ASUSTeK Computer Inc.
ASUS RS720-E11-RS12U
(2.10 GHz, Intel Xeon Gold 6538N)

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

SPECratenet_int_base = 580
SPECratenet_int_peak = 599

Hardware
CPU Name: Intel Xeon Gold 6538N
Max MHz: 4100
Nominal: 2100
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
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 5200)
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.
SPEC CPU® 2017 Integer Rate Result

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CPU2017 License: 9016
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RESULTS TABLE

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<th>Ratio</th>
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</tr>
</tbody>
</table>

SPECrate®2017_int_base = 580
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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 runcpus 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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ASUS RS720-E11-RS12U
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Test Date: Apr-2024
Hardware Availability: Dec-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)
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 Sun Apr 7 03:25:10 2024

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

Table of contents
1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numaclt --hardware
9. /proc/meminfo
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
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS

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

03:25:10 up 4 days, 9:36, 2 users, load average: 81.36, 116.34, 123.18
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Platform Notes (Continued)

USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
root     tty1     -                Tue17    4days  0.85s  0.00s /bin/bash ./rate.sh
root     tty2     -                Wed10    3days  0.06s  0.06s -bash

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) 4126776
   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) 4126776
   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
   /bin/bash ./rate.sh
   /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/CPU2017.205/templogs/preenv.intrate.205.0.log --lognum 205.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /ic23u2

6. /proc/cpuinfo
   model name : INTEL(R) XEON(R) GOLD 6538N
   vendor_id : GenuineIntel
   cpu family : 6
   model : 207
   stepping : 2
   microcode : 0x21000200
   bugs : spectre_v1 spectre_v2 spec_store_bypass swaps eibr_pbrsb
   cpu cores : 32
   siblings : 64
   2 physical ids (chips)
   128 processors (hardware threads)
   physical id 0: core ids 0-31

(Continued on next page)
Platform Notes (Continued)

physical id 1: core ids 0-31
physical id 0: apicids 0-63
physical id 1: apicids 128-191
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): 128
On-line CPU(s) list: 0-127
Vendor ID: GenuineIntel
Model name: INTEL(R) XEON(R) GOLD 6538N
CPU family: 6
Model: 207
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
Stepping: 2
CPU max MHz: 4100.0000
CPU min MHz: 800.0000
BogoMIPS: 4200.00
Flags:

  fpu vme de pse tsc msr pae mca cmov pat pse36
  clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdscp
  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 smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca ssse
  ssse3 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand
  lahf_lm abm 3dnowprefetch cpuid_fault epb cat_i3 cat_i2 cdp cdu
  invpcid_single cdp cdu ida lpmctl lifence scs跛 avgx512f act pmx pclmulqdq
  dtes64_64 cplmonitor sha _extended burning sha_hardware sha negotiated

Virtualization: VT-x
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 Mmio stale data: Not affected

(Continued on next page)
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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 Srbd: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:

<table>
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<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
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<td>L1d</td>
<td>48K</td>
<td>3M</td>
<td>12</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>2M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>2M</td>
<td>12M</td>
<td>16</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L3</td>
<td>60M</td>
<td>120M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>65536</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

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: 257678 MB
node 0 free: 255948 MB
node 1 cpus: 16-31,80-95
node 1 size: 258005 MB
node 1 free: 256399 MB
node 2 cpus: 32-47,96-111
node 2 size: 258039 MB
node 2 free: 256409 MB
node 3 cpus: 48-63,112-127
node 3 size: 258000 MB
node 3 free: 256372 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: 1056485636 kB

10. who -r
run-level 3 Apr 2 17:49

11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)

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 lvm2-monitor nscd nvme-fc-boot-connections postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wicked-auto4 wicked-dhcp4 wicked-dhcp6 wicked-nanny
enabled-runtime systemd-remount-fs
disabled autosfs autoya(st-init)scripts blk-availability boot-sysctl ca-certificates chrony-wait

(Continued on next page)
Platform Notes (Continued)


indirect wicked

------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
root=UUID=1821a225-9785-4821-9a33-99bd3ded8caef
splash=silent
mitigations=auto
quiet
security=apparmor

------------------------------------------------------------
14. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 800 MHz and 4.10 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_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.dirty_time_expire_seconds 43200
vm.extfrag_threshold 500
vm.min_unmapped_ratio 1
vm.nr_hugepages 0
vm.nr_hugepages_mempolicy 0
vm.nr_overcommit_mempolicy 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

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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 5200

------------------------------------------------------------
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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<th>557.xz_r(base, peak)</th>
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<tbody>
<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x</td>
</tr>
<tr>
<td>Copyright (C) 1985-2023 Intel Corporation. All rights reserved.</td>
</tr>
</tbody>
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| 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) 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. |

| 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 2023.2.3 Build x |
| Copyright (C) 1985-2023 Intel Corporation. All rights reserved. |

| Fortran | 548.exchange2_r(base, peak) |
|-------------------------------------|
| Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x |
| Copyright (C) 1985-2023 Intel Corporation. All rights reserved. |

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.leea_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
SPEC CPU®2017 Integer Rate Result

ASUSTeK Computer Inc.
ASUS RS720-E11-RS12U
(2.10 GHz, Intel Xeon Gold 6538N)

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

SPECrate®2017_int_base = 580
SPECrate®2017_int_peak = 599

Test Date: Apr-2024
Hardware Availability: Dec-2023
Software Availability: Dec-2023

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
-ffast-math -flto -fprofile-generate(pass 1)
-ffast-math -flto -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-ffunroll-loops -qopt-mem-layout-trans=4
-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
-fno-alias
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc
-L/usr/local/jemalloc32-5.0.1/lib -ljemalloc

502.gcc_r: -m32
-std=gnu89 -Wl,-z,muldefs -fprofile-generate(pass 1)
-ffast-math -flto -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-ffast-math -flto -fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)
-ffast-math -ffast-math -fno-strict-overflow
-ffunroll-loops -qopt-mem-layout-trans=4
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

505.mcf_r: basepeak = yes

525.x264_r: -w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffunroll-loops -flto -mfpmath=sse -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 RS720-E11-RS12U**  
(2.10 GHz, Intel Xeon Gold 65388N)

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</tbody>
</table>

### SPECrate®2017 Results

- **SPECrate®2017_int_base = 580**
- **SPECrate®2017_int_peak = 599**

### 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.

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