# SPEC CPU®2017 Floating Point Rate Result

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## FusionStor

(Test Sponsor: Meganet)

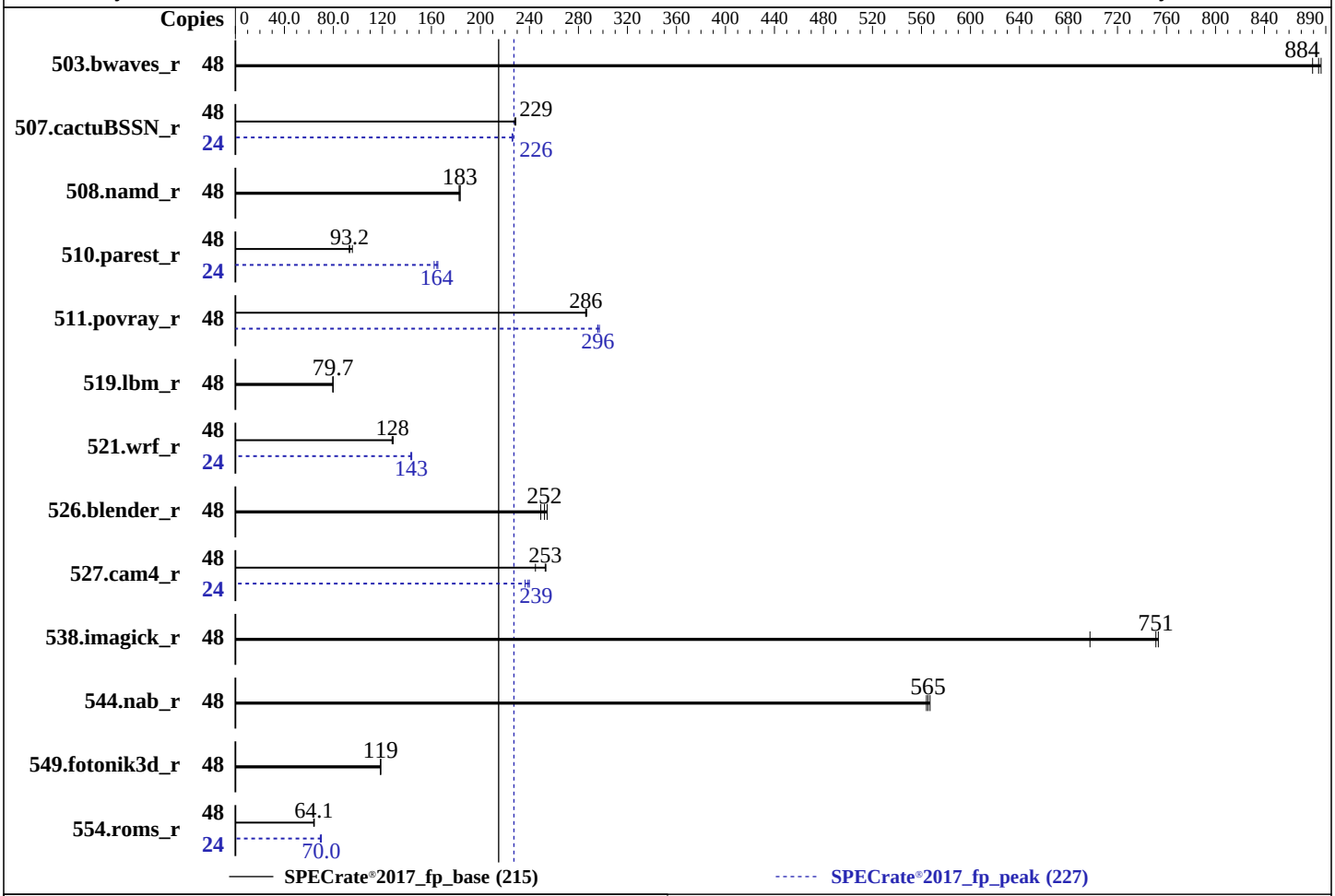
## Invento i6000 (Intel Xeon Silver 4510)

**SPECrate®2017_fp_base = 215**

**SPECrate®2017_fp_peak = 227**

**CPU2017 License:** 6221
**Test Sponsor:** Meganet
**Tested by:** FusionStor

**Test Date:** Mar-2025
**Hardware Availability:** Dec-2022
**Software Availability:** Jan-2025




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Silver 4510 |
| Max MHz: | 4100 |
| Nominal: | 2400 |
| Enabled: | 24 cores, 2 chips, 2 threads/core |
| Orderable: | 1,2 chips |
| 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: | 384 GB (6 x 64 GB 2Rx4 PC5-4800B-R, running at 4000) |
| Storage: | 960 GB SATA SSD |
| Other: | CPU Cooling: Air |

