Fujitsu
PRIMERGY CX2550 M7, Intel Xeon Platinum 8468, 2.10GHz

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

SPECrate®2017_fp_base = 908
SPECrate®2017_fp_peak = Not Run

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 of additional power usage
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Results Table

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<th>Benchmark</th>
<th>Copies</th>
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<td>305</td>
<td>996</td>
<td>306</td>
<td>4947</td>
<td>61.7</td>
</tr>
</tbody>
</table>

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.:
umactl --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.
SPEC CPU®2017 Floating Point Rate Result

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SPECrates

| SPECrates 2017 fp_base | 908 |
| SPECrates 2017 fp_peak | Not Run |

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

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

Sysinfo program /home/Benchmark/spec/cpu/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.

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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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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 : specstore_v1 specstore_v2 spec_store_bypass swapgs ebibs_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.

(Continued on next page)
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<table>
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**CPU2017 License:** 19  
**Test Sponsor:** Fujitsu  
**Tested by:** Fujitsu

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### SPEC CPU®2017 Floating Point Rate Result

**CPU Frequency:** 2.10GHz

**SPEC CPU®2017 Floating Point Rate Result**

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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
- **Stepping:** 6
- **CPU max MHz:** 3800.0000
- **CPU min MHz:** 800.0000
- **BogoMIPS:** 4200.00

**Flags:**

- `fpu vme de pse tsc msr pae mca cmov pat pse36 cli flush dtsc假日 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 dcasse4_l sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm 3dnowprefetch cpuid_fault eb x save f safe sr a mt ms a plic shum64 mmx fxsr sse sse2 ss sd sb di nrt tx virt
- **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 Ltt:** Not affected

**Vulnerability Ms:** Not affected

**Vulnerability Meltdown:** Not affected

**Vulnerability Mmio stale data:** Not affected

**Vulnerability Retbleed:** Not affected

(Continued on next page)
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 /proc/cpuinfo:
- CPU socket(s): 1
- CPU cores: 12
- CPU threads: 12
- CPU(s) online: 12
- Model name: Intel Xeon Platinum 8468
- L1d cache: 48K bytes
- L1i cache: 32K bytes
- L2 cache: 2M bytes
- L3 cache: 105M bytes
- L4 cache: Not present
- Cache alignment: 64
- Cache line size: 64 bytes
- Cache Coherence: 64

CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu
CPU2017 License: 19
Test Sponsor: Fujitsu
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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: 128630 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: 0 10 12 12 12 21 21 21 21
  node 1: 12 10 12 12 21 21 21 21
  node 2: 12 12 10 12 21 21 21 21
  node 3: 12 12 12 10 21 21 21 21
  node 4: 21 21 21 21 10 12 12 12
  node 5: 21 21 21 21 12 10 12 12
  node 6: 21 21 21 21 12 12 10 12
  node 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

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SPEC CPU®2017 Floating Point Rate Result

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SPECRate®2017_fp_base =  908
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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
   systemd-remount-fs
   NetworkManager NetworkManager-dispatcher NetworkManager-wait-online accounts-daemon
   appstream-sync-cache autosfs autoyast-initscripts blk-availability bluetooth-mesh
   boot-sysctl ca-certificates chrony-wait chronyd console-getty cups cups-browsed
debug-shell dmraid-activation dsmq ebtacles exchange-bmc-os-info firewalld gpm
   grub2-once havedeg-switch-root ipmi ipmiold iscii-issue-initiscii issue-add-ash-keys
   kexec-load junmask man-db-create multipathd nfs nfs-bklmap nm-cloud-setup nmb openvpn
   ostree-remount ppone ppone-server rdisc rpaybind rpmconfigcheck rsyncd rttkit-daemon
   serial-getty@ smartd_generate_opts smm snmpd snmptrapd speech-dispatcherd
   systemd-boot-check-no-failures systemd-network-generator systemd-systemd
   systemd-time-wait-sync systemd-timesyncd udisks2 upower wpasuppliant@
   indirect
   pcscd saned@ wicked

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. sysct1
   kernel.numa_balancing 1
   kernel.randomize_va_space 2
   vm.companion_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+madvice [madvice] never
   enabled [always] madvice 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
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
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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
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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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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)
**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

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

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