## SPEC CPU®2017 Integer Rate Result

### Fujitsu

**PRIMERGY RX2540 M7, Intel Xeon Platinum 8592+, 1.90GHz**

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base =</th>
<th>1060</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Mar-2024</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Apr-2024</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2023</td>
</tr>
</tbody>
</table>

### CPU2017 License: 19

### Test Sponsor: Fujitsu

### Tested by: Fujitsu

<table>
<thead>
<tr>
<th>CPU Name: Intel Xeon Platinum 8592+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz: 3900</td>
</tr>
<tr>
<td>Nominal: 1900</td>
</tr>
</tbody>
</table>

| 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: Cooling: Air |

### 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;

### Firmware:

Fujitsu BIOS Version V1.0.0.0 R2.4.0 for D3983-A1x. Released Apr-2024
(tested as V1.0.0.0 R2.1.2 for D3983-A1x Dec-2023)

### File System: btrfs

### System State: Run level 3 (multi-user)

### Base Pointers: 64-bit

### Peak Pointers: Not Applicable

### Power Management: BIOS set to prefer performance at the cost of additional power usage

---

### SPECrate®2017_int_base (1060)

<table>
<thead>
<tr>
<th>SPEC benchmark</th>
<th>Copies</th>
<th>SPECrate®2017_int_base</th>
</tr>
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<tbody>
<tr>
<td>500.perlbench_r</td>
<td>256</td>
<td>813</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>256</td>
<td>844</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>256</td>
<td>1560</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>256</td>
<td>1460</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>256</td>
<td>789</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>256</td>
<td>768</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>256</td>
<td>2200</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>256</td>
<td>2330</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>256</td>
<td>552</td>
</tr>
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PRIMERGY RX2540 M7, Intel Xeon Platinum 8592+, 1.90GHz

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Results Table

<table>
<thead>
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<th>Copies</th>
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<th>Ratio</th>
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<td>288</td>
<td>2330</td>
<td>288</td>
<td>2330</td>
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<tr>
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<td>256</td>
<td>501</td>
<td>552</td>
<td>500</td>
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<td>552</td>
</tr>
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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-23.2/lib/intel64:/home/benchmark/speccpu-23.2/lib/ia32:/home/benchmark/speccpu-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.

(Continued on next page)
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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
Fan Control = Full
HWPM Support = Disabled

Sysinfo program /home/benchmark/speccpu-23.2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Sat Mar 9 10:22:16 2024

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

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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/ktuplepaged
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
10:22:16 up 2 min, 1 user, load average: 0.48, 0.27, 0.10
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 10:20 8.00s 2.02s 0.18s -bash

3. Username

(Continued on next page)
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---

**Platform Notes (Continued)**

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) 4124666
- 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
- 4124666
- max user processes (-u) 64
- virtual memory (kbytes, -v) unlimited
- file locks (-x) unlimited

5. sysinfo process ancestry

```
/systemd --switched-root --system --deserialize 30
```

```
login -- root
-bash
```

```
runccpu --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
```

```
---
```

