## SPEC CPU® 2017 Floating Point Rate Result

### Hewlett Packard Enterprise

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

### Hardware

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Jan-2023</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test Sponsor:</td>
<td>HPE</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Dec-2022</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2022</td>
</tr>
<tr>
<td>CPU Name:</td>
<td>AMD EPYC 9374F</td>
</tr>
<tr>
<td>Max MHz:</td>
<td>4300</td>
</tr>
<tr>
<td>Nominal:</td>
<td>3850</td>
</tr>
<tr>
<td>Enabled:</td>
<td>32 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core, 32 MB shared / 4 cores</td>
</tr>
<tr>
<td>Cache L2:</td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td>Cache L3:</td>
<td>256 MB I+D on chip per chip, 32 MB shared / 4 cores</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>384 GB (12 x 32 GB 2Rx8 PC5-4800B-R)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 1.6 TB NVMe SSD, RAID 0</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
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</table>

### Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>Red Hat Enterprise Linux 9.0 (Plow)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kernel:</td>
<td>5.14.0-70.13.1.el9_0.x86_64</td>
</tr>
<tr>
<td>Compiler:</td>
<td>C/C++/Fortran: Version 4.0.0 of AOCC</td>
</tr>
<tr>
<td>Parallel:</td>
<td>No</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version v1.12 11/24/2022 released</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Other:</td>
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<tr>
<td>Power Management:</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

### SPECrate® 2017 fp_base = 473  
### SPECrate® 2017 fp_peak = 476

<table>
<thead>
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<th>SPECrate® 2017 fp_base</th>
<th>SPECrate® 2017 fp_peak</th>
</tr>
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<tr>
<td>503.bwaves_r</td>
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<td>862</td>
</tr>
<tr>
<td>507.cactuBSSN_r</td>
<td>64</td>
<td>586</td>
</tr>
<tr>
<td>508.namd_r</td>
<td>64</td>
<td>309</td>
</tr>
<tr>
<td>510.parest_r</td>
<td>64</td>
<td>489</td>
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<tr>
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<td>519.lbm_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>442</td>
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<tr>
<td>538.imagick_r</td>
<td>64</td>
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<tr>
<td>544.nab_r</td>
<td>64</td>
<td>665</td>
</tr>
<tr>
<td>549.fotonik3d_r</td>
<td>64</td>
<td>284</td>
</tr>
<tr>
<td>554.roms_r</td>
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<td>231</td>
</tr>
</tbody>
</table>

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**Copies**  
**SPECrate® 2017 fp_base** (473)  
**SPECrate® 2017 fp_peak** (476)
SPEC CPU® 2017 Floating Point Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.85 GHz, AMD EPYC 9374F)

SPECrate® 2017_fp_base = 473
SPECrate® 2017_fp_peak = 476

Copyright 2017-2023 Standard Performance Evaluation Corporation

Test Date: Jan-2023
Hardware Availability: Dec-2022
Software Availability: Nov-2022
Hewlett Packard Enterprise
ProLiant DL345 Gen11
(3.85 GHz, AMD EPYC 9374F)

Results Table

<table>
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<td>343</td>
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<tr>
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<td>237</td>
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<td>285</td>
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<td>526.blender_r</td>
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<td>527.cam4_r</td>
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<tr>
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</tr>
<tr>
<td>549.fotonik3d_r</td>
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<td>285</td>
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<td>554.roms_r</td>
<td>64</td>
<td>440</td>
<td>231</td>
<td>441</td>
<td>231</td>
<td>440</td>
<td>231</td>
</tr>
</tbody>
</table>

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.

(Continued on next page)
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/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_aocc400_genoa_B_lib/lib:/home/CPU2017/amd_rate_aocc400_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 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 0x0A10110e for the
AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this
Hewlett Packard Enterprise

ProLiant DL345 Gen11

(3.85 GHz, AMD EPYC 9374F)

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

SPECrate®2017_fp_base = 473
SPECrate®2017_fp_peak = 476

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 982a61ec0915b55891ef0e16acaf64d
running on localhost.localdomain Thu Apr 7 12:11:38 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 9374F 32-Core Processor
  1 "physical id"s (chips)
  64 "processors"

core(s), siblings (Caution: counting these is hw and system dependent. The following
excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
cpu cores : 32
siblings : 64
physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31
```

