# SPEC CPU®2017 Floating Point Rate Result

## Cisco Systems

Cisco UCS C240 M7 (Intel Xeon Platinum 8458P, 2.70GHz)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
<th>9019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>Cisco Systems</td>
</tr>
<tr>
<td>Tested by:</td>
<td>Cisco Systems</td>
</tr>
<tr>
<td>Test Date:</td>
<td>Apr-2023</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Mar-2023</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Dec-2022</td>
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</tbody>
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### Copies

<table>
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<th>Test</th>
<th>Value</th>
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<tbody>
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<td>503.bwaves_r</td>
<td>176</td>
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<td>88</td>
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</tr>
<tr>
<td>554.roms_r</td>
<td>176</td>
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</tbody>
</table>

### SPECrate®2017_fp_base = 868

| SPECrate®2017_fp_peak = 902 |

### Hardware

- **CPU Name:** Intel Xeon Platinum 8458P 503.bwaves_r 176
- **Max MHz:** 3800
- **Nominal:** 2700
- **Enabled:** 88 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:** 82.5 MB I+D on chip per core
- **Other:** None
- **Memory:** 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
- **Storage:** 1 x 960 GB M.2 SSD SATA
- **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:** Version 4.3.1a released Feb-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 set to prefer performance at the cost of additional power usage
# SPEC CPU® 2017 Floating Point Rate Result

## Overview

**Cisco Systems**

Cisco UCS C240 M7 (Intel Xeon Platinum 8458P, 2.70GHz)

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### Benchmark Results

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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**Results Table**

**Peak (Base)**

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</tbody>
</table>

**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/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
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)
Cisco Systems
Cisco UCS C240 M7 (Intel Xeon Platinum 8458P, 2.70GHz)

SPECrate®2017_fp_base = 868
SPECrate®2017_fp_peak = 902

CPU2017 License: 9019
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Tested by: Cisco Systems

Test Date: Apr-2023
Hardware Availability: Mar-2023
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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 Settings:
Sub NUMA Clustering set to Enable SNC4
LLC Dead Line set to Disabled
ADDDC Sparing set to Disabled
Processor C6 Report set to Enabled
UPI Link Enablement 3
UPI Power Management Enabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on srv04 Mon Apr 10 09:13:36 2023

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

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1. uname -a
2. w
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 249 (249.11+suse.124.g2bc0b2c447)
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/hugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS

1. uname -a
Linux srv04 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222) x86_64 x86_64 GNU/Linux

2. w
09:13:36 up 6 min, 1 user, load average: 0.12, 1.10, 0.79

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Cisco UCS C240 M7 (Intel Xeon Platinum 8458P, 2.70GHz)

CPU2017 License: 9019
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Platform Notes (Continued)

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<th>USER</th>
<th>TTY</th>
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<th>LOGIN@</th>
<th>IDLE</th>
<th>JCPU</th>
<th>PCPU</th>
<th>WHAT</th>
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<tbody>
<tr>
<td>root</td>
<td>tty1</td>
<td>-</td>
<td>09:13</td>
<td>8.00s</td>
<td>1.28s</td>
<td>0.26s</td>
<td>-bash</td>
</tr>
</tbody>
</table>

3. Username
From environment variable $USER: root

4. ulimit -a
core file size (blocks, -c) unlimited
data seg size (kbytes, -d) unlimited
scheduling priority (pq) 0
file size (blocks, -f) unlimited
pending signals (soft) 4126760
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 (rq) 0
stack size (kbytes, -s) unlimited
cpu time (seconds, -t) unlimited
max user processes (r) 4126760
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
runpcu --nobuild --action validate --define default-platform-flags --define numcopies=176 -c
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define amt-on --define
cores=88 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune all -o all
fprate
runpcu --nobuild --action validate --define default-platform-flags --define numcopies=176 --configfile
ic2023.0-lin-sapphirerapids-rate-20221201.cfg --reportable --iterations 3 --define amt-on --define
cores=88 --define physicalfirst --define invoke_with_interleave --define drop_caches --tune all
--output_format all --nopower --tunemode rate --tune base:peak --size refrate fprate --nopreenv
--note-preevn --logfile $SPEC/tmp/CPU2017.224/templogs/preenv.fprate.224.0.log --lognum 224.0
--from_runucpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017

