Lenovo Global Technology
Wentian WR5220 G3
(2.00 GHz, Intel Xeon Platinum 8480+)

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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SPECrate®2017_fp_base = 952
SPECrate®2017_fp_peak = Not Run

Copies 

503.bwaves_r 224
507.caCTuBSSN_r 224
508.namd_r 224
510.parest_r 224
511.povray_r 224
519.lbm_r 224
521.wrf_r 224
526.blender_r 224
527.cam4_r 224
538.imagick_r 224
544.nab_r 224
549.fotonik3d_r 224
554.roms_r 224

SPECrate®2017_fp_base (952)

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554.roms_r 224

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Hardware

CPU Name: Intel Xeon Platinum 8480+
Max MHz: 3800
Nominal: 2000
Enabled: 112 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 3.84 TB SATA SSD
Other: None

Software

OS: Red Hat Enterprise Linux 9.0 (Plow)
Kernel 5.14.0-70.13.1.el9_0.x86_64
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: Lenovo BIOS Version T8E120T 0.36 released Feb-2023
File System: xfs
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance
at the cost of additional power usage
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Results Table

<table>
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<th>Ratio</th>
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<th>Seconds</th>
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<td></td>
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</tr>
</tbody>
</table>

SPECrate®2017_fp_base = 952
SPECrate®2017_fp_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"
OS set to performance mode via cpupower frequency-set -g performance

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "*/home/cpu_report/lib/intel64:/home/cpu_report/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.:
numactl --interleave=all runcpu <etc>
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) (Continued on next page)
General Notes (Continued)

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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Power Mode set to Custom
SNC set to Enable SNC4 (4-clusters)
LLC Prefetch set to Enabled
DCU Streamer Prefetcher set to Disabled
C1 Enhanced Mode set to Disabled
Patrol Scrub set to Disabled
Intel Virtualization Technology set to Disabled
Package C State set to C0/C1 state

Sysinfo program /home/cpu_report/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Sat Apr 15 01:09:21 2023

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

---

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---

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3. Username
4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
7. lscpu
8. numacl --hardware
9. /proc/meminfo
10. who -r
11. systemd service manager version: systemd 250 (250-6.e19_0)
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. syact
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
---

---

1. uname -a
Linux localhost.localdomain 5.14.0-70.13.1.e19_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64 x86_64 GNU/Linux

(Continued on next page)
# SPEC CPU®2017 Floating Point Rate Result

## Lenovo Global Technology

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### SPECrate®2017_fp_base = 952

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_peak = Not Run</th>
</tr>
</thead>
</table>

**CPU2017 License:** 9017  
**Test Date:** Apr-2023  
**Test Sponsor:** Lenovo Global Technology  
**Tested by:** Lenovo Global Technology

### Platform Notes (Continued)

**2.**

```
01:09:21 up  3:22,  1 user,  load average: 153.36, 207.08, 216.94
USER TTY LOGIN@   IDLE   JCPU   PCPU WHAT
root :l  21:48 ?xdm?  18:50   0.00s /usr/libexec/gdm-x-session --register-session --run-script
gnome-session
```

**3.**

Username

From environment variable $USER: root

**4.**

```
ulimit -a
real-time non-blocking time (microseconds, -R) unlimited
core file size   (blocks, -c) 0
data seg size    (kbytes, -d) unlimited
scheduling priority (-e) 0
file size        (blocks, -f) unlimited
pending signals  (-l) 4124569
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) 4124569
virtual memory   (kbytes, -v) unlimited
file locks       (-x) unlimited
```

**5.**

```
sysinfo process ancestry
/usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
/usr/lib/systemd/systemd --user
/usr/libexec/gnome-terminal-server
bash
bash
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=224 -c
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=112 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base -o all fprate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=224 --configfile
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=112 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
rate --tune base --size refrate --note-preenv --note-prenv --logfile
$SPEC/tmp/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu_report
```

