SPEC® CPU2017 Floating Point Speed Result

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

$SPECspeed2017\_fp\_base = 86.6$

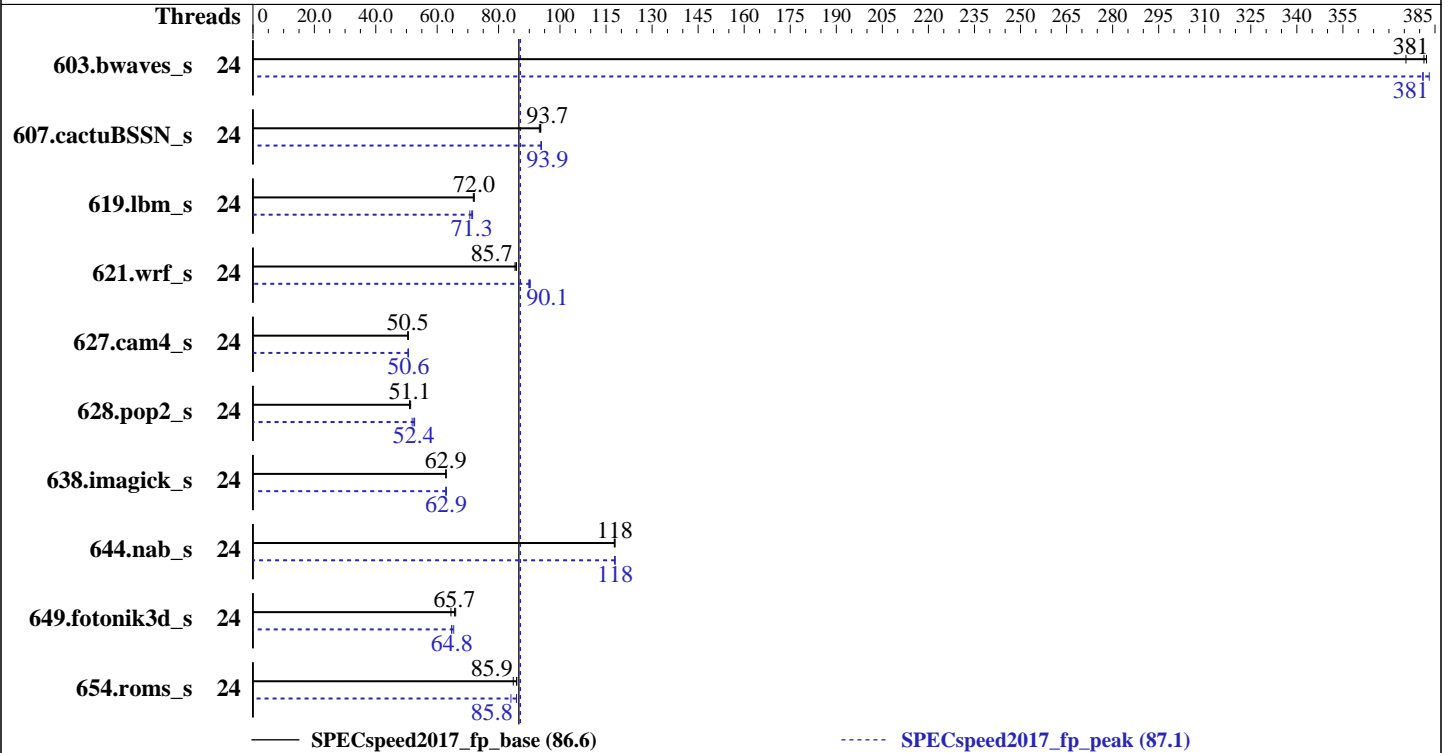$SPECspeed2017\_fp\_peak = 87.1$

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Apr-2019
Hardware Availability: Feb-2019
Software Availability: Nov-2018

Threads — scale: 0 20.0 40.0 60.0 80.0 100 115 130 145 160 175 190 205 220 235 250 265 280 295 310 325 340 355 385