6. /proc/cpuinfo
model name : Intel(R) Xeon(R) Platinum 8458P
vendor_id : GenuineIntel
cpu family : 6
model : 143
stepping : 8
microcode : 0x2b000161
bugs : spectre_v1 spectre_v2 spec_store_bypass swappgs
cpu cores : 44
siblings : 88
2 physical ids (chips)
176 processors (hardware threads)
physical id 0: core ids 0-43
physical id 1: core ids 0-43

(Continued on next page)
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Platform Notes (Continued)

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): 176
On-Line CPU(s) list: 0-175
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8458P
CPU family: 6
Model: 143
Thread(s) per core: 2
Core(s) per socket: 44
Socket(s): 2
Stepping: 8
CPU max MHz: 3800.0000
CPU min MHz: 800.0000
BogoMIPS: 5400.00

Flags:

Virtualization: VT-x
L1d cache: 4.1 MiB (88 instances)
L1i cache: 2.8 MiB (88 instances)
L2 cache: 176 MiB (88 instances)
L3 cache: 165 MiB (2 instances)
NUMA node(s): 8
NUMA node0 CPU(s): 0-10, 88-98
NUMA node1 CPU(s): 11-21, 99-109
NUMA node2 CPU(s): 22-32, 110-120
NUMA node3 CPU(s): 33-43, 121-131
NUMA node4 CPU(s): 44-54, 132-142
NUMA node5 CPU(s): 55-65, 143-153
NUMA node6 CPU(s): 66-76, 154-164
NUMA node7 CPU(s): 77-87, 165-175
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf: Not affected

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Platform Notes (Continued)

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 sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

---
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
 available: 8 nodes (0-7)
 node 0 cpus: 0-10,88-98
 node 0 size: 128666 MB
 node 0 free: 127484 MB
 node 1 cpus: 11-21,99-109
 node 1 size: 128983 MB
 node 1 free: 128292 MB
 node 2 cpus: 22-32,110-120
 node 2 size: 129018 MB
 node 2 free: 128918 MB
 node 3 cpus: 33-43,121-131
 node 3 size: 129018 MB
 node 3 free: 128466 MB
 node 4 cpus: 44-54,132-142
 node 4 size: 129018 MB
 node 4 free: 128417 MB
 node 5 cpus: 55-65,143-153
 node 5 size: 129018 MB
 node 5 free: 128249 MB
 node 6 cpus: 66-76,154-164
 node 6 size: 129018 MB
 node 6 free: 128390 MB
 node 7 cpus: 77-87,165-175
 node 7 size: 128971 MB
 node 7 free: 128341 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 12

9. /proc/meminfo
MemTotal: 1056475204 kB

---
10. who -r

(Continued on next page)
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SPECrate®2017_fp_base = 868
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CPU2017 License: 9019
Test Sponsor: Cisco Systems
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Test Date: Apr-2023
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Software Availability: Dec-2022

vm.watermark_scale_factor  10
vm.zone_reclaim_mode  0

16. /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

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

18. OS release
   From /etc/*-release /etc/*-version
   os-release SUSE Linux Enterprise Server 15 SP4

19. Disk information
   SPEC is set to: /home/cpu2017
   Filesystem     Type  Size  Used Avail Use% Mounted on
   /dev/sdb3      xfs   218G   12G  206G   6% /

20. /sys/devices/virtual/dmi/id
   Vendor:        Cisco Systems Inc
   Product:       UCS-C240-M7SX
   Serial:        WSP263592NZ

21. 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:
   16x 0xAD00 HMCG94MEBRA109N 64 GB 2 rank 4800

22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:   Cisco Systems, Inc.
   BIOS Version:  C240M7.4.3.1a.0.0201231701
   BIOS Date:     02/01/2023
   BIOS Revision: 5.29

Compiler Version Notes
============================================================================================================
C                  | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
(Continued on next page)
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Compiler Version Notes (Continued)

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, Fortran
| 507.cactuBSSN_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.
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.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.

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

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

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
-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

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Base Optimization Flags (Continued)

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

Benchmarks using both C and C++:
icpx icx

Benchmarks using Fortran, C, and C++:
icpx icx ifx
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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
       -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

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)

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**SPECrate®2017_fp_base = 868**
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</table>

**Test Date:** Apr-2023  
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### Peak Optimization Flags (Continued)

511.povray_r (continued):
- 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
- flto -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)

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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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