## Software

| | |
|---|---|
| OS: | Ubuntu 22.04.5 LTS 6.8.0-52-generic |
| 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 EG0.10.01 released Mar-2024 |
| File System: | ext4 |
| System State: | Run level 5 (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 expense 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 | 48 | **544** | **884** | 543 | 886 | 547 | 879 | 48 | **544** | **884** | 543 | 886 | 547 | 879 |
| 507.cactuBSSN_r | 48 | **266** | **229** | 266 | 229 | 267 | 228 | 24 | **134** | **226** | 135 | 226 | 134 | 226 |
| 508.namd_r | 48 | **249** | **183** | 250 | 183 | 249 | 183 | 48 | **249** | **183** | 250 | 183 | 249 | 183 |
| 510.parest_r | 48 | 1351 | 93.0 | 1315 | 95.5 | **1347** | **93.2** | 24 | 387 | 162 | **382** | **164** | 380 | 165 |
| 511.povray_r | 48 | 391 | 287 | **392** | **286** | 392 | 286 | 48 | **379** | **296** | 377 | 297 | 379 | 296 |
| 519.lbm_r | 48 | **635** | **79.7** | 636 | 79.6 | 635 | 79.7 | 48 | **635** | **79.7** | 636 | 79.6 | 635 | 79.7 |
| 521.wrf_r | 48 | 841 | 128 | **838** | **128** | 835 | 129 | 24 | 375 | 143 | **375** | **143** | 373 | 144 |
| 526.blender_r | 48 | 293 | 249 | 287 | 254 | **290** | **252** | 48 | 293 | 249 | 287 | 254 | **290** | **252** |
| 527.cam4_r | 48 | **332** | **253** | 343 | 245 | 331 | 253 | 24 | 178 | 236 | **176** | **239** | 175 | 240 |
| 538.imagick_r | 48 | **159** | **751** | 158 | 753 | 171 | 698 | 48 | **159** | **751** | 158 | 753 | 171 | 698 |
| 544.nab_r | 48 | 143 | 564 | **143** | **565** | 142 | 567 | 48 | 143 | 564 | **143** | **565** | 142 | 567 |
| 549.fotonik3d_r | 48 | 1579 | 118 | **1578** | **119** | 1577 | 119 | 48 | 1579 | 118 | **1578** | **119** | 1577 | 119 |
| 554.roms_r | 48 | **1190** | **64.1** | 1193 | 63.9 | 1184 | 64.4 | 24 | 550 | 69.3 | **545** | **70.0** | 543 | 70.2 |

**SPECrate®2017_fp_base = 215**

**SPECrate®2017_fp_peak = 227**

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"
```

## Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/speccpu/cpu2017/lib/intel64:/home/speccpu/cpu2017/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>
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 settings
Enable SNC2 (2-Clusters)

 Sysinfo program /home/speccpu/cpu2017/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on intel Tue Mar 11 18:25:16 2025

 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 (249.11-0ubuntu3.12)
 12. Failed units, from systemctl list-units --state=failed
 13. Services, from systemctl list-unit-files
 14. Linux kernel boot-time arguments, from /proc/cmdline
 15. cpupower frequency-info
 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 intel 6.8.0-52-generic #53~22.04.1-Ubuntu SMP PREEMPT_DYNAMIC Wed Jan 15 19:18:46 UTC 2 x86_64 x86_64
   x86_64 GNU/Linux

 ------------------------------------------------------------
 2. w
    18:25:16 up  6:46,  2 users,  load average: 30.35, 43.76, 45.81
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   intel    :1       :1               11:57   ?xdm?   2:53m  0.00s /usr/libexec/gdm-x-session --run-script env
   GNOME_SHELL_SESSION_MODE=ubuntu /usr/bin/gnome-session --session=ubuntu
   intel    pts/1    -                12:07    6:17m  0.96s  0.01s sudo
   ./reportable-ic2023.2.3-lin-sapphirerapids-rate-smt-on-20231121.sh

 ------------------------------------------------------------
 3. Username
   From environment variable $USER:  root
   From the command 'logname':       intel

 ------------------------------------------------------------
 4. ulimit -a
   time(seconds)        unlimited
   file(blocks)         unlimited
```

