



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECspeed®2017_fp_base = 39.7

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_peak = 40.0

CPU2017 License: 9017

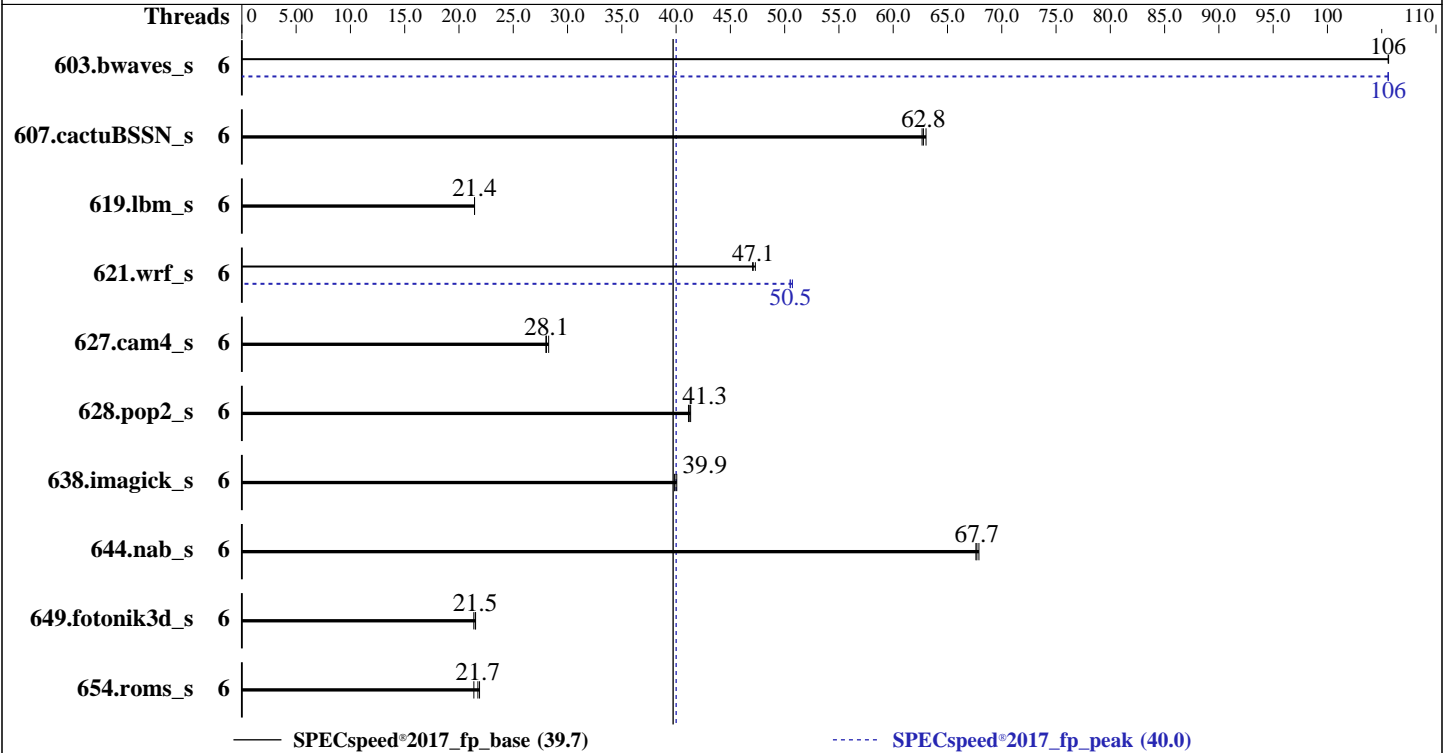
Test Date: Jun-2022

Test Sponsor: Lenovo Global Technology

Hardware Availability: Apr-2022

Tested by: Lenovo Global Technology

Software Availability: Jun-2021



Hardware

CPU Name: Intel Xeon E-2356G
 Max MHz: 5000
 Nominal: 3200
 Enabled: 6 cores, 1 chip
 Orderable: 1 chip
 Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 12 MB I+D on chip per chip
 Other: None
 Memory: 64 GB (2 x 32 GB 2Rx8 PC4-3200AA-E)
 Storage: 1 x 960 GB SATA SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP3 (x86_64)
 Kernel 5.3.18-57-default
 Compiler: Fortran: Version 2021.1 of Intel Fortran Compiler Classic Build 20201112 for Linux;
 C/C++: Version 2021.1 of Intel C/C++ Compiler Classic Build 20201112 for Linux
 Parallel: Yes
 Firmware: Lenovo BIOS Version TQE104H 1.01 released Jun-2022 tested as TQE103G 1.01 Apr-2022
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 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

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECSpeed®2017_fp_base = 39.7

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECSpeed®2017_fp_peak = 40.0

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

Test Date: Jun-2022
Hardware Availability: Apr-2022
Software Availability: Jun-2021

