## SPEC CPU®2017 Floating Point Rate Result

**Fujitsu**

PRIMERGY RX2540 M7, Intel Xeon Gold 5418Y, 2.00GHz

**SPECrater®2017_fp_base = 520**

**SPECrater®2017_fp_peak = Not Run**

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### Hardware

- **CPU Name:** Intel Xeon Gold 5418Y
- **Max MHz:** 3800
- **Nominal:** 2000
- **Enabled:** 48 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:** 45 MB I+D on chip per chip
- **Other:** None
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R, running at 4400)
- **Storage:** 1 x SATA SSD, 1.92TB
- **Other:** None

### Software

- **OS:** SUSE Linux Enterprise Server 15 SP4
  5.14.21-150-400.22-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 R1.1.0.0 for D3983-A1x. Released Mar-2023 tested as V1.0.0.0 R0.24.1 for D3983-A1x Jan-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
SPEC CPU®2017 Floating Point Rate Result

Fujitsu
PRIMERGY RX2540 M7, Intel Xeon Gold 5418Y, 2.00GHz

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

Test Date: Apr-2023
Hardware Availability: Mar-2023
Software Availability: Dec-2022

Results Table

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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-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>
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)
Fujitsu
PRIMERGY RX2540 M7, Intel Xeon Gold 5418Y, 2.00GHz

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

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.


Platform Notes

BIOS configuration:
Package C State limit = C0
CPU Performance Boost = Aggressive
SNC (Sub NUMA) = Enable SNC4
FAN Control = Full

Sysinfo program /home/benchmark/speccpu-1.1.9/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Mon Apr 10 18:28:31 2023

SUT (System Under Test) info as seen by some common utilities.

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6. /proc/cpuinfo
7. lscpu
8. numacl --hardware
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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) x86_64 x86_64 x86_64 GNU/Linux

2. w
18:28:31 up 4 min, 2 users, load average: 0.11, 0.18, 0.09
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT

(Continued on next page)
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) 4125354
   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) 4125354
   virtual memory   (kbytes, -v) unlimited
   file locks       (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   ssdh: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
   ssdh: root@pts/0
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=96 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=48 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
data rate --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) Gold 5418Y
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 143
   stepping        : 8
   microcode       : 0x2b000130
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swaps
   cpu cores       : 24
   siblings        : 48
   2 physical ids (chips)
   96 processors (hardware threads)
   physical id 0: core ids 0-23

(Continued on next page)
Fujitsu
PRIMERGY RX2540 M7, Intel Xeon Gold 5418Y, 2.00GHz

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**Platform Notes (Continued)**

physical id 1: core ids 0-23  
physical id 0: apicids 0-47  
physical id 1: apicids 128-175

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): 96
On-line CPU(s) list: 0-95
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Gold 5418Y
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 2
Stepping: 8
CPU max MHz: 3800.000
CPU min MHz: 800.000
BogoMIPS: 4000.00
Flags: fpu vme de pse tsc msr pae mca cmov pat pse36
```

Virtualization: VT-x

| L2d cache: 2.3 MiB (48 instances) |
| L1i cache: 1.5 MiB (48 instances) |
| L2 cache: 96 MiB (48 instances) |
| L3 cache: 90 MiB (2 instances) |
| NUMA node(s): 4 | |
| NUMA node0 CPU(s): 0-11,48-59 |
| NUMA node1 CPU(s): 12-23,60-71 |
| NUMA node2 CPU(s): 24-35,72-83 |
| NUMA node3 CPU(s): 36-47,84-95 |
| Vulnerability Itlb multihit: Not affected |
| Vulnerability Lldt: Not affected |
| Vulnerability Mds: Not affected |
| Vulnerability Meltdown: Not affected |
| Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp |

(Continued on next page)
Platform Notes (Continued)

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 Tx async abort: Not affected

From lsckpt-cache:

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8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0-11, 48-59
node 0 size: 257622 MB
node 0 free: 256684 MB
node 1 cpus: 12-23, 60-71
node 1 size: 256804 MB
node 1 free: 256591 MB
node 2 cpus: 24-35, 72-83
node 2 size: 257607 MB
node 2 free: 257604 MB
node 3 cpus: 36-47, 84-95
node 3 size: 257690 MB
node 3 free: 257287 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: 1056115000 kB

10. who -r
run-level 3 Apr 10 18:24

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
* sep5.service loaded 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 cron display-manager getty@ haveged
irqbalance iscsi issue-generator kbdsettings kdump kdump-early klog libvirtd lvm2-monitor
nsd postfix purge-kernels rollback rsyslog sep5 smartd sshd wicked wickedd-auto4
wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny

(Continued on next page)
Platform Notes (Continued)

---

14. Linux kernel boot-time arguments, from /proc/cmdline

```bash
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=0fc48b86-32e9-4597-b40a-5581420df75f
splash=silent
resume=/dev/disk/by-uuid/82af1018-ea10-4182-81e8-fe09edc70bd4
mitigations=auto
quiet
security=apparmor
mitigations=auto
```

---

15. cpupower frequency-info

```bash
analyzing CPU 0:
  current policy: frequency should be within 800 MHz and 3.80 GHz.
  The governor "powersave" may decide which speed to use
  within this range.

boost state support:
  Supported: yes
  Active: yes
```

---

16. sysctl

```bash
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

(Continued on next page)
Platform Notes (Continued)

hpage_pmd_size  2097152
shm_enabled   always within_size advise [never] deny force

18. /sys/kernel/mm/transparent_hugepage/khugepaged
alloc_sleepMillisecs   60000
defrag                      1
max_ptes_none             511
max_ptes_shared           256
max_ptes_swap              64
pages_to_scan            4096
scan_sleepMillisecs    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/sda3      xfs   741G   38G  703G   6% /home

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.
   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:
   3x Samsung M321R8G0B0-CQKDG 64 GB 2 rank 4800, configured at 4400
   4x Samsung M321R8G0B0-CQKMG 64 GB 2 rank 4800, configured at 4400
   9x Samsung M321R8G0B0-CQKVG 64 GB 2 rank 4800, configured at 4400

23. BIOS
   (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       FUJITSU
   BIOS Version:      V1.0.0.0 R0.24.1 for D3983-A1x
   BIOS Date:         01/06/2023
   BIOS Revision:     0.24
   Firmware Revision: 2.0

Compiler Version Notes

---
| 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
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(Continued on next page)
Fujitsu
PRIMERGY RX2540 M7, Intel Xeon Gold 5418Y, 2.00GHz

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

Compiler Version Notes (Continued)

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)

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, 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.

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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Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

(Continued on next page)
Base Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
ifx icx

Benchmarks using both C and C++:
icpx icx

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

Base Portability Flags

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

Base Optimization Flags

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

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

(Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

**Fujitsu**

PRIMERGY RX2540 M7, Intel Xeon Gold 5418Y, 2.00GHz

**SPECrate®2017_fp_base = 520**

**SPECrate®2017_fp_peak = Not Run**

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<thead>
<tr>
<th>CPU2017 License:</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Fujitsu</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Fujitsu</td>
</tr>
</tbody>
</table>

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

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**Base Optimization Flags (Continued)**

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/Intel-ic2023-official-linux64.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/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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