SPEC CPU®2017 Integer Rate Result

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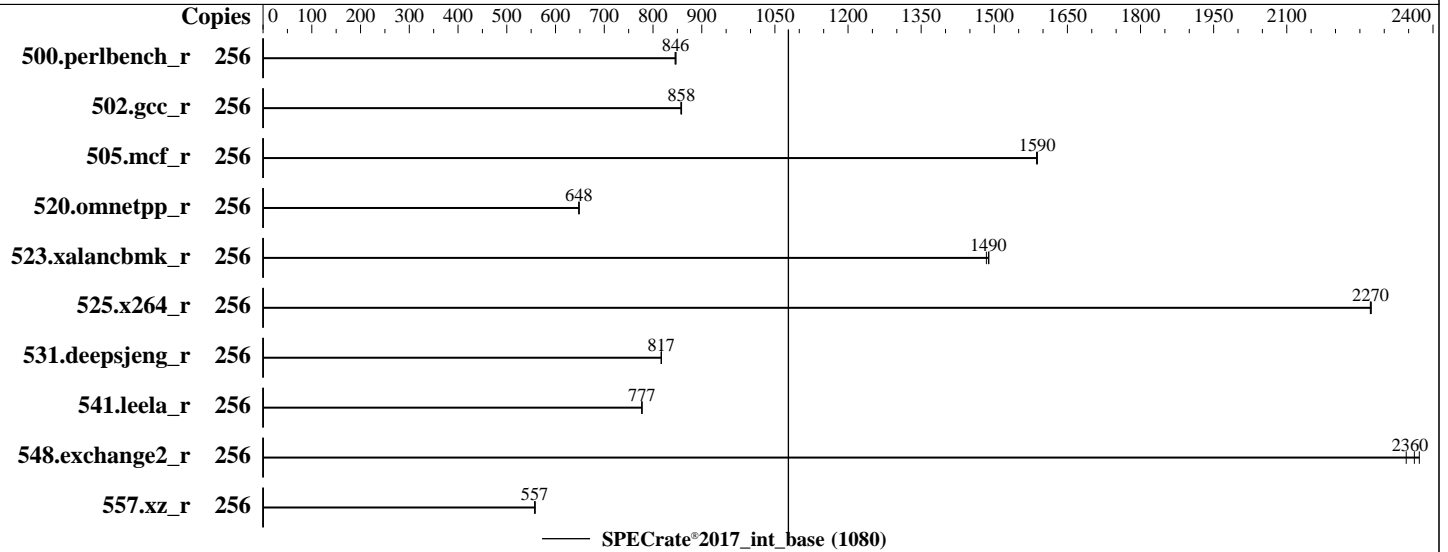## Fujitsu

PRIMERGY CX2550 M7, Intel Xeon Platinum 8592+, 1.90GHz

$SPECrate^{®}2017_int_base = $ **1080**

$SPECrate^{®}2017_int_peak = $ Not Run

CPU2017 License: 19

Test Sponsor: Fujitsu

Tested by: Fujitsu

Test Date: Apr-2024

Hardware Availability: May-2024

Software Availability: Dec-2023

Benchmark	Copies	Result
500.perlbench_r	256	846
502.gcc_r	256	858
505.mcf_r	256	1590
520.omnetpp_r	256	648
523.xalancbmk_r	256	1490
525.x264_r	256	2270
531.deepsjeng_r	256	817
541.leela_r	256	777
548.exchange2_r	256	2360
557.xz_r	256	557

$SPECrate^{®}2017\_int\_base$ (1080)

Hardware

CPU Name: Intel Xeon Platinum 8592+

  Max MHz: 3900

  Nominal: 1900

Enabled: 128 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: 320 MB I+D on chip per chip

  Other: None

Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R)

Storage: 1 x SATA M.2, 960GB

Other: CPU Cooling: DLC

Software

OS: SUSE Linux Enterprise Server 15 SP5
5.14.21-150500.53-default

Compiler: C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux;
Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;

Parallel: No

Firmware: Fujitsu BIOS Version V1.0.0.0 R2.4.0 for D3988-A1x. Released May-2024
tested as V1.0.0.0 R2.3.1 for D3988-A1x Mar-2024

