Hewlett Packard Enterprise
ProLiant DL345 Gen10 Plus
(3.20 GHz, AMD EPYC 74F3)

CPU2017 License: 3
Test Sponsor: HPE
Test Date: May-2021

Tested by: HPE
Hardware Availability: Jun-2021

Software
OS: Ubuntu 20.04.1 LTS (x86_64)
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: No
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: 32/64-bit
Power Management: BIOS set to prefer performance at the cost of additional power usage

Hardware
CPU Name: AMD EPYC 74F3
Max MHz: 4000
Nominal: 3200
Enabled: 24 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: 256 MB I+D on chip per chip, 32 MB shared / 3 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

SPECrate®2017_int_base = 224
SPECrate®2017_int_peak = 231

0 30.0 60.0 90.0 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570

0 30.0 60.0 90.0 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570

500.perlbench_r 48
502.gcc_r 48
505.mcf_r 48
520.omnetpp_r 48
523.xalancbmk_r 48
525.x264_r 48
531.deepsjeng_r 48
541.leela_r 48
548.exchange2_r 48
557.xz_r 48

163 180
112 270
279
190
201
127
128

SPECrate®2017_int_base (224)
SPECrate®2017_int_peak (231)
SPEC CPU®2017 Integer Rate Result

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Results Table

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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Compiler Notes

The AMD64 AOCC Compiler Suite is available at http://developer.amd.com/amd-aocc/

Submit Notes

The config file option 'submit' was used. 'numactl' was used to bind copies to the cores. See the configuration file for details.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
'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/enabled' and

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

'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root for peak integer runs and all FP runs to enable Transparent Hugepages (THP).
'echo madvise > /sys/kernel/mm/transparent_hugepage/enabled' run as root for base integer runs to enable THP only on request.

Environment Variables Notes

Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = 
    "/home/SPEC_CPU2017/cpu2017/amd_rate_aocc300_milan_A_lib/64;/home/SPEC_CPU2017/cpu2017/amd_rate_aocc300_milan_A_lib/32:" 
MALLOC_CONF = "retain:true"

Environment variables set by runcpu during the 523.xalancbmk_r peak run:
MALLOC_CONF = "thp:never"

General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 512GiB 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 May 24 12:30:16 EDT 2021
Submission: cpu2017-20210524-26409.sub

Platform Notes

BIOS Configuration
Workload Profile set to General Throughput 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 Four memory domains per socket

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

Infinity Fabric Power Management set to Disabled  
Infinity Fabric Performance State set to P0  
Thermal Configuration set to Maximum Cooling  
Workload Profile set to Custom  
L2 HW Prefetcher set to Disabled

Sysinfo program /home/SPEC_CPU2017/cpu2017/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on admin Wed Apr 1 17:34:24 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 74F3 24-Core Processor  
- 1 "physical id"s (chips)  
- 48 "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: 24  
  - siblings: 48  
  - physical 0: cores 0 1 2 4 5 6 8 9 10 12 13 14 16 17 18 20 21 22 24 25 26 28 29 30

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): 48  
- On-line CPU(s) list: 0-47  
- Thread(s) per core: 2  
- Core(s) per socket: 24  
- Socket(s): 1  
- NUMA node(s): 8  
- Vendor ID: AuthenticAMD  
- CPU family: 25  
- Model: 1  
- Model name: AMD EPYC 74F3 24-Core Processor  
- Stepping: 1  
- CPU MHz: 2394.582  
- BogoMIPS: 6387.73  
- Virtualization: AMD-V  
- L1d cache: 768 KiB  
- L1i cache: 768 KiB  
- L2 cache: 12 MiB  
- L3 cache: 256 MiB
### Platform Notes (Continued)

