SPEC CPU®2017 Floating Point Rate Result

Fujitsu

PRIMERGY CX2550 M7, Intel Xeon Platinum 8468, 2.10GHz

SPECrate®2017_fp_base = 908

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 19	**Test Date:** Jun-2023
Test Sponsor: Fujitsu	**Hardware Availability:** May-2023
Tested by: Fujitsu	**Software Availability:** Dec-2022

Copies

Benchmark	Copies	Value
503.bwaves_r	192	4230
507.cactuBSSN_r	192	981
508.namd_r	192	671
510.parest_r	192	409
511.povray_r	192	1030
519.lbm_r	192	404
521.wrf_r	192	606
526.blender_r	192	964
527.cam4_r	192	1040
538.imagick_r	192	2920
544.nab_r	192	2000
549.fotonik3d_r	192	557
554.roms_r	192	305

SPECrate®2017_fp_base (908)

Hardware

CPU Name: Intel Xeon Platinum 8468
Max MHz: 3800
Nominal: 2100
Enabled: 96 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: 105 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x SATA M.2 SSD, 480GB
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
5.14.21-150400.24.33-default
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: Fujitsu BIOS Version V1.0.0.0 R1.10.0 for D3988-A1x. Released May-2023 tested as V1.0.0.0 R1.1.0 for D3988-A1x Apr-2023
File System: btrfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS set to prefer performance at the cost ofadditional power usage

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

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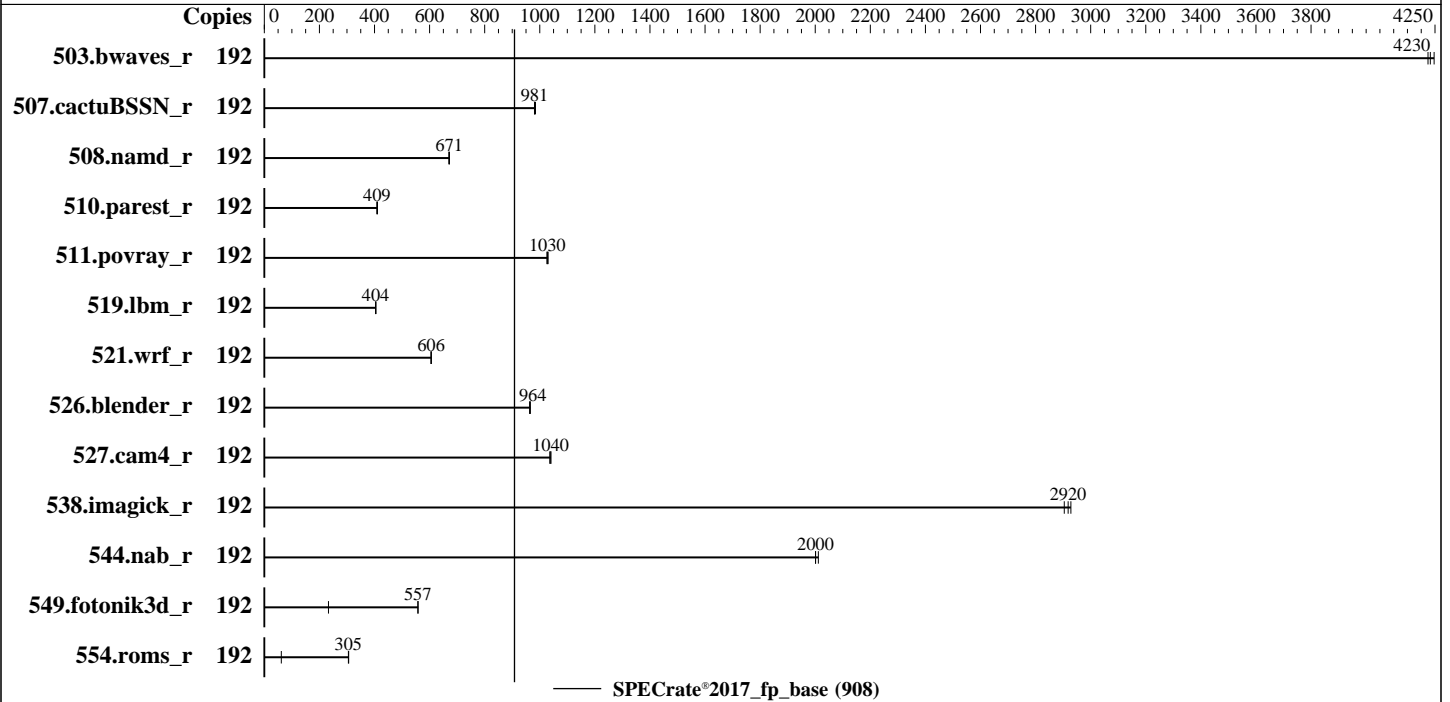
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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	192	456	4220	453	4250	**455**	**4230**							
507.cactuBSSN_r	192	248	981	247	984	**248**	**981**							
508.namd_r	192	272	672	272	670	**272**	**671**							
510.parest_r	192	**1228**	**409**	1223	411	1228	409							
511.povray_r	192	**436**	**1030**	435	1030	437	1030							
519.lbm_r	192	500	405	500	404	**500**	**404**							
521.wrf_r	192	710	606	710	605	**710**	**606**							
526.blender_r	192	**303**	**964**	304	963	303	966							
527.cam4_r	192	**323**	**1040**	323	1040	324	1040							
538.imagick_r	192	**164**	**2920**	164	2900	163	2930							
544.nab_r	192	**161**	**2000**	161	2010	161	2000							
549.fotonik3d_r	192	1340	558	**1343**	**557**	3213	233							
554.roms_r	192	**1000**	**305**	996	306	4947	61.7							
SPECrate®2017_fp_base =		908												
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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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/Benchmark/speccpu/lib/intel64:/home/Benchmark/speccpu/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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Hardware Availability: May-2023
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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:
Package C State limit = C0
CPU Performance Boost = Aggressive
SNC (Sub NUMA) = Enable SNC4

