ASUSTeK Computer Inc.
ASUS RS700-E10(Z12PP-D32) Server System
(2.40 GHz, Intel Xeon Silver 4314)

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

Hardware
CPU Name: Intel Xeon Silver 4314
Max MHz: 3400
Nominal: 2400
Enabled: 32 cores, 2 chips, 2 threads/core
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: 24 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R, running at 2666)
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: No
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.
SPEC CPU®2017 Floating Point Rate Result

ASUSTeK Computer Inc.
ASUS RS700-E10(Z12PP-D32) Server System
(2.40 GHz, Intel Xeon Silver 4314)

SPECrata®2017_fp_base = 270
SPECrata®2017_fp_peak = 279

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

Results Table

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</tbody>
</table>

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"
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:
LD_LIBRARY_PATH = "/home/cpu118/lib/intel64:/home/cpu118/je5.0.1-64"
MALLOCONF = "retain:true"

General Notes

Binaries compiled on a system with 1x Intel Core i9-7980XE CPU + 64GB RAM memory using Red Hat Enterprise Linux 8.1
Transparent Huge Pages enabled by default
Prior to runcpu invocation

(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

ASUSTeK Computer Inc.
ASUS RS700-E10(Z12PP-D32) Server System
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CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.

SPECrater®2017_fp_base = 270
SPECrater®2017_fp_peak = 279

Test Date: Dec-2021
Hardware Availability: May-2021
Software Availability: Mar-2021

General Notes (Continued)

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.
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
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
SNC = Enable SNC2 (2-clusters)
Engine Boost = Aggressive
SR-IOV Support = Disabled
BMC Configuration:
Fan mode = Full speed mode

Sysinfo program /home/cpu118/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaafc64d
running on localhost.localdomain Thu Dec 23 04:59:07 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) Silver 4314 CPU @ 2.40GHz
  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 : 16
siblings : 32
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

From lscpu from util-linux 2.32.1:

(Continued on next page)
Platform Notes (Continued)

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: 2
Core(s) per socket: 16
Socket(s): 2
NUMA node(s): 4
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Silver 4314 CPU @ 2.40GHz
Stepping: 6
CPU MHz: 1267.981
CPU max MHz: 3400.0000
CPU min MHz: 800.0000
BogoMIPS: 4800.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 24576K
NUMA node0 CPU(s): 0-7,32-39
NUMA node1 CPU(s): 8-15,40-47
NUMA node2 CPU(s): 16-23,48-55
NUMA node3 CPU(s): 24-31,56-63
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
aperfmpref pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16
xtrm 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_ppga sbbd mba ibrs ibps enhanced tpr_shadow vnni flexpriority ept
vpid ept_ad fsxgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cqm rdt_a
avx512f avx512fd rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni
avx512bw avx512vl xsavemt xsaveopt xsaves xsaveopt xsaves cqm_llc cqm_occup_llc cqm_mb擎_total
cpu_mb擎_local split_lock_detect wbnoiwvd dtherm ida arat pln pts hwp hwp_act_window
hwp_epp hwp_pkeq require avx512vbmi umip kpu ospe avx512_vbmi2 gfn vaes vpclmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lld
arch_capabilities

/proc/cpuinfo cache data
cache size : 24576 KB

From numactl --hardware
WARNING: a numactl 'node' might or might not correspond to a physical chip.

(Continued on next page)
ASUSTeK Computer Inc.

ASUS RS700-E10(Z12PP-D32) Server System
(2.40 GHz, Intel Xeon Silver 4314)

SPEC CPU® 2017 Floating Point Rate Result

Copyright 2017-2022 Standard Performance Evaluation Corporation

SPECraten® 2017 fp_base = 270
SPECraten® 2017 fp_peak = 279

ASUSTeK Computer Inc. (2.40 GHz, Intel Xeon Silver 4314)

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

Platform Notes (Continued)

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 6 7 32 33 34 35 36 37 38 39
node 0 size: 253952 MB
node 0 free: 257277 MB
node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
node 1 size: 254271 MB
node 1 free: 257708 MB
node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
node 2 size: 254401 MB
node 2 free: 257661 MB
node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
node 3 size: 254256 MB
node 3 free: 257478 MB
node distances:
node 0 1 2 3
0: 10 11 20 20
1: 11 10 20 20
2: 20 20 10 11
3: 20 20 11 10

From /proc/meminfo
MemTotal: 1056475948 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="8.3 (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
ASUSTeK Computer Inc.

ASUS RS700-E10(Z12PP-D32) Server System
(2.40 GHz, Intel Xeon Silver 4314)

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Software Availability: Mar-2021

Platform Notes (Continued)

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):
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling):
CVE-2019-11135 (TSX Asynchronous Abort):
run-level 3 Dec 23 04:52

SPEC is set to: /home/cpu118
  Filesystem            Type  Size  Used Avail Use% Mounted on
  /dev/mapper/rhel-home xfs   3.6T   31G  3.6T   1% /home

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, configured at 2666

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**

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<th>C</th>
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### Compiler Version Notes (Continued)

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**C++, C**  
511.povray_r(base) 526.blender_r(base, peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,  
Version 2021.1 Build 20201113  
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**C++, C, Fortran**  
507.cactuBSSN_r(base, peak)

---

**Fortran**  
503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)  
554.roms_r(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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---

