SPEC CPU®2017 Floating Point Rate Result

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xFusion

FusionServer 2288H V7 (Intel Xeon Gold 6438N)

$SPECrate^{®}2017\_fp\_base = 684$

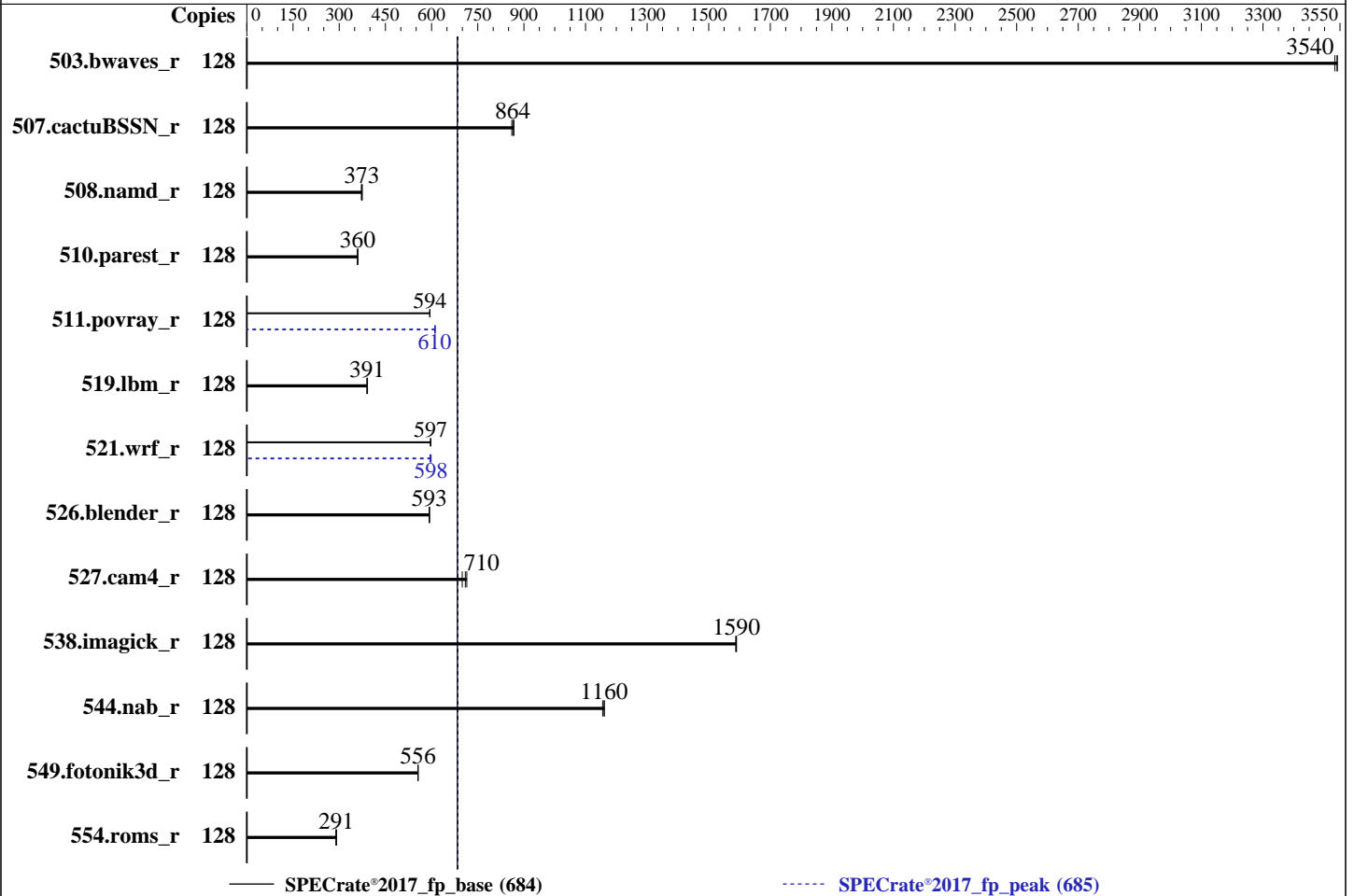$SPECrate^{®}2017\_fp\_peak = 685$

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Jul-2023
Hardware Availability: Jan-2023
Software Availability: Dec-2022

Benchmark	Copies	Result
503.bwaves_r	128	3540
507.cactuBSSN_r	128	864
508.namd_r	128	373
510.parest_r	128	360
511.povray_r	128	594 (base), 610 (peak)
519.lbm_r	128	391
521.wrf_r	128	597 (base), 598 (peak)
526.blender_r	128	593
527.cam4_r	128	710
538.imagick_r	128	1590
544.nab_r	128	1160
549.fotonik3d_r	128	556
554.roms_r	128	291

