## SPEC CPU®2017 Floating Point Rate Result

xFusion  
FusionServer 2488H V7 (Intel Xeon Gold 6434H)

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**CPU2017 License:** 6488  
**Test Sponsor:** xFusion  
**Tested by:** xFusion  
**Test Date:** Sep-2023  
**Hardware Availability:** Jul-2023  
**Software Availability:** Dec-2022

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### Hardware

- **CPU Name:** Intel Xeon Gold 6434H  
- **Max MHz:** 4100  
- **Nominal:** 3700  
- **Enabled:** 32 cores, 4 chips, 2 threads/core  
- **Orderable:** 1,2,4 chips  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 2 MB I+D on chip per core  
- **L3:** 22.5 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 1 TB (32 x 32 GB 2Rx8 PC5-4800B-R)  
- **Storage:** 1 x 960 GB SATA SSD  
- **Other:** None

### Software

- **OS:** Red Hat Enterprise Linux release 9.0 (Plow)  
  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:** Version 01.02.00.05 Released Jul-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
## Results 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"

**Environment Variables Notes**

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/Uniautos/cpu2017/lib/intel64:/home/Uniautos/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
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.

(Continued on next page)
General Notes (Continued)

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:
Performance Profile Set to Performance
SNC Set to Enable SNC2 (2-clusters)

Sysinfo program /home/Uniautos/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Tue Sep 12 01:58:43 2023

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 250 (250-6.el9_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. tuned-adm active
17. sysctl
18. /sys/kernel/mm/transparent_hugepage
19. /sys/kernel/mm/transparent_hugepage/khugepaged
20. OS release
21. Disk information
22. /sys/devices/virtual/dmi/id
23. dmidecode
24. BIOS

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 GNU/Linux

2. w
01:58:43 up 4:31, 0 users, load average: 20.21, 50.37, 58.64
USER TTY LOGIN@ IDLE JCPU PCPU WHAT

(Continued on next page)
Platform Notes (Continued)

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 (-i) 4125299
   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) 4125299
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited

5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 30
   /bin/sh ./run_rate.sh
   runcpu --define default-platform-flags --copies 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 --define default-platform-flags --copies 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/CPU2017.093/templogs/preenv.fprate.093.0.log --lognum 093.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/Uniautos/cpu2017

6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Gold 6434H
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 8
   microcode : 0x2b0001b0
   bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores : 8
   siblings : 16
   4 physical ids (chips)
   64 processors (hardware threads)
   physical id 0: core ids 0-7
   physical id 1: core ids 0-7
   physical id 2: core ids 0-7
   physical id 3: core ids 0-7
   physical id 0: apicids 0-15
   physical id 1: apicids 128-143
   physical id 2: apicids 256-271
   physical id 3: apicids 384-399

(Continued on next page)
Platform Notes (Continued)

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): 64
On-line CPU(s) list: 0-63
Vendor ID: GenuineIntel
BIOS Vendor ID: Intel(R) Corporation
Model name: Intel(R) Xeon(R) Gold 6434H
BIOS Model name: Intel(R) Xeon(R) Gold 6434H
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 8
Socket(s): 4
Stepping: 8
BogoMIPS: 7400.00
Flags:

Virtualization: VT-x
L1d cache: 1.5 MiB (32 instances)
L1i cache: 1 MiB (32 instances)
L2 cache: 64 MiB (32 instances)
L3 cache: 90 MiB (4 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0-3,32-35
NUMA node1 CPU(s): 4-7,36-39
NUMA node2 CPU(s): 8-11,40-43
NUMA node3 CPU(s): 12-15,44-47
NUMA node4 CPU(s): 16-19,48-51
NUMA node5 CPU(s): 20-23,52-55
NUMA node6 CPU(s): 24-27,56-59
NUMA node7 CPU(s): 28-31,60-63
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

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

**xFusion**

FusionServer 2488H V7 (Intel Xeon Gold 6434H)

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**CPU2017 License:** 6488  
**Test Sponsor:** xFusion  
**Tested by:** xFusion  
**Test Date:** Sep-2023  
**Hardware Availability:** Jul-2023  
**Software Availability:** Dec-2022

### Platform Notes (Continued)

- **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 Tsx async abort:** Not affected

**From lscpu --cache:**

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<tr>
<td>L2</td>
<td>2M</td>
<td>64M</td>
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<td>L3</td>
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<td>Unified</td>
<td>3</td>
<td>24576</td>
<td>1</td>
<td>64</td>
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</table>

8. numactl --hardware

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

<table>
<thead>
<tr>
<th>node</th>
<th>cpus</th>
<th>size</th>
<th>free</th>
<th>cpus</th>
<th>size</th>
<th>free</th>
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<tbody>
<tr>
<td>0</td>
<td>0-3,32-35</td>
<td>128218</td>
<td>128080</td>
<td>8-11,40-43</td>
<td>129022</td>
<td>129022</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>128218</td>
<td>128080</td>
<td>8-11,40-43</td>
<td>129022</td>
<td>129022</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>128363</td>
<td>128363</td>
<td>12-15,44-47</td>
<td>129022</td>
<td>129022</td>
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<tr>
<td>3</td>
<td>0</td>
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<td>129022</td>
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<tr>
<td>4</td>
<td>0</td>
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<td>12-15,44-47</td>
<td>129022</td>
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<td>129022</td>
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<tr>
<td>7</td>
<td>0</td>
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<td>128322</td>
<td>12-15,44-47</td>
<td>129022</td>
<td>129022</td>
</tr>
</tbody>
</table>