NUMA node0 CPU(s): 0-2, 24-26
NUMA node1 CPU(s): 3-5, 27-29
NUMA node2 CPU(s): 6-8, 30-32
NUMA node3 CPU(s): 9-11, 33-35
NUMA node4 CPU(s): 12-14, 36-38
NUMA node5 CPU(s): 15-17, 39-41
NUMA node6 CPU(s): 18-20, 42-44
NUMA node7 CPU(s): 21-23, 45-47
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 Srbd: 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 rdscrp 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 ibs kirit wdt tce topoext perfctr_core perfctr_nb bpreg perfctr_11c mwattx cpb cat_13 cdp_13 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmcall fsqsbases bml1 avx2 sme pml2 invpced cqm rdt_a rdseed adx smap clflushopt clwb sha_xni xsaveopt xsavec xgetbv1 xsavees cqm_11c cqm_occup_11c cqm_mbb_total cqm_mbb_local clzero irperf xsaveerpt wboinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyaid decodeassists pausefilter pfthreshold v_vmsave_vmload vgif umip pkv ospeka 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: 8 nodes (0-7)
node 0 cpus: 0 1 2 24 25 26
node 0 size: 128776 MB
node 0 free: 128263 MB
node 1 cpus: 3 4 5 27 28 29
node 1 size: 128996 MB
node 1 free: 128797 MB
node 2 cpus: 6 7 8 30 31 32
node 2 size: 129022 MB


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**Platform Notes (Continued)**

node 2 free: 128867 MB
node 3 cpus:  9 10 11 33 34 35
node 3 size: 129021 MB
node 3 free: 128878 MB
node 4 cpus:  12 13 14 36 37 38
node 4 size: 129022 MB
node 4 free: 128875 MB
node 5 cpus:  15 16 17 39 40 41
node 5 size: 129021 MB
node 5 free: 128864 MB
node 6 cpus:  18 19 20 42 43 44
node 6 size: 129022 MB
node 6 free: 128874 MB
node 7 cpus:  21 22 23 45 46 47
node 7 size: 129008 MB
node 7 free: 128847 MB

node distances:

0: 10 11 12 12 12 12 12 12
1: 11 10 12 12 12 12 12 12
2: 12 12 10 11 12 12 12 12
3: 12 12 11 10 12 12 12 12
4: 12 12 12 12 10 11 12 12
5: 12 12 12 12 11 10 12 12
6: 12 12 12 12 12 10 11 11
7: 12 12 12 12 12 12 11 10

---

From /proc/meminfo

MemTotal:       1056657932 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

/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/

(Continued on next page)
Platform Notes (Continued)

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): 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, 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 17:23

SPEC is set to: /home/SPEC_CPU2017/cpu2017
    Filesystem Type Size Used Avail Use% Mounted on
    /dev/mapper/ubuntu--vg-ubuntu--lv ext4 196G 83G 104G 45% /

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

(Continued on next page)
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Test Sponsor: HPE
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Platform Notes (Continued)

Firmware Revision: 2.40

(End of data from sysinfo program)

Compiler Version Notes

==============================================================================
C       | 502.gcc_r(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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

==============================================================================
C       | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
       | 525.x264_r(base, peak) 557.xz_r(base, peak)
------------------------------------------------------------------------------
AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on
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Target: x86_64-unknown-linux-gnu
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C       | 502.gcc_r(peak)
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Compiler Version Notes (Continued)

------------------------------------------------------------------------------
| 523.xalancbmk_r(peak) |
------------------------------------------------------------------------------

C++

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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

------------------------------------------------------------------------------
| 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak) |
------------------------------------------------------------------------------

C++

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

------------------------------------------------------------------------------
| 523.xalancbmk_r(peak) |
------------------------------------------------------------------------------

C++

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: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

------------------------------------------------------------------------------
| 520.omnetpp_r(base, peak) 523.xalancbmk_r(base) 531.deepsjeng_r(base, peak) 541.leela_r(base, peak) |
------------------------------------------------------------------------------

C++

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

------------------------------------------------------------------------------
| 548.exchange2_r(base, peak) |
------------------------------------------------------------------------------

Fortran

(Continued on next page)
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Thread model: posix  
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

---

**Base Compiler Invocation**

C benchmarks:  
clang

C++ benchmarks:  
clang++

Fortran benchmarks:  
flang

---

**Base Portability Flags**

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64  
502.gcc_r: -DSPEC_LP64  
505.mcf_r: -DSPEC_LP64  
520.omnetpp_r: -DSPEC_LP64  
523.xalancbmk_r: -DSPEC_LINUX -DSPEC_LP64  
525.x264_r: -DSPEC_LP64  
531.deepsjeng_r: -DSPEC_LP64  
541.leela_r: -DSPEC_LP64  
548.exchange2_r: -DSPEC_LP64  
557.xz_r: -DSPEC_LP64

---

**Base Optimization Flags**

C benchmarks:  
-m64 -Wl,--allow-multiple-definition -Wl,-mllvm,-Wl,-enable-licm-vrp  
-flto -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 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5  
-mllvm -unroll-threshold=50 -mllvm -inline-threshold=1000