Sysinfo program /home/Benchmark/speccpu/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Tue Jun 13 10:39:21 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 249 (249.11+suse.124.g2bc0b2c447)
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 5.14.21-150400.24.33-default #1 SMP PREEMPT_DYNAMIC Fri Nov 4 13:55:06 UTC 2022 (76cfe60)
  x86_64 x86_64 x86_64 GNU/Linux


------------------------------------------------------------
2. w
   10:39:21 up  1:14,  1 user,  load average: 0.00, 0.00, 0.00
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                10:38    8.00s  1.26s  0.17s -bash
```

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PRIMERGY CX2550 M7, Intel Xeon Platinum 8468, 2.10GHz

$SPECrate®2017\_fp\_base =$ 908

$SPECrate®2017_fp_peak = $ Not Run

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Hardware Availability: May-2023
Software Availability: Dec-2022

Platform Notes (Continued)

```
  ----------------------------------------------------------
  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) 4125166
    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) 4125166
    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
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 -c
     ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=96 --define physicalfirst
     --define invoke_with_interleave --define drop_caches --tune base -o all fprate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 --configfile
     ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=96 --define physicalfirst
     --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
     rate --tune base --size refrate fprate --nopreenv --note-preenv --logfile
     $SPEC/tmp/CPU2017.001/templogs/preenv.fprate.001.0.log --lognum 001.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/Benchmark/speccpu