**(Continued on next page)**

## Platform Notes (Continued)

```
   data(kbytes)         unlimited
   stack(kbytes)        unlimited
   coredump(blocks)     0
   memory(kbytes)       unlimited
   locked memory(kbytes) 49486612
   process              1546146
   nofiles              1024
   vmemory(kbytes)      unlimited
   locks                unlimited
   rtprio               0

------------------------------------------------------------
5. sysinfo process ancestry
 /sbin/init splash
 /lib/systemd/systemd --user
 /usr/libexec/gnome-terminal-server
 bash
 sudo ./reportable-ic2023.2.3-lin-sapphirerapids-rate-smt-on-20231121.sh
 sudo ./reportable-ic2023.2.3-lin-sapphirerapids-rate-smt-on-20231121.sh
 sh ./reportable-ic2023.2.3-lin-sapphirerapids-rate-smt-on-20231121.sh
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=48 -c
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=24 --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=48 --configfile
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=24 --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/CPU2017.044/templogs/preenv.fprate.044.0.log --lognum 044.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/speccpu/cpu2017

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : INTEL(R) XEON(R) SILVER 4510
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 8
    microcode       : 0x2b000620
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb bhi
    cpu cores       : 12
    siblings        : 24
    2 physical ids (chips)
    48 processors (hardware threads)
    physical id 0: core ids 0-11
    physical id 1: core ids 0-11
    physical id 0: apicids 0-23
    physical id 1: apicids 64-87
  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 2.37.2:
  Architecture:                       x86_64
  CPU op-mode(s):                     32-bit, 64-bit
  Address sizes:                      52 bits physical, 57 bits virtual
  Byte Order:                         Little Endian
  CPU(s):                             48
```

(Continued on next page)

## Platform Notes (Continued)

```
   On-line CPU(s) list:                0-47
   Vendor ID:                          GenuineIntel
   Model name:                         INTEL(R) XEON(R) SILVER 4510
   CPU family:                         6
   Model:                              143
   Thread(s) per core:                 2
   Core(s) per socket:                 12
   Socket(s):                          2
   Stepping:                           8
   CPU max MHz:                        4100.0000
   CPU min MHz:                        800.0000
   BogoMIPS:                           4800.00
   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 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 intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp
                                       ibrs_enhanced tpr_shadow flexpriority ept vpid ept_ad fsgsbase
                                       tsc_adjust bmi1 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
                                       user_shstk avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts vnmi
                                       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 ibt amx_bf16 avx512_fp16 amx_tile
                                       amx_int8 flush_l1d arch_capabilities
   Virtualization:                     VT-x
   L1d cache:                          1.1 MiB (24 instances)
   L1i cache:                          768 KiB (24 instances)
   L2 cache:                           48 MiB (24 instances)
   L3 cache:                           60 MiB (2 instances)
   NUMA node(s):                       4
   NUMA node0 CPU(s):                  0-5,24-29
   NUMA node1 CPU(s):                  6-11,30-35
   NUMA node2 CPU(s):                  12-17,36-41
   NUMA node3 CPU(s):                  18-23,42-47
   Vulnerability Gather data sampling: Not affected
   Vulnerability Itlb multihit:        Not affected
   Vulnerability L1tf:                 Not affected
   Vulnerability Mds:                  Not affected
   Vulnerability Meltdown:             Not affected
   Vulnerability Mmio stale data:      Not affected
   Vulnerability Reg file data sampling: Not affected
   Vulnerability Retbleed:             Not affected
   Vulnerability Spec rstack overflow: Not affected
   Vulnerability Spec store bypass:    Mitigation; Speculative Store Bypass disabled via prctl
   Vulnerability Spectre v1:           Mitigation; usercopy/swapgs barriers and __user pointer sanitization
   Vulnerability Spectre v2:           Mitigation; Enhanced / Automatic IBRS; IBPB conditional; RSB filling;
                                       PBRSB-eIBRS SW sequence; BHI BHI_DIS_S
   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     1.1M   12 Data            1    64        1             64
```

(Continued on next page)