File System: btrfs

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

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

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Results Table

Benchmark	Copies	Base Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Peak Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	256	**482**	**846**	481	847	482	845							
502.gcc_r	256	423	857	**422**	**858**	422	859							
505.mcf_r	256	**261**	**1590**	260	1590	261	1590							
520.omnetpp_r	256	**518**	**648**	518	648	519	648							
523.xalancbmk_r	256	182	1480	182	1490	**182**	**1490**							
525.x264_r	256	**197**	**2270**	197	2270	197	2270							
531.deepsjeng_r	256	359	817	**359**	**817**	359	817							
541.leela_r	256	545	777	**545**	**777**	546	777							
548.exchange2_r	256	286	2350	**284**	**2360**	283	2370							
557.xz_r	256	496	557	**496**	**557**	495	558							
SPECrate®2017_int_base =		**1080**												
SPECrate®2017_int_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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
    "/home/benchmark/speccpu-23.2/lib/intel64:/home/benchmark/speccpu-23.2/lib/ia32:/home/benchmark/speccp
    u-23.2/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
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.
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.
```

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Tested by: Fujitsu	**Software Availability:** Dec-2023

General Notes (Continued)

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
UPI Link Frequency Select = 14.4GT/s
CPU Performance Boost = Aggressive
SNC (Sub NUMA) = Enable SNC2
HWPM Support = Disabled

Sysinfo program /home/benchmark/speccpu-23.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Mon Apr  1 12:00:23 2024

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 (249.16+suse.171.gdad0071f15)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS
-------------------------------------------------------------


-------------------------------------------------------------
1. uname -a
  Linux localhost 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
  x86_64 x86_64 x86_64 GNU/Linux


-------------------------------------------------------------
2. w
   12:00:23 up 3 min,  1 user,  load average: 0.20, 0.31, 0.14
  USER     TTY       FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1      -                11:58   13.00s  2.12s  0.23s -bash


-------------------------------------------------------------
3. Username
  From environment variable $USER:  root
```

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Platform Notes (Continued)

```
          ----------------------------------------------------------
          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) 4124671
            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) 4124671
            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=256 -c
             ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=128 --define physicalfirst
             --define invoke_with_interleave --define drop_caches --tune base -o all intrate
           runcpu --nobuild --action validate --define default-platform-flags --define numcopies=256 --configfile
             ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=128 --define physicalfirst
             --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
             rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
             $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
           specperl $SPEC/bin/sysinfo
          $SPEC = /home/benchmark/speccpu-23.2


          ----------------------------------------------------------
          6. /proc/cpuinfo
              model name      : INTEL(R) XEON(R) PLATINUM 8592+
              vendor_id       : GenuineIntel
              cpu family      : 6
              model           : 207
              stepping        : 2
              microcode       : 0x21000200
              bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
              cpu cores       : 64
              siblings        : 128
              2 physical ids (chips)
              256 processors (hardware threads)
              physical id 0: core ids 0-63
              physical id 1: core ids 0-63
              physical id 0: apicids 0-127
              physical id 1: apicids 128-255
           Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
           virtualized systems.  Use the above data carefully.


          ----------------------------------------------------------
          7. lscpu
```

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Platform Notes (Continued)

```
From lscpu from util-linux 2.37.4:
  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):                      256
  On-line CPU(s) list:         0-255
  Vendor ID:                   GenuineIntel
  Model name:                  INTEL(R) XEON(R) PLATINUM 8592+
  CPU family:                  6
  Model:                       207
  Thread(s) per core:          2
  Core(s) per socket:          64
  Socket(s):                   2
  Stepping:                    2
  Frequency boost:             enabled
  CPU max MHz:                 1901.0000
  CPU min MHz:                 800.0000
  BogoMIPS:                    3800.00
  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 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 avx_vnni avx512_bf16 wbnoinvd dtherm ida arat pln pts
                               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:                   6 MiB (128 instances)
  L1i cache:                   4 MiB (128 instances)
  L2 cache:                    256 MiB (128 instances)
  L3 cache:                    640 MiB (2 instances)
  NUMA node(s):                4
  NUMA node0 CPU(s):           0-31,128-159
  NUMA node1 CPU(s):           32-63,160-191
  NUMA node2 CPU(s):           64-95,192-223
  NUMA node3 CPU(s):           96-127,224-255
  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
  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:
```

(Continued on next page)