9. /proc/meminfo

| MemTotal: | 1056114640 kB |

10. who -r

| run-level 3 Sep 11 21:27 |

(Continued on next page)
Platform Notes (Continued)

11. Systemd service manager version: systemd 250 (250-6.e19_0)
   Default Target  Status
   multi-user     degraded

12. Failed units, from systemctl list-units --state=failed
   UNIT         LOAD   ACTIVE SUB    DESCRIPTION
   * sep5.service loaded failed systemd script to load sep5 driver at boot time

13. Services, from systemctl list-unit-files
   STATE            UNIT FILES
   enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
dbus-broker firewalld getty@ irqbalance mdmonitor microcode nis-domainname rhsmcertd
rsyslog selinux-autorelabel-mark sep5 sshd ssd systemd-network-generator tuned udisks2
enabled-runtime  systemd-remount-fs
   disabled        chrony-wait console-getty cpupower debug-shell kvm_stat man-db-restart-cache-update
ntables rdisc rsh rshm-facts rpmdb-rebuild serial-getty@ sshd-keygen@
systemd-boot-check-no-failures systemd-pstore systemd-sysext
   indirect        sssd-autofs sssd-kcm sssd-nss sssd-pac ssd-pam ssd-ssh ssd-sudo

14. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.e19_0.x86_64
    root=UUID=058bfdf1-c62b-4fad-8d41-5c40aa179007
    ro
    crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
    resume=UUID=b47f1685-a5fa-4d39-b2d7-e3f6e95ad499
    nohz_full=1-72

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

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

(Continued on next page)
Platform Notes (Continued)

```
18. /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

19. /sys/kernel/mm/transparent_hugepage/khugepaged
   alloc_sleepMillisecs 60000
   defrag 1
   max_ptes_none 511
   max_ptes_shared 256
   max_ptes_swap 64
   pagen_to_scan 4096
   scan_sleepMillisecs 10000

20. 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)

21. Disk information
    SPEC is set to: /home/Uniautos/cpu2017
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/sda5 xfs 820G 48G 772G 6% /home

22. /sys/devices/virtual/dmi/id
    Vendor: XFUSION
    Product: 2488H V7
    Product Family: EagleStream

23. 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 SMI BIOS" standard.
    Memory:
    32x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800

24. BIOS
    (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor: XFUSION
    BIOS Version: 01.02.00.05
    BIOS Date: 07/13/2023
```
# SPEC CPU®2017 Floating Point Rate Result

## xFusion

**FusionServer 2488H V7 (Intel Xeon Gold 6434H)**

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>575</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>577</td>
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<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>6488</th>
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<tbody>
<tr>
<td>Test Sponsor:</td>
<td>xFusion</td>
</tr>
<tr>
<td>Tested by:</td>
<td>xFusion</td>
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<tr>
<td>Test Date:</td>
<td>Sep-2023</td>
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<tr>
<td>Hardware Availability:</td>
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<td>Software Availability:</td>
<td>Dec-2022</td>
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## Compiler Version Notes

<table>
<thead>
<tr>
<th>C</th>
<th>519.libm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)</th>
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<tbody>
<tr>
<td>Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201</td>
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<tr>
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<tr>
<th>C++</th>
<th>508.namd_r(base, peak) 510.parest_r(base, peak)</th>
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<tr>
<th>C++, C</th>
<th>511.povray_r(base, peak) 526.blender_r(base, peak)</th>
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</table>

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<thead>
<tr>
<th>C++, C, Fortran</th>
<th>507.cactuBSSN_r(base, peak)</th>
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<tr>
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<table>
<thead>
<tr>
<th>Fortran</th>
<th>503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)</th>
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<tbody>
<tr>
<td>Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201</td>
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<table>
<thead>
<tr>
<th>Fortran, C</th>
<th>521.wrf_r(base, peak) 527.cam4_r(base, peak)</th>
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<tr>
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## Compiler Version Notes (Continued)

<table>
<thead>
<tr>
<th>C benchmarks: icx</th>
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(Continued on next page)
SPEC CPU®2017 Floating Point Rate Result

xFusion
FusionServer 2488H V7 (Intel Xeon Gold 6434H)

SPECrater®2017_fp_base = 575
SPECrater®2017_fp_peak = 577

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion
Test Date: Sep-2023
Hardware Availability: Jul-2023
Software Availability: Dec-2022

Base Compiler Invocation (Continued)

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
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
-fflto -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

(Continued on next page)
 Base Optimization Flags (Continued)

C++ benchmarks (continued):
-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

Peak Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

Fortran benchmarks:
ifx

Benchmarks using both Fortran and C:
ifx icx

(Continued on next page)
Peak Compiler Invocation (Continued)

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
538.imagick_r: basepeak = yes
544.nab_r: basepeak = yes

C++ benchmarks:
508.namd_r: basepeak = yes
510.parest_r: -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:
503.bwaves_r: basepeak = yes
549.fotonik3d_r: basepeak = yes
554.roms_r: -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

(Continued on next page)
Peak Optimization Flags (Continued)

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++:
511.povray_r: `-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs`
- `-fprofile-generate(pass 1)`
- `-fprofile-use=default.profdata(pass 2) -xCORE-AVX2(pass 1)`
- `-flto -Ofast -xCORE-AVX512 -ffast-math -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`

526.blender_r: `basepeak = yes`

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`

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/Intel-ic2023-official-linux64.xml