SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

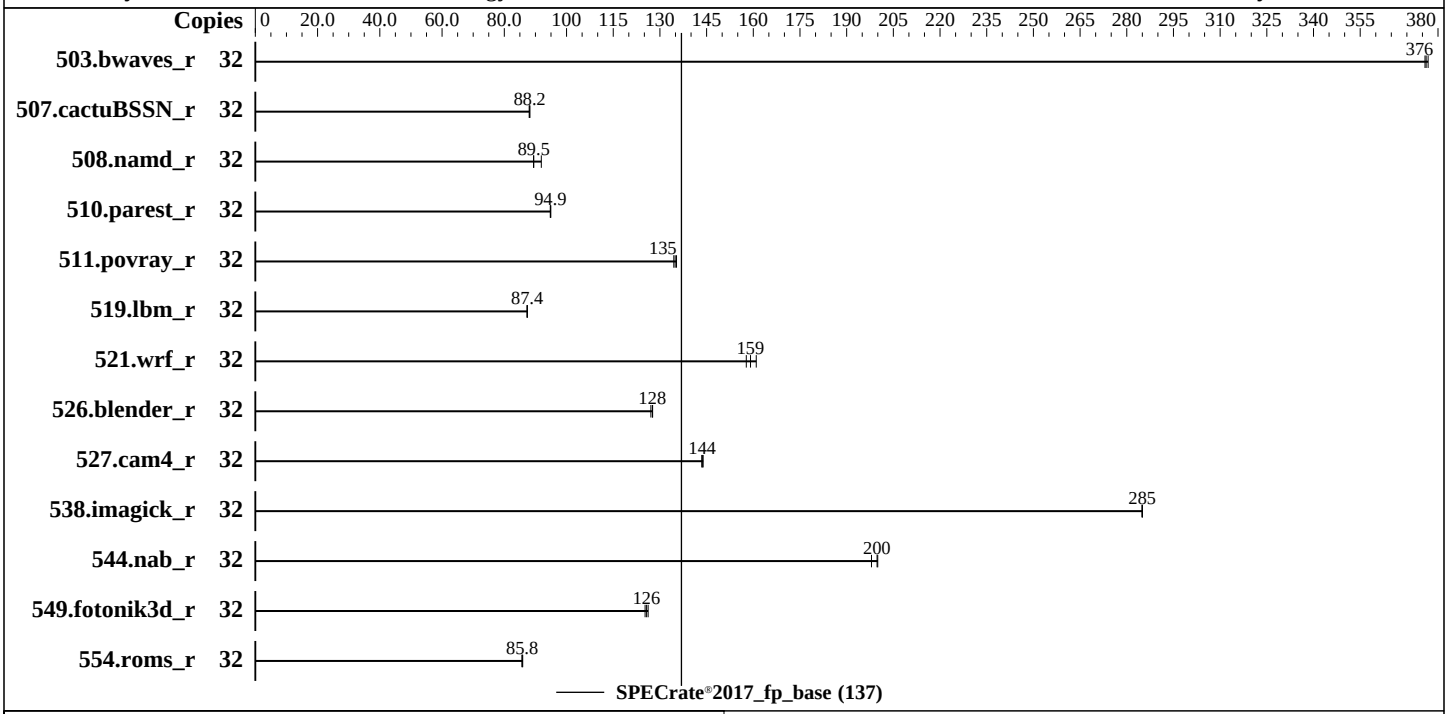
ThinkSystem SR630
(3.30 GHz, Intel Xeon Gold 6234)

SPECrate®2017_fp_base = 137

SPECrate®2017_fp_peak = Not Run

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

Test Date: Aug-2019
Hardware Availability: Jul-2019
Software Availability: Dec-2018



Hardware

CPU Name:	Intel Xeon Gold 6234
Max MHz:	4000
Nominal:	3300
Enabled:	16 cores, 2 chips, 2 threads/core
Orderable:	1,2 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	24.75 MB I+D on chip per chip
Other:	None
Memory:	384 GB (24 x 16 GB 2Rx8 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 19.0.0.117 of Intel C/C++ Compiler for Linux; Fortran: Version 19.0.0.117 of Intel Fortran Compiler for Linux
Parallel:	No
Firmware:	Lenovo BIOS Version IVE142E 2.30 released Aug-2019 tested as IVE141E 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	32	852	377	**853**	**376**	854	376							
507.cactuBSSN_r	32	460	88.0	**459**	**88.2**	459	88.2							
508.namd_r	32	340	89.4	331	91.9	**340**	**89.5**							
510.parest_r	32	882	94.9	883	94.8	**883**	**94.9**							
511.povray_r	32	**554**	**135**	552	135	556	134							
519.lbm_r	32	386	87.4	**386**	**87.4**	386	87.3							
521.wrf_r	32	445	161	**451**	**159**	454	158							
526.blender_r	32	**382**	**128**	383	127	382	128							
527.cam4_r	32	**390**	**144**	389	144	390	143							
538.imagick_r	32	279	285	279	285	**279**	**285**							
544.nab_r	32	269	200	272	198	**270**	**200**							
549.fotonik3d_r	32	988	126	996	125	**992**	**126**							
554.roms_r	32	592	85.9	**593**	**85.8**	593	85.7							

