



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

ASUSTeK Computer Inc.
ASUS RS720-E10-RS12(Z12PP-D32) Server System
(2.30 GHz, Intel Xeon Silver 4310T)

SPECspeed®2017_int_base = 11.6

SPECspeed®2017_int_peak = 11.7

CPU2017 License: 9016

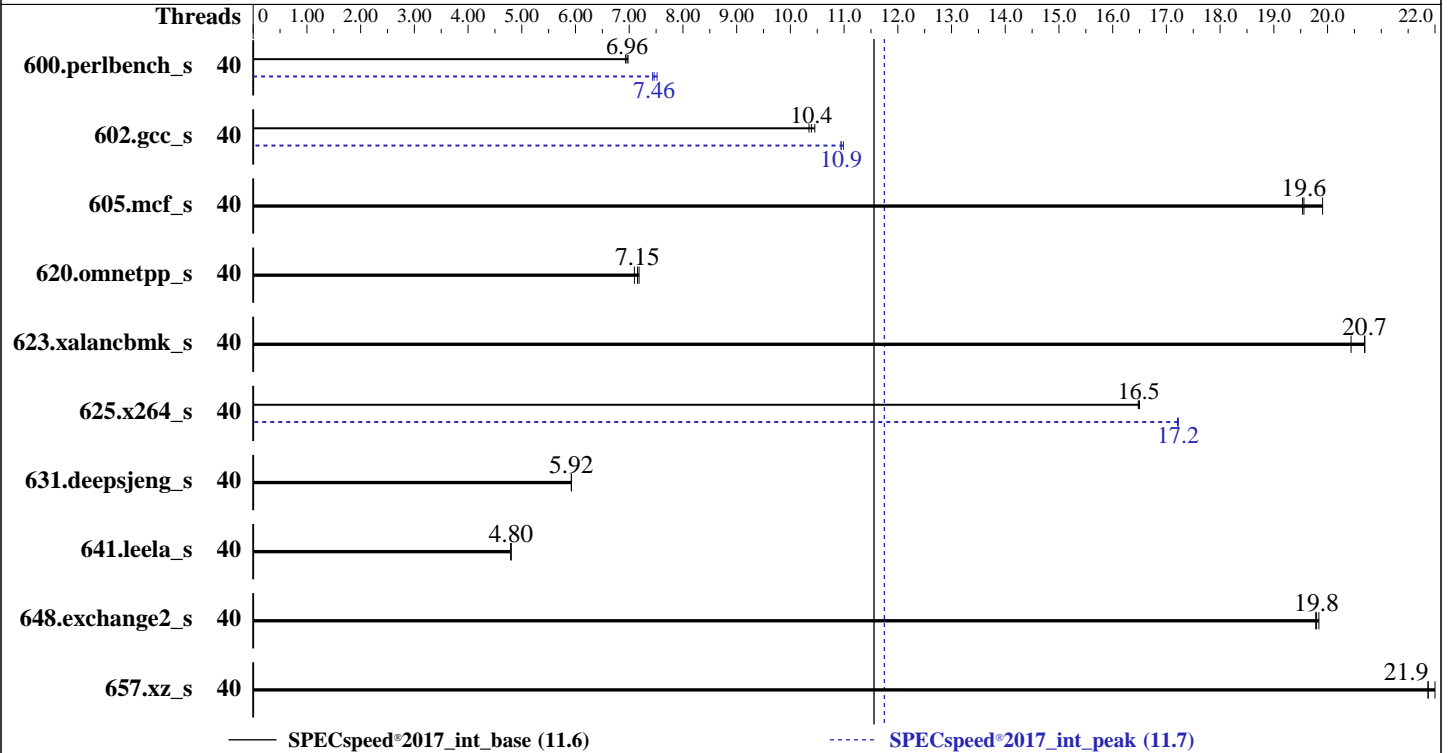
Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Feb-2023

Hardware Availability: Apr-2022

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Silver 4310T
 Max MHz: 3400
 Nominal: 2300
 Enabled: 20 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: 15 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 1 TB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux release 8.4 (Ootpa) 4.18.0-305.25.1.el8_4.x86_64
 Compiler: C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
 Parallel: Yes
 Firmware: Version 0802 released Apr-2022
 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

