### SPEC CPU®2017 Floating Point Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant ML110 Gen11  
(1.80 GHz, Intel Xeon Gold 6421N)  

**SPECrater®2017_fp_base = 325**  
**SPECrater®2017_fp_peak = 337**

<table>
<thead>
<tr>
<th>Copies</th>
<th>Test Date: Apr-2023</th>
<th>Hardware Availability: May-2023</th>
<th>Software Availability: Dec-2022</th>
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#### Copies

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Value</th>
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<tbody>
<tr>
<td>503.bwaves_r</td>
<td>64</td>
<td>394</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>32</td>
<td>194</td>
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<tr>
<td>508.namd_r</td>
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<td>510.parest_r</td>
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<td>519.lbm_r</td>
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<td>521.wrf_r</td>
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<td>526.blender_r</td>
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<td>527.cam4_r</td>
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<td>538.imagick_r</td>
<td>64</td>
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<td>544.nab_r</td>
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<td>593</td>
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<tr>
<td>549.fotonik3d_r</td>
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<tr>
<td>554.roms_r</td>
<td>32</td>
<td>130</td>
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</tbody>
</table>

**SPECrate®2017_fp_base (325)**  
**SPECrate®2017_fp_peak (337)**

#### Hardware

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CPU Name:</strong></td>
<td>Intel Xeon Gold 6421N</td>
</tr>
<tr>
<td><strong>Max MHz:</strong></td>
<td>3600</td>
</tr>
<tr>
<td><strong>Nominal:</strong></td>
<td>1800</td>
</tr>
<tr>
<td><strong>Enabled:</strong></td>
<td>32 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td><strong>Orderable:</strong></td>
<td>1 chip</td>
</tr>
<tr>
<td><strong>Cache L1:</strong></td>
<td>32 KB I + 48 KB D on chip per core</td>
</tr>
<tr>
<td><strong>L2:</strong></td>
<td>2 MB I+D on chip per core</td>
</tr>
<tr>
<td><strong>L3:</strong></td>
<td>60 MB I+D on chip per chip</td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td>None</td>
</tr>
<tr>
<td><strong>Memory:</strong></td>
<td>256 GB (8 x 32 GB 2Rx8 PC5-4800B-R, running at 4400)</td>
</tr>
<tr>
<td><strong>Storage:</strong></td>
<td>1 x 240 GB SATA SSD</td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td>None</td>
</tr>
</tbody>
</table>

#### Software

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
</tr>
</thead>
</table>
| **OS:** | Red Hat Enterprise Linux 9.0 release (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:** | HPE BIOS Version v1.30 03/01/2023 released Mar-2023 |
| **File System:** | xfs |
| **System State:** | Run level 3 (multi-user) |
| **Base Pointers:** | 64-bit |
| **Peak Pointers:** | 64-bit |
| **Other:** | jemalloc memory allocator V5.0.1 |
| **Power Management:** | BIOS and OS set to prefer performance at the cost of additional power usage |
# SPEC CPU®2017 Floating Point Rate Result

**Hewlett Packard Enterprise**

*(Test Sponsor: HPE)*

**ProLiant ML110 Gen11**

*(1.80 GHz, Intel Xeon Gold 6421N)*

---

**SPECrater®2017_fp_base = 325**

**SPECrater®2017_fp_peak = 337**

---

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
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<th>Ratio</th>
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<th>Ratio</th>
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<td>1660</td>
<td>387</td>
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<td>781</td>
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<td>780</td>
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</tr>
</tbody>
</table>

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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"

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
```

Tuned-adm profile was set to throughput-performance using "tuned-adm profile throughput-performance"

Perf-bias for all the CPUs is set using "cpupower set -b 0"

Runcpu command invoked through numactl i.e.:

```
umactl --interleave=all runcpu <etc>
```

---

**Environment Variables Notes**

Environment variables set by runcpu before the start of the run:

- `LD_LIBRARY_PATH = "~/home/CPU2017/lib/intel64:/home/CPU2017/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

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

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.
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

The system ROM used for this result contains Intel microcode version 0x2b0001b0 for the Intel Xeon Gold 6421N processor.

BIOS Configuration:
- Workload Profile set to General Throughput Compute
- Sub-Numa Clustering (SNC) set to SNC4
- Memory Patrol Scrubbing set to Disabled
- Workload Profile set to Custom
- Minimum Processor Idle Power Package C-State set to Package C6 (non-retention) State
- DCU Stream Prefetcher set to Disabled
- Adjacent Sector Prefetch set to Disabled
- Last Level Cache (LLC) Dead Line Allocation set to Disabled
- Enhanced Processor Performance Profile set to Aggressive
- Thermal Configuration set to Maximum Cooling

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c3ae2c92cc097bec197
running on localhost.localdomain Sat Apr  1 05:02:08 2023

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

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15. tuned-adm active
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
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20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
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(Continued on next page)
Platform Notes (Continued)

1. `uname -a`
   
   Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
   x86_64 x86_64 GNU/Linux

2. `w`
   
   05:02:08 up 3 min,  1 user,  load average: 0.02, 0.04, 0.01
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     pts/0     05:00    7.00s  0.85s  0.01s -bash

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) 1030643
   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) 1030643
   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 [priv]
   sshd: root@pts/0
   -bash
   -bash
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 -c
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=32 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak -o all fprate
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=32 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --nopower
   --runmode rate --tune base:peak --size refrate fprate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.002/templtgs/preenv.fprate.002.0.1og --lognum 002.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/CPU2017

6. `/proc/cpuinfo`
   
   model name      : Intel(R) Xeon(R) Gold 6421N
   vendor_id       : GenuineIntel
   cpu family      : 6
SPEC CPU®2017 Floating Point Rate Result
Copyright 2017-2023 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML110 Gen11
(1.80 GHz, Intel Xeon Gold 6421N)

SPECrate®2017_fp_base = 325
SPECrate®2017_fp_peak = 337

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE
Test Date: Apr-2023
Hardware Availability: May-2023
Software Availability: Dec-2022

Platform Notes (Continued)

model            : 143
stepping         : 7
microcode        : 0x2b0001b0
bugs             : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores        : 32
siblings         : 64
1 physical ids (chips)
64 processors (hardware threads)
physical id 0: core ids 0-31
physical id 0: apicids 0-63
Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for virtualized systems. Use the above data carefully.

Platform Notes (Continued)

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):                        64
On-line CPU(s) list:           0-63
Vendor ID:                     GenuineIntel
BIOS Vendor ID:                Intel(R) Corporation
Model name:                    Intel(R) Xeon(R) Gold 6421N
BIOS Model name:               Intel(R) Xeon(R) Gold 6421N
CPU family:                    6
Model:                         143
Thread(s) per core:            2
Core(s) per socket:            32
Socket(s):                     1
Stepping:                      7
BogoMIPS:                      3600.00

Flags:

Virtualization:               VT-x
L1d cache:                    1.5 MiB (32 instances)
L1i cache:                    1.0 MiB (32 instances)
L2 cache:                     64 MiB (32 instances)
L3 cache:                     60 MiB (1 instance)
NUMA node(s):                 2
NUMA node0 CPU(s):            0-15,32-47
NUMA node1 CPU(s):            16-31,48-63
Vulnerability Itlb multihit:  Not affected

(Continued on next page)
Platform Notes (Continued)

Vulnerability L1tf: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spectre v1: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbdm: Not affected
Vulnerability Tsx async abort: Not affected

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>1.5M</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>1M</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>64M</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>60M</td>
<td>15</td>
<td>Unified</td>
<td>3</td>
<td>65536</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

From lscpu --hardware:

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

9. /proc/meminfo
MemTotal: 263885324 kB

10. who -r
run-level 3 Apr 1 04:59

11. Systemd service manager version: systemd 250 (250-6.e19_0)
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>NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond dbus-broker firewalld getty@ irqbalance kdump lvm2-monitor mdmonitor microcode nis-domainname rasqcertd rsyslog selinux-autorelabel-mark sshd sssd systemd-network-generator tuned udisks2</td>
</tr>
<tr>
<td>enabled-runtime</td>
<td></td>
</tr>
<tr>
<td>indirect</td>
<td>ssd-autofs ssd-kvm ssd-nss ssd-pac ssd-pace ssd-sssd ssd-sssd ssd-sssd</td>
</tr>
</tbody>
</table>

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd1,gpt2)/vmlinuz-5.14.0-70.13.1.e19_0.x86_64
platform Notes (Continued)

root=/dev/mapper/rhel-root
ro
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap

------------------------------------------------------------
14. cpupower frequency-info
analyzing CPU 0:
Unable to determine current policy
boost state support:
  Supported: yes
  Active: yes

------------------------------------------------------------
15. tuned-adm active
  Current active profile: throughput-performance

------------------------------------------------------------
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 40
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 10
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+madvice [madvice] never
  enabled [always] madvice 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

  (Continued on next page)
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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML110 Gen11
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

SPECrater®2017_fp_base = 325
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Platform Notes (Continued)

os-release Red Hat Enterprise Linux 9.0 (Flow)
redhat-release Red Hat Enterprise Linux release 9.0 (Flow)
system-release Red Hat Enterprise Linux release 9.0 (Flow)

20. Disk information
SPEC is set to: /home/CPU2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 148G 107G 42G 73% /home

21. /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant ML110 Gen11
Product Family: ProLiant
Serial: CNX2230TMQ

22. /sys/devices/virtual/dmi/id
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:
8x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800, configured at 4400

23. BIOS
(BThis section combines info from /sys/devices and dmidecode.)
BIOS Vendor: HPE
BIOS Version: 1.30
BIOS Date: 03/01/2023
BIOS Revision: 1.30
Firmware Revision: 1.10

Compiler Version Notes

C | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)

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++ | 508.namd_r(base, peak) 510.parest_r(base, peak)

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

Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Compiler Version Notes (Continued)

C++, C, Fortran | 507.cactuBSSN_r(base, peak)
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Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
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

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
**SPEC CPU®2017 Floating Point Rate Result**

**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

ProLiant ML110 Gen11

(1.80 GHz, Intel Xeon Gold 6421N)

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Apr-2023</th>
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<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: May-2023</td>
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<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Dec-2022</td>
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</table>

**SPECrate®2017_fp_base = 325**

**SPECrate®2017_fp_peak = 337**

### 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  
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:**

