



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

CPU2017 License: 9016

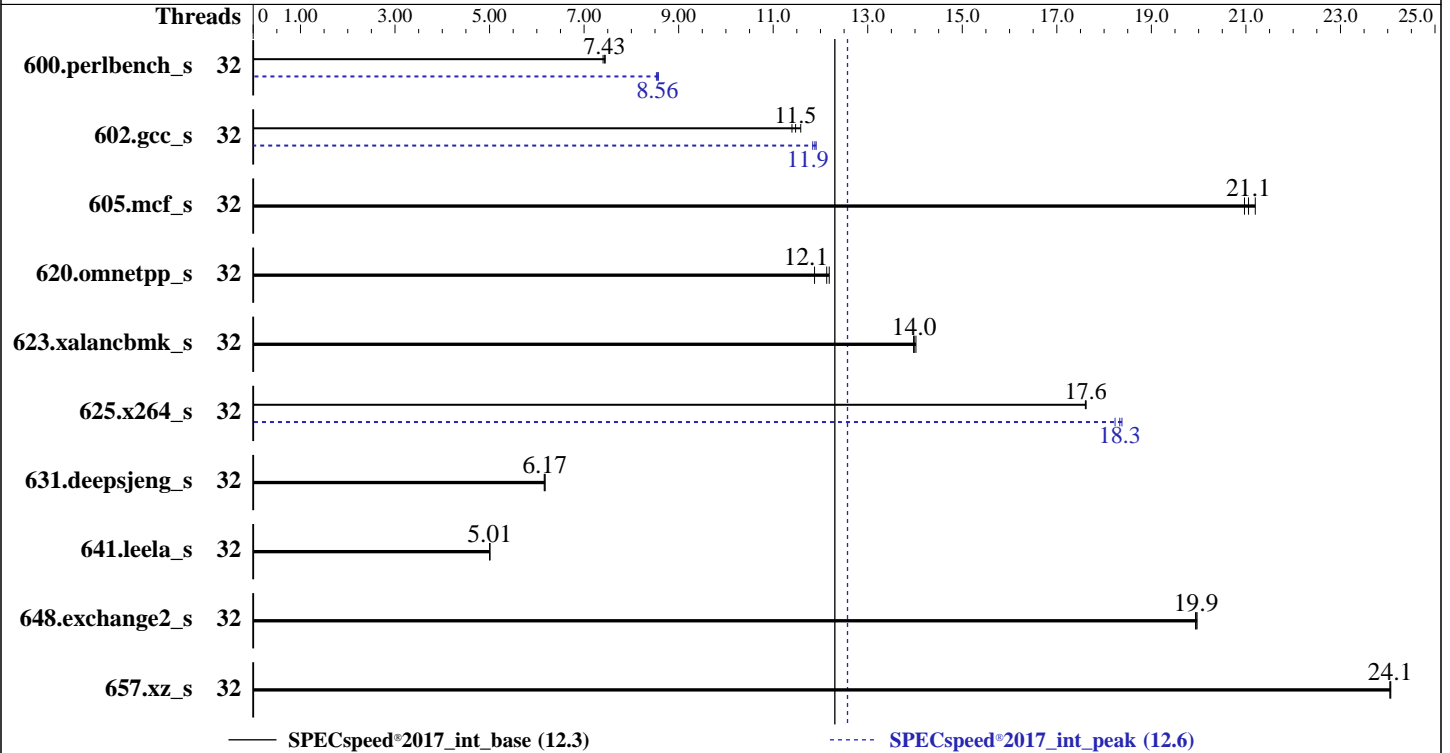
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Jul-2021

Hardware Availability: May-2021

Software Availability: Dec-2020



Hardware

CPU Name: Intel Xeon Gold 6346
 Max MHz: 3600
 Nominal: 3100
 Enabled: 32 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: 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

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: 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 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

Results Table

Benchmark	Base						Peak							
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	32	240	7.40	<u>239</u>	<u>7.43</u>	238	7.45	32	208	8.53	<u>207</u>	<u>8.56</u>	207	8.57
602.gcc_s	32	344	11.6	349	11.4	<u>347</u>	<u>11.5</u>	32	336	11.8	<u>335</u>	<u>11.9</u>	334	11.9
605.mcf_s	32	223	21.2	225	21.0	<u>224</u>	<u>21.1</u>	32	223	21.2	225	21.0	<u>224</u>	<u>21.1</u>
620.omnetpp_s	32	134	12.2	<u>134</u>	<u>12.1</u>	137	11.9	32	134	12.2	<u>134</u>	<u>12.1</u>	137	11.9
623.xalancbmk_s	32	101	14.0	101	14.0	<u>101</u>	<u>14.0</u>	32	101	14.0	101	14.0	<u>101</u>	<u>14.0</u>
625.x264_s	32	100	17.6	100	17.6	<u>100</u>	<u>17.6</u>	32	96.0	18.4	96.8	18.2	<u>96.2</u>	<u>18.3</u>
631.deepsjeng_s	32	<u>232</u>	<u>6.17</u>	232	6.18	233	6.16	32	<u>232</u>	<u>6.17</u>	232	6.18	233	6.16
641.leela_s	32	341	5.01	<u>341</u>	<u>5.01</u>	341	5.00	32	341	5.01	<u>341</u>	<u>5.01</u>	341	5.00
648.exchange2_s	32	147	19.9	<u>147</u>	<u>19.9</u>	147	20.0	32	147	19.9	<u>147</u>	<u>19.9</u>	147	20.0
657.xz_s	32	<u>257</u>	<u>24.1</u>	257	24.1	257	24.0	32	<u>257</u>	<u>24.1</u>	257	24.1	257	24.0