- **603.bwaves_s** 24 — 381 / 381
- **607.cactuBSSN_s** 24 — 93.7 / 93.9
- **619.lbm_s** 24 — 72.0 / 71.3
- **621.wrf_s** 24 — 85.7 / 90.1
- **627.cam4_s** 24 — 50.5 / 50.6
- **628.pop2_s** 24 — 51.1 / 52.4
- **638.imagick_s** 24 — 62.9 / 62.9
- **644.nab_s** 24 — 118 / 118
- **649.fotonik3d_s** 24 — 65.7 / 64.8
- **654.roms_s** 24 — 85.9 / 85.8

—— SPECspeed2017_fp_base (86.6)   ------ **SPECspeed2017_fp_peak (87.1)**

Hardware

CPU Name: Intel Xeon Silver 4116
 Max MHz.: 3000
 Nominal: 2100
Enabled: 24 cores, 2 chips
Orderable: 1, 2 chip(s)
Cache L1: 32 KB I + 32 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 16.5 MB I+D on chip per chip
 Other: None
Memory: 768 GB (24 x 32 GB 2Rx4 PC4-2666V-R, running at 2400)
Storage: 1 x 1 TB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 12 (x86_64) SP3
 Kernel 4.4.120-94.17-default
Compiler: C/C++: Version 19.0.1.144 of Intel C/C++
 Compiler Build 20181018 for Linux;
 Fortran: Version 19.0.1.144 of Intel Fortran
 Compiler Build 20181018 for Linux
Parallel: Yes
Firmware: Version 5102 released Mar-2019 tested as Feb-2019
File System: btrfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: None

SPEC CPU2017 Floating Point Speed Result
Copyright 2017-2019 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

SPECspeed2017_fp_base =   86.6

SPECspeed2017_fp_peak =   87.1

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Apr-2019
Hardware Availability: Feb-2019
Software Availability: Nov-2018

Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	24	**155**	**381**	157	376	154	382	24	155	381	**155**	**381**	154	383
607.cactuBSSN_s	24	179	93.3	**178**	**93.7**	178	93.7	24	178	93.8	**178**	**93.9**	177	94.0
619.lbm_s	24	73.0	71.8	72.7	72.0	**72.8**	**72.0**	24	74.2	70.6	**73.5**	**71.3**	73.2	71.5
621.wrf_s	24	154	85.8	155	85.3	**154**	**85.7**	24	**147**	**90.1**	146	90.3	147	89.9
627.cam4_s	24	175	50.6	176	50.4	**176**	**50.5**	24	176	50.5	**175**	**50.6**	175	50.6
628.pop2_s	24	**232**	**51.1**	231	51.4	233	51.0	24	**226**	**52.4**	229	51.8	225	52.7
638.imagick_s	24	**229**	**62.9**	229	62.9	230	62.8	24	229	62.9	230	62.8	**229**	**62.9**
644.nab_s	24	148	118	**148**	**118**	148	118	24	**148**	**118**	148	118	148	118
649.fotonik3d_s	24	138	66.0	141	64.5	**139**	**65.7**	24	139	65.4	**141**	**64.8**	141	64.7
654.roms_s	24	186	84.8	183	85.9	**183**	**85.9**	24	187	84.0	183	85.9	**183**	**85.8**
SPECspeed2017_fp_base =		**86.6**												
SPECspeed2017_fp_peak =		**87.1**												

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"
```

General Notes

```
Environment variables set by runcpu before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/spec2017_2019u1/lib/ia32:/spec2017_2019u1/lib/intel64"
OMP_STACKSIZE = "192M"

 Binaries compiled on a system with 1x Intel Core i9-7900X 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
```
Yes: 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.

Platform Notes

```
BIOS Configuration:
SNC = Disabled
IMC interleaving = AUTO
```

(Continued on next page)

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

$SPECspeed2017\_fp\_base =$ 86.6

$SPECspeed2017\_fp\_peak =$ 87.1

Platform Notes (Continued)

```
Patrol Scrub = Disabled
VT-d = Disabled
HyperThreading = Disabled
 Sysinfo program /spec2017_2019u1/bin/sysinfo
 Rev: r5974 of 2018-05-19 9bcde8f2999c33d61f64985e45859ea9
 running on linux-pmm5 Mon Apr  1 13:24:15 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) Silver 4116 CPU @ 2.10GHz
       2  "physical id"s (chips)
       24 "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 : 12
       siblings  : 12
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13

