# SPEC CPU®2017 Floating Point Rate Result

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## Fujitsu

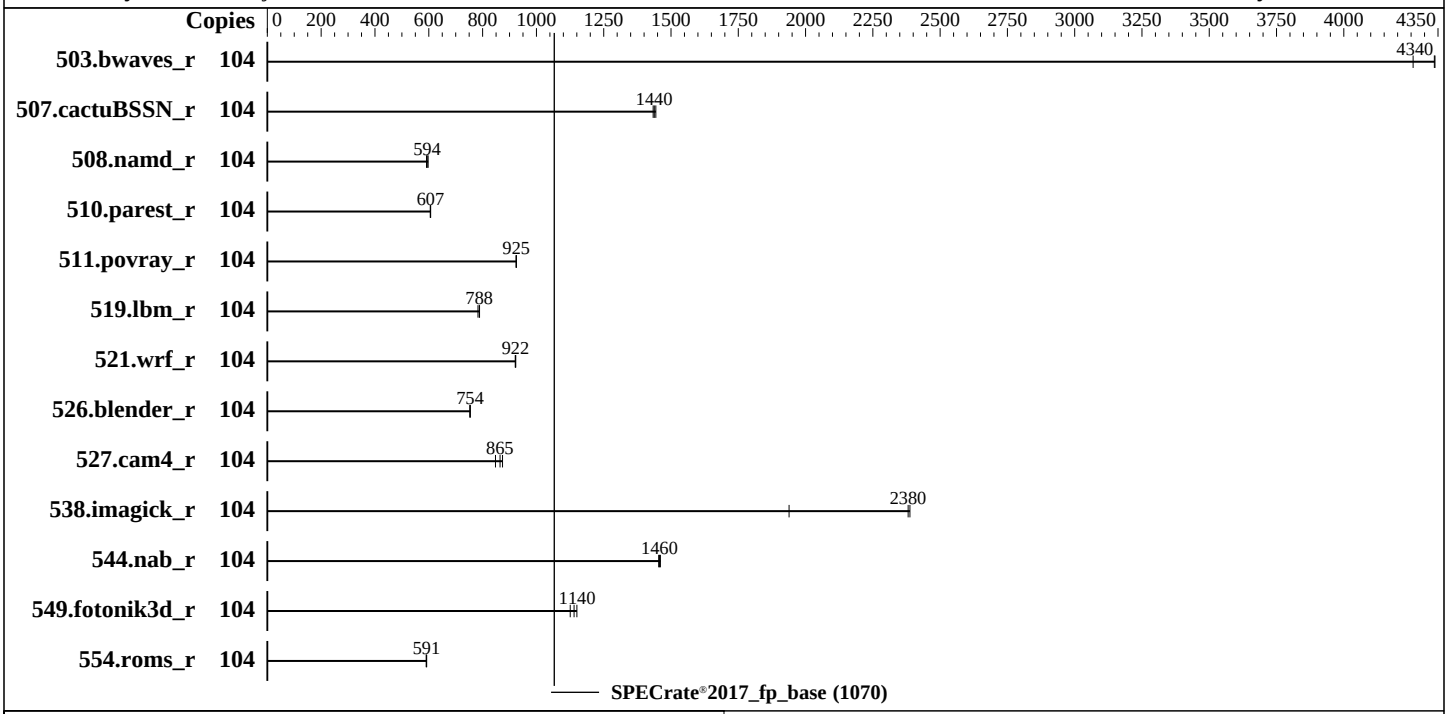
PRIMERGY RX2540 M7, Intel Xeon Max 9470, 2.00GHz

SPECrate®2017_fp_base = 1070

SPECrate®2017_fp_peak = Not Run

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

**Test Date:** Jul-2023
**Hardware Availability:** Mar-2023
**Software Availability:** Dec-2022




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon Max 9470 |
| Max MHz: | 3500 |
| Nominal: | 2000 |
| Enabled: | 104 cores, 2 chips |
| 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: | 1152 GB (16 x 64 GB 2Rx4 PC5-4800B-R + 2 x 64 GB HBM) |
| Storage: | 1 x SATA SSD, 1.92TB |
| Other: | None |

