Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus v2
(2.20 GHz, AMD EPYC 7773X)

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

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>128</td>
<td>445</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>128</td>
<td>450</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>128</td>
<td>450</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>128</td>
<td>450</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>128</td>
<td>450</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>128</td>
<td>450</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>128</td>
<td>450</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>128</td>
<td>450</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>128</td>
<td>450</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>128</td>
<td>450</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: AMD EPYC 7773X</td>
<td>OS: Ubuntu 20.04.2 LTS (x86_64)</td>
</tr>
<tr>
<td>Max MHz: 3500</td>
<td>Kernel 5.11.0-41-generic</td>
</tr>
<tr>
<td>Nominal: 2200</td>
<td>Compiler: C/C++/Fortran: Version 3.2.0 of AOCC</td>
</tr>
<tr>
<td>Enabled: 128 cores, 2 chips</td>
<td>Parallel: Yes</td>
</tr>
<tr>
<td>Orderable: 1, 2 chip(s)</td>
<td>Firmware: HPE BIOS Version A42 v2.56 02/10/2022 released</td>
</tr>
<tr>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
<td>File System: ext4</td>
</tr>
<tr>
<td>L2: 512 KB I+D on chip per core</td>
<td>System State: Run level 3 (multi-user)</td>
</tr>
<tr>
<td>L3: 768 MB I+D on chip per chip, 96 MB shared / 8 cores</td>
<td>Base Pointers: 64-bit</td>
</tr>
<tr>
<td>Other: None</td>
<td>Peak Pointers: 64-bit</td>
</tr>
<tr>
<td>Memory: 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)</td>
<td>Other: jemalloc: jemalloc memory allocator library v5.1.0</td>
</tr>
<tr>
<td>Storage: 1 x 400 GB SAS SSD</td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
<tr>
<td>Other: None</td>
<td></td>
</tr>
</tbody>
</table>

Test Date: Feb-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>128</td>
<td>64.8</td>
<td>911</td>
<td>64.6</td>
<td>913</td>
<td>64.8</td>
<td>911</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>128</td>
<td>37.4</td>
<td>445</td>
<td>37.0</td>
<td>450</td>
<td>37.0</td>
<td>450</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>128</td>
<td>37.1</td>
<td>141</td>
<td>35.0</td>
<td>150</td>
<td>35.0</td>
<td>150</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>128</td>
<td>86.3</td>
<td>153</td>
<td>88.7</td>
<td>149</td>
<td>88.7</td>
<td>149</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>128</td>
<td>40.4</td>
<td>219</td>
<td>41.0</td>
<td>216</td>
<td>40.7</td>
<td>218</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>128</td>
<td>145</td>
<td>81.9</td>
<td>143</td>
<td>83.3</td>
<td>145</td>
<td>82.2</td>
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<tr>
<td>638.imagick_s</td>
<td>128</td>
<td>30.9</td>
<td>467</td>
<td>30.9</td>
<td>467</td>
<td>30.9</td>
<td>467</td>
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<tr>
<td>644.nab_s</td>
<td>128</td>
<td>29.1</td>
<td>601</td>
<td>28.9</td>
<td>604</td>
<td>29.0</td>
<td>603</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>128</td>
<td>74.7</td>
<td>122</td>
<td>75.6</td>
<td>121</td>
<td>75.6</td>
<td>121</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>128</td>
<td>38.6</td>
<td>407</td>
<td>39.6</td>
<td>398</td>
<td>35.3</td>
<td>446</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.

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,
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SPECspeed®2017_fp_base = 273
SPECspeed®2017_fp_peak = 276

Operating System Notes (Continued)

'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To enable THP only on request for peak runs of 628.pop2_s:
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root.
To disable THP for peak runs of 627.cam4_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transparent_hugepage/enabled' run as root.

Environment Variables Notes
Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-127"
LD_LIBRARY_PATH =
    "/home/cpu2017/amd_speed_aocc320_milanx_A_lib/lib;/home/cpu2017/amd_speed_aocc320_milanx_A_lib/lib32:" LIBOMP_NUM_HIDDEN_HELPER_THREADS = "0"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "128"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-127"

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-127"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 1TiB Memory using openSUSE 15.2

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.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)
jemalloc 5.1.0 is available here:
    https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2
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SPECspeed®2017_fp_peak = 276

Test Date: Feb-2022
Hardware Availability: Mar-2022
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Platform Notes

BIOS Configuration
Workload Profile set to General Peak Frequency Compute
AMD SMT Option set to Disabled
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 One memory domain per socket
Thermal Configuration set to Maximum Cooling
Infinity Fabric Power Management set to Disabled
Infinity Fabric Performance State set to P0
Workload Profile set to Custom
Power Regulator set to OS Control Mode

The system date and time as discovered by sysinfo is incorrect as the time was not updated prior to the run. The test_date field shows an accurate date for the result.