SPECrate®2017_fp_base (684)
SPECrate®2017_fp_peak (685)

Hardware

CPU Name: Intel Xeon Gold 6438N
 Max MHz: 3600
 Nominal: 2000
Enabled: 64 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: 60 MB I+D on chip per chip
 Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 1920 GB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux release 9.0 (Plow) 5.14.0-70.13.1.el9_0.x86_64
Compiler: C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
Parallel: No
Firmware: Version 2.00.55 Released Mar-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

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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Results Table

Benchmark	Base Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
503.bwaves_r	128	363	3530	**363**	**3540**	362	3540	128	363	3530	**363**	**3540**	362	3540
507.cactuBSSN_r	128	**188**	**864**	187	867	188	861	128	**188**	**864**	187	867	188	861
508.namd_r	128	324	375	**326**	**373**	327	372	128	324	375	**326**	**373**	327	372
510.parest_r	128	930	360	931	360	**930**	**360**	128	930	360	931	360	**930**	**360**
511.povray_r	128	503	595	**503**	**594**	503	594	128	490	610	**490**	**610**	488	612
519.lbm_r	128	**345**	**391**	346	390	344	392	128	**345**	**391**	346	390	344	392
521.wrf_r	128	480	597	481	597	**480**	**597**	128	479	599	**480**	**598**	482	595
526.blender_r	128	329	592	328	593	**329**	**593**	128	329	592	328	593	**329**	**593**
527.cam4_r	128	320	700	**316**	**710**	313	714	128	320	700	**316**	**710**	313	714
538.imagick_r	128	200	1590	201	1590	**200**	**1590**	128	200	1590	201	1590	**200**	**1590**
544.nab_r	128	186	1160	**186**	**1160**	186	1160	128	186	1160	**186**	**1160**	186	1160
549.fotonik3d_r	128	897	556	897	556	**897**	**556**	128	897	556	897	556	**897**	**556**
554.roms_r	128	699	291	703	289	**700**	**291**	128	699	291	703	289	**700**	**291**

SPECrate®2017_fp_base =	**684**
SPECrate®2017_fp_peak =	**685**

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

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 = "/spec2017-icc2023.0/lib/intel64:/spec2017-icc2023.0/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>
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.

(Continued on next page)

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General Notes (Continued)

```
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:
Performance Profile Set to Performance
SNC Set to Enable SNC2 (2-clusters)

Sysinfo program /spec2017-icc2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Fri Jul 28 14:58:42 2023

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 250 (250-6.el9_0)
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 localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
   x86_64 x86_64 GNU/Linux


------------------------------------------------------------
2. w
   14:58:42 up  3:15,  1 user,  load average: 84.70, 117.35, 123.29
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1       11:50    3:08m  1.36s  0.08s -bash
```

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Platform Notes (Continued)

```
-----------------------------------------------------------
3. Username
   From environment variable $USER:  root


-----------------------------------------------------------
4. ulimit -a
  real-time non-blocking time  (microseconds, -R) unlimited
  core file size              (blocks, -c) 0
  data seg size               (kbytes, -d) unlimited
  scheduling priority                 (-e) 0
  file size                   (blocks, -f) unlimited
  pending signals                     (-i) 2060103
  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) 2060103
  virtual memory              (kbytes, -v) unlimited
  file locks                          (-x) unlimited


-----------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
 login -- root
 -bash
 -bash
 runcpu --define default-platform-flags --copies 128 -c ic2023.0-lin-sapphirerapids-rate-20221201.cfg
   --define smt-on --define cores=64 --define physicalfirst --define invoke_with_interleave --define
   drop_caches --tune base,peak --iterations 3 -o all fprate
 runcpu --define default-platform-flags --copies 128 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak --iterations 3 --output_format all
   --nopower --runmode rate --tune base:peak --size refrate fprate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.103/templogs/preenv.fprate.103.0.log --lognum 103.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /spec2017-icc2023.0


-----------------------------------------------------------
6. /proc/cpuinfo
   model name      : Intel(R) Xeon(R) Gold 6438N
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 143
   stepping        : 7
   microcode       : 0x2b000111
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores       : 32
   siblings        : 64
   2 physical ids (chips)
   128 processors (hardware threads)
   physical id 0: core ids 0-31
   physical id 1: core ids 0-31
   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.
```

