



SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Lenovo Global Technology

SPECrate®2017_fp_base = 516

ThinkSystem SR850
(2.20 GHz, Intel Xeon Platinum 8276M)

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017

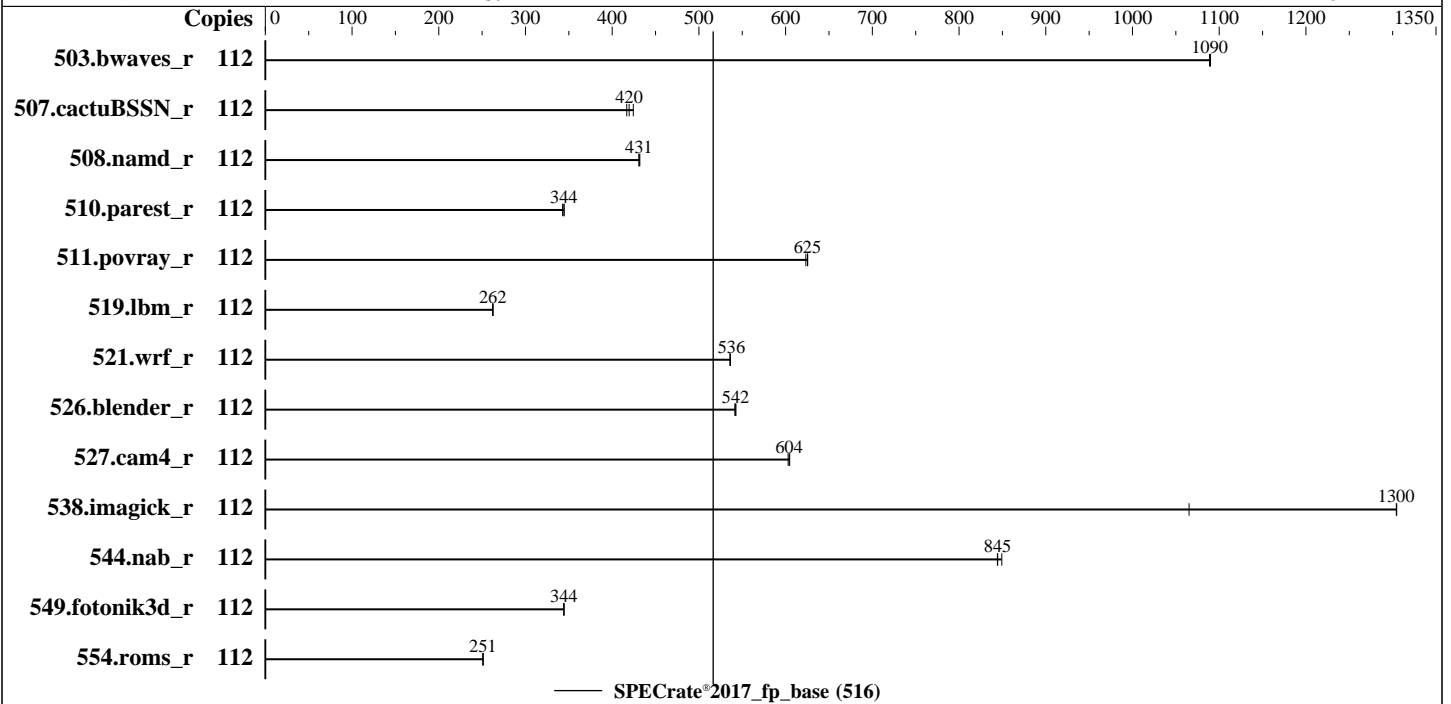
Test Date: Sep-2019

Test Sponsor: Lenovo Global Technology

Hardware Availability: Apr-2019

Tested by: Lenovo Global Technology

Software Availability: May-2019



Hardware

CPU Name: Intel Xeon Platinum 8276M
 Max MHz: 4000
 Nominal: 2200
 Enabled: 112 cores, 4 chips
 Orderable: 2,4 chips
 Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 38.5 MB I+D on chip per chip
 Other: None
 Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2933Y-R)
 Storage: 1 x 800 GB SATA SSD
 Other: None

