Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL385 Gen11  
(2.75 GHz, AMD EPYC 9454)  

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>AMD EPYC 9454</td>
</tr>
<tr>
<td>Max MHz</td>
<td>3800</td>
</tr>
<tr>
<td>Nominal</td>
<td>2750</td>
</tr>
<tr>
<td>Enabled</td>
<td>96 cores, 2 chips, 2 threads/core</td>
</tr>
<tr>
<td>Orderable</td>
<td>1,2 chips</td>
</tr>
<tr>
<td>Cache L1</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td></td>
<td>1 MB I+D on chip per core</td>
</tr>
<tr>
<td></td>
<td>256 MB I+D on chip per chip, 32 MB shared / 6 cores</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
</tr>
<tr>
<td>Memory</td>
<td>1536 GB (24 x 64 GB 2Rx4 PC5-4800B-R)</td>
</tr>
<tr>
<td>Storage</td>
<td>1 x 480 GB SATA SSD</td>
</tr>
<tr>
<td>Other</td>
<td>None</td>
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</table>

**Software**  

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>OS</td>
<td>Ubuntu 22.04.1 LTS</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>ext4</td>
</tr>
<tr>
<td>System State</td>
<td>Run level 5 (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>
<td>None</td>
</tr>
<tr>
<td>Power Management</td>
<td>BIOS and OS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

**Test Sponsor:** HPE  
**Test Date:** Jan-2023  
**Hardware Availability:** Dec-2022  
**Software Availability:** Nov-2022
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SPECrate®2017_fp_base = 1050
SPECrate®2017_fp_peak = 1050

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>503.bwaves_r</td>
<td>192</td>
<td>1100</td>
<td>1750</td>
<td>1100</td>
<td>1750</td>
<td>1099</td>
<td>1750</td>
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<tr>
<td>507.cactuBSSN_r</td>
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<td>1360</td>
<td>180</td>
<td>1350</td>
<td>178</td>
<td>1370</td>
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<tr>
<td>508.namd_r</td>
<td>192</td>
<td>238</td>
<td>767</td>
<td>238</td>
<td>767</td>
<td>239</td>
<td>764</td>
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<tr>
<td>510.parest_r</td>
<td>192</td>
<td>616</td>
<td>815</td>
<td>615</td>
<td>817</td>
<td>619</td>
<td>812</td>
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<td>511.povray_r</td>
<td>192</td>
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<td>1100</td>
<td>408</td>
<td>1100</td>
<td>409</td>
<td>1100</td>
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<td>598</td>
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<td>521.wrf_r</td>
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<td>1020</td>
<td>420</td>
<td>1020</td>
<td>423</td>
<td>1020</td>
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<tr>
<td>526.blender_r</td>
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<td>285</td>
<td>1030</td>
<td>281</td>
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<td>527.cam4_r</td>
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<td>1040</td>
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<td>538.imagick_r</td>
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<td>400</td>
<td>119</td>
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<td>119</td>
<td>400</td>
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<td>1680</td>
<td>194</td>
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<td>549.fotonik3d_r</td>
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<td>566</td>
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<td>1323</td>
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<td>480</td>
<td>648</td>
<td>471</td>
<td>644</td>
<td>474</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)
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<table>
<thead>
<tr>
<th>SPECrate®2017_fp_base</th>
<th>1050</th>
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<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>1050</td>
</tr>
</tbody>
</table>

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

### 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_acc400_genoa_B_lib/lib:/home/cpu2017/amd_rate_acc400_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 0xa10110e for the AMD EPYC 9nn4X family of processors. The reference code/AGESA version used in this
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| SPECrate®2017_fp_base = 1050 |
| SPECrate®2017_fp_peak = 1050 |

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 982a61ec0915b55891ef0e16aca6c64d
running on admin1 Mon Jun 27 19:07:15 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 9454 48-Core Processor
  2 "physical id"s (chips)
  192 "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 : 48
siblings : 96
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
  32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29
  32 33 34 35 36 37 40 41 42 43 44 45 48 49 50 51 52 53 56 57 58 59 60 61

