Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL325 Gen10 Plus v2
(2.00 GHz, AMD EPYC 7663)

SPECSpeed®2017_fp_base = 160
SPECSpeed®2017_fp_peak = 162

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

Test Date: Apr-2021
Hardware Availability: Jun-2021
Software Availability: Mar-2021

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>SPECspeed®2017_fp_peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>160</td>
<td>162</td>
</tr>
</tbody>
</table>

Threads

603.bwaves_s 56
607.cactuBSSN_s 56
619.lbm_s 56
621.wrf_s 56
627.cam4_s 56
628.pop2_s 56
638.imagick_s 56
644.nab_s 56
649.fotonik3d_s 56
654.roms_s 56

Hewlett Packard Enterprise

Test Date: Apr-2021
Hardware Availability: Jun-2021
Software Availability: Mar-2021

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base (160)</th>
<th>SPECspeed®2017_fp_peak (162)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>20.0</td>
<td>40.0</td>
</tr>
<tr>
<td>56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>277</td>
<td></td>
<td></td>
</tr>
<tr>
<td>278</td>
<td></td>
<td></td>
</tr>
<tr>
<td>75.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>163</td>
<td></td>
<td></td>
</tr>
<tr>
<td>115</td>
<td></td>
<td></td>
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<tr>
<td>73.8</td>
<td></td>
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</tr>
<tr>
<td>234</td>
<td></td>
<td></td>
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<tr>
<td>332</td>
<td></td>
<td></td>
</tr>
<tr>
<td>366</td>
<td></td>
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<tr>
<td>75.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>171</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Hewlett Packard Enterprise

Test Date: Apr-2021
Hardware Availability: Jun-2021
Software Availability: Mar-2021

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name: AMD EPYC 7663</td>
<td></td>
</tr>
<tr>
<td>Max MHz: 3500</td>
<td></td>
</tr>
<tr>
<td>Nominal: 2000</td>
<td></td>
</tr>
<tr>
<td>Enabled: 56 cores, 1 chip, 2 threads/core</td>
<td></td>
</tr>
<tr>
<td>Orderable: 1 chip</td>
<td></td>
</tr>
<tr>
<td>Cache L1: 32 KB I+ 32 KB D on chip per core</td>
<td></td>
</tr>
<tr>
<td>L2: 512 KB I+D on chip per core</td>
<td></td>
</tr>
<tr>
<td>L3: 256 MB I+D on chip per chip, 32 MB shared / 7 cores</td>
<td></td>
</tr>
<tr>
<td>Other: None</td>
<td></td>
</tr>
<tr>
<td>Memory: 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)</td>
<td></td>
</tr>
<tr>
<td>Storage: 1 x 800 GB SAS SSD, RAID 0</td>
<td></td>
</tr>
<tr>
<td>Other: None</td>
<td></td>
</tr>
<tr>
<td>OS: Ubuntu 20.04.1 LTS (x86_64)</td>
<td></td>
</tr>
<tr>
<td>Compiler: C/C++/Fortran: Version 3.0.0 of AOCC</td>
<td></td>
</tr>
<tr>
<td>Parallel: Yes</td>
<td></td>
</tr>
<tr>
<td>Firmware: HPE BIOS Version A43 v2.40 02/15/2021 released Mar-2021</td>
<td></td>
</tr>
<tr>
<td>File System: ext4</td>
<td></td>
</tr>
<tr>
<td>System State: Run level 5 (multi-user, GUI disabled)</td>
<td></td>
</tr>
<tr>
<td>Base Pointers: 64-bit</td>
<td></td>
</tr>
<tr>
<td>Peak Pointers: 64-bit</td>
<td></td>
</tr>
<tr>
<td>Other: jemalloc: jemalloc memory allocator library v5.1.0</td>
<td></td>
</tr>
<tr>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
<td></td>
</tr>
</tbody>
</table>
SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL325 Gen10 Plus v2
(2.00 GHz, AMD EPYC 7663)

