Hewlett Packard Enterprise
ProLiant DL385 Gen10 Plus
(3.50 GHz, AMD EPYC 73F3)

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

Threads

<table>
<thead>
<tr>
<th>Specbench</th>
<th>32</th>
</tr>
</thead>
<tbody>
<tr>
<td>603.bwaves_s</td>
<td>64</td>
</tr>
<tr>
<td>607.cactuBSSN_s</td>
<td>64</td>
</tr>
<tr>
<td>619.lbm_s</td>
<td>64</td>
</tr>
<tr>
<td>621.wrf_s</td>
<td>64</td>
</tr>
<tr>
<td>627.cam4_s</td>
<td>64</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>64</td>
</tr>
<tr>
<td>638.imagick_s</td>
<td>64</td>
</tr>
<tr>
<td>644.nab_s</td>
<td>64</td>
</tr>
<tr>
<td>649.fotonik3d_s</td>
<td>64</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>64</td>
</tr>
</tbody>
</table>

HPE

OS: Ubuntu 20.04.1 LTS (x86_64)
Kernel 5.4.0-42-generic
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: Yes
Firmware: HPE BIOS Version A42 v2.40 02/15/2021 released Feb-2021
File System: ext4
System State: Run level 5 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Power Management: BIOS set to prefer performance at the cost of additional power usage
SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(3.50 GHz, AMD EPYC 73F3)

SPECspeed®2017_fp_base = 178
SPECspeed®2017_fp_peak = 192

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>
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<th>Seconds</th>
<th>Ratio</th>
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</tr>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>80.8</td>
<td>730</td>
<td>81.3</td>
<td>726</td>
<td>80.9</td>
<td>729</td>
<td>64</td>
<td>78.3</td>
<td>753</td>
<td>78.5</td>
<td>752</td>
<td>78.5</td>
<td>752</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>67.5</td>
<td>247</td>
<td>66.4</td>
<td>251</td>
<td>67.1</td>
<td>249</td>
<td>32</td>
<td>66.4</td>
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<td>252</td>
<td>66.7</td>
<td>250</td>
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<tr>
<td>619.lbm_s</td>
<td>32</td>
<td>50.3</td>
<td>104</td>
<td>50.3</td>
<td>104</td>
<td>50.0</td>
<td>105</td>
<td>64</td>
<td>44.2</td>
<td>118</td>
<td>41.1</td>
<td>127</td>
<td>42.9</td>
<td>122</td>
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<tr>
<td>621.wrf_s</td>
<td>32</td>
<td>83.7</td>
<td>158</td>
<td>87.4</td>
<td>151</td>
<td>86.2</td>
<td>154</td>
<td>32</td>
<td>83.7</td>
<td>158</td>
<td>87.4</td>
<td>151</td>
<td>86.2</td>
<td>154</td>
</tr>
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<td>32</td>
<td>81.7</td>
<td>108</td>
<td>80.8</td>
<td>110</td>
<td>80.8</td>
<td>110</td>
<td>64</td>
<td>65.6</td>
<td>135</td>
<td>65.1</td>
<td>136</td>
<td>65.5</td>
<td>135</td>
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<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>182</td>
<td>65.4</td>
<td>179</td>
<td>66.4</td>
<td>184</td>
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<td>74.6</td>
<td>193</td>
<td>32</td>
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<td>74.6</td>
<td>193</td>
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<td>32</td>
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<td>62.6</td>
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<td>62.3</td>
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<td>51.5</td>
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</tr>
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<td>32</td>
<td>77.8</td>
<td>117</td>
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<td>654.roms_s</td>
<td>32</td>
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<td>237</td>
<td>66.9</td>
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<td>66.8</td>
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<td>32</td>
<td>55.4</td>
<td>284</td>
<td>55.1</td>
<td>286</td>
<td>55.2</td>
<td>285</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 numactl 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.
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
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CPU2017 License: 3  
Test Sponsor: HPE  
Tested by: HPE

Operating System Notes (Continued)