From lscpu from util-linux 2.37.2:
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): 192
On-line CPU(s) list: 0-191
Vendor ID: AuthenticAMD
Model name: AMD EPYC 9454 48-Core Processor
CPU family: 25
Model: 17
Thread(s) per core: 2
Core(s) per socket: 48
Socket(s): 2
Stepping: 1
Frequency boost: enabled
CPU max MHz: 3812.000
CPU min MHz: 400.0000
BogoMIPS: 5492.00
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
  pdelgb rdtsscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
  aperfmperf 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)
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<table>
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<tbody>
<tr>
<td>SPECrate®2017_fp_peak</td>
<td>1050</td>
</tr>
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</table>

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

**CPU2017 License:** 3  
**Test Date:** Jan-2023  
**Tested by:** HPE

---

**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 vmcall fsqsbase bml1 avx2 smep bmi2 erms invvpid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb avx512cd sha ni avx512bw avx512vl xsaveopt xsaves xgetbv1 xsavec cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local avx512_bf16 clzero irperf xsaverprtr rdpru wbnoinvd amd_prpin cppc arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist pausefilter pfthreshold avic v_vmsave_vmload vgif v_spec_ctrl avx512vbm iumip pku ospeke avx512_vbmi2 gfn i vaes vcplmulqdq avx512_vnni avx512_bitalg avx512_vpopcntdq la57 rdpid overflow_reco conv succor smca farm flush_l1d

Virtualization: AMD-V

| L1d cache: | 3 MiB (96 instances) |
| L1i cache: | 3 MiB (96 instances) |
| L2 cache:  | 96 MiB (96 instances) |
| L3 cache:  | 512 MiB (16 instances) |

NUMA node(s): 16

NUMA node0 CPU(s): 0-5, 96-101
NUMA node1 CPU(s): 24-29, 120-125
NUMA node2 CPU(s): 12-17, 108-113
NUMA node3 CPU(s): 36-41, 132-137
NUMA node4 CPU(s): 18-23, 114-119
NUMA node5 CPU(s): 42-47, 138-143
NUMA node6 CPU(s): 6-11, 102-107
NUMA node7 CPU(s): 30-35, 126-131
NUMA node8 CPU(s): 48-53, 144-149
NUMA node9 CPU(s): 72-77, 168-173
NUMA node10 CPU(s): 60-65, 156-161
NUMA node11 CPU(s): 84-89, 180-185
NUMA node12 CPU(s): 66-71, 162-167
NUMA node13 CPU(s): 90-95, 186-191
NUMA node14 CPU(s): 54-59, 150-155
NUMA node15 CPU(s): 78-83, 174-179

Vulnerability Itlb multihit: Not affected  
Vulnerability Lltf: Not affected  
Vulnerability Mds: Not affected  
Vulnerability Meltdown: Not affected  
Vulnerability Mmio stale data: Not affected  
Vulnerability Retbleed: 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; Retpolines, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling, PBRSB-eIBRS Not affected

Vulnerability Srbds: Not affected  
Vulnerability Ttx async abort: Not affected

(Continued on next page)
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(2.75 GHz, AMD EPYC 9454)

**SPECrate® 2017 fp_base = 1050**  
**SPECrate® 2017 fp_peak = 1050**

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

### Platform Notes (Continued)

From `lscpu --cache`:

<table>
<thead>
<tr>
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<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>3M</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>3M</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>96M</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>512M</td>
<td>16</td>
<td>Unified</td>
<td>3</td>
<td>32768</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data  

```plaintext
cache size : 1024 KB
```

