SPEC CPU®2017 Floating Point Rate Result

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ASUSTeK Computer Inc.

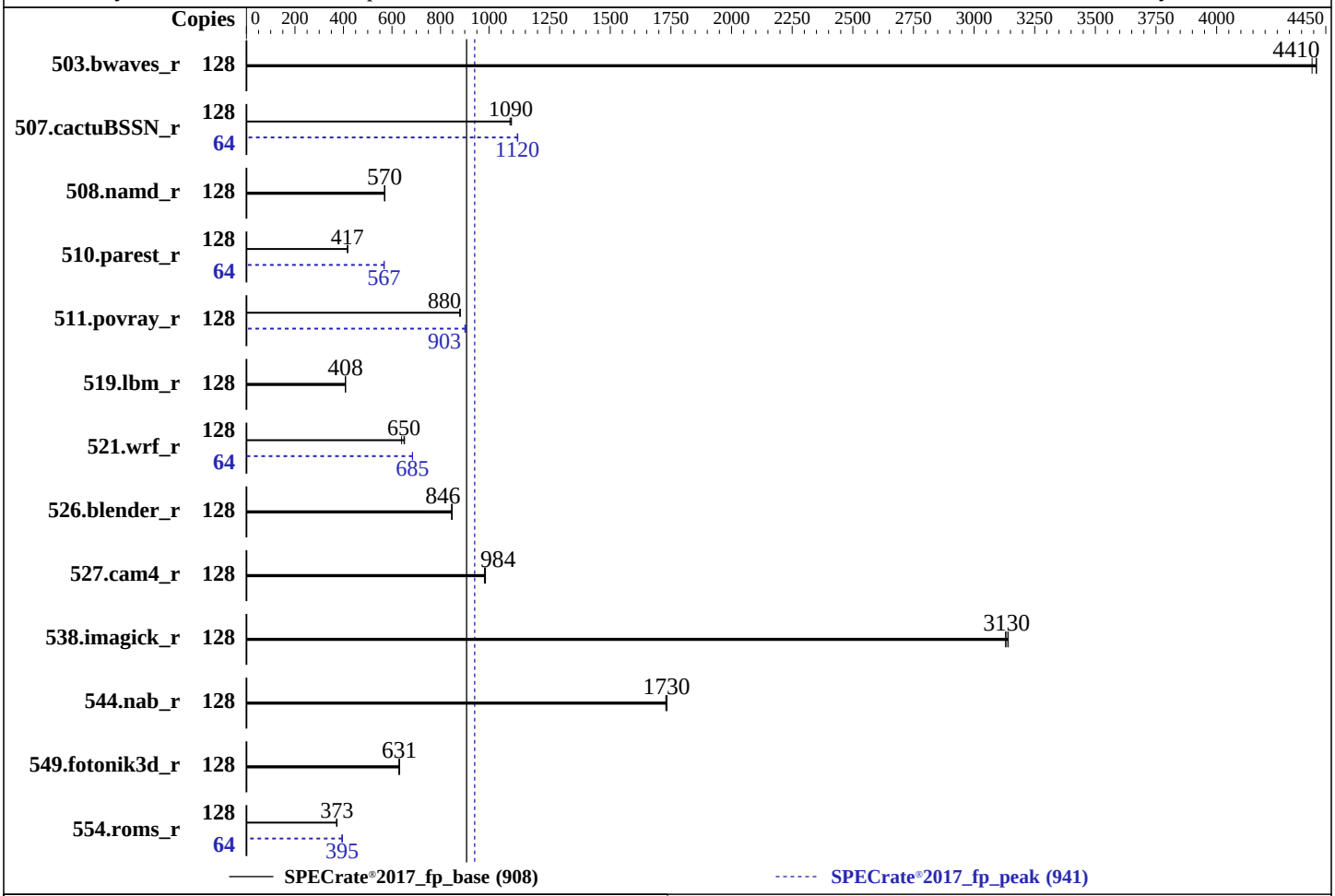
ASUS RS720-E11-RS12U
(2.80 GHz, Intel Xeon Platinum 8562Y+)

SPECrate®2017_fp_base = 908

SPECrate®2017_fp_peak = 941

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

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



Hardware

CPU Name:	Intel Xeon Platinum 8562Y+
Max MHz:	4100
Nominal:	2800
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)
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 2024.0.2 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2024.0.2 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:	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						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	128	292	4390	291	4410	**291**	**4410**	128	292	4390	291	4410	**291**	**4410**
507.cactuBSSN_r	128	148	1090	149	1090	**149**	**1090**	64	**72.5**	**1120**	72.5	1120	72.4	1120
508.namd_r	128	213	570	213	570	**213**	**570**	128	213	570	213	570	**213**	**570**
510.parest_r	128	803	417	**804**	**417**	804	417	64	**295**	**567**	295	567	295	568
511.povray_r	128	340	880	339	882	**339**	**880**	128	332	900	**331**	**903**	331	903
519.lbm_r	128	331	408	**331**	**408**	330	408	128	331	408	**331**	**408**	330	408
521.wrf_r	128	**441**	**650**	448	640	440	652	64	**209**	**685**	209	685	209	684
526.blender_r	128	**230**	**846**	230	848	230	846	128	**230**	**846**	230	848	230	846
527.cam4_r	128	228	981	227	985	**228**	**984**	128	228	981	227	985	**228**	**984**
538.imagick_r	128	**102**	**3130**	102	3130	101	3140	128	**102**	**3130**	102	3130	101	3140
544.nab_r	128	125	1730	124	1730	**124**	**1730**	128	125	1730	124	1730	**124**	**1730**
549.fotonik3d_r	128	**791**	**631**	794	628	790	631	128	**791**	**631**	794	628	790	631
554.roms_r	128	**546**	**373**	545	373	548	371	64	257	395	**258**	**395**	258	394

