



# SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

## ASUSTeK Computer Inc.

ASUS RS700-E10(Z12PP-D32) Server System  
(2.40 GHz, Intel Xeon Gold 6312U)

SPECspeed®2017\_fp\_base = 127

SPECspeed®2017\_fp\_peak = 128

CPU2017 License: 9016

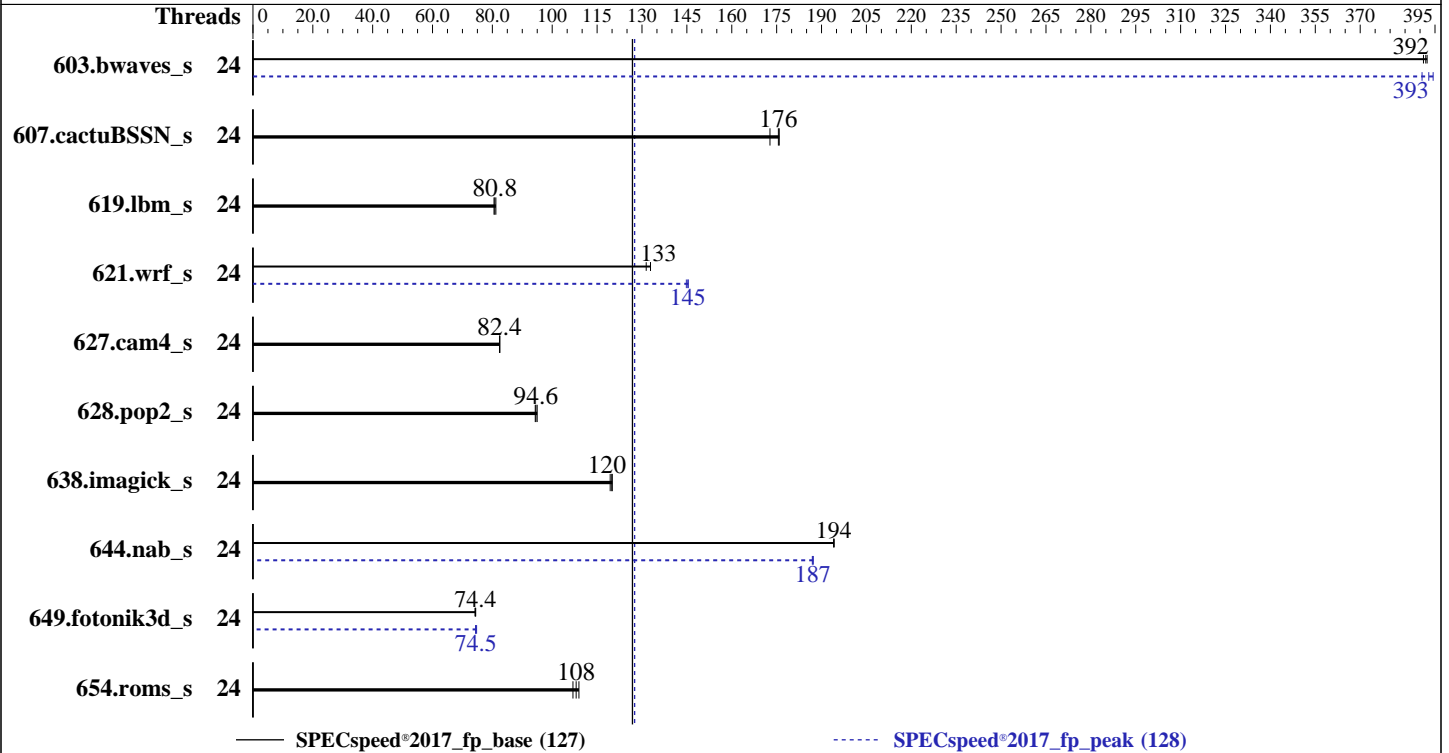
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Dec-2021

Hardware Availability: May-2021

Software Availability: Mar-2021



### Hardware

CPU Name: Intel Xeon Gold 6312U  
 Max MHz: 3600  
 Nominal: 2400  
 Enabled: 24 cores, 1 chip  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 48 KB D on chip per core  
 L2: 1.25 MB I+D on chip per core  
 L3: 36 MB I+D on chip per chip  
 Other: None  
 Memory: 512 GB (8 x 64 GB 2Rx4 PC4-3200AA-R)  
 Storage: 1 x 4 TB PCIE NVME SSD  
 Other: None

### Software

OS: Red Hat Enterprise Linux release 8.3 (Ootpa)  
 4.18.0-240.22.1.el8\_3.x86\_64  
 Compiler: C/C++: Version 2021.1 of Intel oneAPI DPC++/C++  
 Compiler Build 20201113 for Linux;  
 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: Version 0504 released May-2021  
 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.



