### SPEC CPU®2017 Floating Point Speed Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL365 Gen10 Plus  
(3.50 GHz, AMD EPYC 73F3)  

<table>
<thead>
<tr>
<th>SPECspeed®2017_fp_base</th>
<th>178</th>
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</thead>
<tbody>
<tr>
<td>SPECspeed®2017_fp_peak</td>
<td>192</td>
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**CPU2017 License:** 3  
**Test Sponsor:** HPE  
**Tested by:** HPE  
**Test Date:** May-2021  
**Hardware Availability:** Jun-2021  
**Software Availability:** Mar-2021

<table>
<thead>
<tr>
<th>Threads</th>
<th>603.bwaves_s</th>
<th>607.cactuBSSN_s</th>
<th>619.ibm_s</th>
<th>621.wrf_s</th>
<th>627.cam4_s</th>
<th>628.pop2_s</th>
<th>638.imagick_s</th>
<th>644.nab_s</th>
<th>649.fotonik3d_s</th>
<th>654.roms_s</th>
<th>SPECspeed®2017_fp_base (178)</th>
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<tr>
<td>32</td>
<td>64</td>
<td>32</td>
<td>64</td>
<td>32</td>
<td>64</td>
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<td>32</td>
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<td>32</td>
<td>SPECspeed®2017_fp_base (178)</td>
<td>SPECspeed®2017_fp_peak (192)</td>
</tr>
</tbody>
</table>

#### Hardware

- **CPU Name:** AMD EPYC 73F3  
- **Max MHz:** 4000  
- **Nominal:** 3500  
- **Enabled:** 32 cores, 2 chips, 2 threads/core  
- **Orderable:** 1.2 chip(s)  
- **Cache L1:** 32 KB I + 32 KB D on chip per core  
- **L2:** 512 KB I+D on chip per core  
- **L3:** 256 MB I+D on chip per chip, 32 MB shared / 2 cores  
- **Other:** None  
- **Memory:** 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)  
- **Storage:** 1 x 196 GB SATA SSD, RAID 0  
- **Other:** None

#### Software

- **OS:** Ubuntu 20.04.1 LTS (x86_64)  
- **Kernel:** 5.4.0-56-generic  
- **Compiler:** C/C++/Fortran: Version 3.0.0 of AOCC  
- **Parallel:** Yes  
- **Firmware:** HPE BIOS Version A42 v2.42 04/29/2021 released Apr-2021  
- **File System:** ext4  
- **System State:** Run level 5 (multi-user)  
- **Base Pointers:** 64-bit  
- **Peak Pointers:** 64-bit  
- **Other:** jemalloc: jemalloc memory allocator library v5.1.0  
- **Power Management:** BIOS set to prefer performance at the cost of additional power usage
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| 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>
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<tbody>
<tr>
<td>603.bwaves_s</td>
<td>32</td>
<td>80.7</td>
<td>711</td>
<td>81.2</td>
<td>727</td>
<td>81.4</td>
<td>725</td>
<td>64</td>
<td>78.0</td>
<td>756</td>
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<tr>
<td>607.cactuBSSN_s</td>
<td>32</td>
<td>66.3</td>
<td>252</td>
<td>67.0</td>
<td>249</td>
<td>66.0</td>
<td>253</td>
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<td>66.3</td>
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<td>67.0</td>
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<tr>
<td>619.lbm_s</td>
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<td>51.3</td>
<td>102</td>
<td>50.4</td>
<td>104</td>
<td>50.6</td>
<td>103</td>
<td>64</td>
<td>46.7</td>
<td>112</td>
<td>42.6</td>
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<tr>
<td>621.wrf_s</td>
<td>32</td>
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<td>149</td>
<td>87.6</td>
<td>151</td>
<td>85.7</td>
<td>154</td>
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<td>88.9</td>
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<tr>
<td>627.cam4_s</td>
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<td>80.8</td>
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<td>628.pop2_s</td>
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<tr>
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<td>649.fotonik3d_s</td>
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<tr>
<td>654.roms_s</td>
<td>32</td>
<td>67.8</td>
<td>232</td>
<td>66.5</td>
<td>237</td>
<td>66.1</td>
<td>238</td>
<td>32</td>
<td>55.2</td>
<td>285</td>
<td>55.7</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.

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

To enable Transparent Hugepages (THP) for all allocations,
'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, and 638.imagick_s,
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' 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/enabled' 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/SPEC_CPU2017/amd_speed_aocc300_milan_B_lib/64;/home/SPEC_CPU2017/
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 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"

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 (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

Submitted by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>
Submitted: Mon Jun 7 11:50:18 EDT 2021
Submission: cpu2017-20210607-26881.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
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

Sysinfo program /home/SPEC_CPU2017/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080af8aa89d43b38e2f1c
running on admin Wed Apr 1 17:26:01 2020

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 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.)