Software

OS: SUSE Linux Enterprise Server 12 SP4 (x86_64)
 Kernel 4.12.14-94.41-default
 Compiler: C/C++: Version 19.0.4.227 of Intel C/C++
 Compiler for Linux;
 Fortran: Version 19.0.4.227 of Intel Fortran
 Compiler for Linux
 Parallel: No
 Firmware: Lenovo BIOS Version TEE142E 2.30 released Aug-2019
 tested as TEE141E 2.30 Jul-2019
 File System: btrfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: None
 Power Management: --



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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	112	1030	1090	1031	1090	1031	1090							
507.cactuBSSN_r	112	338	420	340	417	334	424							
508.namd_r	112	246	432	247	431	247	431							
510.parest_r	112	850	345	851	344	855	343							
511.povray_r	112	418	625	418	625	420	623							
519.lbm_r	112	450	262	450	262	450	262							
521.wrf_r	112	468	536	468	536	468	536							
526.blender_r	112	315	542	315	541	314	543							
527.cam4_r	112	324	605	325	603	324	604							
538.imagick_r	112	214	1300	261	1070	213	1300							
544.nab_r	112	223	845	222	849	223	844							
549.fotonik3d_r	112	1267	344	1268	344	1268	344							
554.roms_r	112	709	251	709	251	709	251							

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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"

General Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2017-1.0.5-ic19.0u4/lib/intel64"

Binaries compiled on a system with 1x Intel Core i9-799X CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.5
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.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3640 (Spectre variant 3a) is mitigated in the system as tested and documented.
Yes: The test sponsor attests, as of date of publication, that CVE-2018-3639 (Spectre variant 4) is mitigated in the system as tested and documented.

Platform Notes

BIOS configuration:
Choose Operating Mode set to Maximum Performance
Choose Operating Mode set to Custom Mode
C-States set to Legacy
Hyper-Threading set to Disable
SNC set to Enable
Sysinfo program /home/cpu2017-1.0.5-ic19.0u4/bin/sysinfo
Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
running on linux-9o83 Tue Sep 10 03:36:05 2019

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) Platinum 8276M CPU @ 2.20GHz
4 "physical id"s (chips)
112 "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 : 28
siblings : 28
physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30
physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27 28 29 30

From lscpu:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian

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Platform Notes (Continued)

```

CPU(s): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 1
Core(s) per socket: 28
Socket(s): 4
NUMA node(s): 8
Vendor ID: GenuineIntel
CPU family: 6
Model: 85
Model name: Intel(R) Xeon(R) Platinum 8276M CPU @ 2.20GHz
Stepping: 6
CPU MHz: 2200.000
CPU max MHz: 4000.0000
CPU min MHz: 1000.0000
BogoMIPS: 4400.00
Virtualization: VT-x
L1d cache: 32K
L1i cache: 32K
L2 cache: 1024K
L3 cache: 39424K
NUMA node0 CPU(s): 0-3,7-9,14-17,21-23
NUMA node1 CPU(s): 4-6,10-13,18-20,24-27
NUMA node2 CPU(s): 28-31,35-37,42-45,49-51
NUMA node3 CPU(s): 32-34,38-41,46-48,52-55
NUMA node4 CPU(s): 56-59,63-65,70-73,77-79
NUMA node5 CPU(s): 60-62,66-69,74-76,80-83
NUMA node6 CPU(s): 84-87,91-93,98-101,105-107
NUMA node7 CPU(s): 88-90,94-97,102-104,108-111
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
aperfmpperf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtpr pdc_m 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 cdp_l3
invpcid_single intel_ppin ssbd mba ibrs ibpb stibp tpr_shadow vnmi flexpriority ept
vpid fsgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm cqm mpx rdt_a
avx512f avx512dq rdseed adx smap clflushopt clwb intel_pt avx512cd avx512bw avx512vl
xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local
dtherm ida arat pln pts pku ospke avx512_vnni flush_lld arch_capabilities