 From lscpu:
       Architecture:          x86_64
       CPU op-mode(s):        32-bit, 64-bit
       Byte Order:            Little Endian
       CPU(s):                24
       On-line CPU(s) list:   0-23
       Thread(s) per core:    1
       Core(s) per socket:    12
       Socket(s):             2
       NUMA node(s):          2
       Vendor ID:             GenuineIntel
       CPU family:            6
       Model:                 85
       Model name:            Intel(R) Xeon(R) Silver 4116 CPU @ 2.10GHz
       Stepping:              4
       CPU MHz:               2698.811
       CPU max MHz:           3000.0000
       CPU min MHz:           800.0000
       BogoMIPS:              4200.00
       Virtualization:        VT-x
       L1d cache:             32K
       L1i cache:             32K
       L2 cache:              1024K
       L3 cache:              16896K
       NUMA node0 CPU(s):     0-11
```

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

$SPECspeed2017\_fp\_base = 86.6$

$SPECspeed2017\_fp\_peak = 87.1$

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Apr-2019
Hardware Availability: Feb-2019
Software Availability: Nov-2018

Platform Notes (Continued)

```
     NUMA node1 CPU(s):     12-23
     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
  aperfmperf eagerfpu 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 ida arat epb invpcid_single pln pts
  dtherm hwp hwp_act_window hwp_epp hwp_pkg_req intel_pt rsb_ctxsw spec_ctrl stibp
  retpoline kaiser tpr_shadow vnmi flexpriority ept vpid fsgsbase tsc_adjust bmi1 hle
  avx2 smep bmi2 erms invpcid rtm cqm mpx avx512f avx512dq rdseed adx smap clflushopt
  clwb avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 cqm_llc cqm_occup_llc pku
  ospke

 /proc/cpuinfo cache data
    cache size : 16896 KB

 From numactl --hardware  WARNING: a numactl 'node' might or might not correspond to a
 physical chip.
   available: 2 nodes (0-1)
   node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11
   node 0 size: 386333 MB
   node 0 free: 384502 MB
   node 1 cpus: 12 13 14 15 16 17 18 19 20 21 22 23
   node 1 size: 387036 MB
   node 1 free: 384412 MB
   node distances:
   node   0   1
     0:  10  21
     1:  21  10

 From /proc/meminfo
    MemTotal:       791931416 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

 From /etc/*release* /etc/*version*
    SuSE-release:
       SUSE Linux Enterprise Server 12 (x86_64)
       VERSION = 12
       PATCHLEVEL = 3
       # 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-SP3"
       VERSION_ID="12.3"
       PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
```

(Continued on next page)

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

$SPECspeed2017\_fp\_base = 86.6$

$SPECspeed2017\_fp\_peak = 87.1$

CPU2017 License:	9016	**Test Date:**	Apr-2019
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Feb-2019
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Nov-2018

Platform Notes (Continued)

```
        ID="sles"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp3"

 uname -a:
    Linux linux-pmm5 4.4.120-94.17-default #1 SMP Wed Mar 14 17:23:00 UTC 2018 (cf3a7bb)
    x86_64 x86_64 x86_64 GNU/Linux

 Kernel self-reported vulnerability status:

 CVE-2017-5754 (Meltdown):          Mitigation: PTI
 CVE-2017-5753 (Spectre variant 1): Mitigation: __user pointer sanitization
 CVE-2017-5715 (Spectre variant 2): Mitigation: IBRS+IBPB

 run-level 3 Mar 29 09:11

 SPEC is set to: /spec2017_2019u1
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda2       btrfs  933G   70G  863G   8% /

 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 American Megatrends Inc. 5102 02/11/2019
   Memory:
    24x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666, configured at 2400

 (End of data from sysinfo program)
```

Compiler Version Notes

```
==============================================================================
 CC  619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 FC  607.cactuBSSN_s(base, peak)
------------------------------------------------------------------------------
Intel(R) C++ Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
```

(Continued on next page)

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

$SPECspeed2017\_fp\_base = 86.6$

$SPECspeed2017\_fp\_peak = 87.1$

CPU2017 License: 9016

Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Apr-2019

Hardware Availability: Feb-2019

Software Availability: Nov-2018

Compiler Version Notes (Continued)

```
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 FC   603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
FC   603.bwaves_s(peak) 649.fotonik3d_s(peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
 CC   621.wrf_s(base) 627.cam4_s(base, peak) 628.pop2_s(base)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------