From `numactl --hardware`  
WARNING: a numactl 'node' might or might not correspond to a physical chip.  
available: 16 nodes (0-15)  
node 0 cpus: 0 1 2 3 4 5 96 97 98 99 100 101  
node 0 size: 96454 MB  
node 0 free: 96142 MB  
node 1 cpus: 24 25 26 27 28 29 120 121 122 123 124 125  
node 1 size: 96764 MB  
node 1 free: 96465 MB  
node 2 cpus: 12 13 14 15 16 17 108 110 111 112 113  
node 2 size: 96729 MB  
node 2 free: 96456 MB  
node 3 cpus: 36 37 38 39 40 41 132 133 134 135 136 137  
node 3 size: 96764 MB  
node 3 free: 96535 MB  
node 4 cpus: 18 19 20 21 22 23 114 116 117 118 119  
node 4 size: 96764 MB  
node 4 free: 96500 MB  
node 5 cpus: 42 43 44 45 46 47 138 139 140 141 142 143  
node 5 size: 96764 MB  
node 5 free: 96538 MB  
node 6 cpus: 6 7 8 9 10 11 102 103 104 105 106 107  
node 6 size: 96764 MB  
node 6 free: 96559 MB  
node 7 cpus: 30 31 32 33 34 35 126 127 128 129 130 131  
node 7 size: 96764 MB  
node 7 free: 96552 MB  
node 8 cpus: 48 49 50 51 52 53 144 145 146 147 148 149  
node 8 size: 96764 MB  
node 8 free: 96587 MB  
node 9 cpus: 72 73 74 75 76 77 168 169 170 171 172 173  
node 9 size: 96764 MB  
node 9 free: 96582 MB  
node 10 cpus: 60 61 62 63 64 65 156 157 158 159 160 161  
node 10 size: 96764 MB  
node 10 free: 96587 MB  
node 11 cpus: 84 85 86 87 88 89 180 181 182 183 184 185  
node 11 size: 96764 MB  
node 11 free: 96587 MB

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CPU2017 License: 3
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Platform Notes (Continued)

node 11 size: 96764 MB
node 11 free: 96576 MB
node 12 cpus: 66 67 68 69 70 71 162 163 164 165 166 167
node 12 size: 96764 MB
node 12 free: 96583 MB
node 13 cpus: 90 91 92 93 94 95 186 187 188 189 190 191
node 13 size: 96764 MB
node 13 free: 96592 MB
node 14 cpus: 54 55 56 57 58 59 150 151 152 153 154 155
node 14 size: 96764 MB
node 14 free: 96580 MB
node 15 cpus: 78 79 80 81 82 83 174 175 176 177 178 179
node 15 size: 96715 MB
node 15 free: 96524 MB
node distances:

From /proc/meminfo
MemTotal: 1584992444 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
/sbin/tuned-adm active
Current active profile: throughput-performance
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance
/usr/bin/lsb_release -d
Ubuntu 22.04.1 LTS

(Continued on next page)
Platform Notes (Continued)

From /etc/*release* /etc/*version*
debian_version: bookworm/sid
  os-release:
    PRETTY_NAME="Ubuntu 22.04.1 LTS"
    NAME="Ubuntu"
    VERSION_ID="22.04"
    VERSION="22.04.1 LTS (Jammy Jellyfish)"
    VERSION_CODENAME=jammy
    ID=ubuntu
    ID_LIKE=debian
    HOME_URL="https://www.ubuntu.com/"

uname -a:
    Linux admin1 5.15.0-56-generic #62-Ubuntu SMP Tue Nov 22 19:54:14 UTC 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
mmio_stale_data:                                       Not affected
retbleed:                                               Not affected
CVE-2018-3639 (Speculative Store Bypass):             Mitigation: Speculative Store
  Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):                     Mitigation: usercopy/swapgs
  barriers and __user pointer sanitation
CVE-2017-5715 (Spectre variant 2):                     Mitigation: Retpolines, IBPB:
  conditional, IBRS_FW, STIBP:
  always-on, RSB filling,
  PBRSB-eIBRS: Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort):               Not affected

run-level 5 Jun 27 18:30

SPEC is set to: /home/cpu2017
    Filesystem                        Type  Size  Used Avail Use% Mounted on
    /dev/mapper/ubuntu--vg-ubuntu--lv ext4  437G   21G  398G   5% /

From /sys/devices/virtual/dmi/id
    Vendor:         HPE
    Product:        ProLiant DL385 Gen11
    Product Family: ProLiant

(Continued on next page)
Platform Notes (Continued)

Serial: DL385GEN11-003

Additional information from dmidecode 3.3 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:
13x Hynix HMCG94MEBRA121N 64 GB 2 rank 4800
11x Hynix HMCG94MEBRA123N 64 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++ ----------------------------------------
| 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) |