```

```
/proc/cpuinfo cache data
cache size : 39424 KB
```

```
From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
physical chip.
available: 8 nodes (0-7)
node 0 cpus: 0 1 2 3 7 8 9 14 15 16 17 21 22 23
```

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Platform Notes (Continued)

```

node 0 size: 193132 MB
node 0 free: 192774 MB
node 1 cpus: 4 5 6 10 11 12 13 18 19 20 24 25 26 27
node 1 size: 193499 MB
node 1 free: 193282 MB
node 2 cpus: 28 29 30 31 35 36 37 42 43 44 45 49 50 51
node 2 size: 193528 MB
node 2 free: 193346 MB
node 3 cpus: 32 33 34 38 39 40 41 46 47 48 52 53 54 55
node 3 size: 193528 MB
node 3 free: 193354 MB
node 4 cpus: 56 57 58 59 63 64 65 70 71 72 73 77 78 79
node 4 size: 193528 MB
node 4 free: 193285 MB
node 5 cpus: 60 61 62 66 67 68 69 74 75 76 80 81 82 83
node 5 size: 193528 MB
node 5 free: 193179 MB
node 6 cpus: 84 85 86 87 91 92 93 98 99 100 101 105 106 107
node 6 size: 193528 MB
node 6 free: 193353 MB
node 7 cpus: 88 89 90 94 95 96 97 102 103 104 108 109 110 111
node 7 size: 193525 MB
node 7 free: 193355 MB
node distances:
node  0  1  2  3  4  5  6  7
  0:  10 11 21 21 21 21 31 31
  1:  11 10 21 21 21 21 31 31
  2:  21 21 10 11 31 31 21 21
  3:  21 21 11 10 31 31 21 21
  4:  21 21 31 31 10 11 21 21
  5:  21 21 31 31 11 10 21 21
  6:  31 31 21 21 21 21 10 11
  7:  31 31 21 21 21 21 11 10

```

```

From /proc/meminfo
MemTotal:      1584944220 kB
HugePages_Total:      0
Hugepagesize:    2048 kB

```

```

From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 4
# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.
os-release:

```

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Platform Notes (Continued)

```
NAME="SLES"
VERSION="12-SP4"
VERSION_ID="12.4"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP4"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp4"
```

```
uname -a:
Linux linux-9o83 4.12.14-94.41-default #1 SMP Wed Oct 31 12:25:04 UTC 2018 (3090901)
x86_64 x86_64 x86_64 GNU/Linux
```

Kernel self-reported vulnerability status:

```
CVE-2017-5754 (Meltdown): Not affected
CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Indirect Branch Restricted Speculation,
IBPB, IBRS_FW
```

```
run-level 3 Sep 10 03:34
```

```
SPEC is set to: /home/cpu2017-1.0.5-ic19.0u4
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda2 btrfs 744G 134G 609G 19% /home
```

Additional information from dmidecode 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.

```
BIOS Lenovo -[TEE141E-2.30]- 07/02/2019
Memory:
48x Samsung M393A4K40CB2-CVF 32 GB 2 rank 2933
```

(End of data from sysinfo program)

Compiler Version Notes

```
=====
C | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
=====
```

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
=====
```

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Compiler Version Notes (Continued)

C++ | 508.namd_r(base) 510.parest_r(base)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====
C++, C | 511.povray_r(base) 526.blender_r(base)

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

=====
Fortran | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

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

Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
64, Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,

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Compiler Version Notes (Continued)

Version 19.0.4.227 Build 20190416
Copyright (C) 1985-2019 Intel Corporation. All rights reserved.

Base Compiler Invocation

C benchmarks:

```
icc -m64 -std=c11
```

C++ benchmarks:

```
icpc -m64
```

Fortran benchmarks:

```
ifort -m64
```

Benchmarks using both Fortran and C:

```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using both C and C++:

```
icpc -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:

```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

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
```




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Base Optimization Flags

C benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

C++ benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

Fortran benchmarks:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte
```

Benchmarks using both Fortran and C:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte
```

Benchmarks using both C and C++:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4
```

Benchmarks using Fortran, C, and C++:

```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -auto
-nostandard-realloc-lhs -align array32byte
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.html>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml>

<http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.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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