SPECrate®2017_fp_base = 137

SPECrate®2017_fp_peak = Not Run

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/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
SNC set to Enable
DCU Streamer Prefetcher set to Disable
Trusted Execution Technology set to Enable
Stale AtoS set to Enable
LLC dead line alloc set to Disable
Patrol Scrub set to Disable
 Sysinfo program /home/cpu2017-1.0.5-ic19/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on linux-x8si Tue Aug 20 01:56:56 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) Gold 6234 CPU @ 3.30GHz
       2  "physical id"s (chips)
       32 "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 : 8
       siblings  : 16
       physical 0: cores 2 9 17 19 24 26 27
       physical 1: cores 2 3 4 9 11 24 25 27

 From lscpu:
      Architecture:          x86_64
      CPU op-mode(s):        32-bit, 64-bit
      Byte Order:            Little Endian
      CPU(s):                32
      On-line CPU(s) list:   0-31
```

(Continued on next page)

Platform Notes (Continued)

```
      Thread(s) per core:    2
      Core(s) per socket:    8
      Socket(s):             2
      NUMA node(s):          4
      Vendor ID:             GenuineIntel
      CPU family:            6
      Model:                 85
      Model name:            Intel(R) Xeon(R) Gold 6234 CPU @ 3.30GHz
      Stepping:              7
      CPU MHz:               3300.000
      CPU max MHz:           4000.0000
      CPU min MHz:           1200.0000
      BogoMIPS:              6600.00
      Virtualization:        VT-x
      L1d cache:             32K
      L1i cache:             32K
      L2 cache:              1024K
      L3 cache:              25344K
      NUMA node0 CPU(s):     0,2,3,5,16,18,19,21
      NUMA node1 CPU(s):     1,4,6,7,17,20,22,23
      NUMA node2 CPU(s):     8,11,13,14,24,27,29,30
      NUMA node3 CPU(s):     9,10,12,15,25,26,28,31
      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 pni pclmulqdq dtes64 monitor 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 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_l1d arch_capabilities

  /proc/cpuinfo cache data
     cache size : 25344 KB

  From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
  physical chip.
    available: 4 nodes (0-3)
    node 0 cpus: 0 2 3 5 16 18 19 21
    node 0 size: 96367 MB
    node 0 free: 95892 MB
    node 1 cpus: 1 4 6 7 17 20 22 23
    node 1 size: 96727 MB
    node 1 free: 96282 MB
    node 2 cpus: 8 11 13 14 24 27 29 30
```

(Continued on next page)

Platform Notes (Continued)

```
   node 2 size: 96756 MB
   node 2 free: 96362 MB
   node 3 cpus: 9 10 12 15 25 26 28 31
   node 3 size: 96753 MB
   node 3 free: 96296 MB
   node distances:
   node   0   1   2   3
     0:  10  11  21  21
     1:  11  10  21  21
     2:  21  21  10  11
     3:  21  21  11  10

 From /proc/meminfo
    MemTotal:       395882284 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:
       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-x8si 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 Aug 19 20:08

 SPEC is set to: /home/cpu2017-1.0.5-ic19
```

(Continued on next page)

Platform Notes (Continued)

```
    Filesystem     Type   Size  Used Avail Use% Mounted on
    /dev/sda3      btrfs  740G   50G  690G   7% /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 -[IVE141E-2.30]- 07/02/2019
   Memory:
    24x Samsung M393A2K43CB2-CVF 16 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 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------

==============================================================================
C++             | 508.namd_r(base) 510.parest_r(base)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 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 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 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,
```

(Continued on next page)

Compiler Version Notes (Continued)

```
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 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 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 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 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.0.117 Build 20180804
Copyright (C) 1985-2018 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`

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Base Compiler Invocation (Continued)

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

Base Optimization Flags

C benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -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=3 -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=3

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Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=3 -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-ic19.0-official-linux64.2019-01-15.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-ic19.0-official-linux64.2019-01-15.xml
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-CLX-D.xml

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Tested with SPEC CPU®2017 v1.0.5 on 2019-08-19 13:56:55-0400.
Report generated on 2019-09-17 16:12:28 by CPU2017 PS formatter v6255.
Originally published on 2019-09-17.