Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen10 Plus
(3.00 GHz, AMD EPYC 7313P)

SPECspeed®2017_fp_base = 111
SPECspeed®2017_fp_peak = 117

<table>
<thead>
<tr>
<th>Threads</th>
<th>SPECspeed®2017_fp_base=111</th>
<th>SPECspeed®2017_fp_peak=117</th>
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</thead>
<tbody>
<tr>
<td>603.bwaves_s 16</td>
<td></td>
<td>154</td>
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<tr>
<td>607.cactuBSSN_s 16</td>
<td></td>
<td>55.0</td>
</tr>
<tr>
<td>619.libm_s 16</td>
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<tr>
<td>621.wrf_s 16</td>
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<td></td>
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<tr>
<td>627.cam4_s 16</td>
<td>66.6</td>
<td></td>
</tr>
<tr>
<td>628.pop2_s 16</td>
<td>84.2</td>
<td></td>
</tr>
<tr>
<td>638.imagick_s 16</td>
<td>101</td>
<td></td>
</tr>
<tr>
<td>644.nab_s 16</td>
<td>143</td>
<td></td>
</tr>
<tr>
<td>649.fotonik3d_s 16</td>
<td>67.6</td>
<td></td>
</tr>
<tr>
<td>654.roms_s 16</td>
<td>123</td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

- CPU Name: AMD EPYC 7313P
- Max MHz: 3700
- Nominal: 3000
- Enabled: 16 cores, 1 chip, 2 threads/core
- Orderable: 1 chip
- Cache L1: 32 KB I+ 32 KB D on chip per core
- L2: 512 KB I+D on chip per core
- L3: 128 MB I+D on chip per chip, 32 MB shared / 4 cores
- Other: None
- Memory: 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)
- Storage: 1 x 480 GB SAS 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 A43 v2.42 04/15/2021 released Apr-2021
- File System: ext4
- System State: Run level 5 (multi-user)
- Base Pointers: 64-bit
- Peak Pointers: 64-bit
- Other: jemalloc: malloc memory allocator library v5.1.0
- Power Management: BIOS set to prefer performance at the cost of additional power usage
## 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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<td>55.0</td>
<td>95.2</td>
<td>55.0</td>
<td>94.8</td>
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<td>66.6</td>
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<td>628.pop2_s</td>
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<td>84.0</td>
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<td>141</td>
<td>84.3</td>
</tr>
<tr>
<td>638.imagick_s</td>
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<td>101</td>
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<td>99.7</td>
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<td>644.nab_s</td>
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<td>122</td>
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<td>16</td>
<td>134</td>
<td>67.8</td>
<td>135</td>
<td>67.6</td>
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</tr>
<tr>
<td>654.roms_s</td>
<td>16</td>
<td>128</td>
<td>123</td>
<td>128</td>
<td>123</td>
<td>128</td>
<td>123</td>
</tr>
</tbody>
</table>

### Compiler Notes


### Submit Notes

The config file option 'submit' was used.

### 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.

To enable Transparent Hugepages (THP) for all allocations,
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL345 Gen10 Plus  
(3.00 GHz, AMD EPYC 7313P)  

**SPECspeed®2017_fp_base = 111**  
**SPECspeed®2017_fp_peak = 117**

<table>
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<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Apr-2021</th>
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<tbody>
<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Jun-2021</td>
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<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Mar-2021</td>
</tr>
</tbody>
</table>

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**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, 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 = "0-31"  
LD_LIBRARY_PATH =  
"/home/SPEC_CPU2017/cpu2017/amd_speed_aocc300_milan_B_lib/64;/home/SPEC_CPU2017/cpu2017/amd_speed_aocc300_milan_B_lib/32;"  
MALLOC_CONF = "retain:true"  
OMP_DYNAMIC = "false"  
OMP_SCHEDULE = "static"  
OMP_STACKSIZE = "128M"  
OMP_THREAD_LIMIT = "32"

Environment variables set by runcpu during the 603.bwaves_s peak run:  
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 619.lbm_s peak run:  
GOMP_CPU_AFFINITY = "0-15"

Environment variables set by runcpu during the 644.nab_s peak run:  
GOMP_CPU_AFFINITY = "0 16 1 17 2 18 3 19 4 20 5 21 6 22 7 23 8 24 9 25 10 26 11 27 12 28 13 29 14 30 15 31"

Environment variables set by runcpu during the 654.roms_s peak run:  
GOMP_CPU_AFFINITY = "0-15"

---

**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.

(Continued on next page)
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL345 Gen10 Plus  
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<td>117</td>
</tr>
</tbody>
</table>

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

General Notes (Continued)

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

Platform Notes

BIOS Configuration

Workload Profile set to General Peak Frequency Compute  
Thermal Configuration set to Maximum Cooling  
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  
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/cpu2017/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on admin Wed Apr  1 17:36:30 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 7313P 16-Core Processor  
1 "physical id"s (chips)  
32 "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

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): 32  
On-line CPU(s) list: 0-31  
Thread(s) per core: 2  
Core(s) per socket: 16  
Socket(s): 1

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

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SPECspeed®2017_fp_base = 111
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CPU2017 License: 3
Test Sponsor: HPE
Test Date: Apr-2021
Tested by: HPE
Hardware Availability: Jun-2021
Software Availability: Mar-2021

Platform Notes (Continued)