**6.**

```
model name : Intel(R) Xeon(R) Platinum 8480+
vendor_id : GenuineIntel
cpu family : 6
model : 143
stepping : 6
microcode : 0x2b000161
bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores : 56
```

(Continued on next page)
Platform Notes (Continued)

siblings : 112
2 physical ids (chips)
224 processors (hardware threads)
physical id 0: core ids 0-55
physical id 1: core ids 0-55
physical id 0: apicids 0-11
physical id 1: apicids 128-239
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 2.37.4:
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):                          224
On-line CPU(s) list:             0-223
Vendor ID:                       GenuineIntel
BIOS Vendor ID:                  Intel(R) Corporation
Model name:                      Intel(R) Xeon(R) Platinum 8480+
BIOS Model name:                 Intel(R) Xeon(R) Platinum 8480+
CPU family:                      6
Model:                           143
Thread(s) per core:              2
Core(s) per socket:              56
Socket(s):                       2
Stepping:                        6
CPU max MHz:                     3800.0000
CPU min MHz:                     800.0000
BogoMIPS:                        4000.00
Flags:                           fpu vme de pse tsc msr pae mce cmov pat pse36
clflush dtsc acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
lm constant_tsc art arch_perfmon pebs bts rep_good nopl sfpl stp_guaranteed
nonstop_tsc tsc_known_freq pni pclmulqdq dtes64 monitor
mce counter tsc侏儒 hwcap pdpteplen pdpte2sz
mcmos specshield
msrclassifier
mbmsvipc ndisp iommu virtstore
pni2 tsc_adjust

L1d cache:                       5.3 MiB (112 instances)
L1l cache:                       3.5 MiB (112 instances)
L2 cache:                        224 MiB (112 instances)
L3 cache:                        210 MiB (2 instances)
NUMA node(s):                    8
NUMA node0 CPU(s):               0-13,112-125
NUMA node1 CPU(s):               14-27,126-139
NUMA node2 CPU(s):               28-41,140-153
NUMA node3 CPU(s):               42-55,154-167
NUMA node4 CPU(s):               56-69,168-181

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

NUMA node5 CPU(s): 70-83,182-195
NUMA node6 CPU(s): 84-97,196-209
NUMA node7 CPU(s): 98-111,210-223
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
Vulnerability Spectre v1: Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tax async abort: Not affected

From lscpu --cache:

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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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<td>5.3M</td>
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<td>Data</td>
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<td>64</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L1i</td>
<td>32K</td>
<td>3.5M</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>224M</td>
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<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>105M</td>
<td>210M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>114688</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: 8 nodes (0-7)
node 0 cpus: 0-13,112-125
node 0 size: 128131 MB
node 0 free: 119412 MB
node 1 cpus: 14-27,126-139
node 1 size: 128981 MB
node 1 free: 122564 MB
node 2 cpus: 28-41,140-153
node 2 size: 129017 MB
node 2 free: 122475 MB
node 3 cpus: 42-55,154-167
node 3 size: 129017 MB
node 3 free: 122365 MB
node 4 cpus: 56-69,168-181
node 4 size: 129017 MB
node 4 free: 122454 MB
node 5 cpus: 70-83,182-195
node 5 size: 129017 MB
node 5 free: 122044 MB
node 6 cpus: 84-97,196-209
node 6 size: 129017 MB
node 6 free: 121732 MB
node 7 cpus: 98-111,210-223
node 7 size: 129017 MB
node 7 free: 122545 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
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<td>Tested by:</td>
<td>Lenovo Global Technology</td>
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<tr>
<td>Test Date:</td>
<td>Apr-2023</td>
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<td>Software Availability:</td>
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</table>