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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	24	150	392	151	391	<b><u>151</u></b>	<b><u>392</u></b>	24	151	391	<b><u>150</u></b>	<b><u>393</u></b>	150	394
607.cactuBSSN_s	24	96.5	173	94.8	176	<b><u>94.9</u></b>	<b><u>176</u></b>	24	96.5	173	94.8	176	<b><u>94.9</u></b>	<b><u>176</u></b>
619.lbm_s	24	<b><u>64.8</u></b>	<b><u>80.8</u></b>	64.5	81.2	65.0	80.6	24	<b><u>64.8</u></b>	<b><u>80.8</u></b>	64.5	81.2	65.0	80.6
621.wrf_s	24	99.6	133	<b><u>99.6</u></b>	<b><u>133</u></b>	101	131	24	91.3	145	<b><u>91.0</u></b>	<b><u>145</u></b>	90.9	145
627.cam4_s	24	107	82.5	108	82.4	<b><u>108</u></b>	<b><u>82.4</u></b>	24	107	82.5	108	82.4	<b><u>108</u></b>	<b><u>82.4</u></b>
628.pop2_s	24	125	95.0	126	94.3	<b><u>126</u></b>	<b><u>94.6</u></b>	24	125	95.0	126	94.3	<b><u>126</u></b>	<b><u>94.6</u></b>
638.imagick_s	24	121	119	120	120	<b><u>120</u></b>	<b><u>120</u></b>	24	121	119	120	120	<b><u>120</u></b>	<b><u>120</u></b>
644.nab_s	24	<b><u>90.0</u></b>	<b><u>194</u></b>	90.0	194	90.0	194	24	93.3	187	<b><u>93.4</u></b>	<b><u>187</u></b>	93.5	187
649.fotonik3d_s	24	123	74.2	<b><u>123</u></b>	<b><u>74.4</u></b>	122	74.4	24	123	74.4	<b><u>122</u></b>	<b><u>74.5</u></b>	122	74.7
654.roms_s	24	145	109	147	107	<b><u>146</u></b>	<b><u>108</u></b>	24	145	109	147	107	<b><u>146</u></b>	<b><u>108</u></b>

SPECSpeed®2017\_fp\_base = **127**

SPECSpeed®2017\_fp\_peak = **128**

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"  
OS set to performance mode via cpupower frequency-set -g performance

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
KMP\_AFFINITY = "granularity=fine,compact"  
LD\_LIBRARY\_PATH = "/home/cpull8/lib/intel64:/home/cpull8/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 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

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### General Notes (Continued)

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:

VT-d = Disabled

Patrol Scrub = Disabled

Hyper-Threading = Disable

Engine Boost = Aggressive

SR-IOV Support = Disabled

BMC Configuration:

Fan mode = Full speed mode

Sysinfo program /home/cpull18/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d

running on localhost.localdomain Wed Dec 1 02:48:54 2021

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 6312U CPU @ 2.40GHz

1 "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 : 24

siblings : 24

physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23

From lscpu from util-linux 2.32.1:

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: 24

Socket(s): 1

NUMA node(s): 1

Vendor ID: GenuineIntel

CPU family: 6

Model: 106

Model name: Intel(R) Xeon(R) Gold 6312U CPU @ 2.40GHz

(Continued on next page)



