## SPEC CPU®2017 Floating Point Speed Result

**ASUSTeK Computer Inc.**

ASUS RS700-E10(Z12PP-D32) Server System
(2.80 GHz, Intel Xeon Platinum 8362)

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>= 239</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>= 240</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 9016  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Tested by:** ASUSTeK Computer Inc.  
**Test Date:** Jul-2021  
**Hardware Availability:** May-2021  
**Software Availability:** Dec-2020

### Threads

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
</tr>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
</tr>
<tr>
<td>621.wrf_s</td>
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</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
</tr>
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</table>

### SPECspeed®2017_fp_base (239)  
### SPECspeed®2017_fp_peak (240)

#### Hardware

- **CPU Name:** Intel Xeon Platinum 8362  
- **Max MHz:** 3600  
- **Nominal:** 2800  
- **Enabled:** 64 cores, 2 chips  
- **Orderable:** 1, 2 chip(s)  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 1.25 MB I+D on chip per core  
- **L3:** 48 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)  
- **Storage:** 1 x 4 TB PCIE NVME SSD  
- **Other:** None

#### Software

- **OS:** Red Hat Enterprise Linux release 8.2 (Ootpa)  
- **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 0502 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.
SPEC CPU®2017 Floating Point Speed Result
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SPECspeed®2017_fp_base = 239
SPECspeed®2017_fp_peak = 240

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
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<tr>
<td>603.bwaves_s</td>
<td>64</td>
<td>76.1</td>
<td>776</td>
<td>76.0</td>
<td>776</td>
<td>76.5</td>
<td>771</td>
<td>64</td>
<td>76.6</td>
<td>770</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
<td>56.1</td>
<td>297</td>
<td>55.6</td>
<td>300</td>
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<tr>
<td>619.ibm_s</td>
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<td>145</td>
<td>34.2</td>
<td>153</td>
<td>34.4</td>
<td>152</td>
<td>64</td>
<td>36.1</td>
<td>145</td>
<td>34.2</td>
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<tr>
<td>621.wrf_s</td>
<td>64</td>
<td>55.5</td>
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<td>56.0</td>
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<td>57.6</td>
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<td>228</td>
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<tr>
<td>627.cam4_s</td>
<td>64</td>
<td>50.0</td>
<td>177</td>
<td>49.8</td>
<td>178</td>
<td>50.7</td>
<td>175</td>
<td>64</td>
<td>50.0</td>
<td>177</td>
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<td>628.pop2_s</td>
<td>64</td>
<td>121</td>
<td>98.3</td>
<td>122</td>
<td>97.3</td>
<td>122</td>
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<td>60.3</td>
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<td>64</td>
<td>60.5</td>
<td>238</td>
<td>60.3</td>
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<tr>
<td>644.nab_s</td>
<td>64</td>
<td>37.4</td>
<td>468</td>
<td>36.8</td>
<td>475</td>
<td>36.8</td>
<td>474</td>
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<td>538</td>
<td>32.4</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>121</td>
<td>75.8</td>
<td>120</td>
<td>75.3</td>
<td>121</td>
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<td>75.7</td>
<td>120</td>
<td>75.4</td>
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<tr>
<td>654.roms_s</td>
<td>64</td>
<td>52.1</td>
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<td>301</td>
<td>64</td>
<td>52.1</td>
<td>302</td>
<td>52.3</td>
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SPECspeed®2017_fp_base = 239
SPECspeed®2017_fp_peak = 240

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 = "/cpu118/lib/intel64:/cpu118/je5.0.1-64"
MALLOC_CONF = "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

(Continued on next page)
General Notes (Continued)

built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

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 /cpu18/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aca24d6
running on localhost.localdomain Fri Jul 23 07:32:27 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) Platinum 8362 CPU @ 2.80GHz
  2 "physical id"s (chips)
  64 "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 : 32
  siblings : 32
  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 24
  25 26 27 28 29 30 31
  physical 1: 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 24
  25 26 27 28 29 30 31

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): 64
On-line CPU(s) list: 0-63
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
NUMA node(s): 2
Vendor ID: GenuineIntel

(Continued on next page)
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Platform Notes (Continued)

CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Platinum 8362 CPU @ 2.80GHz
Stepping: 6
CPU MHz: 800.000
CPU max MHz: 3600.0000
CPU min MHz: 800.0000
BogoMIPS: 5600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s): 0-31
NUMA node1 CPU(s): 32-63
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 ablm mcm cpuid_fault epb cat_13 invpcid_single ssbd
mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmni flexpriority ept vpid fsgsbase
tsc_adjust bm1 hle avx2 smep bmi2 erms invpcid rtm cmqm rdt_a avx512f avx512dq
rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw
avx512vl xsaveopt xsaves xsavec xgetbv1 xsaves cmqm_llc cmqm_occup_llc cmqm_mbm_total
cmqm_mbm_local whnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp_epp
hwp_pkg_req avx512vbmi umip pku ospke avx512_vbmi2 gfn vaes vpclmulqdq avx512_vnni
avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_l1d
arch_capabilities