To enable Transparent Hugepages (THP) for all allocations,
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To enable THP only on request for peak runs of 628.pop2_s, and 638.imagick_s,
'echo madvise > /sys/kernel/mm/transparent_hugepage/defrag' run as root.
To disable THP for peak runs of 627.cam4_s, 644.nab_s, 649.fotonik3d_s, and 654.roms_s,
'echo never > /sys/kernel/mm/transparent_hugepage/defrag' run as root.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
GOMP_CPU_AFFINITY = "0-63"
LD_LIBRARY_PATH = 
"/home/cpu2017_B1/amd_speed_aocc300_milan_B_lib/64;/home/cpu2017_B1/amd_speed_aocc300_milan_B_lib/32:"
MALLOC_CONF = "retain:true"
OMP_DYNAMIC = "false"
OMP_SCHEDULE = "static"
OMP_STACKSIZE = "128M"
OMP_THREAD_LIMIT = "64"

Environment variables set by runcpu during the 603.bwaves_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"

Environment variables set by runcpu during the 607.cactuBSSN_s peak run:
GOMP_CPU_AFFINITY = "0-31"

Environment variables set by runcpu during the 619.lbm_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"

Environment variables set by runcpu during the 627.cam4_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"

Environment variables set by runcpu during the 644.nab_s peak run:
GOMP_CPU_AFFINITY = "0 32 1 33 2 34 3 35 4 36 5 37 6 38 7 39 8 40 9 41 10 42
11 43 12 44 13 45 14 46 15 47 16 48 17 49 18 50 19 51 20 52 21 53 22 54
23 55 24 56 25 57 26 58 27 59 28 60 29 61 30 62 31 63"
Environnment Variables Notes (Continued)

Environment variables set by runcpu during the 654.roms_s peak run:
GOMP_CPU_AFFINITY = "0-31"

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
jemalloc 5.1.0 is available here:
https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2

Submitted_by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon May 24 12:46:43 EDT 2021
Submission: cpu2017-20210524-26459.sub

Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Tue Jun  1 09:07:28 EDT 2021
Submission: cpu2017-20210524-26459.sub

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 /home/cpu2017_B1/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on dl385g10v2 Thu Apr  8 22:07:35 2021

SUT (System Under Test) info as seen by some common utilities.

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

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SPECspeed®2017 fp_peak = 192

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

Platform Notes (Continued)

For more information on this section, see https://www.spec.org/cpu2017/Docs/config.html#sysinfo

From /proc/cpuinfo

- model name: AMD EPYC 73F3 16-Core Processor
- 2 "physical id"s (chips)
- 64 "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: 16
- siblings: 32
- physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
- physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

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): 64
- On-line CPU(s) list: 0-63
- Thread(s) per core: 2
- Core(s) per socket: 16
- Socket(s): 2
- NUMA node(s): 16
- Vendor ID: AuthenticAMD
- CPU family: 25
- Model: 1
- Model name: AMD EPYC 73F3 16-Core Processor
- Stepping: 1
- Frequency boost: enabled
- CPU MHz: 1796.202
- CPU max MHz: 3500.0000
- CPU min MHz: 1500.0000
- BogoMIPS: 6986.74
- Virtualization: AMD-V
- L1d cache: 1 MiB
- L1i cache: 1 MiB
- L2 cache: 16 MiB
- L3 cache: 512 MiB
- NUMA node0 CPU(s): 0,1,32,33
- NUMA node1 CPU(s): 2,3,34,35
- NUMA node2 CPU(s): 4,5,36,37
- NUMA node3 CPU(s): 6,7,38,39
- NUMA node4 CPU(s): 8,9,40,41
- NUMA node5 CPU(s): 10,11,42,43
- NUMA node6 CPU(s): 12,13,44,45

(Continued on next page)
Hewlett Packard Enterprise

ProLiant DL385 Gen10 Plus
(3.50 GHz, AMD EPYC 73F3)

SPECspeed®2017_fp_base = 178
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Hewlett Packard Enterprise
(Test Sponsor: HPE)

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

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

Platform Notes (Continued)

NUMA node7 CPU(s): 14,15,46,47
NUMA node8 CPU(s): 16,17,48,49
NUMA node9 CPU(s): 18,19,50,51
NUMA node10 CPU(s): 20,21,52,53
NUMA node11 CPU(s): 22,23,54,55
NUMA node12 CPU(s): 24,25,56,57
NUMA node13 CPU(s): 26,27,58,59
NUMA node14 CPU(s): 28,29,50,51
NUMA node15 CPU(s): 30,31,52,53
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 sanitation
Vulnerability Spectre v2: Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBF 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 rdosp lpae cmp_legacy svm ext_apic cr8_legacy abm sse4a misalignsse 3nowprefetch osvw ibs kfnit wdt tce topoext perfctr_core perfctr_nb bextent perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsfgsbase bm1 avx2 smep bmi2 invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsaves xgetbv1 xsavecr xsavecr cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr wbinvd arat npt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyaid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif umip pkp ospe vaes vpcmulqdq rdpid overflow_recov succor smca