Benchmark	Base						Peak							
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	40	255	6.96	254	6.98	256	6.93	40	238	7.46	239	7.43	236	7.52
602.gcc_s	40	385	10.3	381	10.5	383	10.4	40	364	10.9	362	11.0	364	10.9
605.mcf_s	40	242	19.5	237	19.9	241	19.6	40	242	19.5	237	19.9	241	19.6
620.omnetpp_s	40	230	7.10	228	7.15	227	7.18	40	230	7.10	228	7.15	227	7.18
623.xalancbmk_s	40	69.3	20.4	68.5	20.7	68.5	20.7	40	69.3	20.4	68.5	20.7	68.5	20.7
625.x264_s	40	107	16.5	107	16.5	107	16.5	40	102	17.2	103	17.2	102	17.2
631.deepsjeng_s	40	242	5.92	242	5.92	242	5.92	40	242	5.92	242	5.92	242	5.92
641.leela_s	40	356	4.80	355	4.80	355	4.80	40	356	4.80	355	4.80	355	4.80
648.exchange2_s	40	149	19.8	149	19.8	148	19.8	40	149	19.8	149	19.8	148	19.8
657.xz_s	40	281	22.0	283	21.9	283	21.9	40	281	22.0	283	21.9	283	21.9

SPECspeed®2017_int_base = **11.6**

SPECspeed®2017_int_peak = **11.7**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

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 = "/home/ic23/lib/intel64:/home/ic23/je5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Redhat Enterprise Linux 8.0
Transparent Huge Pages enabled by default

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General Notes (Continued)

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
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
Engine Boost = Aggressive
SR-IOV Support = Disabled
BMC Configuration:
Fan mode = Full speed mode

Sysinfo program /home/ic23/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Wed Feb 22 10:26:46 2023

SUT (System Under Test) info as seen by some common utilities.

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 10. who -r
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 13. Linux kernel boot-time arguments, from /proc/cmdline
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Platform Notes (Continued)

1. `uname -a`
Linux localhost.localdomain 4.18.0-305.25.1.el8_4.x86_64 #1 SMP Mon Oct 18 14:34:11 EDT 2021 x86_64 x86_64 x86_64 GNU/Linux

2. `w`
10:26:46 up 5:57, 1 user, load average: 28.72, 35.63, 37.29
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 04:29 5:56m 1.14s 0.00s /bin/bash ./speed.sh

3. `Username`
From environment variable \$USER: root

4. `ulimit -a`
core file size (blocks, -c) 0
data seg size (kbytes, -d) unlimited
scheduling priority (-e) 0
file size (blocks, -f) unlimited
pending signals (-i) 4126718
max locked memory (kbytes, -l) 64
max memory size (kbytes, -m) unlimited
open files (-n) 1024
pipe size (512 bytes, -p) 8
POSIX message queues (bytes, -q) 819200
real-time priority (-r) 0
stack size (kbytes, -s) unlimited
cpu time (seconds, -t) unlimited
max user processes (-u) 4126718
virtual memory (kbytes, -v) unlimited
file locks (-x) unlimited

5. `sysinfo process ancestry`
/usr/lib/systemd/systemd --switched-root --system --deserialize 18
login -- root
-bash
/bin/bash ./speed.sh
/bin/bash ./speed.sh
runcpu --nobuild --action validate --define default-platform-flags -c
ic2023.0-lin-core-avx512-speed-20221201.cfg --define cores=40 --tune base,peak -o all --define
intspeedaffinity --define drop_caches intspeer
runcpu --nobuild --action validate --define default-platform-flags --configfile
ic2023.0-lin-core-avx512-speed-20221201.cfg --define cores=40 --tune base,peak --output_format all
--define intspeeraffinity --define drop_caches --nopower --runmode speed --tune base:peak --size refspeer
intspeer --nopreenv --note-preenv --logfile \$SPEC/tmp/CPU2017.021/templogs/preenv.intspeer.021.0.log
--lognum 021.0 --from_runcpu 2
specperl \$SPEC/bin/sysinfo
\$SPEC = /home/ic23