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 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
28 29 30 31
node 0 size: 515665 MB
node 0 free: 515159 MB
node 1 cpus: 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63
node 1 size: 516058 MB
node 1 free: 507233 MB
node distances:
node 0 1
0: 10 20

(Continued on next page)
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Platform Notes (Continued)

1:  20  10

From /proc/meminfo
MemTotal: 1056485764 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

/sbin/tuned-adm active
Current active profile: throughput-performance
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance

From /etc/*release* /etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux"
    VERSION="8.2 (Ootpa)"
    ID="rhel"
    ID_LIKE="fedora"
    VERSION_ID="8.2"
    PLATFORM_ID="platform:el8"
    PRETTY_NAME="Red Hat Enterprise Linux 8.2 (Ootpa)"
    ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release: Red Hat Enterprise Linux release 8.2 (Ootpa)
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.2:ga

uname -a:
Linux localhost.localdomain 4.18.0-193.el8.x86_64 #1 SMP Fri Mar 27 14:35:58 UTC 2020
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/swaps 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): No status reported
CVE-2019-11135 (TSX Asynchronous Abort): Not affected
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Platform Notes (Continued)

run-level 3 Jul 22 22:54

SPEC is set to: /cpu118
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-root xfs 2.6T 107G 2.5T 5% /

From /sys/devices/virtual/dmi/id
Vendor: ASUSTeK COMPUTER INC.
Product: RS700-E10-RS12U
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:
16x NO DIMM NO DIMM
16x Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200

BIOS:
BIOS Vendor: American Megatrends Inc.
BIOS Version: 0502
BIOS Date: 05/07/2021
BIOS Revision: 5.2

(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.
==============================================================================

(Continued on next page)
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Compiler Version Notes (Continued)

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------------------------------------------------------------------------------
==============================================================================
C++, C, Fortran | 607.cactuBSSN_s(base, peak)
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Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
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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)
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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
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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  
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-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch  
  -ffinite-math-only -qopt-mem-layout-trans=4 -qopenmp -DSPEC_OPENMP  
  -mbranches-within-32B-boundaries

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Base Optimization Flags (Continued)

Fortran benchmarks:
- `-m64`  
- `-Wl,-z,muldefs`  
- `-DSPEC_OPENMP`  
- `-xCORE-AVX512`  
- `-ipo -O3`  
- `-no-prec-div`  
- `-qopt-prefetch`  
- `-ffinite-math-only`  
- `-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-AVX512 -ipo -O3 -no-prec-div`  
- `-qopt-prefetch`  
- `-ffinite-math-only`  
- `-mbranches-within-32B-boundaries`  
- `-L/usr/local/jemalloc64-5.0.1/lib`  
- `-ljemalloc`

Benchmarks using Fortran, C, and C++:
- `-m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
- `-qopt-prefetch`  
- `-ffinite-math-only`  
- `-mbranches-within-32B-boundaries`  
- `-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
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**Test Sponsor:** ASUSTeK Computer Inc.

**Tested by:** ASUSTeK Computer Inc.

**Test Date:** Jul-2021

**Hardware Availability:** May-2021

**Software Availability:** Dec-2020

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### Peak Optimization Flags

**C benchmarks:**

- 619.lbm_s: basepeak = yes
- 638.imagick_s: basepeak = yes
- 644.nab_s: -m64 -Wl, -z, muldefs -xCORE-AVX512 -Ofast -ffast-math
  -fimf -mfpmath=sse -funroll-loops -fopenmp
  -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-AVX512
  -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-AVX512 -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
ASUSTeK Computer Inc.  
ASUS RS700-E10(Z12PP-D32) Server System  
(2.80 GHz, Intel Xeon Platinum 8362)

| SPECspeed®2017_fp_base = 239 |
| SPECspeed®2017_fp_peak = 240 |

| SPEC CPU®2017 Floating Point Speed Result |

| CPU2017 License: 9016 |
| Test Sponsor: ASUSTeK Computer Inc. |
| Tested by: ASUSTeK Computer Inc. |
| Test Date: Jul-2021 |
| Hardware Availability: May-2021 |
| Software Availability: Dec-2020 |

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z12-V1.0.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z12-V1.0.xml
http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

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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 2021-07-22 19:32:27-0400.
Originally published on 2021-08-17.