SPECspeed®2017_fp_base = 160
SPECspeed®2017_fp_peak = 162

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</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>603.bwaves_s</td>
<td>56</td>
<td>153</td>
<td>386</td>
<td>153</td>
<td>386</td>
<td>153</td>
<td>386</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>56</td>
<td>60.3</td>
<td>277</td>
<td>59.7</td>
<td>279</td>
<td>60.3</td>
<td>277</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>56</td>
<td>69.6</td>
<td>75.3</td>
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<td>75.1</td>
<td>69.6</td>
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<tr>
<td>621.wrf_s</td>
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<td>81.8</td>
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<td>81.2</td>
<td>163</td>
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<tr>
<td>627.cam4_s</td>
<td>56</td>
<td>76.9</td>
<td>115</td>
<td>77.0</td>
<td>115</td>
<td>76.7</td>
<td>116</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>56</td>
<td>161</td>
<td>73.8</td>
<td>160</td>
<td>74.1</td>
<td>161</td>
<td>73.8</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>56</td>
<td>61.7</td>
<td>234</td>
<td>61.9</td>
<td>233</td>
<td>61.6</td>
<td>234</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>56</td>
<td>52.6</td>
<td>332</td>
<td>52.5</td>
<td>333</td>
<td>52.6</td>
<td>332</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>56</td>
<td>120</td>
<td>75.7</td>
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<td>654.roms_s</td>
<td>56</td>
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<td>170</td>
<td>92.1</td>
<td>171</td>
<td>92.1</td>
<td>171</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
'ulimit -l 2097152' was used to set environment locked pages in memory limit
runcpu command invoked through numacl i.e.:
numactl --interleave=all runcpu <etc>
'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout randomization (ASLR) to reduce run-to-run variability.
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root to enable

(Continued on next page)
Operating System Notes (Continued)

Transparent Hugepages (THP) for this run.
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for peak
runs of 628.pop2_s and 638.imagick_s to enable THP only on request.

The real test date is Apr-2021. The clock was mistakenly set to 2020 before the benchmark was run.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-111"
LD_LIBRARY_PATH =
"/cpu2017/amd_speed_aocc300_milan_B_lib/64;/cpu2017/amd_speed_aocc300_milan_B_lib/32:"
MALLOCONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREADLIMIT = "112"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-55"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 56 1 57 2 58 3 59 4 60 5 61 6 62 7 63 8 64 9 65 10 66 11 67 12 68 13 69 14 70 15 71 16 72 17 73 18 74 19 75 20 76 21 77 22 78 23 79 24 80 25 81 26 82 27 83 28 84 29 85 30 86 31 87 32 88 33 89 34 90 35 91 36 92 37 93 38 94 39 95 40 96 41 97 42 98 43 99 44 100 45 101 46 102 47 103 48 104 49 105 50 106 51 107 52 108 53 109 54 110 55 111"

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
SPECPACK® 2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL325 Gen10 Plus v2
(2.00 GHz, AMD EPYC 7663)

SPECspeed®2017_fp_base = 160
SPECspeed®2017_fp_peak = 162

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

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

Platform Notes

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

Sysinfo program /cpu2017/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on dl325gen10plus Wed Apr 1 17:28:07 2020

From /proc/cpuinfo
   model name : AMD EPYC 7663 56-Core Processor
   1 "physical id"s (chips)
   112 "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 : 56
   siblings : 112
   physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
   28 29 30 32 33 34 35 36 37 38 40 41 42 43 44 45 46 48 49 50 51 52 53 54 56 57 58 59
   60 61 62

From lscpu:
   Architecture: x86_64
   CPU op-mode(s): 32-bit, 64-bit
   Byte Order: Little Endian
   Address sizes: 48 bits physical, 48 bits virtual
   CPU(s): 112
   On-line CPU(s) list: 0-111
   Thread(s) per core: 2
   Core(s) per socket: 56
   Socket(s): 1
   NUMA node(s): 8
   Vendor ID: AuthenticAMD
   CPU family: 25
   Model: 1
   Model name: AMD EPYC 7663 56-Core Processor

(Continued on next page)
Hewlett Packard Enterprise
ProLiant DL325 Gen10 Plus v2
(2.00 GHz, AMD EPYC 7663)

SPECspeed®2017_fp_base = 160
SPECspeed®2017_fp_peak = 162

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

Test Date: Apr-2021
Hardware Availability: Jun-2021
Software Availability: Mar-2021

Platform Notes (Continued)