6. /proc/cpuinfo

```
model name : INTEL(R) XEON(R) PLATINUM 8592+
vendor_id : GenuineIntel
cpu family : 6
model : 207
stepping : 2
microcode : 0x210001a0
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 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

(Continued on next page)
**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:** 1901.000
- **CPU min MHz:** 800.000
- **BogoMIPS:** 3800.00
- **Flags:** fpu vme de pse tsc msr pae mce cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb 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 3nowprefetch cpuid_fault ebpf cat_l3 cat_l2 cd p cpuid_vendor cpuid_signing cpuideam cpuid fault cpuid ssbd mba ibrs ibpb ibrs_enhanced tpr_shadow intel_constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology arch_capabilities
- **Virtualization:** VT-x

**L1d cache:** 6 MiB (128 instances)
- **L2 cache:** 256 MiB (128 instances)
- **L3 cache:** 640 MiB (2 instances)
- **NUMA node(s):**
  - NUMA node0 CPU(s): 0-31,128-159
  - NUMA node1 CPU(s): 32-63,160-191
  - NUMA node2 CPU(s): 64-95,224-255
- **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 sanitzation
- **Vulnerability Spectre v2:** Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-ibRS SW sequence
- **Vulnerability Srbds:** Not affected
- **Vulnerability Txs async abort:** Not affected

(Continued on next page)
Platform Notes (Continued)

From lscpu --cache:

<table>
<thead>
<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>
</tr>
</thead>
<tbody>
<tr>
<td>L1d</td>
<td>48K</td>
<td>6M</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>4M</td>
<td>8</td>
<td>Instruction</td>
<td>1</td>
<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L2</td>
<td>2M</td>
<td>256M</td>
<td>16</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>320M</td>
<td>640M</td>
<td>20</td>
<td>Unified</td>
<td>3</td>
<td>262144</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: 0-31,128-159
node 0 size: 257610 MB
node 0 free: 256726 MB
node 1 cpus: 32-63,160-191
node 1 size: 258031 MB
node 1 free: 257232 MB
node 2 cpus: 64-95,192-223
node 2 size: 257997 MB
node 2 free: 257241 MB
node 3 cpus: 96-127,224-255
node 3 size: 257556 MB
node 3 free: 256681 MB
node distances:
<table>
<thead>
<tr>
<th>node</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>10</td>
<td>12</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>1</td>
<td>12</td>
<td>10</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>2</td>
<td>21</td>
<td>21</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>3</td>
<td>21</td>
<td>21</td>
<td>12</td>
<td>10</td>
</tr>
</tbody>
</table>

9. `/proc/meminfo`

MemTotal: 1055945220 kB

10. who -r

run-level 3 Mar 9 10:20

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

<table>
<thead>
<tr>
<th>STATE</th>
<th>UNIT FILES</th>
</tr>
</thead>
<tbody>
<tr>
<td>enabled</td>
<td>YaST2-Firstboot YaST2-Second-Stage apparmor appstream-sync-cache audidt bluetooth cron display-manager getty@ irqbalance issue-generator kbdsettings kdump kdump-early klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny</td>
</tr>
<tr>
<td>enabled-runtime</td>
<td>systemd-remount-fs</td>
</tr>
<tr>
<td>disabled</td>
<td>accounts-daemon autofs autofs daemon autoyast-initscripts blk-availability bluetooth-mesh boot-sysctl ca-certificates chrony-wait chronyd console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info firewall ipv6 msmtp man-db create multipathd nfs nfs-bmap nmb ostree-remount rpcbind rpmconfigcheck rsyncd rtkit-daemon serial-getty@ smartd_generate_opts smb snmpd snmptrapd speech-dispatcher systemd-boot-check-no-failures systemd-network-generator systemd-systemd systemctl systemd-update-system-flatpakd systemd-timesyncd udisks2 update-system-flatpakd upower vncserver@ wickedd</td>
</tr>
<tr>
<td>indirect</td>
<td></td>
</tr>
</tbody>
</table>
Platform Notes (Continued)

13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
   root=UUID=d177d129-775e-44ff-bf2a-8f0e7a7a7b1b
   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
   deffrag  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

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda2</td>
<td>btrfs</td>
<td>892G</td>
<td>16G</td>
<td>876G</td>
<td>2%</td>
<td>/home</td>
</tr>
</tbody>
</table>

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 R2.1.2 for D3983-A1x
BIOS Date: 12/21/2023
BIOS Revision: 2.1
Firmware Revision: 2.36

### Compiler Version Notes

<table>
<thead>
<tr>
<th>C</th>
<th>500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x</td>
<td></td>
</tr>
<tr>
<td>Copyright (C) 1985-2023 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>C++</th>
<th>520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x</td>
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<tr>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Fortran</th>
<th>548.exchange2_r(base)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x</td>
<td></td>
</tr>
<tr>
<td>Copyright (C) 1985-2023 Intel Corporation. All rights reserved.</td>
<td></td>
</tr>
</tbody>
</table>
**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

(Continued on next page)
SPEC CPU®2017 Integer Rate Result
Copyright 2017-2024 Standard Performance Evaluation Corporation

Fujitsu
PRIMERGY RX2540 M7, Intel Xeon Platinum 8592+, 1.90GHz

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base</th>
<th>1060</th>
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</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: Mar-2024
Hardware Availability: Apr-2024
Software Availability: Dec-2023

Base Optimization Flags (Continued)
Fortran benchmarks (continued):
- mfpmath=sse
- funroll-loops
- gfortran-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/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-RevC.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml

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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 2024-03-08 20:22:15-0500.
Originally published on 2024-03-26.