## Fujitsu

PRIMERGY RX2540 M7, Intel Xeon Platinum 8470Q, 2.10GHz

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>888</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

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

### Hardware

- **CPU Name:** Intel Xeon Platinum 8470Q  
- **Max MHz:** 3800  
- **Nominal:** 2100  
- **Enabled:** 104 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 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 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:** None  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage

### SPEC CPU®2017 Integer Rate Result

<table>
<thead>
<tr>
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<th>Copies</th>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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Page 1 Standard Performance Evaluation Corporation (info@spec.org) https://www.spec.org/
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**SPECrate®2017_int_base =** 888  
**SPECrate®2017_int_peak =** Not Run

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

### Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

### 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/lib/ia32:/home/benchmark/spec
cpu-1.1.9/je5.0.1-32"
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
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>
```
NR: 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.

**Platform Notes**

BIOS configuration:
- DCU Streamer Prefetcher = Disabled
- 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 fe91ce89b7ed5c36ae2c92cc097bec197
running on localhost Mon May 15 10:34:05 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/klhugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS
```

(Continued on next page)
Platform Notes (Continued)

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`
   10:34:05 up 7 min,  1 user, load average: 0.01, 1.11, 0.98
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     pts/0    10.118.163.62    10:33   13.00s  2.09s  0.18s -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         (-l) 4125168
   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) 4125168
   virtual memory          (kbytes, -v) unlimited
   file locks              (-x) unlimited

5. `sysinfo process ancestry`
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
   sshd: root@pts/0
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=208 --c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=104 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune_base --tune all --nopower --runmode
   rate --tune_base --size refrain infrate --nopreenv --note_preenv --logfile
   $SPEC/tmp/CPUCPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/benchmark/speccpu-1.1.9
   $SPEC = /home/benchmark/speccpu-1.1.9

6. `/proc/cpuinfo`
   model name      : Intel(R) Xeon(R) Platinum 8470Q
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 143
   stepping        : 6
   microcode       : 0x2b000130
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs

   (Continued on next page)
### Platform Notes (Continued)

- **cpu cores**: 52
- **siblings**: 104
- **2 physical ids (chips)**
  - **physical id 0**: core ids 0-51
  - **physical id 1**: core ids 0-51
- **physical id 0**: apicids 0-103
- **physical id 1**: apicids 128-231

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
- **CPU Order**: Little Endian
- **CPU**: 208
- **On-line CPU(s) list**: 0-207
- **Vendor ID**: GenuineIntel
- **Model name**: Intel(R) Xeon(R) Platinum 8470Q
- **CPU family**: 6
- **Model**: 143
- **Thread(s) per core**: 2
- **Core(s) per socket**: 52
- **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 mca cmov pat pse36 clflush dts acpi mmx fxsr mmxext mmx fpxsr vmx smx vmxest sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr mmsse3 sse3 dmb fxsr vme pse36 clflush dts acpi mmx fxsr mmsse3 sse3 dmb fxsr

```
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): 0-12,104-116
NUMA node1 CPU(s): 13-25,117-129
NUMA node2 CPU(s): 26-38,130-142
NUMA node3 CPU(s): 39-51,143-155
```

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Fujitsu

PRIMERGY RX2540 M7, Intel Xeon Platinum 8470Q, 2.10GHz

SPECrate®2017_int_base = 888
SPECrate®2017_int_peak = Not Run

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<td>Fujitsu</td>
</tr>
<tr>
<td>Test Date:</td>
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<td>Mar-2023</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2022</td>
</tr>
</tbody>
</table>

Platform Notes (Continued)

NUMA node4 CPU(s): 52-64,156-168
NUMA node5 CPU(s): 65-77,169-181
NUMA node6 CPU(s): 78-90,182-194
NUMA node7 CPU(s): 91-103,195-207
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 Srbd: Not affected
Vulnerability Tax async abort: Not affected

From lscpu --cache:

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<th>48K</th>
<th>4.9M</th>
<th>12 Data</th>
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<th>64</th>
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<td>2M</td>
<td>208M</td>
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<td>210M</td>
<td>15 Unified</td>
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</tr>
</tbody>
</table>

numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.