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(2.75 GHz, AMD EPYC 9454)

SPECrate®2017_fp_base = 1050
SPECrate®2017_fp_peak = 1050

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

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
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
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)

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)

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(2.75 GHz, AMD EPYC 9454)

SPECrate®2017_fp_base = 1050
SPECrate®2017_fp_peak = 1050

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

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

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.ibm_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

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(2.75 GHz, AMD EPYC 9454)

SPEC CPU® 2017 Floating Point Rate Result

SPECrate® 2017_fp_base = 1050
SPECrate® 2017_fp_peak = 1050

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

Base Portability Flags (Continued)

549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -fleto -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
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -lamdlibm -lamdalloc -lflang

C++ benchmarks:
-m64 -fleto -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
-lflang

Fortran benchmarks:
-m64 -fleto -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
-lflang

 Benchmarks using both Fortran and C:
-m64 -fleto -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
-freemap-arrays -fstrip-mining -mllvm -reduce-array-computations=3
-zopt -Kieee -Mrecursive -funroll-loops -mllvm -lsr-in-nested-loop
-fepilog-vectorization-of-inductions -lamdlibm -lamdalloc -lflang

Benchmarks using both C and C++:
-m64 -fleto -Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

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SPEC CPU®2017 Floating Point Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen11
(2.75 GHz, AMD EPYC 9454)

| SPECrate®2017_fp_base = 1050 |
| SPECrate®2017_fp_peak = 1050 |

CPU2017 License: 3
Test Sponsor: HPE
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Test Date: Jan-2023
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Software Availability: Nov-2022

Base Optimization Flags (Continued):

Benchmarks using both C and C++ (continued):
- -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 -lflang

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
- -zopt -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 -lamdalloc -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++

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:


538.imagick_r: Same as 519.lbm_r


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

544.nab_r (continued):
-mlirv -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc

C++ benchmarks:

508.namd_r: basepeak = yes

510.parest_r: -m64 -flto -Wl,-mlirv -Wl,-suppress-famas
-mlirv -Wl,-X86-use-vzeroupper=false -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math
-mlirv -unroll-threshold=100
-mlirv -reduce-array-computations=3 -zopt -lamdlibm
-lamdalloc

Fortran benchmarks:

503.bwaves_r: -m64 -flto -Wl,-mlirv -Wl,-align-all-nofallthru-blocks=6
-mlirv -Wl,-Wl,-align-all-nofallthru-blocks=6
-march=znver4 -fveclib=AMDLIBM -ffast-math -Mrecursive
-mlirv -reduce-array-computations=3

549.fotonik3d_r: -m64 -flto -Wl,-mlirv -Wl,-align-all-nofallthru-blocks=6
-mlirv -Wl,-X86-prefetching -Ofast
-march=znver4 -fveclib=AMDLIBM -ffast-math -Kieee
-mlirv -reduce-array-computations=3

554.roms_r: Same as 503.bwaves_r

Benchmarks using both Fortran and C:

521.wrf_r: basepeak = yes

527.cam4_r: basepeak = yes

Benchmarks using both C and C++:

511.povray_r: basepeak = yes

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

526.blender_r: basepeak = yes

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 -Ofast -march=znver4`  
- `-fvec=AMDLIBM -ffast-math -fstruct-layout=7`  
- `-mlllvm -unroll-threshold=50 -fremap-arrays -fstrip-mining`  
- `-mlllvm -inline-threshold=1000 -mlllvm -reduce-array-computations=3 -zopt`  
- `-mlllvm -unroll-threshold=100 -mlllvm -loop-unswitch-threshold=200000`  
- `-finline-aggressive -faggressive-loop-transform -fvector-transform`  
- `-fscalar-transform -Mrecursive -fepilog-vectorization-of-inductions`  
- `-lamdllibm -lamdalloc -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:

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/HPE-Platform-Flags-AMD-Genoa-rev2.1.xml)
<table>
<thead>
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<th>SPEC CPU®2017 Floating Point Rate Result</th>
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