### SPEC CPU®2017 Floating Point Rate Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL345 Gen11  
(4.05 GHz, AMD EPYC 9274F)  

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>392</td>
<td>397</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Software Availability:** Dec-2022  
**Hardware Availability:** Jan-2023  
**Test Date:** Jan-2023  
**Hardware Availability:** Nov-2022  
**Test Date:** Jan-2023  
**Test Sponsor:** HPE  
**Hardware Availability:** Dec-2022  
**Tested by:** HPE  
**Software Availability:** Nov-2022

<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>SPECrate®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>392</td>
<td>397</td>
</tr>
</tbody>
</table>

**CPU Name:** AMD EPYC 9274F  
**Max MHz:** 4300  
**Nominal:** 4050  
**Enabled:** 24 cores, 1 chip, 2 threads/core  
**Orderable:** 1 chip  
**Cache L1:** 32 KB I + 32 KB D on chip per core  
**L2:** 1 MB I+D on chip per core  
**L3:** 256 MB I+D on chip per chip, 32 MB shared / 3 cores  
**Other:** None

**Memory:** 384 GB (12 x 32 GB 2Rx8 PC5-4800B-R)  
**Storage:** 1 x 1.6 TB NVMe SSD, RAID 0  
**Other:** None

**OS:** Red Hat Enterprise Linux 9.0 (Plow)  
**Kernel:** 5.14.0-70.13.1.el9_0.x86_64  
**Compiler:** C/C++/Fortran: Version 4.0.0 of AOCC  
**Parallel:** No  
**Firmware:** HPE BIOS Version v1.12 11/24/2022 released Nov-2022  
**File System:** xfs  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 64-bit  
**Peak Pointers:** 64-bit  
**Other:** None  
**Power Management:** BIOS and OS set to prefer performance at the cost of additional power usage
## Results Table

<table>
<thead>
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<td>351</td>
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</tr>
</tbody>
</table>

**SPECrate®2017_fp_base** = 392
**SPECrate®2017_fp_peak** = 397

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Compiler Notes

The AMD64 AOCC Compiler Suite is available at http://developer.amd.com/amd-aocc/

## Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.

## Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>

To limit dirty cache to 8% of memory, 'sysctl -w vm.dirty_ratio=8' run as root.
To limit swap usage to minimum necessary, 'sysctl -w vm.swappiness=1' run as root.
To free node-local memory and avoid remote memory usage, 'sysctl -w vm.zone_reclaim_mode=1' run as root.

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Operating System Notes (Continued)

To clear filesystem caches, 'sync; sysctl -w vm.drop_caches=3' run as root.
To disable address space layout randomization (ASLR) to reduce run-to-run
variability, 'sysctl -w kernel.randomize_va_space=0' run as root.

To enable Transparent Hugepages (THP) for all allocations,
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH =
    "'/home/CPU2017/amd_rate_acc400_genoa_B_lib/lib:/home/CPU2017/amd_rate_a
occ400_genoa_B_lib/lib32:""
MALLOC_CONF = "retain:true"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 9174F CPU + 1.5TiB Memory using RHEL 8.6

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.

Platform Notes

BIOS Configuration
Workload Profile set to General Throughput Compute
Determinism Control set to Manual
Performance Determinism set to Power Deterministic
Last-Level Cache (LLC) as NUMA Node set to Enabled
NUMA memory domains per socket set to Four memory domains per socket
ACPI CST C2 Latency set to 18 microseconds
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
Power Regulator set to OS Control Mode

The system ROM used for this result contains microcode version 0xA010110e for the
AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this
 SPEC CPU®2017 Floating Point Rate Result

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ProLiant DL345 Gen11
(4.05 GHz, AMD EPYC 9274F)

SPECrate®2017_fp_base = 392
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

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

Platform Notes (Continued)

ROM is version GenoaPI 1.0.0.1-L6

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b5589ef0e16aca6c64d
running on localhost.localdomain Thu Apr 7 05:34:36 2022

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see
https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo
model name: AMD EPYC 9274F 24-Core Processor
 1 "physical id"s (chips)
 48 "processors"
cores, siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores: 24
siblings: 48
physical 0: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30