## Platform Notes (Continued)

```
     L1i       32K     768K    8 Instruction     1    64        1             64
     L2         2M      48M   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: 0-5,24-29
  node 0 size: 128626 MB
  node 0 free: 118760 MB
  node 1 cpus: 6-11,30-35
  node 1 size: 129019 MB
  node 1 free: 120933 MB
  node 2 cpus: 12-17,36-41
  node 2 size: 64507 MB
  node 2 free: 57340 MB
  node 3 cpus: 18-23,42-47
  node 3 size: 64460 MB
  node 3 free: 57378 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:       395892916 kB

------------------------------------------------------------
10. who -r
  run-level 5 Mar 11 11:40

------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.11-0ubuntu3.12)
  Default Target  Status
  graphical       degraded

------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
    UNIT                              LOAD   ACTIVE SUB    DESCRIPTION
  * NetworkManager-wait-online.service loaded failed failed Network Manager Wait Online

------------------------------------------------------------
13. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
                   accounts-daemon anacron anydesk apparmor avahi-daemon bluetooth console-setup cron cups
                   cups-browsed dmesg e2scrub_reap getty@ gpu-manager grub-common grub-initrd-fallback
                   irqbalance kerneloops keyboard-setup networkd-dispatcher openvpn power-profiles-daemon
                   rsyslog secureboot-db setvtrgb snapd ssh switcheroo-control systemd-oomd systemd-pstore
                   systemd-resolved systemd-timesyncd teamviewerd thermald ua-reboot-cmds ubuntu-advantage
                   udisks2 ufw unattended-upgrades wpa_supplicant
  enabled-runtime  netplan-ovs-cleanup systemd-fsck-root systemd-remount-fs
  disabled         acpid brltty console-getty debug-shell nftables openvpn-client@ openvpn-server@ openvpn@
                   rsync rtkit-daemon serial-getty@ speech-dispatcherd systemd-boot-check-no-failures
                   systemd-network-generator systemd-networkd systemd-networkd-wait-online systemd-sysext
                   systemd-time-wait-sync tlp upower wpa_supplicant-nl80211@ wpa_supplicant-wired@
```

**(Continued on next page)**

## Platform Notes (Continued)

```
                  wpa_supplicant@
  generated       apport cpufrequtils loadcpufreq speech-dispatcher
  indirect        saned@ spice-vdagentd uuidd
  masked          alsa-utils cryptdisks cryptdisks-early hwclock pulseaudio-enable-autospawn rc rcS saned
                  screen-cleanup sudo systemd-rfkill x11-common

------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-6.8.0-52-generic
  root=UUID=073562bb-1438-42b9-adfa-6a6f7f3d3559
  ro
  quiet
  splash
  vt.handoff=7

------------------------------------------------------------
15. cpupower frequency-info
  analyzing CPU 34:
    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

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

**(Continued on next page)**

## Platform Notes (Continued)

```
   max_ptes_swap             64
   pages_to_scan           4096
   scan_sleep_millisecs   10000

 ------------------------------------------------------------
 19. OS release
   From /etc/*-release /etc/*-version
   os-release Ubuntu 22.04.5 LTS

 ------------------------------------------------------------
 20. Disk information
 SPEC is set to: /home/speccpu/cpu2017
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda2      ext4  879G  687G  148G  83% /

 ------------------------------------------------------------
 21. /sys/devices/virtual/dmi/id
     Vendor:         Fusionstor
     Product:        Invento_i6000
     Product Family: SG_Intel_EagleStream
     Serial:         HQ3110001BDA03CD0002

 ------------------------------------------------------------
 22. dmidecode
   Additional information from dmidecode 3.3 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:
     24x NO DIMM NO DIMM
     1x Samsung M321R8GA0BB0-CQKZJ   2 rank 4800, configured at 4000
     7x Samsung M321R8GA0BB0-CQKZJ 64 GB 2 rank 4800, configured at 4000


 ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       American Megatrends International, LLC.
    BIOS Version:      EG0.10.01
    BIOS Date:         03/22/2024
    BIOS Revision:     5.32
The dmidecode utility was not reporting the memory configuration correctly for this system.
The installed memory configuration was: 384 GB (6 x 64 GB 2Rx4 PC5-4800B-R, running at 4000)
```

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

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

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## Compiler Version Notes (Continued)

```
==============================================================================================================
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 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
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++, C, Fortran | 507.cactuBSSN_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.
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.
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.
--------------------------------------------------------------------------------------------------------------

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

## Base 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`

**(Continued on next page)**

## Base Compiler Invocation (Continued)

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
-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

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## Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
-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:
`-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++:

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`

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## Peak Optimization Flags (Continued)

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/Intel-ic2023p2-official-linux64.html
http://www.spec.org/cpu2017/flags/Fusionstor-Platform-Flags-Intel-ICX-rev6.html

You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml
http://www.spec.org/cpu2017/flags/Fusionstor-Platform-Flags-Intel-ICX-rev6.xml


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