(Continued on next page)
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Hardware Availability: Jun-2021
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Platform Notes (Continued)

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: 3818.578
CPU max MHz: 3500.0000
CPU min MHz: 1500.0000
BogoMIPS: 6987.05
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
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): 28,29,60,61
NUMA node15 CPU(s): 30,31,62,63

(Continued on next page)
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Platform Notes (Continued)

Vulnerability Itlb multihit: Not affected
Vulnerability L1t: Not affected
Vulnerability Mds: Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spectre 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, 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 3dnowprefetch osvw ibs skinit wdt tce topoext perfctr_core perfctr_nb bplext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmcall fsgsbase bml1 avx2 smep bmi2 invpcid cmq rdt_a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsaves cqm_llc cmq_occup_llc cmq_mbb_total cmq_mbb_local clzero irperf xsaverprtr wbnoinvd arat npt lbv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pfthreshold v_vmsave_vmlodg vmsaveopt vaes vpclmulqdq 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: 128775 MB
  node 0 free: 128599 MB
  node 1 cpus: 2 3 34 35
  node 1 size: 129022 MB
  node 1 free: 128907 MB
  node 2 cpus: 4 5 36 37
  node 2 size: 129022 MB
  node 2 free: 128907 MB
  node 3 cpus: 6 7 38 39
  node 3 size: 129022 MB
  node 3 free: 128907 MB
  node 4 cpus: 8 9 40 41
  node 4 size: 129022 MB
  node 4 free: 128853 MB
  node 5 cpus: 10 11 42 43

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

<table>
<thead>
<tr>
<th>node 5</th>
<th>size: 129022 MB</th>
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<tbody>
<tr>
<td>node 5</td>
<td>free: 128923 MB</td>
</tr>
<tr>
<td>node 6</td>
<td>cpus: 12 13 44 45</td>
</tr>
<tr>
<td>node 6</td>
<td>size: 129022 MB</td>
</tr>
<tr>
<td>node 6</td>
<td>free: 128805 MB</td>
</tr>
<tr>
<td>node 7</td>
<td>cpus: 14 15 46 47</td>
</tr>
<tr>
<td>node 7</td>
<td>size: 116909 MB</td>
</tr>
<tr>
<td>node 7</td>
<td>free: 116803 MB</td>
</tr>
<tr>
<td>node 8</td>
<td>cpus: 16 17 48 49</td>
</tr>
<tr>
<td>node 8</td>
<td>size: 129022 MB</td>
</tr>
<tr>
<td>node 8</td>
<td>free: 128954 MB</td>
</tr>
<tr>
<td>node 9</td>
<td>cpus: 18 19 50 51</td>
</tr>
<tr>
<td>node 9</td>
<td>size: 129022 MB</td>
</tr>
<tr>
<td>node 9</td>
<td>free: 128947 MB</td>
</tr>
<tr>
<td>node 10</td>
<td>cpus: 20 21 52 53</td>
</tr>
<tr>
<td>node 10</td>
<td>size: 129022 MB</td>
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<tr>
<td>node 10</td>
<td>free: 128948 MB</td>
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<tr>
<td>node 11</td>
<td>cpus: 22 23 54 55</td>
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<tr>
<td>node 11</td>
<td>free: 128958 MB</td>
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<tr>
<td>node 12</td>
<td>cpus: 24 25 56 57</td>
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<tr>
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<td>size: 129022 MB</td>
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<tr>
<td>node 12</td>
<td>free: 128947 MB</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>node distances:</th>
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</thead>
<tbody>
<tr>
<td>node 0</td>
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<tr>
<td>0: 10</td>
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Platform Notes (Continued)


From /proc/meminfo
  MemTotal:       2101225512 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

/sbin/tuned-adm active
  Current active profile: balanced

/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 admin 5.4.0-56-generic #62-Ubuntu SMP Mon Nov 23 19:20:19 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/swapgs barriers and __user pointer sanitation
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline,
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</table>

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**Platform Notes (Continued)**

IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling

CVE-2020-0543 (Special Register Buffer Data Sampling): Not affected
CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Apr 1 17:24

SPEC is set to: /home/SPEC_CPU2017

```
Filesystem                        Type  Size  Used Avail Use% Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv ext4  196G   42G  145G  23% /
```

From /sys/devices/virtual/dmi/id
Vendor:         HPE
Product:        ProLiant DL365 Gen10 Plus
Product Family: ProLiant
Serial:         CN70430NKR

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 SBMIOSt standard.