From lscpu from util-linux 2.37.4:
Architecture: x86_64
CPU op-mode(s): 32-bit, 64-bit
Address sizes: 52 bits physical, 57 bits virtual
Byte Order: Little Endian
CPU(s): 48
On-line CPU(s) list: 0-47
Vendor ID: AuthenticAMD
BIOS Vendor ID: Advanced Micro Devices, Inc.
Model name: AMD EPYC 9274F 24-Core Processor
BIOS Model name: AMD EPYC 9274F 24-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 2
Core(s) per socket: 24
Socket(s): 1
Stepping: 1
Frequency boost: enabled
CPU max MHz: 4303.1250
CPU min MHz: 1500.0000
BogoMIPS: 8088.23
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
        pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
        pdelpgb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
        aperfmpref rpl pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe
        popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
        misalignsse 3dnowprefetch osvw ibr skinit wdt tce topoext perfctr_core perfctr_nb

(Continued on next page)
Hewlett Packard Enterprise
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ProLiant DL345 Gen11
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SPEC CPU®2017 Floating Point Rate Result

SPECrate®2017_fp_base = 392
SPECrate®2017_fp_peak = 397

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

Total Time: 481.046 seconds
Test Date: Jan-2023
Hardware Availability: Dec-2022
Software Availability: Nov-2022

Virtualization: AMD-V
L1d cache: 768 KiB (24 instances)
L1i cache: 768 KiB (24 instances)
L2 cache: 24 MiB (24 instances)
L3 cache: 256 MiB (8 instances)

NUMA node(s): 8
NUMA node0 CPU(s): 0-2, 24-26
NUMA node1 CPU(s): 12-14, 36-38
NUMA node2 CPU(s): 6-8, 30-32
NUMA node3 CPU(s): 18-20, 42-44
NUMA node4 CPU(s): 9-11, 33-35
NUMA node5 CPU(s): 21-23, 45-47
NUMA node6 CPU(s): 3-5, 27-29
NUMA node7 CPU(s): 15-17, 39-41

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; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 32K 768K 8 Data 1 64 1 64
L1i 32K 768K 8 Instruction 1 64 1 64
L2 1M 24M 8 Unified 2 2048 1 64
L3 32M 256M 16 Unified 3 32768 1 64

From numactl --hardware

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; Retpolines, IBFB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 32K 768K 8 Data 1 64 1 64
L1i 32K 768K 8 Instruction 1 64 1 64
L2 1M 24M 8 Unified 2 2048 1 64
L3 32M 256M 16 Unified 3 32768 1 64

/proc/cpuinfo cache data
 cache size : 1024 KB

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

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

available: 8 nodes (0-7)

- node 0 cpus: 0 1 2 24 25 26
- node 0 size: 48136 MB
- node 0 free: 47886 MB
- node 1 cpus: 12 13 14 36 37 38
- node 1 size: 48382 MB
- node 1 free: 48152 MB
- node 2 cpus: 6 7 8 30 31 32
- node 2 size: 48382 MB
- node 2 free: 48130 MB
- node 3 cpus: 18 19 20 42 43 44
- node 3 size: 48382 MB
- node 3 free: 48098 MB
- node 4 cpus: 9 10 11 33 34 35
- node 4 size: 48346 MB
- node 4 free: 48175 MB
- node 5 cpus: 21 22 23 45 46 47
- node 5 size: 48382 MB
- node 5 free: 48223 MB
- node 6 cpus: 3 4 5 27 28 29
- node 6 size: 48382 MB
- node 6 free: 48209 MB
- node 7 cpus: 15 16 17 39 40 41
- node 7 size: 48334 MB
- node 7 free: 48137 MB

node distances:

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<tr>
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<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
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<td>10</td>
</tr>
</tbody>
</table>

From /proc/meminfo

```
MemTotal: 396010920 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
```

From /sys/devices/system/cpu/cpu*/cputfreq/scaling_governor has performance.

