next page)



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Platform Notes (Continued)

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	32K	9M	8	Data	1	64	1	64
L1i	64K	18M	8	Instruction	1	128	1	64
L2	4M	288M	16	Unified	2	4096	1	64
L3	108M	216M	12	Unified	3	147456	1	64

8. numactl --hardware

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

```

available: 2 nodes (0-1)
node 0 cpus: 0-143
node 0 size: 257644 MB
node 0 free: 256032 MB
node 1 cpus: 144-287
node 1 size: 257985 MB
node 1 free: 255729 MB
node distances:
node  0  1
  0: 10 21
  1: 21 10

```

9. /proc/meminfo

MemTotal: 528005320 kB

10. who -r

run-level 3 Aug 7 14:40

11. Systemd service manager version: systemd 252 (252-32.el9_4)

```

Default Target Status
multi-user      degraded

```

12. Failed units, from systemctl list-units --state=failed

```

UNIT                                LOAD    ACTIVE SUB    DESCRIPTION
* dnf-makecache.service             loaded failed failed dnf makecache

```

13. Services, from systemctl list-unit-files

```

STATE      UNIT FILES
enabled    NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
           dbus-broker firewalld getty@ insights-client-boot irqbalance kdump low-memory-monitor
           mdmmonitor microcode nis-domainname nvme-fc-boot-connections rhsmcertd rsyslog rtkit-daemon
           selinux-autorelabel-mark sshd sssd systemd-boot-update systemd-network-generator udisks2
           upower
enabled-runtime systemd-remount-fs
disabled   canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot
           chrony-wait chronyd-restricted console-getty cpupower debug-shell dnf-system-upgrade
           kvm_stat man-db-restart-cache-update nftables nvmmf-autoconnect pesign rdisc rhcd rhsm
           rhsm-facts rpmdb-rebuild selinux-check-proper-disable serial-getty@ sshd-keygen@
           systemd-boot-check-no-failures systemd-pstore systemd-sysex
generated  jexec
indirect   sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate
           systemd-sysupdate-reboot

```

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

BOOT_IMAGE=(hd0,gpt2)/boot/vmlinuz-5.14.0-427.13.1.el9_4.x86_64

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Platform Notes (Continued)

```
root=UUID=218263b5-b938-4bb9-acd2-fdd6e13af967
ro
resume=UUID=28b98cc0-6b11-4f02-b151-4d764447b0f5
```

```
-----
15. cpupower frequency-info
analyzing CPU 151:
  Unable to determine current policy
  boost state support:
    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+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_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      Red Hat Enterprise Linux 9.4 (Plow)
redhat-release  Red Hat Enterprise Linux release 9.4 (Plow)
system-release  Red Hat Enterprise Linux release 9.4 (Plow)
```

```
-----
20. Disk information
```

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Platform Notes (Continued)

SPEC is set to: /home/cpu2017-1.1.9-ic2024.1
Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme1nlp4 xfs 3.5T 41G 3.4T 2% /home

21. /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR630 V4
Product Family: ThinkSystem
Serial: 0987654321

22. dmidecode
Additional information from dmidecode 3.5 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:
16x Samsung M321R4GA3PB2-CCPEC 32 GB 2 rank 6400

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:
BIOS Version: IHE1030-0.20
BIOS Date: 08/01/2024
BIOS Revision: 0.20
Firmware Revision: 0.38

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 2024.1.0 Build 20240308
Copyright (C) 1985-2024 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 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
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=====
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 2024.1.0 Build 20240308
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=====
Fortran, C | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)

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Compiler Version Notes (Continued)

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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 -xsierraforest -Ofast -ffast-math
 -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
 -DSPEC_OPENMP -Wno-implicit-int -L/usr/local/jemalloc64-5.0.1/lib
 -ljemalloc

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

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Lenovo Global Technology

ThinkSystem SR630 V4
(2.20 GHz, Intel Xeon 6780E)

SPECspeed®2017_fp_base = 326

SPECspeed®2017_fp_peak = Not Run

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Aug-2024

Hardware Availability: Nov-2024

Software Availability: Aug-2024

Base Optimization Flags (Continued)

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -DSPEC_OPENMP -xsierraforest -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 -xsierraforest -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -Wno-implicit-int -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 -xsierraforest -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-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-Birchstream-A.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-Birchstream-A.xml>
<http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.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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