### SPEC CPU®2017 Floating Point Rate Result

**SPECrate®2017_fp_base** = 952

**SPECrate®2017_fp_peak** = Not Run

---

### Platform Notes (Continued)

9. `/proc/meminfo`
   
   ```
   MemTotal: 1055950048 kB
   ```

10. `who -r`
    
    ```
    run-level 5 Apr 14 21:47
    ```

11. `systemd service manager version: systemd 250 (250-6.e19_0)`
    
    ```
    Default Target Status
    graphical degraded
    ```

12. Failed units, from `systemctl list-units --state=failed`
    
    ```
    DESCRIPTION
    NetworkManager-wait-online.service loaded failed failed Network Manager Wait Online
    ```

13. Services, from `systemctl list-unit-files`
    
    ```
    STATE UNIT FILES
    enabled systemd-network-generator udisks2 systemd-remount-fs
    disabled pcmixer atd auditd avahi-daemon bluetooth chronyd crond cups dbus-broker firewalld
    ```

14. Linux kernel boot-time arguments, from `/proc/cmdline`
    
    ```
    BOOT_IMAGE=(hd0,gpt6)/boot/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
    root=UUID=0fcc2b80-3b7a-487a-8bd6-e3cddec3d533
    ro
    crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
    resume=UUID=d8abe978-c0ca-4381-ac68-dadfc58fd1c9
    rhgb
    quiet
    ```

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.
    ```

---

(Continued on next page)
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**SPEC CPU®2017 Floating Point Rate Result**

**SPECrata®2017_fp_base = 952**
**SNCrate®2017_fp_peak = Not Run**

---

**Platform Notes (Continued)**

boost state support:
  Supported: yes
  Active: yes

---

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.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+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`: Red Hat Enterprise Linux 9.0 (Plow)
- `redhat-release`: Red Hat Enterprise Linux release 9.0 (Plow)
- `system-release`: Red Hat Enterprise Linux release 9.0 (Plow)

---

20. **Disk information**

SPEC is set to: `/home/cpu_report`

- `/dev/sda6`: xfs 954G 158G 797G 17%

---

21. **/sys/devices/virtual/dmi/id**

- **Vendor**: Lenovo
- **Product**: Lenovo WenTian GB5520 V3

(Continued on next page)
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SPECraten®2017_fp_base = 952
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Platform Notes (Continued)

Product Family: Lenovo
Serial: J80007RK

22. dmidecode
Additional information from dmidecode 3.3 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:
2x Samsung M321R8GA0BB0-CQKEG 64 GB 2 rank 4800
13x Samsung M321R8GA0BB0-CQKMG 64 GB 2 rank 4800
1x Samsung M321R8GA0BB0-CQKVG 64 GB 2 rank 4800

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: LENOVO
BIOS Version: T8E120T-0.36
BIOS Date: 02/13/2023
BIOS Revision: 5.29

Compiler Version Notes

C | 519.nl_b_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
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C++ | 508.namd_r(base) 510.parest_r(base)

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C++, C | 511.povray_r(base) 526.blender_r(base)

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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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## Lenovo Global Technology

**Wentian WR5220 G3**  
(2.00 GHz, Intel Xeon Platinum 8480+)

<table>
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<tr>
<th>CPU2017 License: 9017</th>
<th>Test Date: Apr-2023</th>
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<tbody>
<tr>
<td>Test Sponsor: Lenovo Global Technology</td>
<td>Hardware Availability: Jan-2023</td>
</tr>
<tr>
<td>Tested by: Lenovo Global Technology</td>
<td>Software Availability: Dec-2022</td>
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### SPEC CPU®2017 Floating Point Rate Result


<table>
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<tr>
<th>SPECrate®2017_fp_base</th>
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</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
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### Compiler Version Notes (Continued)

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<thead>
<tr>
<th>Fortran</th>
<th>bwaves_r(base)</th>
<th>fotonik3d_r(base)</th>
<th>roms_r(base)</th>
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<tr>
<td>Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201</td>
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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

(Continued on next page)
## Base Portability Flags (Continued)

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`  
- `-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`
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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](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/Intel-ic2023-official-linux64.xml)

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