  ----------------------------------------------------------
  6. /proc/cpuinfo
     model name      : Intel(R) Xeon(R) Platinum 8468
     vendor_id       : GenuineIntel
     cpu family      : 6
     model           : 143
     stepping        : 6
     microcode       : 0x2b000161
     bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
     cpu cores       : 48
     siblings        : 96
     2 physical ids (chips)
     192 processors (hardware threads)
     physical id 0: core ids 0-47
     physical id 1: core ids 0-47
     physical id 0: apicids 0-95
     physical id 1: apicids 128-223
    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 2.37.2:
      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):                    192
      On-line CPU(s) list:       0-191
      Vendor ID:                 GenuineIntel
      Model name:                Intel(R) Xeon(R) Platinum 8468
      CPU family:                6
      Model:                     143
      Thread(s) per core:        2
      Core(s) per socket:        48
      Socket(s):                 2
      Stepping:                  6
      CPU max MHz:               3800.0000
      CPU min MHz:               800.0000
      BogoMIPS:                  4200.00
      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 intel_ppin 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 split_lock_detect avx_vnni avx512_bf16 wbnoinvd dtherm ida
                                 arat pln pts hwp hwp_act_window hwp_epp hwp_pkg_req 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:                 4.5 MiB (96 instances)
      L1i cache:                 3 MiB (96 instances)
      L2 cache:                  192 MiB (96 instances)
      L3 cache:                  210 MiB (2 instances)
      NUMA node(s):              8
      NUMA node0 CPU(s):         0-11,96-107
      NUMA node1 CPU(s):         12-23,108-119
      NUMA node2 CPU(s):         24-35,120-131
      NUMA node3 CPU(s):         36-47,132-143
      NUMA node4 CPU(s):         48-59,144-155
      NUMA node5 CPU(s):         60-71,156-167
      NUMA node6 CPU(s):         72-83,168-179
      NUMA node7 CPU(s):         84-95,180-191
      Vulnerability Itlb multihit: Not affected
      Vulnerability L1tf:        Not affected
      Vulnerability Mds:         Not affected
      Vulnerability Meltdown:    Not affected
      Vulnerability Mmio stale data: Not affected
      Vulnerability Retbleed:    Not affected
```

(Continued on next page)

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Platform Notes (Continued)

```
   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     4.5M   12 Data             1      64        1             64
      L1i       32K       3M    8 Instruction     1      64        1             64
      L2         2M     192M   16 Unified          2    2048        1             64
      L3       105M     210M   15 Unified          3  114688        1             64


  -------------------------------------------------------------
  8. numactl --hardware
  NOTE: a numactl 'node' might or might not correspond to a physical chip.
    available: 8 nodes (0-7)
    node 0 cpus: 0-11,96-107
    node 0 size: 128598 MB
    node 0 free: 128063 MB
    node 1 cpus: 12-23,108-119
    node 1 size: 129017 MB
    node 1 free: 128602 MB
    node 2 cpus: 24-35,120-131
    node 2 size: 129017 MB
    node 2 free: 128551 MB
    node 3 cpus: 36-47,132-143
    node 3 size: 129017 MB
    node 3 free: 128590 MB
    node 4 cpus: 48-59,144-155
    node 4 size: 129017 MB
    node 4 free: 128603 MB
    node 5 cpus: 60-71,156-167
    node 5 size: 128983 MB
    node 5 free: 128555 MB
    node 6 cpus: 72-83,168-179
    node 6 size: 129017 MB
    node 6 free: 128592 MB
    node 7 cpus: 84-95,180-191
    node 7 size: 128645 MB
    node 7 free: 128088 MB
    node distances:
    node   0   1   2   3   4   5   6   7
      0:  10  12  12  12  21  21  21  21
      1:  12  10  12  12  21  21  21  21
      2:  12  12  10  12  21  21  21  21
      3:  12  12  12  10  21  21  21  21
      4:  21  21  21  21  10  12  12  12
      5:  21  21  21  21  12  10  12  12
      6:  21  21  21  21  12  12  10  12
      7:  21  21  21  21  12  12  12  10

  -------------------------------------------------------------
  9. /proc/meminfo
     MemTotal:       1056068812 kB


  -------------------------------------------------------------
  10. who -r
    run-level 3 Jun 13 09:26
```

(Continued on next page)

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Platform Notes (Continued)

```
  ----------------------------------------------------------
 11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
   Default Target  Status
   multi-user      degraded