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Platform Notes (Continued)

```
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
      L1d      48K       6M  12 Data            1     64      1              64
      L1i      32K       4M   8 Instruction     1     64      1              64
      L2        2M     256M  16 Unified         2   2048      1              64
      L3      320M     640M  20 Unified         3 262144      1              64


  -------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0-31,128-159
  node 0 size: 257612 MB
  node 0 free: 256722 MB
  node 1 cpus: 32-63,160-191
  node 1 size: 258031 MB
  node 1 free: 257148 MB
  node 2 cpus: 64-95,192-223
  node 2 size: 258031 MB
  node 2 free: 257293 MB
  node 3 cpus: 96-127,224-255
  node 3 size: 257521 MB
  node 3 free: 256758 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:      1055946500 kB


  -------------------------------------------------------------
10. who -r
  run-level 3 Apr 1 11:57


  -------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
  Default Target  Status
  multi-user      running


  -------------------------------------------------------------
12. Services, from systemctl list-unit-files
  STATE           UNIT FILES
  enabled         YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager getty@ irqbalance
                  iscsi issue-generator kbdsettings kdump kdump-early klog libvirtd lvm2-monitor nscd
                  postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wickedd-auto4
                  wickedd-dhcp4 wickedd-dhcp6 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 ebtables exchange-bmc-os-info
                  firewalld gpm grub2-once haveged haveged-switch-root ipmi ipmievd iscsi-init iscsid
                  issue-add-ssh-keys kexec-load ksm kvm_stat libvirt-guests lunmask man-db-create multipathd
                  nfs nfs-blkmap nfs-server nfsserver rpcbind rpmconfigcheck rsyncd serial-getty@
                  smartd_generate_opts snmpd snmptrapd strongswan strongswan-starter svnserve
                  systemd-boot-check-no-failures systemd-network-generator systemd-nspawn@ systemd-sysext
                  systemd-time-wait-sync systemd-timesyncd tcsd udisks2 virtinterfaced virtnetworkd
                  virtnodedevd virtnwfilterd virtproxyd virtqemud virtsecretd virtstoraged vncserver@
  indirect        pcscd virtlockd virtlogd wickedd
```

(Continued on next page)

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Platform Notes (Continued)

```
   ----------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
   root=UUID=9c131c09-0ac8-4880-b3dc-37fa10c43cda
   splash=silent
   quiet
   security=apparmor
   crashkernel=401M,high
   crashkernel=72M,low
   mitigations=auto


   ----------------------------------------------------------
14. cpupower frequency-info
   analyzing CPU 0:
     current policy: frequency should be within 800 MHz and 1.90 GHz.
                     The governor "ondemand" may decide which speed to use
                     within this range.
     boost state support:
       Supported: yes
       Active: yes


   ----------------------------------------------------------
15. 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


   ----------------------------------------------------------
16. /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


   ----------------------------------------------------------
17. /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
```

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Platform Notes (Continued)

```
  --------------------------------------------------------------
  18. OS release
    From /etc/*-release /etc/*-version
    os-release SUSE Linux Enterprise Server 15 SP5

  --------------------------------------------------------------
  19. Disk information
  SPEC is set to: /home/benchmark/speccpu-23.2
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda2       btrfs  892G   41G  851G   5% /home

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

  --------------------------------------------------------------
  21. dmidecode
    Additional information from dmidecode 3.4 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:
      16x Hynix HMCG94AGBRA181N 64 GB 2 rank 5600


  --------------------------------------------------------------
  22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:      FUJITSU
     BIOS Version:     V1.0.0.0 R2.3.1 for D3988-A1x
     BIOS Date:        03/26/2024
     BIOS Revision:    2.3
     Firmware Revision: 2.20
```

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 2023.2.3 Build x
Copyright (C) 1985-2023 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 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran | 548.exchange2_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
```

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Compiler Version Notes (Continued)

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

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`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin`
`-lqkmalloc`

C++ benchmarks:
`-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math`
`-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
`-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin`
`-lqkmalloc`

Fortran benchmarks:
`-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto`

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Fujitsu

PRIMERGY CX2550 M7, Intel Xeon Platinum 8592+, 1.90GHz

SPECrate®2017_int_base =   1080

SPECrate®2017_int_peak = Not Run

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

Test Date: Apr-2024
Hardware Availability: May-2024
Software Availability: Dec-2023

Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc
```

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-EMR-RevD.html
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-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-EMR-RevD.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml

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

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