```
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): 64
On-line CPU(s) list: 0-63
Vendor ID: AuthenticAMD
BIOS Vendor ID: Advanced Micro Devices, Inc.
Model name: AMD EPYC 9374F 32-Core Processor
BIOS Model name: AMD EPYC 9374F 32-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 2
Core(s) per socket: 32
Socket(s): 1
Stepping: 1
Frequency boost: enabled
CPU max MHz: 4304.9312
CPU min MHz: 1500.0000
BogoMIPS: 7688.19
Flags: fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
pgs mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
pdelpgb rdtsscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
aperfmpref rapl 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
```

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

misalignsse 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmcall1 fsqshasbase bm1 avx2 smep bmi2 emms invpcid cgq rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xgetbv1 xsave avx512 llc cqm_occup_llc cgq_mbb_total cgq_mbb_local avx512 bfi6 clzero irperf xsaveerprtr rdpru wbnoinvd amd_ppin arat npt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist sgsfilter pthreshold avic v_vmsave_vmlod vgif v spec ctrl avx512vbmi umip pku ospe avx512 vbmi2 gfni vaes vpcm1muldq avx512 vnii avx512 bitalg avx512_vpopcntdq lal7 rdpid overflow_recover succor smca fslm flush lld

**Virtualization:**

- AMD-V

**L1d cache:**

- 1 MiB (32 instances)

**L1i cache:**

- 1 MiB (32 instances)

**L2 cache:**

- 32 MiB (32 instances)

**L3 cache:**

- 256 MiB (8 instances)

**NUMA node(s):**

- 8

**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 Txw 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>32K</td>
<td>1M</td>
<td>8</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>1M</td>
<td>32M</td>
<td>8</td>
<td>Unified</td>
<td>2</td>
<td>2048</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>L3</td>
<td>32M</td>
<td>256M</td>
<td>16</td>
<td>Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

/cache size : 1024 KB
**Platform Notes (Continued)**

From `numactl --hardware`

```
WARNING: a numactl 'node' might or might not correspond to a physical chip.
available: 8 nodes (0-7)
node 0 cpus:  0  1  2  3  32  33  34  35
node 0 size:   48382 MB
node 0 free:    47858 MB
node 1 cpus: 16 17 18 19 48 49 50 51
node 1 size:   48382 MB
node 1 free:    48079 MB
node 2 cpus:  8  9 10 11 40 41 42 43
node 2 size:   48382 MB
node 2 free:    48049 MB
node 3 cpus: 24 25 26 27 56 57 58 59
node 3 size:   48345 MB
node 3 free:    48067 MB
node 4 cpus: 12 13 14 15 44 45 46 47
node 4 size:   48382 MB
node 4 free:    48093 MB
node 5 cpus: 28 29 30 31 60 61 62 63
node 5 size:   48382 MB
node 5 free:    48033 MB
node 6 cpus:  4  5  6  7 36 37 38 39
node 6 size:   48382 MB
node 6 free:    48026 MB
node 7 cpus: 20 21 22 23 56 57 58 59
node 7 size:   48333 MB
node 7 free:    47903 MB

node distances:
```

```
0:  10  11  12  12  12  12  12  12
1:  11  10  12  12  12  12  12  12
2:  12  12  10  11  12  12  12  12
3:  12  12  11  10  12  12  12  12
4:  12  12  12  12  10  11  12  12
5:  12  12  12  12  11  10  12  12
6:  12  12  12  12  12  12  12  11
7:  12  12  12  12  12  12  12  11
```

From `/proc/meminfo`

```
MemTotal:       396007520 kB
HugePages_Total:       0
Hugepagesize:       2048 kB
```

```
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance
```

From `/etc/*release* /etc/*version* (Continued on next page)
**SPEC CPU®2017 Floating Point Rate Result**

**Test Sponsor:** HPE  
**Hardware Availability:** Dec-2022  
**Software Availability:** Nov-2022

**SPECrate®2017_fp_base = 473**  
**SPECrate®2017_fp_peak = 476**

---

**Platform Notes (Continued)**

```plaintext
os-release:
  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  
  Mitigation: usercopy/swapgs barriers and __user pointer sanitization

- **CVE-2017-5753 (Specitre variant 1):** Mitigation: Retpolines, IBPB: conditional, IBRS_PW, STIBP: always-on, RSB filling
- **CVE-2017-5715 (Specitate variant 2):** Not affected
- **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

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.85 GHz, AMD EPYC 9374F)

SPECrate®2017_fp_base = 473
SPECrate®2017_fp_peak = 476

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

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

Platform Notes (Continued)
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:
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)
                     | 544.nab_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)
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C++             | 508.namd_r(base, peak) 510.parest_r(base, peak)
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AMD clang version 14.0.6 (CLANG: AOCC_4.0.0-Build#389 2022_10_07) (based on
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(Continued on next page)
Hewlett Packard Enterprise  
ProLiant DL345 Gen11  
(3.85 GHz, AMD EPYC 9374F)