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Platform Notes (Continued)

```
        -----------------------------------------------------------
        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
          BIOS Vendor ID:              Intel(R) Corporation
          Model name:                  Intel(R) Xeon(R) Gold 6438N
          BIOS Model name:             Intel(R) Xeon(R) Gold 6438N
          CPU family:                  6
          Model:                       143
          Thread(s) per core:          2
          Core(s) per socket:          32
          Socket(s):                   2
          Stepping:                    7
          BogoMIPS:                    4000.00
          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 invpcid_single
                                       intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi
                                       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
                                       avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts 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
          Vulnerability Mds:           Not affected
          Vulnerability Meltdown:      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 IBRS, IBPB conditional, RSB filling
          Vulnerability Srbds:         Not affected
          Vulnerability Tsx async abort:   Not affected

        From lscpu --cache:
```

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Platform Notes (Continued)

```
    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: 128079 MB
  node 0 free: 119031 MB
  node 1 cpus: 16-31,80-95
  node 1 size: 129017 MB
  node 1 free: 121945 MB
  node 2 cpus: 32-47,96-111
  node 2 size: 129017 MB
  node 2 free: 121937 MB
  node 3 cpus: 48-63,112-127
  node 3 size: 128969 MB
  node 3 free: 121944 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:       527445256 kB

    -------------------------------------------------------------
10. who -r
   run-level 3 Jul 28 11:43

    -------------------------------------------------------------
11. Systemd service manager version: systemd 250 (250-6.el9_0)
   Default Target  Status
   multi-user      degraded

    -------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
    UNIT                   LOAD   ACTIVE SUB    DESCRIPTION
  * dnf-makecache.service loaded failed failed dnf makecache
  * sep5.service          loaded failed failed systemd script to load sep5 driver at boot time

    -------------------------------------------------------------
13. Services, from systemctl list-unit-files
   STATE           UNIT FILES
   enabled         ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
                   accounts-daemon atd auditd avahi-daemon bluetooth chronyd crond cups dbus-broker gdm
                   getty@ insights-client-boot irqbalance iscsi iscsi-onboot kdump libstoragemgmt
                   low-memory-monitor lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname
                   nvmefc-boot-connections ostree-remount power-profiles-daemon qemu-guest-agent rhsmcertd
                   rsyslog rtkit-daemon selinux-autorelabel-mark sep5 smartd sshd sssd switcheroo-control
                   sysstat systemd-network-generator udisks2 upower vgauthd vmtoolsd
   enabled-runtime systemd-remount-fs
   disabled        arp-ethers blk-availability brltty canberra-system-bootup canberra-system-shutdown
```

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Platform Notes (Continued)

```
                  canberra-system-shutdown-reboot chrony-wait cni-dhcp console-getty cpupower cups-browsed
                  dbus-daemon debug-shell dnsmasq firewalld iprdump iprinit iprupdate iscsid iscsiuio kpatch
                  kvm_stat ledmon man-db-restart-cache-update nftables nvmf-autoconnect podman
                  podman-auto-update podman-restart psacct ras-mc-ctl rasdaemon rdisc rhcd rhsm rhsm-facts
                  rpmdb-rebuild serial-getty@ speech-dispatcherd sshd-keygen@ systemd-boot-check-no-failures
                  systemd-pstore systemd-sysext wpa_supplicant
  indirect        spice-vdagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo


----------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=(hd0,gpt3)/boot/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
  root=UUID=cc4bab05-907e-44ef-b818-2b2874390234
  ro
  crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
  resume=UUID=5ba347ca-8beb-4f6e-9c11-de63dc4ddf5f
  rhgb
  quiet


----------------------------------------------------------------
15. cpupower frequency-info
  analyzing CPU 0:
    Unable to determine current policy
    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
```

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Platform Notes (Continued)

```
   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     Red Hat Enterprise Linux 9.0 (Plow)
   redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
   system-release Red Hat Enterprise Linux release 9.0 (Plow)

   --------------------------------------------------------------
20. Disk information
SPEC is set to: /spec2017-icc2023.0
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sda3      xfs   420G   87G  334G  21% /

   --------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
     Vendor:        XFUSION
     Product:       2288H V7
     Product Family: Eagle Stream
     Serial:        serial


   --------------------------------------------------------------
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:
     16x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800



   --------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:      XFUSION
   BIOS Version:     2.00.55
   BIOS Date:        03/07/2023
   BIOS Revision:    0.55
```

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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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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 2023.0.0 Build 20221201
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------------------------------------------------------------------------------


==============================================================================
Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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------------------------------------------------------------------------------
```

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
```

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xFusion

FusionServer 2288H V7 (Intel Xeon Gold 6438N)

SPECrate®2017_fp_base = 684

SPECrate®2017_fp_peak = 685

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Jul-2023
Hardware Availability: Jan-2023
Software Availability: Dec-2022

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
```

SPEC CPU®2017 Floating Point Rate Result

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xFusion

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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: basepeak = yes

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: basepeak = yes

554.roms_r: basepeak = yes

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

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

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Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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Software Availability: Dec-2022

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-SPR-V1.1-revC.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-SPR-V1.1-revC.xml

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

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