==============================================================================
CC   621.wrf_s(peak) 628.pop2_s(peak)
------------------------------------------------------------------------------
Intel(R) Fortran Intel(R) 64 Compiler for applications running on Intel(R)
  64, Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
Intel(R) C Intel(R) 64 Compiler for applications running on Intel(R) 64,
  Version 19.0.1.144 Build 20181018
Copyright (C) 1985-2018 Intel Corporation.  All rights reserved.
------------------------------------------------------------------------------
```

SPEC CPU2017 Floating Point Speed Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

SPECspeed2017_fp_base = 86.6

SPECspeed2017_fp_peak = 87.1

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Apr-2019
Hardware Availability: Feb-2019
Software Availability: Nov-2018

Base Compiler Invocation

C benchmarks:
`icc -m64 -std=c11`

Fortran benchmarks:
`ifort -m64`

Benchmarks using both Fortran and C:
`ifort -m64 icc -m64 -std=c11`

Benchmarks using Fortran, C, and C++:
`icpc -m64 icc -m64 -std=c11 ifort -m64`

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

Fortran benchmarks:
`-DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -nostandard-realloc-lhs`

Benchmarks using both Fortran and C:
`-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP -nostandard-realloc-lhs`

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

SPECspeed2017_fp_base = 86.6

SPECspeed2017_fp_peak = 87.1

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

Test Date: Apr-2019
Hardware Availability: Feb-2019
Software Availability: Nov-2018

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=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs
```

Peak Compiler Invocation

C benchmarks:
```
icc -m64 -std=c11
```

Fortran benchmarks:
```
ifort -m64
```

Benchmarks using both Fortran and C:
```
ifort -m64 icc -m64 -std=c11
```

Benchmarks using Fortran, C, and C++:
```
icpc -m64 icc -m64 -std=c11 ifort -m64
```

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
```

Fortran benchmarks:

```
 603.bwaves_s: -prof-gen(pass 1) -prof-use(pass 2) -DSPEC_SUPPRESS_OPENMP
-DSPEC_OPENMP -O2 -xCORE-AVX512 -qopt-prefetch -ipo -O3
-ffinite-math-only -no-prec-div -qopt-mem-layout-trans=4
-qopenmp -nostandard-realloc-lhs
```

```
 649.fotonik3d_s: Same as 603.bwaves_s
```

```
 654.roms_s: -DSPEC_OPENMP -xCORE-AVX512 -ipo -O3 -no-prec-div
-qopt-prefetch -ffinite-math-only -qopt-mem-layout-trans=4
```

(Continued on next page)

Copyright 2017-2019 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

ASUS RS700-E9(Z11PP-D24) Server System
(2.10 GHz, Intel Xeon Silver 4116)

SPECspeed2017_fp_base = 86.6

SPECspeed2017_fp_peak = 87.1

CPU2017 License:	9016	**Test Date:**	Apr-2019
Test Sponsor:	ASUSTeK Computer Inc.	**Hardware Availability:**	Feb-2019
Tested by:	ASUSTeK Computer Inc.	**Software Availability:**	Nov-2018

Peak Optimization Flags (Continued)

654.roms_s (continued):
```
-qopenmp -nostandard-realloc-lhs
```

Benchmarks using both Fortran and C:

621.wrf_s: -prof-gen(pass 1) -prof-use(pass 2) -O2 -xCORE-AVX512
```
-qopt-prefetch -ipo -O3 -ffinite-math-only -no-prec-div
-qopt-mem-layout-trans=4 -DSPEC_SUPPRESS_OPENMP -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs
```

627.cam4_s: -xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
```
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp
-DSPEC_OPENMP -nostandard-realloc-lhs
```

628.pop2_s: Same as 621.wrf_s

Benchmarks using Fortran, C, and C++:
```
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch
-ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP
-nostandard-realloc-lhs
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z11-V2.0-revD.html
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.html

---

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z11-V2.0-revD.xml
http://www.spec.org/cpu2017/flags/Intel-ic18.0-official-linux64.2019-04-02.xml

---

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

Tested with SPEC CPU2017 v1.0.5 on 2019-04-01 01:24:15-0400.
Report generated on 2019-05-02 11:28:49 by CPU2017 PDF formatter v6067.
Originally published on 2019-05-01.