<table>
<thead>
<tr>
<th>CPU2017 License:</th>
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<td>HPE</td>
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<td>HPE</td>
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**SPECrate®2017_fp_base = 473**  
**SPECrate®2017_fp_peak = 476**

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**Compiler Version Notes (Continued)**

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, 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

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
(3.85 GHz, AMD EPYC 9374F)

SPECraten2017_fp_base = 473
SPECraten2017_fp_peak = 476

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

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

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
SPEC CPU®2017 Floating Point Rate Result

Hewlett Packard Enterprise  
ProLiant DL345 Gen11  
(3.85 GHz, AMD EPYC 9374F)

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

Specrate®2017_fp_base = 473  
Specrate®2017_fp_peak = 476

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

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 -lflang

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 -mlllvm -unroll-threshold=100
- finline-aggressive -mlllvm -loop-unswitch-threshold=200000
- mllvm -reduce-array-computations=3 -zopt -lamdlibm -lamdalloc
- lflang

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 -mlllvm -reduce-array-computations=3
- fremap-arrays -fstrip-mining -mlllvm -reduce-array-computations=3
- zopt -Kieee -Mrecursive -funroll-loops -mlllvm -lsr-in-nested-loop
- fepilog-vectorization-of-inductions -lamdlibm -lamdalloc
- lflang

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,-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 -mlllvm -reduce-array-computations=3
- zopt -mlllvm -unroll-threshold=100 -finline-aggressive
- mllvm -loop-unswitch-threshold=200000 -lamdlibm -lamdalloc -lflang

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.85 GHz, AMD EPYC 9374F)

SPECrater®2017_fp_base = 473
SPECrater®2017_fp_peak = 476

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<td>Jan-2023</td>
</tr>
<tr>
<td>Hardware Availability:</td>
<td>Dec-2022</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2022</td>
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</table>

Base Optimization Flags (Continued)

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

C++ benchmarks:
(Continued on next page)
Peak Optimization Flags (Continued)

508.namd_r: basepeak = yes

510.parest_r: basepeak = yes

Fortran benchmarks:

503.bwaves_r: basepeak = yes

549.fotonik3d_r: -m64 -ftlo -W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlllvm -W1,-reduce-array-computations=3
-W1,-mlllvm -W1,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Kieee
-Mrecursive -mlllvm -reduce-array-computations=3
-feepilog-vectorization-of-inductions -fvector-transform
-fscalar-transform -lamdlibm -lamdalloc -lflang

Benchmarks using both Fortran and C:

521.wrf_r: -m64 -ftlo -W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlllvm -W1,-reduce-array-computations=3
-W1,-mlllvm -W1,-enable-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-fstruct-layout=7 -mlllvm -unroll-threshold=50
-fremap-arrays -fstrip-mining
-mlllvm -inline-threshold=1000
-mlllvm -reduce-array-computations=3 -zopt -Mrecursive
-feepilog-vectorization-of-inductions -lamdlibm -lamdalloc
-lflang

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: -m64 -ftlo -W1,-mlllvm -W1,-align-all-nofallthru-blocks=6
-W1,-mlllvm -W1,-reduce-array-computations=3
-W1,-mlllvm -W1,-x86-use-vzeroupper=false -O3 -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen11
(3.85 GHz, AMD EPYC 9374F)

SPECrate®2017_fp_base = 473
SPECrate®2017_fp_peak = 476

Peak Optimization Flags (Continued)

511.povray_r (continued):
-ffremap-arrays -mllvm -reduce-array-computations=3 -zopt
-mlirvm -unroll-threshold=100 -finline-aggressive
-mlirvm -loop-unswitch-threshold=200000 -lamdlibm
-lamdalloc

526.blender_r: basepeak = yes

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 -Ofast -march=znver4
-fveclib=AMDLIBM -ffast-math -fstruct-layout=7
-mlirvm -unroll-threshold=50 -fremap-arrays -fstrip-mining
-mlirvm -inline-threshold=1000 -mllvm -reduce-array-computations=3 -zopt
-mlirvm -unroll-threshold=100 -mllvm -loop-unswitch-threshold=200000
-finline-aggressive -faggressive-loop-transform -fvector-transform
-fscalar-transform -Mrecursive -fepilog-vectorization-of-inductions
-lamdlibm -lmdalloc -lflang

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
Hewlett Packard Enterprise

ProLiant DL345 Gen11
(3.85 GHz, AMD EPYC 9374F)

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

SPECrate®2017_fp_base = 473
SPECrate®2017_fp_peak = 476

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

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

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