/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 32 33
  node 0 size: 128776 MB
  node 0 free: 128588 MB
  node 1 cpus: 2 3 34 35
  node 1 size: 129022 MB
  node 1 free: 128842 MB
  node 2 cpus: 4 5 36 37

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

**Hewlett Packard Enterprise**  
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ProLiant DL385 Gen10 Plus  
(3.50 GHz, AMD EPYC 73F3)

<table>
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**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE

<table>
<thead>
<tr>
<th>Test Date:</th>
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<tr>
<td>Hardware Availability:</td>
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</tr>
<tr>
<td>Software Availability:</td>
<td>Mar-2021</td>
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</tbody>
</table>

---

## Platform Notes (Continued)

```plaintext
node 2 size: 129022 MB
node 2 free: 128903 MB
node 3 cpus: 6 7 38 39
node 3 size: 129022 MB
node 3 free: 128880 MB
node 4 cpus: 8 9 40 41
node 4 size: 129022 MB
node 4 free: 128890 MB
node 5 cpus: 10 11 42 43
node 5 size: 129022 MB
node 5 free: 128905 MB
node 6 cpus: 12 13 44 45
node 6 size: 129022 MB
node 6 free: 128928 MB
node 7 cpus: 14 15 46 47
node 7 size: 116909 MB
node 7 free: 116817 MB
node 8 cpus: 16 17 48 49
node 8 size: 129022 MB
node 8 free: 128955 MB
node 9 cpus: 18 19 50 51
node 9 size: 128998 MB
node 9 free: 128919 MB
node 10 cpus: 20 21 52 53
node 10 size: 129022 MB
node 10 free: 128935 MB
node 11 cpus: 22 23 54 55
node 11 size: 129022 MB
node 11 free: 128876 MB
node 12 cpus: 24 25 56 57
node 12 size: 129022 MB
node 12 free: 128954 MB
node 13 cpus: 26 27 58 59
node 13 size: 129022 MB
node 13 free: 128952 MB
node 14 cpus: 28 29 60 61
node 14 size: 129022 MB
node 14 free: 128955 MB
node 15 cpus: 30 31 62 63
node 15 size: 129022 MB
node 15 free: 128918 MB
node distances:
node 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
0: 10 11 11 11 11 11 11 11 32 32 32 32 32 32 32 32
```

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

```plaintext
```

From /proc/meminfo
- MemTotal: 2101226108 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 20.04.1 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 dl385g10v2 5.4.0-42-generic #46-Ubuntu SMP Fri Jul 10 00:24:02 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

(Continued on next page)
Hewlett Packard Enterprise
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

Platform Notes (Continued)

Microarchitectural Data Sampling:
CVE-2017-5754 (Meltdown):
CVE-2018-3639 (Speculative Store Bypass):
CVE-2017-5753 (Spectre variant 1):
CVE-2017-5715 (Spectre variant 2):
CVE-2020-0543 (Special Register Buffer Data Sampling):
CVE-2019-11135 (TSX Asynchronous Abort):

run-level 5 Apr 8 22:05

SPEC is set to: /home/cpu2017_B1

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL385 Gen10 Plus
Product Family: ProLiant
Serial: CN79340HC3

Additional information from dmiidcode follows. WARNING: Use caution when you interpret this section. The 'dmiidcode' 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 UNKNOWN M386AAG40AM3-CWE 128 GB 4 rank 3200
16x UNKNOWN NOT AVAILABLE

BIOS:
BIOS Vendor: HPE
BIOS Version: A42
BIOS Date: 02/15/2021
BIOS Revision: 2.40
Firmware Revision: 2.40

(End of data from sysinfo program)
## SPEC CPU®2017 Floating Point Speed Result

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<td>SPECspeed®2017_fp_peak = 192</td>
</tr>
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<td>Tested by: HPE</td>
<td></td>
</tr>
</tbody>
</table>