The system ROM used for this result contains microcode version 0x 0A001227h for the AMD EPYC 7nn3X family of processors. The reference code/AGESA version used in this ROM is version MilanPI 1.0.0.8

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acaf64d
running on oem-ProLiant-DL385-Gen10-Plus Thu Jul 22 00:33:03 2021

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 7773X 64-Core Processor
  2 "physical id"s (chips)
128 "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 : 64
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 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
  53 54 55 56 57 58 59 60 61 62 63

From lscpu from util-linux 2.34:
Architectures: x86_64
CPU op-mode(s): 32-bit, 64-bit
Byte Order: Little Endian

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

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CPU2017 License: 3
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Platform Notes (Continued)

Address sizes: 48 bits physical, 48 bits virtual
CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 1
Core(s) per socket: 64
Socket(s): 2
NUMA node(s): 16
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7773X 64-Core Processor
Stepping: 2
Frequency boost: enabled
CPU MHz: 2200.000
CPU max MHz: 2200.0000
CPU min MHz: 1500.0000
BogoMIPS: 4391.99
Virtualization: AMD-V
L1d cache: 4 MiB
L1i cache: 4 MiB
L2 cache: 64 MiB
L3 cache: 1.5 GiB
NUMA node0 CPU(s): 0-7
NUMA node1 CPU(s): 8-15
NUMA node2 CPU(s): 16-23
NUMA node3 CPU(s): 24-31
NUMA node4 CPU(s): 32-39
NUMA node5 CPU(s): 40-47
NUMA node6 CPU(s): 48-55
NUMA node7 CPU(s): 56-63
NUMA node8 CPU(s): 64-71
NUMA node9 CPU(s): 72-79
NUMA node10 CPU(s): 80-87
NUMA node11 CPU(s): 88-95
NUMA node12 CPU(s): 96-103
NUMA node13 CPU(s): 104-111
NUMA node14 CPU(s): 112-119
NUMA node15 CPU(s): 120-127
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/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Full AMD retpoline, IBPB conditional,

(Continued on next page)
Platform Notes (Continued)

IBRS_FW, STIBP disabled, RSB filling
Vulnerability Srbdss: Not affected
Vulnerability Tsx async abort: Not affected
Flags: 
fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
pg mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
pdpelgr rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid
aperfmpref pni pclmulqdq monitor sse3 fma cx16 pclid sse4_1 sse4_2 x2apic movbe
popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a
misalignsse 3nowprefetch osw ibs skinit wdt tce topoext perfctr_core perfctr_nb
bexact perfctr llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
ibpb stibp vmmcall fgsbase bni avx2 smep bni2 invpcid cqm rdt_a rseed adx smap
cflushopt clwb sha ni xsaveopt xsave cgetbv1 xsavec cqm llc cqm_occup llc
cqm_mbb_total cqm_mbb_local clzero irperf xsaveerptr rdpru wbnoinvd amd_ppin arat
npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists
pausefilter pfthreshold v_vmsave_vmload vgif umip pk uosp vaes vpclmulqdq rdpid
overflow_recov succor smca

From lscpu --cache:
NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL
L1d 32K 4M 8 Data 1
L1i 32K 4M 8 Instruction 1
L2 512K 64M 8 Unified 2
L3 96M 1.5G 16 Unified 3

/proc/cpuinfo cache data
  cache size : 512 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 6 7
  node 0 size: 128710 MB
  node 0 free: 128436 MB
  node 1 cpus: 8 9 10 11 12 13 14 15
  node 1 size: 129022 MB
  node 1 free: 128908 MB
  node 2 cpus: 16 17 18 19 20 21 22 23
  node 2 size: 129022 MB
  node 2 free: 128903 MB
  node 3 cpus: 24 25 26 27 28 29 30 31
  node 3 size: 129022 MB
  node 3 free: 128898 MB
  node 4 cpus: 32 33 34 35 36 37 38 39
  node 4 size: 129022 MB
  node 4 free: 128895 MB
  node 5 cpus: 40 41 42 43 44 45 46 47
  node 5 size: 129022 MB

