ASUSTeK Computer Inc.
ASUS RS700-E10(Z12PP-D32) Server System
(3.10 GHz, Intel Xeon Gold 6346)

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

SPECrate®2017_int_base = 290
SPECrate®2017_int_peak = 300

Test Date: Jul-2021
Hardware Availability: May-2021

Software
OS: Red Hat Enterprise Linux release 8.2 (Ootpa) 4.18.0-193.el8.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 0502 released May-2021
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

Hardware
CPU Name: Intel Xeon Gold 6346
Max MHz: 3600
Nominal: 3100
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: 36 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

SPEC CPU®2017 Integer Rate Result
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500.perlbench_r 64 245
502.gcc_r 64 281
505.mcf_r 64 192
520.omnetpp_r 64 502
523.xalancbmk_r 64 374
525.x264_r 64 619
531.deepsjeng_r 64 583
541.leela_r 64 583
548.exchange2_r 64 583
557.xz_r 64 583

SPECrate®2017_int_base = 290
SPECrate®2017_int_peak = 300
### Results Table

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<td>158</td>
<td>439</td>
<td>157</td>
<td>437</td>
<td>158</td>
</tr>
</tbody>
</table>

**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 = "/cpu118/lib/intel64:/cpu118/lib/ia32:/cpu118/je5.0.1-32"
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
Filesystem page cache synced and cleared with:
`sync; echo 3> /proc/sys/vm/drop_caches`
runcpu command invoked through numactl i.e.:
ASUSTeK Computer Inc.  
ASUS RS700-E10(Z12PP-D32) Server System  
(3.10 GHz, Intel Xeon Gold 6346)

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

SPECrate®2017_int_base = 290
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Test Date: Jul-2021
Hardware Availability: May-2021
Software Availability: Dec-2020