### Compiler Version Notes

<table>
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<th>C</th>
<th>619.lbm_s(base, peak) 638.imagick_s(base, peak) 644.nab_s(base, peak)</th>
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</thead>
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<tr>
<td>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</td>
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<th>C++, C, Fortran</th>
<th>607.cactuBSSN_s(base, peak)</th>
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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(3.50 GHz, AMD EPYC 73F3)

 SPECspeed®2017_fp_base = 178
 SPECspeed®2017_fp_peak = 192

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

Compiler Version Notes (Continued)

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

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
SPEC CPU®2017 Floating Point Speed Result

SPECspeed®2017_fp_base = 178
SPECspeed®2017_fp_peak = 192

Hewlett Packard Enterprise
(3.50 GHz, AMD EPYC 73F3)

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
- fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
- freemap-arrays -mllvm -function-specialize -flv-function-specialization
- mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
- mllvm -enable-lcm-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-lcm-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 -fveclib=AMDLIBM -ffast-math -Mrecursive
- mllvm -fuse-tile-inner-loop -funroll-loops
- mllvm -extra-vectorizer-passes -mllvm -lsr-in-nested-loop
- mllvm -enable-lcm-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-lcm-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 -O3 -march=znver3
- fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
- mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000
- freemap-arrays -mllvm -function-specialize -flv-function-specialization
- mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
- mllvm -enable-lcm-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

(Continued on next page)
Hewlett Packard Enterprise

ProLiant DL385 Gen10 Plus
(3.50 GHz, AMD EPYC 73F3)

SPECspeed®2017_fp_base = 178
SPECspeed®2017_fp_peak = 192

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

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

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
- -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-lcm-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 -lrs-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:
clang

Fortran benchmarks:
flang

Benchmarks using both Fortran and C:
flang clang

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

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: -m64 -mno-adx -mno-sse4a
-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 -flv-function-specialization
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist
-mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-lcm-vrp
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamlb -ljemalloc -lflang

638. imagick_s: basepeak = yes

644. nab_s: -m64 -mno-adx -mno-sse4a -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -function-specialize -mllvm -enable-lcm-vrp
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamlb -ljemalloc -lflang

Fortran benchmarks:

603. bwaves_s: -m64 -mno-adx -mno-sse4a
-Wl,-mllvm -Wl,-enable-X86-prefetching
-Wl,-mllvm -Wl,-enable-lcm-vrp
-Wl,-mllvm -Wl,-function-specialize

(Continued on next page)
Hewlett Packard Enterprise  
ProLiant DL385 Gen10 Plus  
(3.50 GHz, AMD EPYC 73F3)

SPECspeed®2017_fp_base = 178  
SPECspeed®2017_fp_peak = 192

Peak Optimization Flags (Continued)

603.bwaves_s (continued):
-Wl, -mllvm -Wl, -align-all-nofallthru-blocks=6  
-Wl, -mllvm -Wl, -reduce-array-computations=3 -Ofast  
-march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive  
-mllvm -reduce-array-computations=3  
-mllvm -global-vectorize-slp=true -mllvm -enable-licm-vrp  
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm  
-ljemalloc -lflang

649.fotonik3d_s: basepeak = yes

654.roms_s: Same as 603.bwaves_s

Benchmarks using both Fortran and C:

621.wrf_s: basepeak = yes

627.cam4_s: -m64 -mno-adx -mno-sse4a  
-Wl, -mllvm -Wl, -enable-X86-prefetching  
-Wl, -mllvm -Wl, -enable-licm-vrp  
-Wl, -mllvm -Wl, -function-specialize  
-Wl, -mllvm -Wl, -align-all-nofallthru-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 -flv-function-specialization  
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist  
-mllvm -global-vectorize-slp=true  
-mllvm -function-specialize -mllvm -enable-licm-vrp  
-mllvm -reduce-array-computations=3 -Mrecursive  
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm  
-ljemalloc -lflang

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-nofallthru-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 -flv-function-specialization  
-mllvm -inline-threshold=1000 -mllvm -enable-gvn-hoist  
-mllvm -global-vectorize-slp=true -mllvm -function-specialize  
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus
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SPECspeed®2017_fp_base = 178
SPECspeed®2017_fp_peak = 192

Peak Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-flinline-aggressive -mllvm -unroll-threshold=100 -mllvm -reroll-loops
-mllvm -aggressive-loop-unswitch -Mrecursive -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -lamlb1ibm -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

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

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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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