From /etc/*release*/etc/*version*

```bash
os-release:
```

(Continued on next page)
Platform Notes (Continued)

NAME="Red Hat Enterprise Linux"
VERSION="9.0 (Plow)"
ID="rhel"
ID_LIKE="fedora"
VERSION_ID="9.0"
PLATFORM_ID="platform:el9"
PRETTY_NAME="Red Hat Enterprise Linux 9.0 (Plow)"
ANSI_COLOR="0;31"
redhat-release: Red Hat Enterprise Linux release 9.0 (Plow)
system-release: Red Hat Enterprise Linux release 9.0 (Plow)
system-release-cpe: cpe:/o:redhat:enterprise_linux:9::baseos

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

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit): Not affected
CVE-2018-3620 (L1 Terminal Fault): Not affected
Microarchitectural Data Sampling: Not affected
CVE-2017-5754 (Meltdown): Not affected
CVE-2018-3639 (Speculative Store Bypass): Mitigation: Speculative Store Bypass disabled via prctl
CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swaps barriers and __user pointer
CVE-2017-5715 (Spectre variant 2): Mitigation: Retpolines, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 3 Apr 7 05:30

SPEC is set to: /home/CPU2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/rhel-home xfs 819G 23G 796G 3% /home

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL345 Gen11
Product Family: ProLiant
Serial: DL345G11-004

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

(Continued on next page)
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ProLiant DL345 Gen11  
(4.05 GHz, AMD EPYC 9274F)

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

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

**SPECrate®2017_fp_base** = 392  
**SPECrate®2017_fp_peak** = 397

Platform Notes (Continued)

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:  
12x Hynix HMCG88MEBRA113N 32 GB 2 rank 4800

BIOS:  
| BIOS Vendor:    | HPE |  
| BIOS Version:  | 1.12 |  
| BIOS Date:  | 11/24/2022 |  
| BIOS Revision: | 1.12 |  
| Firmware Revision: | 1.10 |

(END of data from sysinfo program)

Compiler Version Notes

| C               | 519.lbm_r(base, peak) 538.imagick_r(base, peak)  
<table>
<thead>
<tr>
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<tr>
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<td>544.nab_r(base, peak)</td>
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</table>

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

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

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

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

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

(Continued on next page)
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(Test Sponsor: HPE)
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(4.05 GHz, AMD EPYC 9274F)

SPECrate®2017_fp_base = 392
SPECrate®2017_fp_peak = 397

Compiler Version Notes (Continued)

LLVM Mirror.Version.14.0.6
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

C++, C, Fortran | 507.cactuBSSN_r(base, peak)

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin
AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

Fortran         | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak)
| 554.roms_r(base, peak)

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

Fortran, C      | 521.wrf_r(base, peak) 527.cam4_r(base, peak)

AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on LLVM Mirror.Version.14.0.6)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL345 Gen11  
(4.05 GHz, AMD EPYC 9274F)  

SPECrater®2017_fp_base = 392  
SPECrater®2017_fp_peak = 397

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

Compiler Version Notes (Continued)

Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc/aocc-compiler-rel-4.0-3206-389/bin

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Base Compiler Invocation

C benchmarks:  
clang

C++ benchmarks:  
clang++

Fortran benchmarks:  
flang

Benchmarks using both Fortran and C:  
flang clang

Benchmarks using both C and C++:  
clang++ clang

Benchmarks using Fortran, C, and C++:  
clang++ clang flang

---

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_CASE_FLAG -Mbyteswapio -DSPEC_LP64
526.blender_r: -funsigned-char -DSPEC_LP64
527.cam4_r: -DSPEC_CASE_FLAG -DSPEC_LP64
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64
Hewlett Packard Enterprise
(Tes:**t Sponsor: HPE)
ProLiant DL345 Gen11
(4.05 GHz, AMD EPYC 9274F)

<table>
<thead>
<tr>
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**CPU2017 License:** 3
**Test Sponsor:** HPE
**Test Date:** Jan-2023
**Tested by:** HPE

**Hardware Availability:** Dec-2022
**Software Availability:** Nov-2022

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### Base Optimization Flags

**C benchmarks:**
- `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3`
- `-Wl,-mllvm -Wl,-ldist-scalar-expand -fenable-aggressive-gather -O3`
- `-march=znver4 -fveclib=AMDLIBM -ffast-math -fstruct-layout=7`
- `-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000`
- `-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3`
- `-zopt -lamdlibm -lamdalloc -1flang`

**C++ benchmarks:**
- `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3`
- `-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4`
- `-fveclib=AMDLIBM -ffast-math -mllvm -unroll-threshold=100`
- `-finline-aggressive -mllvm -loop-unswitch-threshold=200000`
- `-mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc -1flang`