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**General Notes (Continued)**

```
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 /cpu18/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16aaca64d
running on localhost.localdomain Tue Jul 27 01:18:23 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 6346 CPU @ 3.10GHz
  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:
```
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian
```

(Continued on next page)
Platform Notes (Continued)

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) Gold 6346 CPU @ 3.10GHz
Stepping: 6
CPU MHz: 1643.984
CPU max MHz: 3600.0000
CPU min MHz: 800.0000
BogoMIPS: 6200.00
Virtualization: VT-x
L1d cache: 48K
L1i cache: 32K
L2 cache: 1280K
L3 cache: 36864K
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 ndepagb rdtscp
lm constant-tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop-tsc cpluid
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 popcnt_deadline_timer aes xsave
ax f16c rdrand lahf_lm abm 3nowprefetch cpuid_fault epb cat-l3 invpcid_single ssbd
mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid fsgsbse
arch_adjust bni hle avx2 smep bmi2 erms invpcid rtm cmqm rdt_a avx512f avx512dq
rdsseed adx smap avx512sfma clflushopt clwb intel_pt avx512cd sha ni avx512bw
avx512vl xsaveopt xsavec xgetbv1 xsaves cmqm llc cmqm_occu_llc cmqm_mbttotal
cmqm_mbllocal wbnoinvd dtherm ida arat pln pts hwp hwp_act_window hwp epp
hwp_pkgreq avx512vbmip avx512vbi2 avx512_v bmi gfni vaes vpcmldqd avx512_vnmi
avx512_bitalg tme avx512_vpocntdq 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: 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: 257620 MB

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

SPECrate®2017_int_base = 290  
SPECrate®2017_int_peak = 300  

Platform Notes (Continued)  

node 0 free: 256974 MB  
node 1 cpus:  8  9 10 11 12 13 14 15 40 41 42 43 44 45 46 47  
node 1 size: 258016 MB  
node 1 free: 257317 MB  
node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55  
node 2 size: 258044 MB  
node 2 free: 257616 MB  
node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63  
node 3 size: 258041 MB  
node 3 free: 257595 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: 1056484676 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:  

(Continued on next page)
ASUSTeK Computer Inc.
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SPECratenet
SPECratenet

CPU2017 License: 9016
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Test Date: Jul-2021
Hardware Availability: May-2021
Software Availability: Dec-2020

Platform Notes (Continued)

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swapgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
CVE-2017-5715 (Spectre variant 2): Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): No status reported
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Jul 26 19:19
SPEC is set to: /cpu11
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-root xfs 2.6T 101G 2.5T 4% /

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)
ASUSTeK Computer Inc.
ASUS RS700-E10(Z12PP-D32) Server System
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SPEC CPU®2017 Integer Rate Result

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ASUSTeK Computer Inc. SPECrate®2017_int_base = 290
ASUS RS700-E10(Z12PP-D32) Server System SPECrate®2017_int_peak = 300
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Compiler Version Notes

==============================================================================
C       | 500.perlbench_r(peak) 557.xz_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.

==============================================================================
C       | 502.gcc_r(peak)
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2021.1 Build 20201113
Copyright (C) 1985-2020 Intel Corporation. All rights reserved.

==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
          | 525.x264_r(base, peak) 557.xz_r(base)
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113
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==============================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
          | 525.x264_r(base, peak) 557.xz_r(base)
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2021.1 Build 20201113

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

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---------------------------------------------------------------------
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base, peak)
| 525.x264_r(base, peak) 557.xz_r(base)
---------------------------------------------------------------------
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++      | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base, peak)
| 531.deepsjeng_r(base, peak) 541.leela_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 | 548.exchange2_r(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.
SPEC CPU®2017 Integer Rate Result
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Software Availability: Dec-2020

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ipo -no-prec-div
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte
-auto -mbranches-within-32B-boundaries

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

For Fortran benchmarks:
- `L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`
- `-lqkmalloc`

### Peak Compiler Invocation

- **C benchmarks (except as noted below):**
  - `icc`
- **500.perlbench_r: icc**
- **557.xz_r: icc**

- **C++ benchmarks:**
  - `icpx`

- **Fortran benchmarks:**
  - `ifort`

### Peak Portability Flags

- **500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64**
- **502.gcc_r: -D_FILE_OFFSET_BITS=64**
- **505.mcf_r: -DSPEC_LP64**
- **520.omnetpp_r: -DSPEC_LP64**
- **523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX**
- **525.x264_r: -DSPEC_LP64**
- **531.deepsjeng_r: -DSPEC_LP64**
- **541.leela_r: -DSPEC_LP64**
- **548.exchange2_r: -DSPEC_LP64**
- **557.xz_r: -DSPEC_LP64**

### Peak Optimization Flags

- **C benchmarks:**
  - `500.perlbench_r: -Wl,-z,muldefs -prof-gen(pass 1) -prof-use(pass 2)
  - -xCORE-AVX512 -ipo -O3 -no-prec-div
  - -qopt-mem-layout-trans=4 -fno-strict-overflow
  - -mbranches-within-32B-boundaries`

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**ASUSTeK Computer Inc.**

ASUS RS700-E10(Z12PP-D32) Server System (3.10 GHz, Intel Xeon Gold 6346)

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

**Test Date:** Jul-2021  
**Hardware Availability:** May-2021  
**Software Availability:** Dec-2020

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**Peak Optimization Flags (Continued)**

500.perlbench_r (continued):
- `L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`  
- `-lqkmalloc`

502.gcc_r: `-m32`  
- `L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/ia32_lin`  
- `-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass1)`  
- `-fprofile-use=default.profdata(pass2) -xCORE-AVX512 -flto`  
- `-Ofast(pass1) -O3 -ffast-math -gopt-mem-layout-trans=4`  
- `-mbranches-within-32B-boundsaries`  
- `-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc`

505.mcf_r: `basepeak = yes`

525.x264_r: `-w`  
- `-std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -flto`  
- `-O3 -ffast-math -gopt-mem-layout-trans=4 -fno-alias`  
- `-mbranches-within-32B-boundsaries`  
- `L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`  
- `-lqkmalloc`

557.xz_r: `-Wl,-z,muldefs -xCORE-AVX512 -ipo -O3 -no-prec-div`  
- `-gopt-mem-layout-trans=4 -mbranches-within-32B-boundsaries`  
- `L/opt/intel/oneapi/compiler/2021.1.1/linux/compiler/lib/intel64_lin`  
- `-lqkmalloc`

C++ benchmarks:

520.omnetpp_r: `basepeak = yes`

523.xalancbmk_r: `basepeak = yes`

531.deepsjeng_r: `basepeak = yes`

541.leela_r: `basepeak = yes`

Fortran benchmarks:

548.exchange2_r: `basepeak = yes`

---

The flags files that were used to format this result can be browsed at:


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`
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ASUSTeK Computer Inc.  
ASUS RS700-E10(Z12PP-D32) Server System  
(3.10 GHz, Intel Xeon Gold 6346)

**SPECrate®2017_int_base = 290**

**SPECrate®2017_int_peak = 300**

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

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