**SPEC CPU®2017 Integer Rate Result**

**Fujitsu**
PRIMERGY RX2540 M7, Intel Xeon Platinum 8462Y+, 2.80GHz

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>19</th>
</tr>
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<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Fujitsu</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Fujitsu</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Mar-2023</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Dec-2022</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Jun-2022</td>
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<table>
<thead>
<tr>
<th>SPECrate®2017_int_base =</th>
<th>663</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak =</td>
<td>Not Run</td>
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<table>
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<tr>
<th>Copies</th>
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<tbody>
<tr>
<td>500.perlbench_r</td>
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<tr>
<td>502.gcc_r</td>
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<td>505.mcf_r</td>
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<td>520.omnetpp_r</td>
<td>401</td>
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<td>523.xalancbmk_r</td>
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<td>548.exchange2_r</td>
<td>1450</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>305</td>
</tr>
</tbody>
</table>

**Hardware**

- **CPU Name:** Intel Xeon Platinum 8462Y+
- **Max MHz:** 4100
- **Nominal:** 2800
- **Enabled:** 64 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:** 60 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
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Test Sponsor: Fujitsu
Tested by: Fujitsu

SPECrate®2017_int_base = 663
SPECrate®2017_int_peak = Not Run

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

Results Table

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<th>Base Seconds</th>
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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/speccpu-1.1.9/jemalloc-5.0.1-32"
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.:

```
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 fe91c89b7ed5c36ae2c92cc097bec197

running on localhost Tue Mar 21 21:11:55 2023

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

- `uname -a`
- `w`
- `Username`
- `ulimit -a`
- `sysinfo process ancestry`
- `/proc/cpuinfo`
- `lscpu`
- `numactl --hardware`
- `/proc/meminfo`
- `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/transient_hugepage`
18. `/sys/kernel/mm/transient_hugepage/khugepaged`
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`
   ```
   21:11:55 up  8:30,  2 users,  load average:  0.53,  42.34,  88.42
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                12:43    8:26m  2.26s  0.13s
   /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    12:43    8:27m  0.10s  0.10s -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) 4125250
   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) 4125250
   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
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all intrate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --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-1.1.9
   ```

6. `/proc/cpuinfo`
   ```
   model name : Intel(R) Xeon(R) Platinum 8462Y+
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 8
   ```

(Continued on next page)
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Platform Notes (Continued)

-- Platform Notes (Continued) --

microcode       : 0x2b000130
bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores       : 32
siblings        : 64
2 physical ids (chips)
128 processors (hardware threads)
physical id 0: core ids 0-31
physical id 1: core ids 0-31
physical id 1: apicids 128-191
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): 128
On-line CPU(s) list: 0-127
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8462Y+
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 2
Stepping: 8
CPU max MHz: 4100.0000
CPU min MHz: 800.0000
BogoMIPS: 5600.00

Flags:
  fpu vme de pmse pclmns cmov pat pse36 clflush dtlb tsc msr pae mce cx8
  pepx mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtsscp
  lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
  nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor
des_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_pinn cd812 sbbd mba ibrs ibpb ibrs_enhanced
  trp_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1
  hle avx2 smep bmi2 erms invpcid rtm cmqm rdt_a avx512f avx512dq rdseed
  adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha_hui avx512bw
  avx512v1 xsaveopt xsaves xgetbv1 xsaves cmqm_llc cmqm_occup_llc cmqm_mbb_total
  cmqm_mbb_local split_lock_detect avx_vnni avx512_fp16 wbnoiwvd dtherm
  ida arat pln pts hwp hwp_act_window hwp_epp hwp_kpg_req avx512vbmi umip
  pku ospke waitpkg avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg
  tme avx512_vpopcntdq ia57 rdrd bus_lock_detect cidemote movdir movdir64b
  enqcmd frm md_clear serialize txaflintrk pconfg arch_lbr avx512_fp16
  amx_tile flush_lid arch_capabilities

Virtualization:
VT-x

L1d cache: 3 MiB (64 instances)
L1i cache: 2 MiB (64 instances)
L2 cache: 128 MiB (64 instances)
L3 cache: 120 MiB (2 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0-15,64-79
NUMA node1 CPU(s): 16-31,80-95

(Continued on next page)
Platform Notes (Continued)

NUMA node2 CPU(s): 32-47,96-111
NUMA node3 CPU(s): 48-63,112-127
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 sanitation
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tex async abort: Not affected

From lscpu --cache:

<table>
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<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
<th>PHY-LINE</th>
<th>COHERENCY-SIZE</th>
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<tbody>
<tr>
<td>L1d</td>
<td>48K</td>
<td>3M</td>
<td>12</td>
<td>Data</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>2M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L2</td>
<td>2M</td>
<td>128M</td>
<td>16</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
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<tr>
<td>L3</td>
<td>60M</td>
<td>120M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>65536</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0-15,64-79
node 0 size: 257620 MB
node 0 free: 255420 MB
node 1 cpus: 16-31,80-95
node 1 size: 258005 MB
node 1 free: 257196 MB
node 2 cpus: 32-47,96-111
node 2 size: 258039 MB
node 2 free: 257269 MB
node 3 cpus: 48-63,112-127
node 3 size: 257670 MB
node 3 free: 256869 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: 1056088492 kB

10. who -r
run-level 3 Mar 21 12:42

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 failed systemd script to load sep5 driver at boot time

(Continued on next page)
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Platform Notes (Continued)

---
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 libvirtvd lvm2-monitor
nscc postfix purge-kernels rollback rsyslog sep5 smartd sshd wicked wickedd-auto4
wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled autosd autostart-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
cron consolet-getty cups cups-browsed debug-shell dnmaspd ebtables exchange-bmc-os-info
firewalld gpm grub2-once haveged-switch-root ipmi ipmiexpress iscsi-init iscsid
issue-add-ssh-keys kekexec-load ksm kvm_stat libvirt-guests lumnmask man-db-create multipathd
nfs nfs-blpkmap nfs-server nfsserver rdisc rdmconfigcheck rscmd serial-stdin-stdout
send-to-root srpm cfggen cpuacct CPU0 cpufreq cpufreq-policy cpufreq-unsched_properties
cpusets disabled runtime file loop
indirect pcmd pmacd pmd pcscd 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-fe09e4c70bd4
mitigations=auto
quiet
security-apparmor
kernel.randomize_va_space=2
numaanalize
---
15. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 800 MHz and 4.10 GHz.
The governor "powersave" 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.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

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Platform Notes (Continued)

```
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] 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
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-CQKVGG 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 R0.24.1 for D3983-A1x
    BIOS Date:           01/06/2023
    BIOS Revision:       0.24
    Firmware Revision:  2.0
```
Fujitsu

PRIMERGY RX2540 M7, Intel Xeon Platinum 8462Y+, 2.80GHz

SPEC CPU®2017 Integer Rate Result
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CPU2017 License: 19
Test Sponsor: Fujitsu
Tested by: Fujitsu

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 |
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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
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PRIMERGY RX2540 M7, Intel Xeon Platinum 8462Y+, 2.80GHz

SPECrate®2017_int_base = 663
SPECrate®2017_int_peak = Not Run

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

Base Optimization Flags

C benchmarks:
-std=gnu11 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

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

Fortran benchmarks:
-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
-lqkmalloc

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

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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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