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

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

**ProLiant DL385 Gen10 Plus v2**
(2.20 GHz, AMD EPYC 7773X)

**SPECspeed®2017_fp_base = 273**

**SPECspeed®2017_fp_peak = 276**

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**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Hardware Availability:** Mar-2022  
**Software Availability:** Jan-2022  
**Test Date:** Feb-2022

---

**Platform Notes (Continued)**

```plaintext
node 5 free: 128851 MB  
node 6 cpus: 48 49 50 51 52 53 54 55  
node 6 size: 129022 MB  
node 6 free: 128098 MB  
node 7 cpus: 56 57 58 59 60 61 62 63  
node 7 size: 116909 MB  
node 7 free: 116792 MB  
node 8 cpus: 64 65 66 67 68 69 70 71  
node 8 size: 129022 MB  
node 8 free: 128911 MB  
node 9 cpus: 72 73 74 75 76 77 78 79  
node 9 size: 129022 MB  
node 9 free: 128911 MB  
node 10 cpus: 80 81 82 83 84 85 86 87  
node 10 size: 129022 MB  
node 10 free: 128909 MB  
node 11 cpus: 88 89 90 91 92 93 94 95  
node 11 size: 129022 MB  
node 11 free: 128913 MB  
node 12 cpus: 96 97 98 99 100 101 102 103  
node 12 size: 129022 MB  
node 12 free: 128914 MB  
node 13 cpus: 104 105 106 107 108 109 110 111  
node 13 size: 128990 MB  
node 13 free: 128873 MB  
node 14 cpus: 112 113 114 115 116 117 118 119  
node 14 size: 129022 MB  
node 14 free: 128880 MB  
node 15 cpus: 120 121 122 123 124 125 126 127  
node 15 size: 129013 MB  
node 15 free: 128892 MB  
node distances:

<table>
<thead>
<tr>
<th>node</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
<th>15</th>
</tr>
</thead>
</table>
```

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

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ProLiant DL385 Gen10 Plus v2

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<tr>
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<td>276</td>
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**Platform Notes (Continued)**

<p>| | | | | | | | | | | | | | | | | |</p>
<table>
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<th></th>
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<th></th>
</tr>
</thead>
</table>

From /proc/meminfo

- MemTotal: 2101132716 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 20.04.2 LTS

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

- debian_version: bullseye/sid
- os-release:
  - NAME="Ubuntu"
  - VERSION="20.04.2 LTS (Focal Fossa)"
  - ID=ubuntu
  - ID_LIKE=debian
  - PRETTY_NAME="Ubuntu 20.04.2 LTS"
  - VERSION_ID="20.04"
  - HOME_URL="https://www.ubuntu.com/"
  - SUPPORT_URL="https://help.ubuntu.com/"

uname -a:

- Linux oem-ProLiant-DL385-Gen10-Plus 5.11.0-41-generic #45~20.04.1-Ubuntu SMP Wed Nov 10 10:20:10 UTC 2021 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 and seccomp
- CVE-2017-5753 (Spectre variant 1): Mitigation: usercopy/swapps barriers and __user pointer sanitization
- CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP:

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SPECspeed®2017_fp_base = 273
SPECspeed®2017_fp_peak = 276

Platform Notes (Continued)
disabled, RSB filling
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected
run-level 3 Jul 22 00:30
SPECFORCE is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb2 ext4 366G 75G 273G 22% /

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL385 Gen10 Plus
Product Family: ProLiant
Serial: CN7931051F

Additional information from dmidecode 3.2 follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.
Memory:
16x Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200
16x UNKNOWN NOT AVAILABLE

BIOS:
BIOS Vendor: HPE
BIOS Version: A42
BIOS Date: 02/10/2022
BIOS Revision: 2.56
Firmware Revision: 2.55

(End of data from sysinfo program)

Compiler Version Notes

---------------------------------
C 619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)
---------------------------------
AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin

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SPEC CPU®2017 Floating Point Speed Result  

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Compiler Version Notes (Continued)  

C++, C, Fortran | 607.cactuBSSN_s(base, peak)  

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

Fortran | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)  
                  654.roms_s(base, peak)  