  ----------------------------------------------------------
 12. Failed units, from systemctl list-units --state=failed
     UNIT          LOAD   ACTIVE SUB    DESCRIPTION
   * 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 YaST2-Firstboot YaST2-Second-Stage apparmor auditd bluetooth cron
                    display-manager getty@ haveged irqbalance iscsi issue-generator kbdsettings kdump
                    kdump-early klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog sep5 smartd sshd
                    wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny wpa_supplicant
   enabled-runtime  systemd-remount-fs
   disabled         NetworkManager NetworkManager-dispatcher NetworkManager-wait-online accounts-daemon
                    appstream-sync-cache autofs autoyast-initscripts blk-availability bluetooth-mesh
                    boot-sysctl ca-certificates chrony-wait chronyd console-getty cups cups-browsed
                    debug-shell dmraid-activation dnsmasq ebtables exchange-bmc-os-info firewalld gpm
                    grub2-once haveged-switch-root ipmi ipmievd iscsi-init iscsid iscsiuio issue-add-ssh-keys
                    kexec-load lunmask man-db-create multipathd nfs nfs-blkmap nm-cloud-setup nmb openvpn@
                    ostree-remount pppoe pppoe-server rdisc rpcbind rpmconfigcheck rsyncd rtkit-daemon
                    serial-getty@ smartd_generate_opts smb snmpd snmptrapd speech-dispatcherd
                    systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                    systemd-time-wait-sync systemd-timesyncd udisks2 upower wpa_supplicant@
   indirect         pcscd saned@ wickedd


  ----------------------------------------------------------
 14. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.24.33-default
   root=UUID=d977c1aa-2de5-45da-b4b1-9732e87ed311
   splash=silent
   mitigations=auto
   quiet
   security=apparmor
   crashkernel=325M,high
   crashkernel=72M,low


  ----------------------------------------------------------
 15. cpupower frequency-info
   analyzing CPU 0:
     current policy: frequency should be within 800 MHz and 3.80 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
```

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Platform Notes (Continued)

```
  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
  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 Server 15 SP4


  ----------------------------------------------------------
20. Disk information
SPEC is set to: /home/Benchmark/speccpu
  Filesystem      Type   Size  Used Avail Use% Mounted on
  /dev/sda2       btrfs  445G   72G  373G  17% /home


  ----------------------------------------------------------
21. /sys/devices/virtual/dmi/id
  Vendor:         FUJITSU
  Product:        PRIMERGY CX2550 M7
  Product Family: SERVER
  Serial:         BBBB000001


  ----------------------------------------------------------
22. dmidecode
  Additional information from dmidecode 3.2 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:
    14x Samsung M321R8GA0BB0-CQKEG 64 GB 2 rank 4800
    2x Samsung M321R8GA0BB0-CQKVG 64 GB 2 rank 4800
```

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Platform Notes (Continued)

```
    ----------------------------------------------------------
    23. BIOS
    (This section combines info from /sys/devices and dmidecode.)
      BIOS Vendor:      FUJITSU
      BIOS Version:     V1.0.0.0 R0.30.0 for D3988-A1x
      BIOS Date:        02/11/2023
      BIOS Revision:    0.30
      Firmware Revision: 2.20
```

Compiler Version Notes

```
==============================================================================
C              | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
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) 510.parest_r(base)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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------------------------------------------------------------------------------


==============================================================================
C++, C         | 511.povray_r(base) 526.blender_r(base)
------------------------------------------------------------------------------
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------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base)
------------------------------------------------------------------------------
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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) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------------
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==============================================================================
Fortran, C     | 521.wrf_r(base) 527.cam4_r(base)
------------------------------------------------------------------------------
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SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Fujitsu

PRIMERGY CX2550 M7, Intel Xeon Platinum 8468, 2.10GHz

SPECrate®2017_fp_base = 908

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

Test Date: Jun-2023
Hardware Availability: May-2023
Software Availability: Dec-2022

Compiler Version Notes (Continued)

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`

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`

(Continued on next page)

Fujitsu

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Tested by: Fujitsu	**Software Availability:** Dec-2022

Base Optimization Flags (Continued)

C benchmarks (continued):
```
-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
-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
```

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/Fujitsu-Platform-Settings-V1.0-SPR-RevB.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/Fujitsu-Platform-Settings-V1.0-SPR-RevB.xml
```

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CPU2017 License: 19	**Test Date:** Jun-2023
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Tested by: Fujitsu	**Software Availability:** Dec-2022

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

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