Memory:
  16x Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200
  16x UNKNOWN NOT AVAILABLE

BIOS:
  BIOS Vendor:         HPE
  BIOS Version:       A42
  BIOS Date:          04/29/2021
  BIOS Revision: 2.42
  Firmware Revision: 2.42

(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

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus
(3.50 GHz, AMD EPYC 73F3)

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

Compiler Version Notes (Continued)

-------------------
C++, C, Fortran | 607.cactusSSN_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
-------------------
Fortran         | 603.bwaves_s(base, peak) 649.fotonik3d_s(base, peak)
| 654.roms_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
-------------------
Fortran, C      | 621.wrf_s(base, peak) 627.cam4_s(base, peak)
| 628.pop2_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
SPEC CPU®2017 Floating Point Speed Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus
(3.50 GHz, AMD EPYC 73F3)

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

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<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Mar-2021</td>
</tr>
</tbody>
</table>

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,-mllv -Wl,-region-vectorize
-Wl,-mllv -Wl,-function-specialize
-Wl,-mllv -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllv -Wl,-reduce-array-computations=3 -03 -march=znver3
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllv -unroll-threshold=50 -mllv -inline-threshold=1000
-freemap-arrays -mllv -function-specialize -flv-function-specialization
-mllv -enable-gvn-hoist -mllv -global-vectorize-slp=true
-mllv -enable-lcm-vrp -mllv -reduce-array-computations=3 -z muldefs
-DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -lamdlibm -ljemalloc
-1flang -1flangrti

Fortran benchmarks:
-m64 -mno-adx -mno-sse4a -Wl,-mllv -Wl,-enable-X86-prefetching

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

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 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: May-2021
Hardware Availability: Jun-2021
Software Availability: Mar-2021

Base Optimization Flags (Continued):

Fortran benchmarks (continued):
- -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,1,0xl -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-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
- -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,1,0xl
- -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,1,0xl -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
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL365 Gen10 Plus
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SPECspeed\textsuperscript{\textregistered}2017\_fp\_peak = 192
SPECspeed\textsuperscript{\textregistered}2017\_fp\_base = 178

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Base Other Flags

C benchmarks:
- \texttt{-Wno-unused-command-line-argument} \texttt{-Wno-return-type}

Fortran benchmarks:
- \texttt{-Wno-unused-command-line-argument} \texttt{-Wno-return-type}

Benchmarks using both Fortran and C:
- \texttt{-Wno-unused-command-line-argument} \texttt{-Wno-return-type}

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

Peak Compiler Invocation

C benchmarks:
\texttt{clang}

Fortran benchmarks:
\texttt{flang}

Benchmarks using both Fortran and C:
\texttt{flang clang}

Benchmarks using Fortran, C, and C++:
\texttt{clang++ clang flang}

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

\texttt{619.lbm.s: -m64 -mno-adx -mno-sse4a}
\texttt{-Wl, -mllvm -Wl, function-specialize}
\texttt{-Wl, -mllvm -Wl, align-all-nofallthru-blocks=6}
\texttt{-Wl, -mllvm -Wl, reduce-array-computations=3 -Ofast}
\texttt{-march=znver3 -fveclib=AMDLIBM -ffast-math -flto}
\texttt{-fstruct-layout=5 -mllvm -unroll-threshold=50}

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

619.lbm_s (continued):
- -fremap-arrays -flv-function-specialization
- -mlllvm -inline-threshold=1000 -mlllvm -enable-gvn-hoist
- -mlllvm -global-vectorize-slp=true
- -mlllvm -function-specialize -mlllvm -enable-lcm-vrp
- -mlllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
  - fopenmp=libomp -lomp -ldlmdlibm -ljemalloc -lflang

638.imagick_s: basepeak = yes

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

Fortran benchmarks:

603.bwaves_s: -m64 -mno-adx -mno-sse4a
- -Wl,-mlllvm -Wl,-enable-X86-prefetching
- -Wl,-mlllvm -Wl,-enable-lcm-vrp
- -Wl,-mlllvm -Wl,-function-specialize
- -Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
- -Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast
- -march=znver3 -fveclib=AMDLIBM -ffast-math -Mrecursive
- -mlllvm -reduce-array-computations=3
- -mlllvm -global-vectorize-slp=true -mlllvm -enable-lcm-vrp
- -DSPEC_OPENMP -fopenmp -fopenmp=libomp -lomp -ldlmdlibm
- -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,-mlllvm -Wl,-enable-X86-prefetching
- -Wl,-mlllvm -Wl,-enable-lcm-vrp
- -Wl,-mlllvm -Wl,-function-specialize
Hewlett Packard Enterprise
ProLiant DL365 Gen10 Plus
(3.50 GHz, AMD EPYC 73F3)

CPU2017 License: 3
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Tested by: HPE
Hardware Availability: Jun-2021
Software Availability: Mar-2021

**Peak Optimization Flags (Continued)**

```
627.cam4_s (continued):
   -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++:
```
607.cactuBSSN_s: basepeak = yes
```

**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


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-revQ.xml
Hewlett Packard Enterprise
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