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

Fortran, C | 621.wrf_s(base, peak) 627.cam4_s(base, peak)  
                  628.pop2_s(base, peak)  

AMD clang version 13.0.0 (CLANG: AOCC_3.2.0-Build#128 2021_11_12) (based on LLVM Mirror.Version.13.0.0)  
Target: x86_64-unknown-linux-gnu  
Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.2.0/bin  

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Standard Performance Evaluation Corporation (info@spec.org)  
https://www.spec.org/
**SPEC CPU®2017 Floating Point Speed Result**

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL385 Gen10 Plus v2  
(2.20 GHz, AMD EPYC 7773X)

| SPECspeed®2017_fp_base = 273 |
| SPECspeed®2017_fp_peak = 276 |

| CPU2017 License: 3 | Test Date: Feb-2022 |
| Test Sponsor: HPE | Hardware Availability: Mar-2022 |
| Tested by: HPE | Software Availability: Jan-2022 |

### Base Compiler Invocation

C benchmarks:  
clang

Fortran benchmarks:  
flang

Benchmarks using both Fortran and C:  
flang clang

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

### Base Portability Flags

603.bwaves_s: -DSPEC_LP64  
607.cactuBSSN_s: -DSPEC_LP64  
619.lbm_s: -DSPEC_LP64  
621.wrf_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64  
627.cam4_s: -DSPEC_CASE_FLAG -DSPEC_LP64  
628.pop2_s: -DSPEC_CASE_FLAG -Mbyteswapio -DSPEC_LP64  
638.imagick_s: -DSPEC_LP64  
644.nab_s: -DSPEC_LP64  
649.fotonik3d_s: -DSPEC_LP64  
654.roms_s: -DSPEC_LP64

### Base Optimization Flags

C benchmarks:

-m64 -Wl,-mllvm -Wl,-region-vectorize  
-mWl,-mllvm -Wl,-function-specialize  
-mWl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
-mWl,-mllvm -Wl,-reduce-array-computations=3 -03 -march=znver3  
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5  
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000  
-fremap-arrays -mlvm -function-specialize -flv-function-specialization  
-mlvm -enable-gvn-hoist -mlvm -global-vectorize-slp=true  
-mlvm -enable-licm-vrp -mlvm -reduce-array-computations=3 -z muldefs  
-DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Fortran benchmarks:

-m64 -Wl,-mllvm -Wl,-enable-X86-prefetching  
-Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize

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

Fortran benchmarks (continued):
-Wl,-mlirvm -Wl,-function-specialize
-Wl,-mlirvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirvm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -O3
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp -Mrecursive
-mlirvm -fuse-tile-inner-loop -funroll-loops
-mlirvm -extra-vectorizer-passes -mlirvm -lsr-in-nested-loop
-mlirvm -enable-licm-vrp -mlirvm -reduce-array-computations=3
-mlirvm -global-vectorize-slp=true -mlirvm -enable-loopinterchange
-mlirvm -compute-interchange-order -z muldefs -DSPEC_OPENMP
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Benchmarks using both Fortran and C:
-m64 -Wl,-mlirvm -Wl,-enable-X86-prefetching
-Wl,-mlirvm -Wl,-enable-licm-vrp -Wl,-mlirvm -Wl,-region-vectorize
-Wl,-mlirvm -Wl,-function-specialize
-Wl,-mlirvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mlirvm -unroll-threshold=50 -mlirvm -inline-threshold=1000
-freemap-arrays -mlirvm -function-specialize -flv-function-specialization
-mlirvm -enable-gvn-hoist -mlirvm -global-vectorize-slp=true
-mlirvm -enable-licm-vrp -mlirvm -reduce-array-computations=3 -Hz,1,0x1
-Mrecursive -mlirvm -fuse-tile-inner-loop -funroll-loops
-mlirvm -extra-vectorizer-passes -mlirvm -lsr-in-nested-loop
-mlirvm -enable-loopinterchange -mlirvm -compute-interchange-order
-z muldefs -DSPEC_OPENMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang

Benchmarks using Fortran, C, and C++:
-m64 -Wl,-mlirvm -Wl,-x86-use-vzeroupper=false
-Wl,-mlirvm -Wl,-region-vectorize -Wl,-mlirvm -Wl,-function-specialize
-Wl,-mlirvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlirvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mlirvm -unroll-threshold=50 -mlirvm -inline-threshold=1000
-freemap-arrays -mlirvm -function-specialize -flv-function-specialization
-mlirvm -enable-gvn-hoist -mlirvm -global-vectorize-slp=true
-mlirvm -enable-licm-vrp -mlirvm -reduce-array-computations=3
-mlirvm -enable-partial-unswitch -mlirvm -unroll-threshold=100
-finline-aggressive -mlirvm -loop-unswitch-threshold=200000
-mlirvm -reroll-loops -mlirvm -aggressive-loop-unswitch
-mlirvm -extra-vectorizer-passes -mlirvm -convert-pow-exp-to-int=false
-Hz,1,0x1 -Mrecursive -mlirvm -fuse-tile-inner-loop -funroll-loops
-mlirvm -lsr-in-nested-loop -mlirvm -enable-loopinterchange
-mlirvm -compute-interchange-order -z muldefs -DSPEC_OPENMP

(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL385 Gen10 Plus v2  
(2.20 GHz, AMD EPYC 7773X)  

Specspeed®2017_fp_base = 273  
Specspeed®2017_fp_peak = 276

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<th>CPU2017 License: 3</th>
<th>Test Date: Feb-2022</th>
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<td>Hardware Availability: Mar-2022</td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Jan-2022</td>
</tr>
</tbody>
</table>

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- `-fopenmp=libomp`  
- `-lomp`  
- `-lamdlibm`  
- `-ljemalloc`  
- `-lflang`

Base Other Flags

C benchmarks:
- `-Wno-unused-command-line-argument`  
- `-Wno-return-type`

Fortran benchmarks:
- `-Wno-unused-command-line-argument`  
- `-Wno-return-type`

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

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

Peak Compiler Invocation

C benchmarks:
- `clang`

Fortran benchmarks:
- `flang`

Benchmarks using both Fortran and C:
- `flang clang`

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

Peak Portability Flags

Same as Base Portability Flags
Peak Optimization Flags

C benchmarks:

619.lbm_s: basepeak = yes
638.imagick_s: basepeak = yes
644.nab_s: basepeak = yes

Fortran benchmarks:

603.bwaves_s: basepeak = yes
649.fotonik3d_s: basepeak = yes
654.roms_s: -m64 -WI,-mllvm -WI,-enable-X86-prefetching
-WI,-mllvm -WI,-enable-licm-vrp
-WI,-mllvm -WI,-function-specialize
-WI,-mllvm -WI,-align-all-nofallthru-blocks=6
-WI,-mllvm -WI,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -ffast-math -fopenmp
-Mrecursive -mlvm -reduce-array-computations=3
-mlvm -global-vectorize-slp=true -mlvm -enable-licm-vrp
-DSPEC_OpenMP -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-llflang

Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes
627.cam4_s: basepeak = yes
628.pop2_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

-m64 -WI,-mllvm -WI,-x86-use-vzeroupper=false
-WI,-mllvm -WI,-enable-licm-vrp
-WI,-mllvm -WI,-do-block-reorder=aggressive
-WI,-mllvm -WI,-function-specialize
-WI,-mllvm -WI,-align-all-nofallthru-blocks=6
-WI,-mllvm -WI,-reduce-array-computations=3 -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -fopenmp -flto -fstruct-layout=5
-mlvm -unroll-threshold=50 -freemap-arrays -flv-function-specialization
-mlvm -inline-threshold=1000 -mlvm -enable-gvn-hoist
-mlvm -global-vectorize-slp=true -mlvm -function-specialize
-mlvm -enable-licm-vrp -mlvm -reduce-array-computations=3
-finline-aggressive -mlvm -unroll-threshold=100 -mlvm -reroll-loops

(Continued on next page)
Hewlett Packard Enterprise
ProLiant DL385 Gen10 Plus v2
(2.20 GHz, AMD EPYC 7773X)

SPECspeed®2017_fp_base = 273
SPECspeed®2017_fp_peak = 276

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

Test Date: Feb-2022
Hardware Availability: Mar-2022
Software Availability: Jan-2022

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-mllvm -aggressive-loop-unswitch -Mrecursive
-mllvm -do-block-reorder=aggressive -DSPEC_OPENMP -fopenmp=libomp
-lomp -lamdlibm -ljemalloc -lflang

Peak Other Flags

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

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

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

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revR.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revR.xml

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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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