## Software

| | |
|---|---|
| OS: | SUSE Linux Enterprise Server 15 SP4 5.14.21-150400.22-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 D3983-A1x. Released Mar-2023 tested as V1.0.0.0 R1.1.0 for D3983-A1x Feb-2023 |
| File System: | xfs |
| 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 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 | 104 | 245 | 4260 | 240 | 4340 | **241** | **4340** | | | | | | | |
| 507.cactuBSSN_r | 104 | 91.2 | 1440 | 91.8 | 1430 | **91.6** | **1440** | | | | | | | |
| 508.namd_r | 104 | **166** | **594** | 167 | 591 | 165 | 598 | | | | | | | |
| 510.parest_r | 104 | 449 | 605 | **449** | **607** | 448 | 607 | | | | | | | |
| 511.povray_r | 104 | **263** | **925** | 263 | 925 | 262 | 925 | | | | | | | |
| 519.lbm_r | 104 | 139 | 789 | 140 | 783 | **139** | **788** | | | | | | | |
| 521.wrf_r | 104 | 252 | 923 | 253 | 921 | **253** | **922** | | | | | | | |
| 526.blender_r | 104 | 210 | 753 | 210 | 754 | **210** | **754** | | | | | | | |
| 527.cam4_r | 104 | **210** | **865** | 208 | 874 | 215 | 848 | | | | | | | |
| 538.imagick_r | 104 | 133 | 1940 | **109** | **2380** | 108 | 2390 | | | | | | | |
| 544.nab_r | 104 | 120 | 1460 | **120** | **1460** | 120 | 1450 | | | | | | | |
| 549.fotonik3d_r | 104 | 352 | 1150 | **356** | **1140** | 360 | 1130 | | | | | | | |
| 554.roms_r | 104 | **279** | **591** | 279 | 592 | 280 | 590 | | | | | | | |

**SPECrate®2017_fp_base = 1070**

**SPECrate®2017_fp_peak = Not Run**

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"
Kernel Boot Parameter set with : nohz_full=1-103
cpupower -c all frequency-set -g performance
```

## Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/benchmark/speccpu-1.1.9/lib/intel64:/home/benchmark/speccpu-1.1.9/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:
Hyper Threading = Disabled
SNC (Sub NUMA) = Enable SNC4
Package C State Limit = C0
Volatile Memory Mode = 2LM
CPU Performance Boost = Aggressive
FAN Control = Full

Sysinfo program /home/benchmark/speccpu-1.1.9/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Thu Jul  6 08:46:30 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 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222/lp)
  x86_64 x86_64 x86_64 GNU/Linux
```

(Continued on next page)

## Platform Notes (Continued)

```
------------------------------------------------------------
2. w
   08:46:30 up 3 min,  2 users,  load average: 0.69, 1.54, 0.79
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                08:46   14.00s  2.33s  0.10s
  /home/benchmark/ptu_v4.0/UNIFIED_SERVER_PTAT_V4.0.0_20230110/ptat -mon -i 5000000 -filter 0x3f -y -ts -csv
  -log
  root     pts/0    10.118.163.62    08:43   30.00s  0.17s  0.17s -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) 4125340
  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) 4125340
  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=104 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=52 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all fprate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=104 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=52 --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-1.1.9

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel (R) Xeon (R) CPU Max 9470
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 8
    microcode       : 0x2c000120
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 52
    siblings        : 52
```

(Continued on next page)

## Platform Notes (Continued)

```
     2 physical ids (chips)
     104 processors (hardware threads)
     physical id 0: core ids 0-51
     physical id 1: core ids 0-51
     physical id 0: apicids
     0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
     ,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102
     physical id 1: apicids
     128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,1
     80,182,184,186,188,190,192,194,196,198,200,202,204,206,208,210,212,214,216,218,220,222,224,226,228,230
   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:                   46 bits physical, 57 bits virtual
   Byte Order:                      Little Endian
   CPU(s):                          104
   On-line CPU(s) list:             0-103
   Vendor ID:                       GenuineIntel
   Model name:                      Intel (R) Xeon (R) CPU Max 9470
   CPU family:                      6
   Model:                           143
   Thread(s) per core:              1
   Core(s) per socket:              52
   Socket(s):                       2
   Stepping:                        8
   CPU max MHz:                     3500.0000
   CPU min MHz:                     800.0000
   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 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:                       4.9 MiB (104 instances)
   L1i cache:                       3.3 MiB (104 instances)
   L2 cache:                        208 MiB (104 instances)
   L3 cache:                        210 MiB (2 instances)
   NUMA node(s):                    8
   NUMA node0 CPU(s):               0-12
   NUMA node1 CPU(s):               13-25
```