Stepping: 1
Frequency boost: enabled
CPU MHz: 2849.274
CPU max MHz: 2000.0000
CPU min MHz: 1500.0000
BogoMIPS: 3992.32
Virtualization: AMD-V
L1d cache: 1.8 MiB
L1i cache: 1.8 MiB
L2 cache: 28 MiB
L3 cache: 256 MiB
NUMA node0 CPU(s): 0-6,56-62
NUMA node1 CPU(s): 7-13,63-69
NUMA node2 CPU(s): 14-20,70-76
NUMA node3 CPU(s): 21-27,77-83
NUMA node4 CPU(s): 28-34,84-90
NUMA node5 CPU(s): 35-41,91-97
NUMA node6 CPU(s): 42-48,98-104
NUMA node7 CPU(s): 49-55,105-111
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, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbds: Not affected
Vulnerability Tsx async abort: Not affected
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 pdpe1gb rdtscp lm constant_tsc rep_good nopl nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3nowprefetch osvw ibr skinit wdt tce topoext perfctr_core perfctr_nb bprext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsgsbase bml1 avx2 smep bmi2 invpcid cqm rdt_a rdsed adx smap clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsave vmprevalid wbinvd arat np tlbbr svm_lock nrip save tsc_scale vmcb_clean flushbyasid decodeassist pfthreshold vmsave_vmload vgif umip pkpu ospe vaes vpclmulqdq rdpid overflow_reco succor smca

/proc/cpuinfo cache data
  cache size : 512 KB

(Continued on next page)
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 4 5 6 56 58 59 60 61 62
    node 0 size: 128774 MB
    node 0 free: 128455 MB
    node 1 cpus: 7 8 9 10 11 12 13 63 64 65 66 67 68 69
    node 1 size: 129020 MB
    node 1 free: 128848 MB
    node 2 cpus: 14 15 16 17 18 19 20 70 71 72 73 74 75 76
    node 2 size: 129020 MB
    node 2 free: 128162 MB
    node 3 cpus: 21 22 23 24 25 26 27 77 78 79 80 81 82 83
    node 3 size: 129020 MB
    node 3 free: 128867 MB
    node 4 cpus: 28 29 30 31 32 33 34 84 85 86 87 88 89 90
    node 4 size: 128996 MB
    node 4 free: 128752 MB
    node 5 cpus: 35 36 37 38 39 40 41 91 92 93 94 95 96 97
    node 5 size: 129020 MB
    node 5 free: 128886 MB
    node 6 cpus: 42 43 44 45 46 47 48 98 99 100 101 102 103 104
    node 6 size: 129020 MB
    node 6 free: 128847 MB
    node 7 cpus: 49 50 51 52 53 54 55 105 106 107 108 109 110 111
    node 7 size: 116906 MB
    node 7 free: 116738 MB
    node distances:
    node  0  1  2  3  4  5  6  7
    0: 10 11 11 11 11 11 11 11
    1: 11 10 11 11 11 11 11 11
    2: 11 11 10 11 11 11 11 11
    3: 11 11 11 10 11 11 11 11
    4: 11 11 11 11 10 11 11 11
    5: 11 11 11 11 11 10 11 11
    6: 11 11 11 11 11 11 10 11
    7: 11 11 11 11 11 11 11 10

From /proc/meminfo

    MemTotal:       1044256396 kB
    HugePages_Total:       0
    Hugepagesize:       2048 kB

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

/usr/bin/lsb_release -d

(Continued on next page)
Platform Notes (Continued)

Ubuntu 20.04.1 LTS

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

debian_version: bullseye/sid
os-release:
    NAME="Ubuntu"
    VERSION="20.04.1 LTS (Focal Fossa)"
    ID=ubuntu
    ID_LIKE=debian
    PRETTY_NAME="Ubuntu 20.04.1 LTS"
    VERSION_ID="20.04"
    HOME_URL="https://www.ubuntu.com/"
    SUPPORT_URL="https://help.ubuntu.com/"

uname -a:
    Linux dl325gen10plus 5.4.0-54-generic #60-Ubuntu SMP Fri Nov 6 10:37:59 UTC 2020
    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): Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2018-3639 (Speculative Store Bypass): Mitigation: usercopy/swaps barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Apr 1 17:23

SPEC is set to: /cpu2017

Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb2 ext4 733G 23G 672G 4% /

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL325 Gen10 Plus
Product Family: ProLiant
Serial: CN79290FKQ

(Continued on next page)
Hewlett Packard Enterprise
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Platform Notes (Continued)

Additional information from dmidecode 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:
  8x UNKNOWN M386AAG40AM3-CWE 128 GB 4 rank 3200
  8x UNKNOWN NOT AVAILABLE

BIOS:
  BIOS Vendor:       HPE
  BIOS Version:      A43
  BIOS Date:         02/15/2021
  BIOS Revision:     2.40
  Firmware Revision: 2.40

(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 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

