Supermicro
SuperServer SYS-211E-FRDN2T
(X13SEM-TF, Intel Xeon Platinum 8490H)

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

SPECrater®2017_fp_base = 484
SPECrater®2017_fp_peak = 486

Test Date: Feb-2023
Hardware Availability: Jan-2023
Software Availability: Dec-2022

Hardware
CPU Name: Intel Xeon Platinum 8490H
Max MHz: 3500
Nominal: 1900
Enabled: 60 cores, 1 chip
Orderable: 1 chip
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 2 MB I+D on chip per core
L3: 112.5 MB I+D on chip per chip
Other: None
Memory: 512 GB
(8 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 1 x 600 GB SATA III SSD
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 1.1 released Jan-2023
File System: btrfs
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.
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SPEC CPU®2017 Floating Point Rate Result
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SPECrate®2017_fp_base = 484
SPECrate®2017_fp_peak = 486

Results Table

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</tbody>
</table>

SPECrate®2017_fp_base = 484
SPECrate®2017_fp_peak = 486

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"

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = 
"/root/cpu2017-1.1.9-2/lib/intel64:/root/cpu2017-1.1.9-2/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

(Continued on next page)
General Notes (Continued)

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>

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.
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.
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) 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 Settings:
Power Technology = Custom
Power Performance Tuning = BIOS Controls EPB
ENERGY_PERF_BIAS_CFG mode = Maximum Performance
SNC = Enable SNC4 (4-Clusters)
KTI Prefetch = Enable
LLC Dead Line Alloc = Disable
Hyper-Threading [ALL] = Disable

Sysinfo program /root/cpu2017-1.1.9-2/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on 139-164 Mon Feb 6 03:32:12 2023

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

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3. Username
4. ulimit -a
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7. lscpu
8. numactl --hardware
9. /proc/meminfo
10. who -r

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SPEC CPU®2017 Floating Point Rate Result
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CPU2017 License: 001176
Test Sponsor: Supermicro
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Platform Notes (Continued)

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/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
dmidecode
22. BIOS

1. uname -a
Linux 139-164 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
x86_64 x86_64 x86_64 GNU/Linux

2. w
03:32:12 up 1 min, 1 user, load average: 0.21, 0.11, 0.04
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 03:31 4.00s 1.08s 0.01s -bash

3. Username
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 (-i) 2062517
   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) 2062517
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited

(Continued on next page)
Platform Notes (Continued)

5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
bash
bash
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=60 -c ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define cores=60 --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=60 --configfile ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define cores=60 --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/CPU2017.005/templogs/preenv.fprate.005.0.log --lognum 005.0 --from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /root/cpu2017-1.1.9-2

6. /proc/cpuinfo
model name : Intel(R) Xeon(R) Platinum 8490H
vendor_id : GenuineIntel
cpu family : 6
model : 143
stepping : 6
microcode : 0x2b000161
bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores : 60
siblings : 60
1 physical ids (chips)
60 processors (hardware threads)
physical id 0: core ids 0-59
physical id 0: apicids
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110,112,114,116,118
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 2.37.2:
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): 60

(Continued on next page)
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SPECrate®2017_fp_base = 484
SPECrate®2017_fp_peak = 486

Platform Notes (Continued)

On-line CPU(s) list: 0-59
Vendor ID: GenuineIntel
Model name: Intel(R) Xeon(R) Platinum 8490H
CPU family: 6
Model: 143
Thread(s) per core: 1
Core(s) per socket: 60
Socket(s): 1
Stepping: 6
BogoMIPS: 3800.00

Virtualization: VT-x
L1d cache: 2.8 MiB (60 instances)
L1i cache: 1.9 MiB (60 instances)
L2 cache: 120 MiB (60 instances)
L3 cache: 112.5 MiB (1 instance)
NUMA node(s): 4
NUMA node0 CPU(s): 0-14
NUMA node1 CPU(s): 15-29
NUMA node2 CPU(s): 30-44
NUMA node3 CPU(s): 45-59
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 and seccomp
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBP conditional, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

(Continued on next page)
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CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

SPECrate®2017_fp_base = 484
SPECrate®2017_fp_peak = 486

Platform Notes (Continued)

From lscpu --cache:

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<td>120M</td>
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<td>112.5M</td>
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<td>15</td>
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<td>122880</td>
<td>1</td>
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8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0-14
node 0 size: 128622 MB
node 0 free: 127909 MB
node 1 cpus: 15-29
node 1 size: 129020 MB
node 1 free: 128447 MB
node 2 cpus: 30-44
node 2 size: 129020 MB
node 2 free: 128703 MB
node 3 cpus: 45-59
node 3 size: 128991 MB
node 3 free: 128704 MB
node distances:
node 0 1 2 3
0: 10 12 12 12
1: 12 10 12 12
2: 12 12 10 12
3: 12 12 12 10

9. /proc/meminfo
MemTotal: 528029328 kB

10. who -r
run-level 3 Feb 6 03:31

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled YaST2-Firstboot YaST2-Second-Stage auditd cron display-manager getty@ haveged irqbalance

(Continued on next page)
Platform Notes (Continued)

13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=2d678d2d-7c7c-4447-9a76-01d4d4bc98fa
   splash=silent
   mitigations=auto
   quiet
   security=apparmor

14. cpupower frequency-info
    analyzing CPU 0:
    Unable to determine current policy
    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.extrfrag_threshold             500
    vm.min_unmapped_ratio              1
    vm.nr_hugepages                   0
    vm.nr_hugepages_mempolicy         0
    vm.nr_overcommit_hugepages        0

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Platform Notes (Continued)

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<tr>
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<th>Value</th>
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<td>vm.watermark_boost_factor</td>
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<tr>
<td>vm.watermark_scale_factor</td>
<td>10</td>
</tr>
<tr>
<td>vm.zone_reclaim_mode</td>
<td>0</td>
</tr>
</tbody>
</table>

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: /root/cpu2017-1.1.9-2
   Filesystem     Type   Size  Used Avail Use% Mounted on
   /dev/sda2      btrfs  559G  418G  141G  75% /root

20. /sys/devices/virtual/dmi/id
    Vendor: Supermicro
    Product: Super Server
    Product Family: Family
    Serial: 0123456789

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:

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

8x Micron Technology MTC40F2046S1RC48BA1 64 GB 2 rank 4800

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### 22. BIOS
(This section combines info from /sys/devices and dmidecode.)

<table>
<thead>
<tr>
<th>BIOS Vendor:</th>
<th>American Megatrends International, LLC.</th>
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</tr>
<tr>
<td>BIOS Date:</td>
<td>01/20/2023</td>
</tr>
<tr>
<td>BIOS Revision:</td>
<td>5.29</td>
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## 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. |

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| 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 |
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| 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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| 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 |

(Continued on next page)
## Compiler Version Notes (Continued)

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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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Intel (R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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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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### 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

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

**Supermicro**
SuperServer SYS-211E-FRDN2T (X13SEM-TF, Intel Xeon Platinum 8490H)

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<td>Feb-2023</td>
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<td>Dec-2022</td>
</tr>
</tbody>
</table>

**SPECrate®2017_fp_base = 484**

**SPECrate®2017_fp_peak = 486**

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**Base Compiler Invocation (Continued)**

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=cpp14 -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

(Continued on next page)
Supermicro
SuperServer SYS-211E-FRDN2T
(X13SEM-TF, Intel Xeon Platinum 8490H)

SPECrate®2017_fp_base = 484
SPECrate®2017_fp_peak = 486

CPU2017 License: 001176
Test Sponsor: Supermicro
Tested by: Supermicro

Test Date: Feb-2023
Hardware Availability: Jan-2023
Software Availability: Dec-2022

**Base Optimization Flags (Continued)**

Benchmarks using both Fortran and C (continued):
-`-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`

**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

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
-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
Supermicro
SuperServer SYS-211E-FRDN2T
(X13SEM-TF, Intel Xeon Platinum 8490H)

SPECrate®2017_fp_base = 484
SPECrate®2017_fp_peak = 486

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 -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
http://www.spec.org/cpu2017/flags/Supermicro-Platform-Settings-V1.2-SPR-revC.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 2023-02-06 06:32:11-0500.
Report generated on 2023-03-15 10:17:24 by CPU2017 PDF formatter v6442.
Originally published on 2023-03-14.