NUMA node(s): 4
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7313P 16-Core Processor
Stepping: 1
Frequency boost: enabled
CPU MHz: 3534.571
CPU max MHz: 3000.0000
CPU min MHz: 1500.0000
BogoMIPS: 5988.83
Virtualization: AMD-V
L1d cache: 512 KiB
L1i cache: 512 KiB
L2 cache: 8 MiB
L3 cache: 128 MiB
NUMA node0 CPU(s): 0-3,16-19
NUMA node1 CPU(s): 4-7,20-23
NUMA node2 CPU(s): 8-11,24-27
NUMA node3 CPU(s): 12-15,28-31
Vulnerability Itlb multihit: Not affected
Vulnerability Lttf: 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 pdelgr ndtsc pml constant tsc rep_good nopl nonstop tsc cdpu extd_apicid aperfmperf pii 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 osuw ibs kini wt tce topoext perfctr core perfctr nb pbext perfctr llc mwaitx cpb cat_l3 cd_p13 invpcid single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsqgsbase bmi1 avx2 smep bmi2 invpcid cqm rdt_a rdseed adx smap clflushopt clwb sha ni xsaveopt xsavec xgetbv1 xsavevs cqm_llc cqm_occup llc cqm_mbb_total cqm_mbb_local clzero irperf xsaveserptr wbinvd arat npt lbv svm_lock nrip_save tsc_scale vmcb clean flushbyasid decodeassists pdesel ptdwidth pfthreshold v_vmsave_vmload vgif umip pkpu ospke vaes vpclmulqdq rdpid overflow_recov succor smca

/proc/cpuinfo cache data
  cache size : 512 KB

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

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ProLiant DL345 Gen10 Plus
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SPECspeed®2017_fp_base = 111
SPECspeed®2017_fp_peak = 117

| CPU2017 License: | 3 |
| Test Sponsor: | HPE |
| Tested by: | HPE |
| Test Date: | Apr-2021 |
| Hardware Availability: | Jun-2021 |
| Software Availability: | Mar-2021 |

Platform Notes (Continued)

From numactl –hardware WARNING: a numactl 'node' might or might not correspond to a physical chip.

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 16 17 18 19
node 0 size: 257800 MB
node 0 free: 257299 MB
node 1 cpus: 4 5 6 7 20 21 22 23
node 1 size: 258046 MB
node 1 free: 257828 MB
node 2 cpus: 8 9 10 11 24 25 26 27
node 2 size: 258046 MB
node 2 free: 257846 MB
node 3 cpus: 12 13 14 15 28 29 30 31
node 3 size: 245910 MB
node 3 free: 245442 MB
node distances:

node 0 1 2 3
0: 10 11 11 11
1: 11 10 11 11
2: 11 11 10 11
3: 11 11 11 10

From /proc/meminfo
MemTotal: 1044278376 kB
HugePages_Total: 0
Hugepagesize: 2048 kB
/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:

(Continued on next page)
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SPECspeed\textsuperscript{®}2017\_fp\_peak = 117

CPU2017 License: 3
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Tested by: HPE

Platform Notes (Continued)

Linux admin 5.4.0-56-generic #62-Ubuntu SMP Mon Nov 23 19:20:19 UTC 2020
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/swapgs barriers and \_user pointer sanitization
CVE-2017-5715 (Spectre variant 2): Mitigation: Full AMD retpoline, IBFB: 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 17:23

SPEC is set to: /home/SPEC_CPU2017/cpu2017

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL345 Gen10 Plus
Product Family: ProLiant
Serial: J20APP000K

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 Samsung M386AAG40AM3-CWE 128 GB 4 rank 3200
8x UNKNOWN NOT AVAILABLE

BIOS:
BIOS Vendor: HPE
BIOS Version: A43
BIOS Date: 04/15/2021
BIOS Revision: 2.42
Firmware Revision: 2.40

(Continued on next page)
Platform Notes (Continued)

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C               | 619.libm_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
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Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin
-----------------------------------------------------------------------------
Portran         | 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
-----------------------------------------------------------------------------
(Continued on next page)
Compiler Version Notes (Continued)

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
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

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

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

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
-fveclib=AMDLIBM -ffast-math -flto -fstruct-layout=5
-mllvm -unroll-threshold=50 -mllvm -inlinethreshold=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 -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,1,0xl -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-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 -inlinethreshold=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 -Hz,1,0xl
-Mrecursive -mllvm -funroll-loops -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)
### 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-l icmp-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:
- `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-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 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -sladllibm -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-licm-vrp
-mllvm -reduce-array-computations=3 -DSPEC_OPENMP -fopenmp
-fopenmp=libomp -lomp -sladllibm -ljemalloc -lflang

Fortran benchmarks:

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

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen10 Plus
(3.00 GHz, AMD EPYC 7313P)

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

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**SPECspeed®2017_fp_base = 111**

**SPECspeed®2017_fp_peak = 117**

<table>
<thead>
<tr>
<th>CPU2017 License: 3</th>
<th>Test Date: Apr-2021</th>
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<tr>
<td>Test Sponsor: HPE</td>
<td>Hardware Availability: Jun-2021</td>
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<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Mar-2021</td>
</tr>
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</table>

**Peak Optimization Flags (Continued)**

603.bwaves_s (continued):
- `-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-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: basepeak = yes
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:

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
(3.00 GHz, AMD EPYC 7313P)

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- **Test Date:** Apr-2021
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- **CPU2017 License:** 3
- **Test Sponsor:** HPE
- **Tested by:** HPE

You can also download the XML flags sources by saving the following links:

- [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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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