```bash
-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:**

```bash
-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:**

```bash
-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:**

```bash
-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++:**

```bash
-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
```

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 ProLiant ML110 Gen11  
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SPECrate®2017_fp_base = 325  
SPECrate®2017_fp_peak = 337

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### Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
- 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

### Peak 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

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

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## Peak Optimization Flags (Continued)

<table>
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<tr>
<th>Benchmark</th>
<th>Optimization Flags</th>
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<tr>
<td>538.imagick_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>544.nab_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>-w -std=c++14 -m64 -W1,-z,muldefs -xsapphirerapids</td>
</tr>
<tr>
<td></td>
<td>-Ofast -ffast-math -flto -mfpmath=sse -funroll-loops</td>
</tr>
<tr>
<td></td>
<td>-qopt-mem-layout-trans=4 -mprefer-vector-width=512</td>
</tr>
<tr>
<td></td>
<td>-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib</td>
</tr>
<tr>
<td>503.bwaves_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>554.roms_r</td>
<td>-w -m64 -W1,-z,muldefs -xsapphirerapids -Ofast</td>
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<td>-ffast-math -flto -mfpmath=sse -funroll-loops</td>
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<td>-qopt-mem-layout-trans=4 -nostandard-realloc-lhs</td>
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<tr>
<td></td>
<td>-align array32byte -auto -ljemalloc</td>
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<td>-L/usr/local/jemalloc64-5.0.1/lib</td>
</tr>
<tr>
<td>521.wrf_r</td>
<td>-w -m64 -std=c11 -W1,-z,muldefs -xsapphirerapids</td>
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<td>-Ofast -ffast-math -flto -mfpmath=sse -funroll-loops</td>
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<td>-qopt-mem-layout-trans=4 -Wno-implicit-int</td>
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<td>-mprefer-vector-width=512 -nostandard-realloc-lhs</td>
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<td>-L/usr/local/jemalloc64-5.0.1/lib</td>
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<td>527.cam4_r</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>511.povray_r</td>
<td>-w -std=c++14 -m64 -std=c11 -W1,-z,muldefs</td>
</tr>
<tr>
<td></td>
<td>-fprofile-generate(pass 1)</td>
</tr>
<tr>
<td></td>
<td>-fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)</td>
</tr>
<tr>
<td></td>
<td>-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse</td>
</tr>
<tr>
<td></td>
<td>-funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int</td>
</tr>
<tr>
<td></td>
<td>-mprefer-vector-width=512 -ljemalloc</td>
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<td>-L/usr/local/jemalloc64-5.0.1/lib</td>
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SPEC CPU®2017 Floating Point Rate Result

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(Test Sponsor: HPE)
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SPECrate®2017_fp_peak = 337
SPECrate®2017_fp_base = 325

CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Peak Optimization Flags (Continued)

526.blender_r:basepeak = yes

Benchmarks using Fortran, C, and C++:
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsaphirerapids -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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-Intel-SPR-rev1.1.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/HPE-Platform-Flags-Intel-SPR-rev1.1.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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