ASUSTeK Computer Inc.
ASUS ESC4000-E11
(3.10 GHz, Intel Xeon Gold 6458Q)

SPECrater®2017_int_base = 741
SPECrater®2017_int_peak = 768

CPU2017 License: 9016
Test Sponsor: ASUSTeK Computer Inc.
Tested by: ASUSTeK Computer Inc.
Hardware Availability: Jul-2023
Software Availability: Dec-2023

Test Date: Jan-2024

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**Hardware**

- **CPU Name:** Intel Xeon Gold 6458Q
- **Max MHz:** 4000
- **Nominal:** 3100
- **Enabled:** 64 cores, 2 chips, 2 threads/core
- **Orderable:** 1, 2 chip(s)
- **Cache L1:** 32 KB I + 48 KB D on chip per core
- **L2:** 2 MB I+D on chip per core
- **L3:** 60 MB I+D on chip per chip
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
- **Storage:** 1 x 1.6 TB PCIe NVMe SSD
- **Other:** None

**Software**

- **OS:** SUSE Linux Enterprise Server 15 SP4 (x86_64) Kernel 5.14.21-150400.22-default
- **Compiler:** C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;
- **Parallel:** No
- **Firmware:** Version 0301 released May-2023
- **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.

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SPEC CPU®2017 Integer Rate Result

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Results Table

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</table>

SPEC CPU®2017_int_base = 741
SPEC CPU®2017_int_peak = 768

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 = "/ic23u2/lib/intel64:/ic23u2/lib/ia32:/ic23u2/je5.0.1-32"
MALLOC_CONF = "retain:true"

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Red Hat Enterprise Linux 8.4
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.:
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.

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

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Hardware Availability: Jul-2023
Software Availability: Dec-2023

General Notes (Continued)

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)
LLC dead line alic = Disabled
Engine Boost = Aggressive
SR-IOV Support = Disabled
BMC Configuration:
Fan mode = Full speed mode

Sysinfo program /lc23u2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Mon Jan  8 11:29:05 2024

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

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1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numacl --hardware
9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. tuned-adm active
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/krhugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS

(Continued on next page)
Platform Notes (Continued)

11:29:05 up 2 min, 1 user, load average: 1.50, 1.62, 0.69
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 11:28 9.00s 0.90s 0.04s /bin/bash ./rate.sh

3. Username
From environment variable $USER: root

4. ulimit -a
core file size (blocks, -c) unlimited
data seg size (kbytes, -d) unlimited
 scheduling priority (--e) 0
 file size (blocks, -f) unlimited
 pending signals (--l) 416755
 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) 416755
 virtual memory (kbytes, -v) unlimited
 file locks (--x) unlimited

5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
/bin/bash ./rate.sh

runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 -c
ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=64 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak -o all intrate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=64 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
--runmode rate --tune base:peak --size refrate intrate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.193/temlogs/preenv.intrate.193.0.log --lognum 193.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo

$SPEC = /ic23u2

6. /proc/cpuinfo
model name : Intel(R) Xeon(R) Gold 6458Q
 vendor_id : GenuineIntel
cpu family : 6
 model : 143
 stepping : 8
 microcode : 0x2b000461
 bugs : spectre_v1 spectre_v2 spec_store_bypass swappgs
cpu cores : 32
 siblings : 64
2 physical ids (chips)
128 processors (hardware threads)
 physical id 0: core ids 0-31
 physical id 1: core ids 0-31

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

**ASUSTeK Computer Inc.**

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(3.10 GHz, Intel Xeon Gold 6458Q)

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---

**Platform Notes (Continued)**

```
7. lscpu

From lscpu from util-linux 2.37.2:

Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 46 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 128
On-Line CPU(s) list: 0-127
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Gold 6458Q
CPU family: 6
Model: 134
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 8
CPU max MHz: 4000.0000
CPU min MHz: 800.0000
BogoMIPS: 6200.00

Flags:
  fpu vme de pmtdbr mtr nr mce mta cmov pat pse 3dnow cx8 apic sep mtrr pge mce cmov pat pse36
  clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
  lm constant_tsc arch_perfmon pebs bts rep_good nopl xtopology
  nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor
  ds_cpl vmx aes f16c rdseed rdrand lahf_lm abm 3nowprefetch cpuid_fault ebcat_13 cat_12 cdp cd
  invpcid_single intel_pstate rdylimit rdimm
  l1d cache: 3 MiB (64 instances)
l1i cache: 2 MiB (64 instances)
l2 cache: 128 MiB (64 instances)
l3 cache: 120 MiB (2 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0-15,64-79
NUMA node1 CPU(s): 16-31,80-95
NUMA node2 CPU(s): 32-47,96-111
NUMA node3 CPU(s): 48-63,112-127

Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
```

(Continued on next page)
## Platform Notes (Continued)

Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

### From lscpu --cache:

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<td>2M</td>
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<td>64</td>
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</tbody>
</table>

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8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0-15,64-79
node 0 size: 257675 MB
node 0 free: 256380 MB
node 1 cpus: 16-31,80-95
node 1 size: 258039 MB
node 1 free: 257439 MB
node 2 cpus: 32-47,96-111
node 2 size: 258039 MB
node 2 free: 257512 MB
node 3 cpus: 48-63,112-127
node 3 size: 257958 MB
node 3 free: 257529 MB
node distances:

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<td>3</td>
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</tbody>
</table>

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11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
Default Target Status
multi-user running
Platform Notes (Continued)

13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=9bcf0374-b29f-4a4c-932e-9c0e90fb0803
    splash=silent
    mitigations=auto
    quiet

14. cpupower frequency-info
    analyzing CPU 0:
    current policy: frequency should be within 800 MHz and 4.00 GHz.
    The governor "performance" may decide which speed to use
    within this range.
    boost state support:
    Supported: yes
    Active: yes

15. tuned-adm active
    It seems that tuned daemon is not running, preset profile is not activated.
    Preset profile: throughput-performance

16. sysctl
    kernel.numa_balancing               1
    kernel.randomize_va_space           2
    vm.comperation_proactiveness        20
    vm.dirty_background_bytes          0
    vm.dirty_background_ratio          10
    vm.dirty_bytes                      0
    vm.dirty_expire_centisecs          3000
    vm.dirty_ratio                      20
    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                      60
    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] 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

(Continued on next page)
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Platform Notes (Continued)

max_ptes_none 511
max_ptes_shared 256
max_ptes_swap 64
pages_to_scan 4096
scan_sleep_millisecs 10000

19. OS release
From /etc/*-release /etc/*-version
os-release SUSE Linux Enterprise Server 15 SP4

20. Disk information
SPEC is set to: /ic23u2
Filesystem Type Size Used Avail Use% Mounted on
/dev/nvme0n1p8 xfs 500G 295G 205G 59% /

21. /sys/devices/virtual/dmi/id
Vendor: ASUSTeK COMPUTER INC.
Product: ESC4000-E11
Product Family: Server
Serial: /psn/

22. 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 M321R8GA0BB0-CQKVGE 64 GB 2 rank 4800

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: American Megatrends Inc.
BIOS Version: 0301
BIOS Date: 05/18/2023
BIOS Revision: 3.1

Compiler Version Notes

---
502.gcc_r(peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on IA-32, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

---
500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)
557.xz_r(base, peak)

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

(Continued on next page)
ASUSTeK Computer Inc.  
ASUS ESC4000-E11  
(3.10 GHz, Intel Xeon Gold 6458Q)

**SPEC CPU®2017 Integer Rate Result**

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**ASUSTeK Computer Inc.**

**SPECrate®2017_int_base** = 741

**SPECrate®2017_int_peak** = 768

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**CPU2017 License:** 9016  
**CPU2017 License:** 9016  
**Test Sponsor:** ASUSTeK Computer Inc.  
**Test Date:** Jan-2024  
**Tested by:** ASUSTeK Computer Inc.  
**Hardware Availability:** Jul-2023  
**Software Availability:** Dec-2023

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**Compiler Version Notes (Continued)**

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<thead>
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<td>C++ benchmarks: icpx</td>
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<td>Fortran benchmarks: ifx</td>
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</tbody>
</table>

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**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

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

ASUSTeK Computer Inc.
ASUS ESC4000-E11
(3.10 GHz, Intel Xeon Gold 6458Q)

SPECrate®2017_int_base = 741
SPECrate®2017_int_peak = 768

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

Base Portability Flags (Continued)

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 -xsapphirerapis -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapis -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xsapphirerapis -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifix
SPEC® CPU®2017 Integer Rate Result

ASUSTeK Computer Inc.
ASUS ESC4000-E11
(3.10 GHz, Intel Xeon Gold 6458Q)

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

Test Date: Jan-2024
Hardware Availability: Jul-2023
Software Availability: Dec-2023

SPECrate®2017_int_base = 741
SPECrate®2017_int_peak = 768

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: -w -std=c11 -m64 -Wl,-z,muldefs
-fprofile=generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast -xcORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-fno-strict-overflow
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc
502.gcc_r: -m32
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/ia32_lin
-std=gnu89 -Wl,-z,muldefs -fprofile=generate(pass 1)
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast -xcORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc
505.mcf_r: basepeak = yes
525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fno-alias
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc
557.xz_r: basepeak = yes

C++ benchmarks:

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

### ASUSTeK Computer Inc.

**ASUS ESC4000-E11**  
(3.10 GHz, Intel Xeon Gold 6458Q)

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</table>

### Peak Optimization Flags (Continued)

- 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/Intel-ic2023p2-official-linux64.xml

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**SPECrates**

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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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