SPECspeed®2017_int_base = **12.3**

SPECspeed®2017_int_peak = **12.6**

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,scatter"
LD_LIBRARY_PATH = "/cpull8/lib/intel64:/cpull8/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)



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

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 /cpull8/bin/sysinfo

Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d

running on localhost.localdomain Wed Jul 28 16:29:03 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)

32 "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 : 16

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

CPU(s): 32

On-line CPU(s) list: 0-31

Thread(s) per core: 1

Core(s) per socket: 16

Socket(s): 2

NUMA node(s): 2

Vendor ID: GenuineIntel

CPU family: 6

Model: 106

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

Platform Notes (Continued)

```

Model name: Intel(R) Xeon(R) Gold 6346 CPU @ 3.10GHz
Stepping: 6
CPU MHz: 3375.462
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): 0-15
NUMA node1 CPU(s): 16-31
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
aperfmpperf 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 ssbd
mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid fsgsbase
tsc_adjust bmi1 hle avx2 smep bmi2 erms invpcid rtm 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 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: 2 nodes (0-1)
node 0 cpus: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
node 0 size: 515641 MB
node 0 free: 514881 MB
node 1 cpus: 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31
node 1 size: 516089 MB
node 1 free: 515688 MB
node distances:
node  0  1
 0:  10  20
 1:  20  10

```

```

From /proc/meminfo
MemTotal: 1056492544 kB

```

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

Platform Notes (Continued)

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/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): No status reported
CVE-2019-11135 (TSX Asynchronous Abort): Not affected
```

run-level 3 Jul 28 16:28

SPEC is set to: /cpu118

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

Platform Notes (Continued)

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)

Compiler Version Notes

```

=====
C          | 600.perlbench_s(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          | 600.perlbench_s(base) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
          | 625.x264_s(base, peak) 657.xz_s(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          | 600.perlbench_s(peak)
-----

```

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

Compiler Version Notes (Continued)

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 | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak)
| 625.x264_s(base, peak) 657.xz_s(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++ | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak)
| 631.deepsjeng_s(base, peak) 641.leela_s(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 | 648.exchange2_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.

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifort



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

Base Portability Flags

```
600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64
```

Base Optimization Flags

C benchmarks:

```
-DSPEC_OPENMP -std=c11 -m64 -fiopenmp -Wl,-z,muldefs -xCORE-AVX512
-O3 -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:

```
-DSPEC_OPENMP -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:

```
-m64 -xCORE-AVX512 -O3 -ipo -no-prec-div -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-mbranches-within-32B-boundaries
```

Peak Compiler Invocation

C benchmarks (except as noted below):

icx

600.perlbench_s: icc

C++ benchmarks:

icpx

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

Peak Compiler Invocation (Continued)

Fortran benchmarks:

ifort

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -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
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profddata(pass 2) -xCORE-AVX512 -flto
-Ofast(pass 1) -O3 -ffast-math -qopt-mem-layout-trans=4
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
605.mcf_s: basepeak = yes
```

```
625.x264_s: -DSPEC_OPENMP -fiopenmp -std=c11 -m64 -Wl,-z,muldefs
-xCORE-AVX512 -flto -O3 -ffast-math
-qopt-mem-layout-trans=4 -fno-alias
-mbranches-within-32B-boundaries
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

```
657.xz_s: basepeak = yes
```

C++ benchmarks:

```
620.omnetpp_s: basepeak = yes
```

```
623.xalancbmk_s: basepeak = yes
```

```
631.deepsjeng_s: basepeak = yes
```

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.

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

SPECspeed®2017_int_base = 12.3

SPECspeed®2017_int_peak = 12.6

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

Peak Optimization Flags (Continued)

641.leela_s:basepeak = yes

Fortran benchmarks:

648.exchange2_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-V1.0.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-V1.0.xml>

http://www.spec.org/cpu2017/flags/Intel-ic2021-official-linux64_revA.xml

SPEC CPU and SPECspeed are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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 2021-07-28 04:29:03-0400.

Report generated on 2021-08-19 10:47:47 by CPU2017 PDF formatter v6442.

Originally published on 2021-08-17.