8. numactl --hardware

available: 8 nodes (0-7)

- node 0 cpus: 0-12,104-116
- node 0 size: 128597 MB
- node 0 free: 126707 MB
- node 1 cpus: 13-25,117-129
- node 1 size: 129017 MB
- node 1 free: 128606 MB
- node 2 cpus: 26-38,130-142
- node 2 size: 129017 MB
- node 2 free: 128618 MB
- node 3 cpus: 39-51,143-155
- node 3 size: 129017 MB
- node 3 free: 128703 MB
- node 4 cpus: 52-64,156-168
- node 4 size: 129017 MB
- node 4 free: 128639 MB
- node 5 cpus: 65-77,169-181
- node 5 size: 129017 MB
- node 5 free: 128607 MB
- node 6 cpus: 78-90,182-194
- node 6 size: 129017 MB
- node 6 free: 128653 MB
- node 7 cpus: 91-103,195-207
- node 7 size: 128614 MB
- node 7 free: 128347 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

(Continued on next page)
Platform Notes (Continued)

9. /proc/meminfo
   MemTotal: 1056067612 kB

10. who -r
    run-level 3 May 15 10:27

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
    Default Target multi-user Status
    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 cron display-manager getty@ haveged
               irqbalance iscsi issue-generator kbdsettings kdump kdump-early klog libvirt dlv
               nscd postfix purge-kernels rollback rsyslog sep5 smartd sshd wicked wickedd-auto4
               wickedd-fc4 wickedd-hp6 wickedd-nanny
    enabled-runtime systemd-remount-fs
    disabled autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
               chronyd console-getty cups cups-browsed debug-shell dnsmasq ebt tables exchange-bmc-os-info
               firewall gpm grub2-once haveged-switch-root ipmi ipmienv iscsi-init iscsid
               issue-add-ssh-keys kexec-load ksm kvm_stat libvirt-guests lunarmask man-db-create multipathd
               nfs nfs-blkmap nfs-server nfsserver rdisc rpcbind rpmconfigcheck rsyncd serial-getty0
               smartd_generate_opts snmpd smntrapd strongswan strongswan-starter avainservice
               systemd-boot-check-no-failures systemd-network-generator systemd-nspawn systemd-sysvext
               systemd-time-wait-sync systemd-timesyncd tsdb udisks2 virtinterfaced virtnetworkd
               virtiodedev virtnfswilterd virtproxyd virtqemud virtsecretdev virtstoraged
    indirect pcsd virtlockd virtlogd wicked

14. Linux kernel boot-time arguments, from /proc/cmdline
    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
    crashkernel=322M,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 "powersave" may decide which speed to use
    within this range.
    boost state support:
    Supported: yes
    Active: yes
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CPU2017 License: 19
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Test Date: May-2023
Hardware Availability: Mar-2023
Software Availability: Dec-2022

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.extrfrag_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/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
Platform Notes (Continued)

determined*, but the intent may not be met, as there are frequent changes to hardware, firmware, and the
"DMTF SMBIOS* standard.

Memory:
3x Samsung M321R8GA0BB0-CQKDG 64 GB 2 rank 4800
4x Samsung M321R8GA0BB0-CQKMG 64 GB 2 rank 4800
9x Samsung M321R8GA0BB0-CQKVG 64 GB 2 rank 4800

Compiler Version Notes

C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_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++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_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 | 548.exchange2_r(base)
------------------------------------------------------------------------------------------------------------
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.

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx
SPEC CPU®2017 Integer Rate Result
Copyright 2017-2024 Standard Performance Evaluation Corporation

Fujitsu
PRIMERGY RX2540 M7, Intel Xeon Platinum 8470Q, 2.10GHz

<table>
<thead>
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<th>SPECrate®2017_int_base =</th>
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<tr>
<td>SPECrate®2017_int_peak = Not Run</td>
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</tbody>
</table>

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

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

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
525.x264_r: -DSPEC_LP64
531.deepsjeng_r: -DSPEC_LP64
541.leela_r: -DSPEC_LP64
548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-fflto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-1qkmalloc

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-fflto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-1qkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-1qkmalloc

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/Fujitsu-Platform-Settings-V1.0-SPR-RevB.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml
Fujitsu
PRIMERGY RX2540 M7, Intel Xeon Platinum 8470Q, 2.10GHz

SPECrate®2017_int_base = 888
SPECrate®2017_int_peak = Not Run

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

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

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

Tested with SPEC CPU®2017 v1.1.9 on 2023-05-14 21:34:04-0400.
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