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

C benchmarks (continued):
-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
-lamdlibm -ljemalloc -lflang -lflangrti

C++ benchmarks:
-m64 -std=c++98 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallback-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-z muldefs -mllvm -do-block-reorder=aggressive
-flvirtual-function-elimination -fvisibility=hidden -lamdlibm
-ljemalloc -lflang -lflangrti

Fortran benchmarks:
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallback-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -z muldefs -mllvm -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang -lflangrti

Base Other Flags

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

C++ benchmarks:
-Wno-unused-command-line-argument
## SPEC CPU®2017 Integer Rate Result

<table>
<thead>
<tr>
<th>Hewlett Packard Enterprise</th>
<th>SPECrate®2017_int_base = 224</th>
</tr>
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(3.20 GHz, AMD EPYC 74F3)

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

### Peak Compiler Invocation

C benchmarks:
```
clang
```

C++ benchmarks:
```
clang++
```

Fortran benchmarks:
```
flang
```

### Peak Portability Flags

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>500.perlbench_r</td>
<td>-DSPEC_LINUX_X64 -DSPEC_LP64</td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>-DSPEC_LINUX -DSPEC_LP64</td>
</tr>
<tr>
<td>525.x264_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>541.leela_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>-DSPEC_LP64</td>
</tr>
<tr>
<td>557.xz_r</td>
<td>-DSPEC_LP64</td>
</tr>
</tbody>
</table>

### Peak Optimization Flags

C benchmarks:
```
```

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

502.gcc_r (continued):
-Wl, -Wl, -Wl, -function-outline-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mlvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mlvm -inline-threshold=1000
-mlvm -enable-gvn-hoist -mlvm -global-vectorize-slp=true
-mlvm -function-specialize -mlvm -enable-llicm-vrp
-mlvm -reduce-array-computations=3 -fgnu89-inline
-ljemalloc

505.mcf_r: basepeak = yes
525.x264_r: basepeak = yes

557.xz_r: -m64 -Wl, -allow-multiple-definition
-Wl,-mlvm -Wl,-enable-llicm-vrp -flto
-Wl,-mlvm -Wl,-function-specialize
-Wl,-mlvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=7
-mlvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mlvm -inline-threshold=1000
-mlvm -enable-gvn-hoist -mlvm -global-vectorize-slp=true
-mlvm -function-specialize -mlvm -enable-llicm-vrp
-mlvm -reduce-array-computations=3 -lamdlibm -ljemalloc

C++ benchmarks:

520.omnetpp_r: -m64 -std=c++98
-Wl,-mlvm -Wl,-do-block-reorder=aggressive -flto
-Wl,-mlvm -Wl,-function-specialize
-Wl,-mlvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -finline-aggressive
-mlvm -unroll-threshold=100 -flv-function-specialization
-mlvm -enable-llicm-vrp -mlvm -reroll-loops
-mlvm -aggressive-loop-unswitch
-mlvm -reduce-array-computations=3
-mlvm -global-vectorize-slp=true
-mlvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-lamdlibm -ljemalloc

523.xalancbnk_r: -m32 -Wl, -mlvm -Wl, -do-block-reorder=aggressive -flto
-Wl, -mlvm -Wl, -function-specialize
-Wl, -mlvm -Wl, -align-all-nofallthru-blocks=6

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

523.xalancbmk_r (continued):
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -Ofast
-march=znver3 -fveclib=AMDLIBM -finline-aggressive
-mlllvm -unroll-threshold=100 -fveclib=AMDLIBM
-mlllvm -enable-licm-vrp -mlllvm -reroll-loops
-mlllvm -aggressive-loop-unschedule
-mlllvm -reduce-array-computations=3
-mlllvm -global-vectorize-slpa=true
-mlllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-ljemalloc

531.deepsjeng_r: basepeak = yes

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

Peak Other Flags

C benchmarks (except as noted below):
-Who-unused-command-line-argument

-L/sppo/bin/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32

C++ benchmarks (except as noted below):
-Who-unused-command-line-argument

523.xalancbmk_r: -L/usr/lib -Who-unused-command-line-argument
-L/sppo/bin/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32

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
**SPEC CPU®2017 Integer Rate Result**  
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Tested with SPEC CPU®2017 v1.1.5 on 2020-04-01 13:34:23-0400.
Originally published on 2021-06-08.