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

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

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

#### Fortran

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>bwaves</td>
<td>603</td>
<td>649</td>
</tr>
<tr>
<td>fotonik3d</td>
<td>654</td>
<td></td>
</tr>
<tr>
<td>roms</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

------

#### Fortran

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>wrf</td>
<td>621</td>
<td>627</td>
</tr>
<tr>
<td>cam4</td>
<td>628</td>
<td></td>
</tr>
<tr>
<td>pop2</td>
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</table>

#### AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)

Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

------

### 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 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-region-vectorize  
- Wl,-mllvm -Wl,-function-specialize  
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
- Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3  
- fvecclib=AMDLIBM -ffast-math -flto -fstruct-layout=5  
- mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000  
- fremap-arrays -mllvm -function-specialize -flv-function-specialization  
- mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true  
- mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs  
- DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc  
- lflang -lflangrti

**Fortran benchmarks:**

- m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching  
- Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize  
- Wl,-mllvm -Wl,-function-specialize  
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6  
- Wl,-mllvm -Wl,-reduce-array-computations=3 -Hz,1,0x1 -O3  
- march=znver3 -fvecclib=AMDLIBM -ffast-math -Mrecursive  
- mllvm -fuse-tile-inner-loop -funroll-loops  
- mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop  
- mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3  
- mllvm -global-vectorize-slp=true -z muldefs -DSPEC_OPENMP -fopenmp  
- fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti

**Benchmarks using both Fortran and C:**

- m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-enable-X86-prefetching  
- Wl,-mllvm -Wl,-enable-licm-vrp -Wl,-mllvm -Wl,-region-vectorize  
- Wl,-mllvm -Wl,-function-specialize  
- Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL325 Gen10 Plus v2
(2.00 GHz, AMD EPYC 7663)

| SPECspeed®2017_fp_base = 160 |
| SPECspeed®2017_fpPeak = 162 |

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

Test Date: Apr-2021
Hardware Availability: Jun-2021
Software Availability: Mar-2021

Base Optimization Flags (Continued)

Benchmarks using both Fortran and C (continued):
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -Hz,1,0x1
-Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-lflang -lflangrti

Benchmarks using Fortran, C, and C++:
-m64 -mno-adx -mno-sse4a -std=c++98
-Wl,-mllvm -Wl,-x86-use-vzeroupper=false
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3
-mllvm -enable-partial-unswitch -mllvm -unroll-threshold=100
-finline-aggressive -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -convert-pow-exp-to-int=false
-Hz,1,0x1 -Mrecursive -mllvm -fuse-tile-inner-loop -funroll-loops
-mllvm -lsr-in-nested-loop -z muldefs -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamdlibm -ljemalloc -lflang -lflangrti

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:

```plaintext
clang
```

Fortran benchmarks:

```plaintext
flang
```

Benchmarks using both Fortran and C:

```plaintext
flang clang
```

Benchmarks using Fortran, C, and C++:

```plaintext
clang++ clang flang
```

### Peak Portability Flags

Same as Base Portability Flags

### Peak Optimization Flags

C benchmarks:

```plaintext
619.lbm_s: basepeak = yes

638.imagick_s: basepeak = yes

```

Fortran benchmarks:

```plaintext
603.bwaves_s: basepeak = yes

649.fotonik3d_s: basepeak = yes

654.roms_s: basepeak = yes
```

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

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 -mno-adx -mno-sse4a -std=c++98
- -Wl,-mllvm -Wl,-x86-use-vzeroupper=false -Wl,-mllvm -Wl,-enable-licm-vrp
- -Wl,-mllvm -Wl,-function-specialize
- -Wl,-mllvm -Wl,-align-all-nofallback-thru-blocks=6
- -Wl,-mllvm -Wl,-reduce-array-computations=3 -Ofast -march=znver3
- -fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- -mllvm -unroll-threshold=50 -fremap-arrays -flicm-function-specialization
- -mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
- -mllvm -global-vectorize-slp=true -mllvm -function-specialize
- -mllvm -enable-lcim-vrp -mllvm -reduce-array-computations=3
- -finline-aggressive -mllvm -unroll-threshold=100 -mllvm -reroll-loops
- -mllvm -aggressive-loop-unswitch -Mrecursive -DSPEC_OPENMP -fopenmp
- -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-revP.html
# SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**

**ProLiant DL325 Gen10 Plus v2**

**(2.00 GHz, AMD EPYC 7663)**

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<td>HPE</td>
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</table>

**Test Date:** Apr-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

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-revP.xml](http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revP.xml)

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