ASUSTeK Computer Inc.  
ASUS RS700-E10(Z12PP-D32) Server System
(2.30 GHz, Intel Xeon Gold 6314U)

**SPEC CPU®2017 Floating Point Rate Result**

**SPECrater®2017_fp_base = 216**
**SPECrater®2017_fp_peak = 229**

<table>
<thead>
<tr>
<th>Test Sponsor:</th>
<th>ASUSTeK Computer Inc.</th>
<th>Hardware Availability:</th>
<th>May-2021</th>
</tr>
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<tr>
<td>Tested by:</td>
<td>ASUSTeK Computer Inc.</td>
<td>Software Availability:</td>
<td>Mar-2021</td>
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<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9016</th>
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<tr>
<td>Test Date:</td>
<td>Nov-2021</td>
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<td>May-2021</td>
</tr>
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<td>Mar-2021</td>
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</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Gold 6314U
- **Max MHz:** 3400
- **Nominal:** 2300
- **Enabled:** 32 cores, 1 chip, 2 threads/core
- **Orderable:** 1 chip
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **Cache L2:** 1.25 MB I+D on chip per core
- **Cache L3:** 48 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

### 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.
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### Results Table

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<th>Benchmark</th>
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**SPECrate®2017_fp_base = 216**  
**SPECrate®2017_fp_peak = 229**

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"
MALLOC_CONF = "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)
## 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.


## 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 982a61ec0915b55891ef0e16acafc64d running on localhost.localdomain Tue Nov 23 06:15:26 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 6314U CPU @ 2.30GHz
  1 "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 : 64
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
```

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: 32
Socket(s): 1
NUMA node(s): 2
Vendor ID: GenuineIntel
CPU family: 6
Model: 106
Model name: Intel(R) Xeon(R) Gold 6314U CPU @ 2.30GHz
Stepping: 6
CPU MHz: 3085.740
CPU max MHz: 3400.0000
CPU min MHz: 800.0000
BogoMIPS: 4600.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 49152K
NUMA node0 CPU(s): 0-15,32-47
NUMA node1 CPU(s): 16-31,48-63
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 dts
lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid
aerfmpref perf pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma
ct16 xtr px2 mp cdc dca sse4_1 sse4_2 x2apic movbe popcnt tsc_deadline_timer aes
xsavex f16c rdrand lahf_lm abm 3dmowprefetch cpuid_fault epb cat_l3 invpcid_single
intel_pinn sbbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmbi flexpriority ept
vpid ept_ad fsbgsbase tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid cm qrdt_a
avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha
avx512bw avx512vl xsaveopt xsave xgetbv1 xsavec qcm_llc qcm_occup_llc qcm_mbb_total
qcm_mbb_local split lock_detect wbinvd dtherm ida arat pln pts hwp hwp_act_window
hwp_ee p hwp_pkg_req avx512vli umip pku ospe avx512_vmbi2 gfn vaes vpctmulqdq
avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid md_clear pconfig flush_lld
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 32 33 34 35 36 37 38 39 40 41 42 43
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CPU2017 License: 9016
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Test Date: Nov-2021
CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Test Date: Nov-2021

Platform Notes (Continued)

44 45 46 47
node 0 size: 249425 MB
node 0 free: 257007 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 48 49 50 51 52 53 54 55 56
57 58 59 60 61 62 63
node 1 size: 249364 MB
node 1 free: 257211 MB
node distances:
node 0 1
0: 10 11
1: 11 10

From /proc/meminfo
MemTotal: 527995340 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
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

(Continued on next page)
Platform Notes (Continued)

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): 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 23 06:00

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:
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               | 519.ibm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak) |
==============================================================================

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

(Continued on next page)
ASUSTeK Computer Inc.
ASUS RS700-E10(Z12PP-D32) Server System
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SPECRate®2017_fp_base = 216
SPECRate®2017_fp_peak = 229

Compiler Version Notes (Continued)

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---------------------------------------------------------------------
C++ | 508.namd_r(base, peak) 510.parest_r(base, 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 | 511.povray_r(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)
64, Version 2021.1 Build 20201112_000000
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
---------------------------------------------------------------------

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
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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 | 511.povray_r(peak)
---------------------------------------------------------------------

Intel(R) C++ Intel(R) 64 Compiler Classic for applications running on
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Copyright (C) 1985-2020 Intel Corporation. All rights reserved.
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++, C | 511.povray_r(base) 526.blender_r(base, peak)
---------------------------------------------------------------------

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

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)  
---

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.

---

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

Intel (R) Fortran Intel (R) 64 Compiler Classic for applications running on 
Intel (R) 64, Version 2021.1 Build 20201112_000000

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

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 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
Fortran, C | 521.wrf_r(peak)
==============================================================================
Intel(R) Fortran Intel(R) 64 Compiler Classic for applications running on
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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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Fortran, C | 521.wrf_r(base) 527.cam4_r(base, peak)
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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.

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

(Continued on next page)
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Base Compiler Invocation (Continued)
Benchmarks using Fortran, C, and C++:
icpx icx ifort

Base Portability Flags

503.bwaves_r: -DSPEC_LP64 507.cactusBSSN_r: -DSPEC_LP64 508 namd_r: -DSPEC_LP64 510.parest_r: -DSPEC_LP64 511.povray_r: -DSPEC_LP64 519.ibm_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

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 -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

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

Benchmarks using both Fortran and C:

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` `-mbranches-within-32B-boundaries` `-ljemalloc` `-L/usr/local/jemalloc64-5.0.1/lib`

Benchmarks using Fortran, C, and C++:

Peak Compiler Invocation

C benchmarks:
- `icx`

C++ benchmarks:
- `icpx`

Fortran benchmarks:
- `ifort`

Benchmarks using both Fortran and C:
- `521.wrf_r: ifort icc`
- `527.cam4_r: ifort icx`

Benchmarks using both C and C++:
- `511.povray_r: icpc icc`

(Continued on next page)
Peak Compiler Invocation (Continued)

526.blender_r icpx icx

Benchmarks using Fortran, C, and C++:
icpx 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 -qopt-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
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503.bwaves_r -w -m64 -Wl,-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 -no-standard-realloc-lhs
-align array32byte -auto -mbranches-within-32B-boundaries
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

(Continued on next page)
Peak Optimization Flags (Continued)

549.fotonik3d_r.basepeak = yes

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_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
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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

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