**(Continued on next page)**

## Platform Notes (Continued)

```
  NUMA node2 CPU(s):                26-38
  NUMA node3 CPU(s):                39-51
  NUMA node4 CPU(s):                52-64
  NUMA node5 CPU(s):                65-77
  NUMA node6 CPU(s):                78-90
  NUMA node7 CPU(s):                91-103
  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 and seccomp
  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:
     NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
     L1d       48K     4.9M   12 Data            1     64        1             64
     L1i       32K     3.3M    8 Instruction     1     64        1             64
     L2         2M     208M   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: 0-12
  node 0 size: 128566 MB
  node 0 free: 127804 MB
  node 1 cpus: 13-25
  node 1 size: 129020 MB
  node 1 free: 128764 MB
  node 2 cpus: 26-38
  node 2 size: 129020 MB
  node 2 free: 128782 MB
  node 3 cpus: 39-51
  node 3 size: 129020 MB
  node 3 free: 128791 MB
  node 4 cpus: 52-64
  node 4 size: 129020 MB
  node 4 free: 128720 MB
  node 5 cpus: 65-77
  node 5 size: 129020 MB
  node 5 free: 128675 MB
  node 6 cpus: 78-90
  node 6 size: 129020 MB
  node 6 free: 128764 MB
  node 7 cpus: 91-103
  node 7 size: 128669 MB
  node 7 free: 128309 MB
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  17  17  17  26  26  26  26
    1:  17  10  17  17  26  26  26  26
    2:  17  17  10  17  26  26  26  26
    3:  17  17  17  10  26  26  26  26
    4:  26  26  26  26  10  17  17  17
    5:  26  26  26  26  17  10  17  17
    6:  26  26  26  26  17  17  10  17
```

**(Continued on next page)**

## Platform Notes (Continued)

```
     7:  26  26  26  26  17  17  17  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1056112204 kB

------------------------------------------------------------
10. who -r
  run-level 3 Jul 6 08:43

------------------------------------------------------------
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          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
  enabled-runtime  systemd-remount-fs
  disabled         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 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 nmb ostree-remount 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
  indirect         wickedd

------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
  root=UUID=0e5beafe-73ba-4cb4-b738-5343b4292867
  splash=silent
  quiet
  security=apparmor
  crashkernel=322M,high
  crashkernel=72M,low
  nohz_full=1-103
  mitigations=auto

------------------------------------------------------------
15. cpupower frequency-info
  analyzing CPU 0:
    current policy: frequency should be within 800 MHz and 3.50 GHz.
                    The governor "performance" may decide which speed to use
                    within this range.
    boost state support:
      Supported: yes
      Active: yes
```

**(Continued on next page)**

## Platform Notes (Continued)

```
------------------------------------------------------------
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
  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-1.1.9
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sda2      xfs   1.8T  117G  1.7T   7% /

------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         FUJITSU
    Product:        PRIMERGY RX2540 M7
    Product Family: SERVER
    Serial:         EWCExxxxxx

------------------------------------------------------------
22. dmidecode
  Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you interpret this section.
```

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## Platform Notes (Continued)

```
   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:
     8x Intel  16 GB 1 rank 3200
     2x Samsung M321R8GA0BB0-CQKDG 64 GB 2 rank 4800
     8x Samsung M321R8GA0BB0-CQKEG 64 GB 2 rank 4800
     6x Samsung M321R8GA0BB0-CQKVG 64 GB 2 rank 4800


 ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       FUJITSU
    BIOS Version:      V1.0.0.0 R1.1.0 for D3983-A1x
    BIOS Date:         02/03/2023
    BIOS Revision:     1.1
    Firmware Revision: 2.0
Each Intel Xeon CPU Max processor is configured with 64 GB of High Bandwidth Memory (HBM)
in-package. dmidecode is additionally reporting the capacity of the CPU in-package
HBM stack as: '8x Intel 16 GB 1 rank 3200'
```

## 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
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++, C          | 511.povray_r(base) 526.blender_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.
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)
--------------------------------------------------------------------------------------------------------------
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
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Intel(R) Fortran 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)

```
Fortran         | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------------
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) 527.cam4_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran 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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------------------------------------------------------------------------------
```

## 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

**(Continued on next page)**

## Base Portability Flags (Continued)

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
-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/Fujitsu-Platform-Settings-V1.0-SPR-RevC.html
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html

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

http://www.spec.org/cpu2017/flags/Fujitsu-Platform-Settings-V1.0-SPR-RevC.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-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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