# SPEC CPU®2017 Integer Rate Result

**ASUSTeK Computer Inc.**  
ASUS RS720-E11-RS12U  
(2.00 GHz, Intel Xeon Silver 4514Y)

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<td>xz_r</td>
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<td>557</td>
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</tbody>
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**Hardware**
- **CPU Name:** Intel Xeon Silver 4514Y  
- **Max MHz:** 3400  
- **Nominal:** 2000  
- **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:** 2 MB I+D on chip per core  
- **L3:** 30 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 4400)  
- **Storage:** 1 x 1.6 TB PCIe NVMe SSD  
- **Other:** CPU Cooling: Air

**Software**
- **OS:** SUSE Linux Enterprise High Performance Computing 15 SP5 (x86_64)  
  Kernel 5.14.21-150500.53-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 2201 released Dec-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.

**Test Details**
- **CPU2017 License:** 9016  
- **Test Sponsor:** ASUSTeK Computer Inc.  
- **Tested by:** ASUSTeK Computer Inc.  
- **Test Date:** Apr-2024  
- **Hardware Availability:** Dec-2023  
- **Software Availability:** Dec-2023
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**SPECrate®2017_int_base = 273**  
**SPECrate®2017_int_peak = 280**

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.

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

Sysinfo program /ic23u2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Tue Apr 16 20:49:37 2024

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

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10. who -r
11. systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. tuned-adm active
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22. dmidecode
23. BIOS
------------------------------------------------------------------

1. uname -a
Linux localhost 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
x86_64 x86_64 x86_64 GNU/Linux

------------------------------------------------------------------
2. w
20:49:37 up 1 day, 3:36, 2 users, load average: 34.90, 56.49, 60.99

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

3. Username
   From environment variable $USER: root

4. ulimit -a
   - core file size: unlimited
   - data seg size: unlimited
   - scheduling priority: 0
   - file size: unlimited
   - pending signals: 4126911
   - max locked memory: 64
   - max memory size: unlimited
   - open files: 1024
   - pipe size: 8
   - POSIX message queues: 819200
   - real-time priority: 0
   - stack size: unlimited
   - cpu time: unlimited
   - max user processes: 4126911
   - virtual memory: unlimited
   - file locks: unlimited

5. sysinfo process ancestry
   ```
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   login -- root
   -bash
   /bin/bash ./rate.sh
   /bin/bash ./rate.sh
   /bin/bash ./rate.sh
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 -c
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=32 --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/CPU2017.215/templogs/preenv.intrate.215.0.log --lognum 215.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /ic23u2
   ```

6. /proc/cpuinfo
   ```
   model name : INTEL(R) XEON(R) SILVER 4514Y
   vendor_id : GenuineIntel
   cpu family : 6
   model : 207
   stepping : 2
   microcode : 0x21000200
   bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
   cpu cores : 16
   siblings : 32
   2 physical ids (chips)
   64 processors (hardware threads)
   physical id 0: core ids 0-15
   ```

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

physical id 1: core ids 0-15
physical id 0: apicids 0-31

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 2.37.4:

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): 64
On-line CPU(s) list: 0-63
Vendor ID: GenuineIntel
Model name: INTEL(R) XEON(R) SILVER 4514Y
CPU family: 6
Model: 207
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s): 2
Stepping: 2
CPU max MHz: 3400.0000
CPU min MHz: 800.0000
BogoMIPS: 4000.00
Flags:

Virtualization: VT-x
L1d cache: 1.5 MIB (32 instances)
L1i cache: 1 MIB (32 instances)
L2 cache: 64 MIB (32 instances)
L3 cache: 60 MIB (2 instances)
NUMA node(s): 4
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
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Mmio stale data: Not affected

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SPECrate®2017_int_base = 273
SPECrate®2017_int_peak = 280

Platform Notes (Continued)

Vulnerability Retbleed: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-eIBRS SW sequence
Vulnerability Srbds: Not affected
Vulnerability Tx async abort: Not affected

From lscpu --cache:

NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 1.5M 12 Data 1 64 1 64
L1i 32K 1M 8 Instruction 1 64 1 64
L2 2M 64M 16 Unified 2 2048 1 64
L3 30M 60M 15 Unified 3 32768 1 64

8. numactl --hardware
   NOTE: a numactl 'node' might or might not correspond to a physical chip.
   available: 4 nodes (0-3)
   node 0 cpus: 0-7,32-39
   node 0 size: 257647 MB
   node 0 free: 256412 MB
   node 1 cpus: 8-15,40-47
   node 1 size: 258043 MB
   node 1 free: 256858 MB
   node 2 cpus: 16-23,48-55
   node 2 size: 258043 MB
   node 2 free: 256866 MB
   node 3 cpus: 24-31,56-63
   node 3 size: 258022 MB
   node 3 free: 256760 MB
   node distances:
   node 0 1 2 3
   0: 10 12 21 21
   1: 12 10 21 21
   2: 21 21 10 12
   3: 21 21 12 10

9. /proc/meminfo
   MemTotal: 1056520224 kB

10. who -r
    run-level 3 Apr 15 17:13

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
    Default Target Status
    multi-user running

12. Services, from systemctl list-unit-files
    STATE UNIT FILES
    enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager getty@ haveged
    irqbalance issue-generator kbdsettings klog 1vm2-monitor nscd nvme-fc-boot-connections
    postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wickedd-auto4
    wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
    enabled-runtime systemd-remount-fs
    disabled autofs autoyast-initscripts blk-availability boot-ssl-systemd ca-certificates chrony-wait

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Platform Notes (Continued)

indirect wickedd

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

-------------------------------------------------------------
16. sysctl
kernel.numa_balancing 1
kernel.randomize_va_space 2
vm.compartment_proactivities 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 3
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+madvise [madvise] never
  enabled [always] madvise never
  hpage_pmd_size 2097152

(Continued on next page)
Platform Notes (Continued)

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_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 High Performance Computing 15 SP5

-----------------------------------------------
20. Disk information
  SPEC is set to: /ic23u2
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/nvme0n1p8 xfs   1.3T  102G  1.2T   9% /

-----------------------------------------------
21. /sys/devices/virtual/dmi/id
  Vendor:         ASUSTeK COMPUTER INC.
  Product:        RS720-E11-RS12U
  Product Family: Server
  Serial:         R1S0MD000002

22. dmidecode
  Additional information from dmidecode 3.4 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 M321R8GA0PB0-CWMXJ 64 GB 2 rank 5600, configured at 4400

23. BIOS
  (This section combines info from /sys/devices and dmidecode.)
  BIOS Vendor: American Megatrends Inc.
  BIOS Version: 2201
  BIOS Date: 12/22/2023
  BIOS Revision: 22.1

Compiler Version Notes

-----------------------------------------------
C       | 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.

-----------------------------------------------
C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak) 525.x264_r(base, peak)

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## Compiler Version Notes (Continued)

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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.

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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
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### Base Compiler Invocation

**C benchmarks:**
- icx

**C++ benchmarks:**
- icpx

**Fortran benchmarks:**
- ifx

### Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64

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Base Portability Flags (Continued)

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 -xsapphirerapids -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 -xsapphirerapids -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 -xsapphirerapids -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:
ifx
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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)
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**Tested by:** ASUSTeK Computer Inc.  
**Test Date:** Apr-2024  
**Hardware Availability:** Dec-2023  
**Software Availability:** Dec-2023

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**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:


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

Tested with SPEC CPU®2017 v1.1.9 on 2024-04-16 08:49:37-0400.  
Originally published on 2024-05-07.