**Fortran benchmarks:**
- `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3`
- `-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4`
- `-fveclib=AMDLIBM -ffast-math -Kieee -Mrecursive -funroll-loops`
- `-mllvm -lsr-in-nested-loop -mllvm -reduce-array-computations=3`
- `-fepilog-vectorization-of-inductions -zopt -lamdlibm -lamdalloc -1flang`

**Benchmarks using both Fortran and C:**
- `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3`
- `-Wl,-mllvm -Wl,-enable-X86-prefetching -O3 -march=znver4`
- `-fveclib=AMDLIBM -ffast-math -fstruct-layout=7`
- `-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000`
- `-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3`

**Benchmarks using both C and C++:**
- `-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6`
- `-Wl,-mllvm -Wl,-reduce-array-computations=3`
- `-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4`
- `-fveclib=AMDLIBM -ffast-math -fstruct-layout=7`
- `-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000`
- `-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3`
- `-zopt -mllvm -unroll-threshold=100 -finline-aggressive`
- `-mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -1flang`

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(4.05 GHz, AMD EPYC 9274F)

SPECrate®2017_fp_base = 392
SPECrate®2017_fp_peak = 397

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

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++:
-m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zoet -mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -Kieee -Mrecursive
-funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdaloc -lflang

Base Other Flags

C benchmarks:
-Wno-unused-command-line-argument

C++ benchmarks:
-Wno-unused-command-line-argument

Fortran benchmarks:
-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:
-Wno-unused-command-line-argument

Benchmarks using both C and C++:
-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:
-Wno-unused-command-line-argument

Peak Compiler Invocation

C benchmarks:
clang

C++ benchmarks:
clang++

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

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

Benchmarks using both C and C++:
clang++ clang

Benchmarks using Fortran, C, and C++:
clang++ clang flang

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

519.lbm_r: basepeak = yes

538.imagick_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6 -Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdllibm
-lamdalloc

544.nab_r: -m64 -flto -Wl,-mllvm -Wl,-ldist-scalar-expand
-fenable-aggressive-gather -Ofast -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -lamdllibm
-lamdalloc

C++ benchmarks:

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

508.namd_r: basepeak = yes

510.parest_r: -m64 -flto -Wl,-mllvm -Wl,-suppress-fmas
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-finline-aggressive -mllvm -unroll-threshold=100
-mllvm -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc

Fortran benchmarks:

503.bwaves_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mllvm -reduce-array-computations=3
-fepilog-vectorization-of- inductions -zopt -lamdlibm
-lamdalloc -lflang

549.fotonik3d_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Kieee
-Mrecursive -mllvm -reduce-array-computations=3
-fepilog-vectorization-of- inductions -fvector-transform
-fscalar-transform -lamdlibm -lamdalloc -lflang

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mllvm -inline-threshold=1000
-mllvm -reduce-array-computations=3 -zopt -Mrecursive
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

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

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Hewlett Packard Enterprise (Test Sponsor: HPE)
ProLiant DL345 Gen11 (4.05 GHz, AMD EPYC 9274F)

SPECrate®2017_fp_base = 392
SPECrate®2017_fp_peak = 397

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

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

Peak Optimization Flags (Continued)

511.povray_r: -m64 -flto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -reduce-array-computations=3 -zopt
-mllvm -unroll-threshold=100 -finline-aggressive
-mllvm -loop-unswitch-threshold=200000 -lamdlibm
-lamdaloc

526.blender_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

507.cactuBSSN_r: basepeak = yes

Peak Other Flags

C benchmarks:
-Wno-unused-command-line-argument

C++ benchmarks:
-Wno-unused-command-line-argument

Fortran benchmarks:
-Wno-unused-command-line-argument

Benchmarks using both Fortran and C:
-Wno-unused-command-line-argument

Benchmarks using both C and C++:
-Wno-unused-command-line-argument

Benchmarks using Fortran, C, and C++:
-Wno-unused-command-line-argument

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.html
http://www.spec.org/cpu2017/flags/aocc400-flags.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-Genoa-rev2.1.xml
http://www.spec.org/cpu2017/flags/aocc400-flags.xml
## SPEC CPU®2017 Floating Point Rate Result

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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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