6. `/proc/cpuinfo`
model name : Intel(R) Xeon(R) Silver 4310T CPU @ 2.30GHz
vendor_id : GenuineIntel
cpu family : 6
model : 106
stepping : 6
microcode : 0xd000331
bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs

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Platform Notes (Continued)

```
cpu cores      : 10
siblings      : 20
2 physical ids (chips)
40 processors (hardware threads)
physical id 0: core ids 0-9
physical id 1: core ids 0-9
physical id 0: apicids 0-19
physical id 1: apicids 64-83
```

Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

7. lscpu

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):            40
On-line CPU(s) list: 0-39
Thread(s) per core: 2
Core(s) per socket: 10
Socket(s):         2
NUMA node(s):     2
Vendor ID:         GenuineIntel
BIOS Vendor ID:   Intel
CPU family:        6
Model:            106
Model name:        Intel(R) Xeon(R) Silver 4310T CPU @ 2.30GHz
BIOS Model name:   Intel(R) Xeon(R) Silver 4310T CPU @ 2.30GHz
Stepping:          6
CPU MHz:           2819.748
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:          15360K
NUMA node0 CPU(s): 0-9,20-29
NUMA node1 CPU(s): 10-19,30-39
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
                  abm 3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppin ssbd mba ibrs ibpb
                  stibp ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust
                  bmi1 hle avx2 smep bmi2 erms invpcid 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 split_lock_detect
                  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 fsrm md_clear pconfig flush_l1d arch_capabilities
```

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 2 nodes (0-1)

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Platform Notes (Continued)

```
node 0 cpus: 0-9,20-29
node 0 size: 515667 MB
node 0 free: 513846 MB
node 1 cpus: 10-19,30-39
node 1 size: 516051 MB
node 1 free: 514617 MB
node distances:
node 0 1
  0: 10 20
  1: 20 10
```

```
-----
9. /proc/meminfo
  MemTotal:      1056480752 kB
```

```
-----
10. who -r
  run-level 3 Feb 22 04:29
```

```
-----
11. Systemd service manager version: systemd 239 (239-45.el8_4.3)
  Default Target  Status
  multi-user      running
```

```
-----
12. Services, from systemctl list-unit-files
  STATE  UNIT FILES
  enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online atd auditd autovt@ chronyd
  crond firewalld getty@ import-state insights-client-boot irqbalance iscsi iscsi-onboot kdump
  libstoragemgmt lm_sensors loadmodules lvm2-monitor mcelog mdmonitor microcode multipathd
  nvme-fc-boot-connections pmcd pmie pmlogger rhsmcertd rsyslog selinux-autorelabel-mark smartd sshd
  sssd syslog sysstat timedatex tuned udisks2 vdo
  disabled arp-ethers blk-availability chrony-wait console-getty cpupower debug-shell ebttables fancontrol
  grafana-server iprdump iprinit iprupdate ipsec iscsid iscsiui kpatch kvm_stat ledmon nftables
  nis-domainname nvmmf-autoconnect oddjobd pmfind pmie-check pmlogger-check pmlogger_daily_report
  pmlogger_daily_report-poll pmproxy podman-auto-update postfix powertop psacct ras-mc-ctl
  rasdaemon rdisc rhcd rhsm rhsm-facts rrdcached sasauthd serial-getty@ sshd-keygen@
  systemd-resolved tcscd
  indirect sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
  masked  systemd-timedated
```

```
-----
13. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=(hd0,gpt2)/vmlinuz-4.18.0-305.25.1.el8_4.x86_64
  root=/dev/mapper/rhel-root
  ro
  resume=/dev/mapper/rhel-swap
  rd.lvm.lv=rhel/root
  rd.lvm.lv=rhel/swap
  rhgb
  quiet
```