SPECrate®2017_fp_base = 908

SPECrate®2017_fp_peak = 941

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 = "/ic24u0/lib/intel64:/ic24u0/je5.0.1-64"
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>
```

(Continued on next page)

General Notes (Continued)

```
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
SNC = Enable SNC2 (2-clusters)
Engine Boost = Aggressive
SR-IOV Support = Disabled
BMC Configuration:
Fan mode = Full speed mode

Sysinfo program /ic24u0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Thu Mar 28 23:43:48 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. numactl --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
------------------------------------------------------------

------------------------------------------------------------
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
```

(Continued on next page)

Platform Notes (Continued)

```
------------------------------------------------------------
2. w
   23:43:48 up  6:56,  2 users,  load average: 32.56, 78.62, 103.17
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                16:47    6:55m  0.90s  0.00s /bin/bash ./rate.sh
  root     tty2     -                16:57    6:41m  0.02s  0.02s -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                 (-i) 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
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 -c
   ic2024.0.2-lin-sapphirerapids-rate-20231213.cfg --define smt-on --define cores=64 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak -o all fprate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
   ic2024.0.2-lin-sapphirerapids-rate-20231213.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 fprate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.102/templogs/preenv.fprate.102.0.log --lognum 102.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /ic24u0

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : INTEL(R) XEON(R) PLATINUM 8562Y+
    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       : 32
    siblings        : 64
```

(Continued on next page)

Platform Notes (Continued)

```
     2 physical ids (chips)
     128 processors (hardware threads)
     physical id 0: core ids 0-31
     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) PLATINUM 8562Y+
   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:                        5600.00
   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 tsc_known_freq 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 cat_l2 cdp_l3
                                    invpcid_single cdp_l2 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 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 avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts hwp
                                    hwp_act_window hwp_epp hwp_pkg_req hfi avx512vbmi umip pku ospke waitpkg
                                    avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
                                    avx512_vpopcntdq la57 rdpid bus_lock_detect cldemote movdiri movdir64b
                                    enqcmd fsrm md_clear serialize tsxldtrk pconfig arch_lbr avx512_fp16
                                    amx_tile flush_l1d arch_capabilities
   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
```

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Platform Notes (Continued)

```
  Vulnerability Mds:                Not affected
  Vulnerability Meltdown:           Not affected
  Vulnerability Mmio stale data:    Not affected
  Vulnerability Retbleed:           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
  Vulnerability Spectre v2:         Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-eIBRS SW
                                    sequence
  Vulnerability Srbds:              Not affected
  Vulnerability Tsx async abort:    Not affected

From lscpu --cache:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
     L1d       48K       3M   12 Data            1    64        1             64
     L1i       32K       2M    8 Instruction     1    64        1             64
     L2         2M     128M   16 Unified         2  2048        1             64
     L3        60M     120M   15 Unified         3 65536        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: 0-15,64-79
  node 0 size: 257643 MB
  node 0 free: 256193 MB
  node 1 cpus: 16-31,80-95
  node 1 size: 258039 MB
  node 1 free: 256746 MB
  node 2 cpus: 32-47,96-111
  node 2 size: 258039 MB
  node 2 free: 256683 MB
  node 3 cpus: 48-63,112-127
  node 3 size: 258000 MB
  node 3 free: 256677 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 Mar 28 16:47

------------------------------------------------------------
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 lvm2-monitor nscd nvmefc-boot-connections
                  postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wickedd-auto4
```

(Continued on next page)

Platform Notes (Continued)

```
                  wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
  enabled-runtime systemd-remount-fs
  disabled        autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
                  chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info
                  firewalld gpm grub2-once haveged-switch-root hwloc-dump-hwdata ipmi ipmievd
                  issue-add-ssh-keys kexec-load lunmask man-db-create multipathd ndctl-monitor nfs
                  nfs-blkmap nvmf-autoconnect rpcbind rpmconfigcheck rsyncd serial-getty@
                  smartd_generate_opts snmpd snmptrapd svnserve systemd-boot-check-no-failures
                  systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd tuned
                  udisks2 vncserver@
  indirect        wickedd

------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
  root=UUID=1821a225-9785-4821-9a33-99bd3ded8cae
  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.compaction_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
```

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Platform Notes (Continued)

```
  defrag          always defer defer+madvise [madvise] never
  enabled         [always] madvise 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_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: /ic24u0
  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


------------------------------------------------------------
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              | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
==============================================================================================================
C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C          | 511.povray_r(base, peak) 526.blender_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
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--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
--------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.0.2 Build 20231213
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

(Continued on next page)

Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx

Base Portability Flags

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4

(Continued on next page)

Base Optimization Flags (Continued)

Fortran benchmarks (continued):
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:
-w -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both C and C++:
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_r: basepeak = yes

544.nab_r: basepeak = yes

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: -w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids
-Ofast -ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

554.roms_r: -w -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

Benchmarks using both Fortran and C:

521.wrf_r: -w -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int
-mprefer-vector-width=512 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

527.cam4_r: basepeak = yes

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Peak Optimization Flags (Continued)

Benchmarks using both C and C++:

511.povray_r: `-w -std=c++14 -m64 -std=c11 -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 -Wno-implicit-int`
`-mprefer-vector-width=512 -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:
`-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast`
`-ffast-math -flto -mfpmath=sse -funroll-loops`
`-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512`
`-nostandard-realloc-lhs -align array32byte -auto -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

The flags files that were used to format this result can be browsed at
`http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z13-V1.3.html`
`http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html`

You can also download the XML flags sources by saving the following links:
`http://www.spec.org/cpu2017/flags/ASUSTekPlatform-Settings-z13-V1.3.xml`
`http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml`

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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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