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### Platform Notes (Continued)

```
Stepping: 6
CPU MHz: 2181.539
CPU max MHz: 3600.0000
CPU min MHz: 800.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 36864K
NUMA node0 CPU(s): 0-23
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 cpuid
aperfperf 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 invpcid_single
intel_ppin ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept
vpid ept_ad fsgsbase tsc_adjust bmil hle avx2 smep bmi2 erms invpcid cqm rdt_a
avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni
avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
cqm_mbm_local split_lock_detect wbnoinvd dtherm ida arat pln pts hwp hwp_act_window
hwp_epp hwp_pkg_req avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
arch_capabilities
```

```
/proc/cpuinfo cache data
cache size : 36864 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 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23
node 0 size: 493390 MB
node 0 free: 506182 MB
node distances:
node 0
0: 10
```

```
From /proc/meminfo
MemTotal: 528003920 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

```
/sbin/tuned-adm active
Current active profile: throughput-performance
```

(Continued on next page)



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### Platform Notes (Continued)

/sys/devices/system/cpu/cpu\*/cpufreq/scaling\_governor has performance

From /etc/\*release\* /etc/\*version\*

os-release:

NAME="Red Hat Enterprise Linux"

VERSION="8.3 (Ootpa)"

ID="rhel"

ID\_LIKE="fedora"

VERSION\_ID="8.3"

PLATFORM\_ID="platform:el8"

PRETTY\_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"

ANSI\_COLOR="0;31"

redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)

system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)

system-release-cpe: cpe:/o:redhat:enterprise\_linux:8.3:ga

uname -a:

Linux localhost.localdomain 4.18.0-240.22.1.el8\_3.x86\_64 #1 SMP Thu Mar 25 14:36:04 EDT 2021 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 Nov 30 04:08

SPEC is set to: /home/cpul18

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	3.6T	37G	3.6T	2%	/home

From /sys/devices/virtual/dmi/id

Vendor: ASUSTeK COMPUTER INC.

Product: RS700-E10-RS12U

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### Platform Notes (Continued)

Product Family: Server

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:

24x NO DIMM NO DIMM

8x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200

BIOS:

BIOS Vendor: American Megatrends Inc.

BIOS Version: 0504

BIOS Date: 05/26/2021

BIOS Revision: 5.4

(End of data from sysinfo program)

### Compiler Version Notes

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

```
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 | 644.nab_s(peak)  
-----
```

```
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.  
-----
```

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

```
Intel(R) C Intel(R) 64 Compiler Classic for applications running on Intel(R)  
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-----
```

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### Compiler Version Notes (Continued)

=====  
C | 644.nab\_s(peak)  
-----

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
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)  
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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  
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)  
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## 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

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

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):

```
-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 (except as noted below):

```
icc
```

```
644.nab_s: icx
```

Fortran benchmarks:

```
ifort
```

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: -m64 -Wl,-z,muldefs -xCORE-AVX2 -Ofast -ffast-math  
-flto -mfpmath=sse -funroll-loops -fiopenmp
```

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## Peak Optimization Flags (Continued)

644.nab\_s (continued):

```
-DSPEC_OPENMP -qopt-mem-layout-trans=4  
-fimf-accuracy-bits=14:sqrt  
-mbranches-within-32B-boundaries  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

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: Same as 603.bwaves\_s

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
```

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/ASUSTekPlatform-Settings-z12-V1.2.html>

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.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/ASUSTekPlatform-Settings-z12-V1.2.xml>

[http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64\\_revA.xml](http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml)



# SPEC CPU®2017 Floating Point Speed Result

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**ASUSTeK Computer Inc.**

ASUS RS700-E10(Z12PP-D32) Server System  
(2.40 GHz, Intel Xeon Gold 6312U)

SPECspeed®2017\_fp\_base = 127

SPECspeed®2017\_fp\_peak = 128

**CPU2017 License:** 9016

**Test Sponsor:** ASUSTeK Computer Inc.

**Tested by:** ASUSTeK Computer Inc.

**Test Date:** Dec-2021

**Hardware Availability:** May-2021

**Software Availability:** Mar-2021

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For questions about this result, please contact the tester. For other inquiries, please contact [info@spec.org](mailto:info@spec.org).

Tested with SPEC CPU®2017 v1.1.8 on 2021-12-01 02:48:54-0500.  
Report generated on 2021-12-22 12:22:00 by CPU2017 PDF formatter v6442.  
Originally published on 2021-12-21.