```
-----
14. cpupower frequency-info
  analyzing CPU 0:
    current policy: frequency should be within 800 MHz and 3.40 GHz.
                    The governor "performance" may decide which speed to use
                    within this range.
  boost state support:
    Supported: yes
```

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Platform Notes (Continued)

Active: yes

15. tuned-adm active
Current active profile: throughput-performance

16. sysctl
kernel.numa_balancing 1
kernel.randomize_va_space 2
vm.compaction_proactiveness 0
vm.dirty_background_bytes 0
vm.dirty_background_ratio 10
vm.dirty_bytes 0
vm.dirty_expire_centisecs 3000
vm.dirty_ratio 40
vm.dirty_writeback_centisecs 500
vm.dirtytime_expire_seconds 43200
vm.extfrag_threshold 500
vm.min_unmapped_ratio 1
vm.nr_hugepages 0
vm.nr_hugepages_mempolicy 0
vm.nr_overcommit_hugepages 0
vm.swappiness 10
vm.watermark_boost_factor 15000
vm.watermark_scale_factor 10
vm.zone_reclaim_mode 0

17. /sys/kernel/mm/transparent_hugepage
defrag always defer defer+madvice [madvice] never
enabled [always] madvice never
hpage_pmd_size 2097152
shmem_enabled always within_size advise [never] deny force

18. /sys/kernel/mm/transparent_hugepage/khugepaged
alloc_sleep_millisecs 60000
defrag 1
max_ptes_none 511
max_ptes_swap 64
pages_to_scan 4096
scan_sleep_millisecs 10000

19. OS release
From /etc/*-release /etc/*-version
os-release Red Hat Enterprise Linux 8.4 (Ootpa)
redhat-release Red Hat Enterprise Linux release 8.4 (Ootpa)
system-release Red Hat Enterprise Linux release 8.4 (Ootpa)

20. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities
itlb_multihit Not affected
l1tf Not affected
mds Not affected
meltdown Not affected
spec_store_bypass Mitigation: Speculative Store Bypass disabled via prctl and seccomp
spectre_v1 Mitigation: usercopy/swaps barriers and __user pointer sanitization
spectre_v2 Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling

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Platform Notes (Continued)

srbds Not affected
tsx_async_abort Not affected
For more information, see the Linux documentation on hardware vulnerabilities, for example
<https://www.kernel.org/doc/html/latest/admin-guide/hw-vuln/index.html>

21. Disk information
SPEC is set to: /home/ic23
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 878G 124G 755G 15% /home

22. /sys/devices/virtual/dmi/id
Vendor: ASUSTeK COMPUTER INC.
Product: RS720-E10-RS12
Product Family: Server
Serial: 012345678901

23. dmidecode
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 Samsung M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2666

24. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: American Megatrends Inc.
BIOS Version: 0802
BIOS Date: 04/29/2022
BIOS Revision: 8.2

Compiler Version Notes

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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

Fortran | 648.exchange2_s(base, peak)

Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

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Compiler Version Notes (Continued)

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

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

C++ benchmarks:
-m64 -std=c++14 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

Fortran benchmarks:
-m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nonstandard-realloc-lhs -align array32byte

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Base Optimization Flags (Continued)

Fortran benchmarks (continued):

`-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc`

Peak Compiler Invocation

C benchmarks:

`icx`

C++ benchmarks:

`icpx`

Fortran benchmarks:

`ifx`

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

`600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profddata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-fiopenmp -DSPEC_OPENMP -fno-strict-overflow
-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-AVX2(pass 1)
-flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-fiopenmp -DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc`

`605.mcf_s: basepeak = yes`

`625.x264_s: -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -O3
-ffast-math -flto -mfpmath=sse -funroll-loops`

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

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ASUSTeK Computer Inc.
ASUS RS720-E10-RS12(Z12PP-D32) Server System
(2.30 GHz, Intel Xeon Silver 4310T)

SPECspeed®2017_int_base = 11.6

SPECspeed®2017_int_peak = 11.7

CPU2017 License: 9016

Test Sponsor: ASUSTeK Computer Inc.

Tested by: ASUSTeK Computer Inc.

Test Date: Feb-2023

Hardware Availability: Apr-2022

Software Availability: Dec-2022

Peak Optimization Flags (Continued)

625.x264_s (continued):

```
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP  
-fno-alias -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

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/Intel-ic2023-official-linux64.html>

<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/Intel-ic2023-official-linux64.xml>

<http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z12-V1.2.xml>

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