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	6	559	106	559	106	559	106	6	559	106	559	106	559	106
607.cactuBSSN_s	6	265	63.0	266	62.7	266	62.8	6	265	63.0	266	62.7	266	62.8
619.lbm_s	6	244	21.4	244	21.4	244	21.4	6	244	21.4	244	21.4	244	21.4
621.wrf_s	6	280	47.3	281	47.1	281	47.0	6	261	50.7	262	50.5	262	50.5
627.cam4_s	6	314	28.3	316	28.0	316	28.1	6	314	28.3	316	28.0	316	28.1
628.pop2_s	6	287	41.3	289	41.1	288	41.3	6	287	41.3	289	41.1	288	41.3
638.imagick_s	6	360	40.1	362	39.9	362	39.9	6	360	40.1	362	39.9	362	39.9
644.nab_s	6	257	67.9	258	67.7	258	67.6	6	257	67.9	258	67.7	258	67.6
649.fotonik3d_s	6	423	21.5	424	21.5	427	21.4	6	423	21.5	424	21.5	427	21.4
654.roms_s	6	719	21.9	724	21.7	737	21.4	6	719	21.9	724	21.7	737	21.4

SPECSpeed®2017_fp_base = **39.7**

SPECSpeed®2017_fp_peak = **40.0**

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/cpu2017-1.1.8-ic2021.1-revA-updatel/lib/intel64:/home/cpu2017-1.1
.8-ic2021.1-revA-updatel/je5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Redhat Enterprise Linux 8.0
Transparent Huge Pages disabled by default
echo never > /sys/kernel/mm/transparent_hugepage/enabled
echo never > /sys/kernel/mm/transparent_hugepage/defrag
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.

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECspeed®2017_fp_base = 39.7

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_peak = 40.0

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

Test Date: Jun-2022
Hardware Availability: Apr-2022
Software Availability: Jun-2021

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.

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
Hyper-Threading set to Disabled

Sysinfo program /home/cpu2017-1.1.8-ic2021.1-revA-updatel/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d

running on node1 Wed Jun 1 22:14:00 2022

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

For more information on this section, see

<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

model name : Intel(R) Xeon(R) E-2356G CPU @ 3.20GHz

1 "physical id"s (chips)

6 "processors"

cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)

cpu cores : 6

siblings : 6

physical 0: cores 0 1 2 3 4 5

From lscpu from util-linux 2.36.2:

Architecture: x86_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

Address sizes: 39 bits physical, 48 bits virtual

CPU(s): 6

On-line CPU(s) list: 0-5

Thread(s) per core: 1

Core(s) per socket: 6

Socket(s): 1

NUMA node(s): 1

Vendor ID: GenuineIntel

CPU family: 6

Model: 167

Model name: Intel(R) Xeon(R) E-2356G CPU @ 3.20GHz

Stepping: 1

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECspeed®2017_fp_base = 39.7

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_peak = 40.0

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

Test Date: Jun-2022
Hardware Availability: Apr-2022
Software Availability: Jun-2021

Platform Notes (Continued)

```

CPU MHz: 4800.000
BogoMIPS: 6384.00
Virtualization: VT-x
L1d cache: 288 KiB
L1i cache: 192 KiB
L2 cache: 3 MiB
L3 cache: 12 MiB
NUMA node0 CPU(s): 0-5
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: 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
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 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault epb invpcid_single ssbd ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2 erms invpcid mpx avx512f avx512dq rdseed adx smap avx512ifma clflushopt intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves dtherm ida arat pln pts avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq rdpid fsrm md_clear flush_lld arch_capabilities

```

From `lscpu --cache:`

NAME	ONE-SIZE	ALL-SIZE	WAYS	TYPE	LEVEL	SETS	PHY-LINE	COHERENCY-SIZE
L1d	48K	288K	12	Data	1	64	1	64
L1i	32K	192K	8	Instruction	1	64	1	64
L2	512K	3M	8	Unified	2	1024	1	64
L3	12M	12M	16	Unified	3	12288	1	64

`/proc/cpuinfo` cache data
cache size : 12288 KB

From `numactl --hardware`

WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0 1 2 3 4 5

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_base = 39.7

SPECspeed®2017_fp_peak = 40.0

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

Test Date: Jun-2022
Hardware Availability: Apr-2022
Software Availability: Jun-2021

Platform Notes (Continued)

```
node 0 size: 64233 MB
node 0 free: 62956 MB
node distances:
node 0
0: 10
```

```
From /proc/meminfo
MemTotal:      65775564 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
From /etc/*release* /etc/*version*
os-release:
NAME="SLES"
VERSION="15-SP3"
VERSION_ID="15.3"
PRETTY_NAME="SUSE Linux Enterprise Server 15 SP3"
ID="sles"
ID_LIKE="suse"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:15:sp3"
```

```
uname -a:
Linux node1 5.3.18-57-default #1 SMP Wed Apr 28 10:54:41 UTC 2021 (ba3c2e9) x86_64
x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):	Not affected
CVE-2018-3620 (L1 Terminal Fault):	Not affected
Microarchitectural Data Sampling:	Not affected
CVE-2017-5754 (Meltdown):	Not affected
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