**Fortran, C**  
521.wrf_r(base, peak) 527.cam4_r(base, peak)

---
### SPEC CPU®2017 Floating Point Rate Result

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

### Base Compiler Invocation

- **C benchmarks:** icx
- **C++ benchmarks:** icpx
- **Fortran benchmarks:** ifort
- **Benchmarks using both Fortran and C:** ifort icx
- **Benchmarks using both C and C++:** icpx icx
- **Benchmarks using Fortran, C, and C++:** icpx icx ifort

### 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:  
- `-w` `-std=c11` `-m64` `-Wl,-z,muldefs` `-xcORE-AVX512` `-Ofast` `-ffast-math`  
- `-flto` `-mfpmath=sse` `-funroll-loops` `-qopt-mem-layout-trans=4`  
- `-mbranches-within-32B-boundaries` `-ljemalloc`  
- `-L/usr/local/jemalloc64-5.0.1/lib`

(Continued on next page)
## Base Optimization Flags (Continued)

### C++ benchmarks:
- `-w 
- `-m64 
- `-Wl,-z,muldefs 
- `-xCORE-AVX512 
- `-Ofast 
- `-ffast-math 
- `-flto 
- `-mfpmath=sse 
- `-funroll-loops 
- `-qopt-mem-layout-trans=4 
- `-mbranches-within-32B-boundaries 
- `-ljemalloc 
- `-L/usr/local/jemalloc64-5.0.1/lib`

### Fortran benchmarks:
- `-w 
- `-m64 
- `-Wl,-z,muldefs 
- `-xCORE-AVX512 
- `-O3 
- `-no-prec-div 
- `-qopt-prefetch 
- `-ffinite-math-only 
- `-qopt-multiple-gather-scatter-by-shuffles 
- `-qopt-mem-layout-trans=4 
- `-nostandard-realloc-lhs 
- `-align array32byte 
- `-auto 
- `-mbranches-within-32B-boundaries 
- `-ljemalloc 
- `-L/usr/local/jemalloc64-5.0.1/lib`

### Benchmarks using both Fortran and C:
- `-w 
- `-m64 
- `-std=c11 
- `-Wl,-z,muldefs 
- `-xCORE-AVX512 
- `-Ofast 
- `-ffast-math 
- `-flto 
- `-mfpmath=sse 
- `-funroll-loops 
- `-qopt-mem-layout-trans=4 
- `-O3 
- `-no-prec-div 
- `-qopt-prefetch 
- `-ffinite-math-only 
- `-qopt-multiple-gather-scatter-by-shuffles 
- `-mbranches-within-32B-boundaries 
- `-nostandard-realloc-lhs 
- `-align array32byte 
- `-auto 
- `-ljemalloc 
- `-L/usr/local/jemalloc64-5.0.1/lib`

### Benchmarks using both C and C++:
- `-w 
- `-m64 
- `-std=c11 
- `-Wl,-z,muldefs 
- `-xCORE-AVX512 
- `-Ofast 
- `-ffast-math 
- `-flto 
- `-mfpmath=sse 
- `-funroll-loops 
- `-qopt-mem-layout-trans=4 
- `-L/usr/local/jemalloc64-5.0.1/lib`

### Benchmarks using Fortran, C, and C++:
- `-w 
- `-m64 
- `-std=c11 
- `-Wl,-z,muldefs 
- `-xCORE-AVX512 
- `-Ofast 
- `-ffast-math 
- `-flto 
- `-mfpmath=sse 
- `-funroll-loops 
- `-qopt-mem-layout-trans=4 
- `-O3 
- `-no-prec-div 
- `-qopt-prefetch 
- `-ffinite-math-only 
- `-qopt-multiple-gather-scatter-by-shuffles 
- `-mbranches-within-32B-boundaries 
- `-nostandard-realloc-lhs 
- `-align array32byte 
- `-auto 
- `-ljemalloc 
- `-L/usr/local/jemalloc64-5.0.1/lib`

## Peak Compiler Invocation

### C benchmarks:
- `icx`

### C++ benchmarks:
- `icpx`
Fortran benchmarks:
ifort

Benchmarks using both Fortran and C:
ifort icx

Benchmarks using both C and C++:
511.povray_r: icpc icc
526.blender_r: icpx icx

Benchmarks using Fortran, C, and C++:
icx icx ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
519.lbm_r: basepeak = yes
538.imagick_r: basepeak = yes
544.nab_r: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto
-Ofast -gopt-mem-layout-trans=4 -fimf-accuracy-bits=14:sqrt
-mbranches-within-32B-boundaries -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
508.namd_r: basepeak = yes
510.parest_r: -w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops
-gopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

(Continued on next page)
ASUSTeK Computer Inc.
ASUS RS700-E10(Z12PP-D32) Server System
(2.40 GHz, Intel Xeon Silver 4314)

SPECrate®2017_fp_base = 270
SPECrate®2017_fp_peak = 279

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

Peak Optimization Flags (Continued)

Fortran benchmarks:

503.bwaves_r: basepeak = yes
549.fotonik3d_r: basepeak = yes
554.roms_r: -w -m64 -W1, -z, muldefs -xCORE-AVX512 -O3 -ipo
-no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes
527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512 -O3
-ipo -no-prec-div -qopt-prefetch -ffinite-math-only
-qopt-multiple-gather-scatter-by-shuffles
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: 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

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
ASUSTeK Computer Inc.
ASUS RS700-E10(Z12PP-D32) Server System (2.40 GHz, Intel Xeon Silver 4314)

SPECrater®2017_fp_base = 270
SPECrater®2017_fp_peak = 279

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
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Test Date: Dec-2021
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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 2021-12-23 04:59:07-0500.
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