```
run-level 3 Jun 1 16:28
```

```
SPEC is set to: /home/cpu2017-1.1.8-ic2021.1-revA-update1
Filesystem      Type      Size  Used Avail Use% Mounted on
```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_base = 39.7

SPECspeed®2017_fp_peak = 40.0

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

Test Date: Jun-2022
Hardware Availability: Apr-2022
Software Availability: Jun-2021

Platform Notes (Continued)

```
/dev/sda2      xfs      894G  118G  777G  14% /
```

```
From /sys/devices/virtual/dmi/id
Vendor:         Lenovo
Product:        ThinkSystem ST250 V2
Product Family: ThinkSystem
Serial:         1234567890
```

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:
2x Micron Technology 18ASF4G72AZ-3G2B1 32 GB 2 rank 3200

BIOS:
BIOS Vendor: Lenovo
BIOS Version: TQE103G-1.01
BIOS Date: 04/19/2022
BIOS Revision: 1.1
Firmware Revision: 1.96

(End of data from sysinfo program)

Compiler Version Notes

```
=====
C | 619.lbm_s(base, peak) 638.imagick_s(base, peak)
  | 644.nab_s(base, peak)
=====
```

```
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====
```

```
=====
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
=====
```

```
Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECspeed®2017_fp_base = 39.7

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_peak = 40.0

CPU2017 License: 9017

Test Date: Jun-2022

Test Sponsor: Lenovo Global Technology

Hardware Availability: Apr-2022

Tested by: Lenovo Global Technology

Software Availability: Jun-2021

Compiler Version Notes (Continued)

Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

```

=====
Fortran          | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
                  | 654.roms_s(base, peak)
=====

```

```

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

```

```

=====
Fortran, C       | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
                  | 628.pop2_s(base, peak)
=====

```

```

Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
Intel(R) 64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
=====

```

Base Compiler Invocation

C benchmarks:

icc

Fortran benchmarks:

ifort

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

Base Portability Flags

```

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64

```

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECspeed®2017_fp_base = 39.7

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_peak = 40.0

CPU2017 License: 9017

Test Date: Jun-2022

Test Sponsor: Lenovo Global Technology

Hardware Availability: Apr-2022

Tested by: Lenovo Global Technology

Software Availability: Jun-2021

Base Portability Flags (Continued)

```

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 -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries

```

Fortran benchmarks:

```

-m64 -Wl,-z,muldefs -DSPEC_OPENMP -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-nostandard-realloc-lhs -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

```

Benchmarks using both Fortran and C:

```

-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

```

Benchmarks using Fortran, C, and C++:

```

-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX2 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

```

Peak Compiler Invocation

C benchmarks:

icc

Fortran benchmarks:

ifort

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECspeed®2017_fp_base = 39.7

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_peak = 40.0

CPU2017 License: 9017

Test Date: Jun-2022

Test Sponsor: Lenovo Global Technology

Hardware Availability: Apr-2022

Tested by: Lenovo Global Technology

Software Availability: Jun-2021

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

ifort icc

Benchmarks using Fortran, C, and C++:

icpc icc ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: -m64 -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
-DSPEC_SUPPRESS_OPENMP -DSPEC_OPENMP -ipo -xCORE-AVX2
-O3 -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf_s: -m64 -std=c11 -Wl,-z,muldefs -prof-gen(pass 1)
-prof-use(pass 2) -ipo -xCORE-AVX2 -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
-DSPEC_SUPPRESS_OPENMP -qopenmp -DSPEC_OPENMP
-mbranches-within-32B-boundaries -nostandard-realloc-lhs
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

(Continued on next page)



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

Lenovo Global Technology

ThinkSystem ST250 V2
(3.20 GHz, Intel Xeon E-2356G)

SPECspeed®2017_fp_base = 39.7

SPECspeed®2017_fp_peak = 40.0

CPU2017 License: 9017

Test Sponsor: Lenovo Global Technology

Tested by: Lenovo Global Technology

Test Date: Jun-2022

Hardware Availability: Apr-2022

Software Availability: Jun-2021

Peak Optimization Flags (Continued)

627.cam4_s: basepeak = yes

628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN_s: basepeak = yes

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-RocketB-A.html>

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.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-RocketB-A.xml>

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

Tested with SPEC CPU®2017 v1.1.8 on 2022-06-01 10:13:59-0400.

Report generated on 2022-06-21 17:29:46 by CPU2017 PDF formatter v6442.

Originally published on 2022-06-21.