**SPEC CPU®2017 Integer Rate Result**

**Hewlett Packard Enterprise**
*(Test Sponsor: HPE)*

ProLiant DL385 Gen10 Plus v2
*(2.45 GHz, AMD EPYC 7763)*

---

**SPECrate®2017_int_base = 821**

**SPECrate®2017_int_peak = 872**

---

**CPU2017 License:** 3  
**Test Sponsor:** HPE

**Test Sponsor:** HPE  
**Hardware Availability:** Apr-2021

**Test Date:** Feb-2021  
**Software Availability:** Mar-2021

**Tested by:** HPE

---

**Hardware**

**CPU Name:** AMD EPYC 7763  
**Max MHz:** 3500

**Nominal:** 2450  
**Enabled:** 128 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 / 8 cores

**Other:** None  
**Memory:** 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)

**Storage:** 1 x 182 GB SATA SSD, RAID 0  
**Other:** None

---

**Software**

**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:** No

**Firmware:** HPE BIOS Version A42 v2.40 02/15/2021 released Mar-2021

**File System:** ext4  
**System State:** Run level 5 (multi-user)

**Base Pointers:** 64-bit  
**Peak Pointers:** 32/64-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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Test Date: Feb-2021
Hardware Availability: Apr-2021
Software Availability: Mar-2021

Results Table

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<thead>
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<th>Ratio</th>
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<td>482</td>
<td>570</td>
<td>485</td>
<td>570</td>
<td>485</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 limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit
runcpu command invoked through numaclt 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/cpu2017/amd_rate_aocc300_milan_A_lib/64;/home/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

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
Data Fabric C-State Enable set to Force Enabled
Memory PStates set to Disabled
Thermal Configuration set to Maximum Cooling
Workload Profile set to Custom
Infinity Fabric Power Management set to Disabled

(Continued on next page)
Platform Notes (Continued)

Infinity Fabric Performance State set to P0
L2 HW Prefetcher set to Disabled

Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
running on dl385g10v2 Thu Feb 25 18:11:09 2021

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 7763 64-Core Processor
- 2 "physical id"s (chips)
- 256 "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: 64
  - siblings: 128
  - physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
    25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
    53 54 55 56 57 58 59 60 61 62 63
  - physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
    25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52
    53 54 55 56 57 58 59 60 61 62 63

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): 256
- On-line CPU(s) list: 0-255
- Thread(s) per core: 2
- Core(s) per socket: 64
- Socket(s): 2
- NUMA node(s): 16
- Vendor ID: AuthenticAMD
- CPU family: 25
- Model: 1
- Model name: AMD EPYC 7763 64-Core Processor
- Stepping: 1
- CPU MHz: 2199.491
- BogoMIPS: 4890.75
- Virtualization: AMD-V
- L1d cache: 4 MiB
- L1i cache: 4 MiB

(Continued on next page)
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**SPECrater®2017_int_base** = 821

**SPECrater®2017_int_peak** = 872

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**Platform Notes (Continued)**

- **L2 cache:** 64 MiB
- **L3 cache:** 512 MiB
- **NUMA node0 CPU(s):** 0-7, 128-135
- **NUMA node1 CPU(s):** 8-15, 136-143
- **NUMA node2 CPU(s):** 16-23, 144-151
- **NUMA node3 CPU(s):** 24-31, 152-159
- **NUMA node4 CPU(s):** 32-39, 160-167
- **NUMA node5 CPU(s):** 40-47, 168-175
- **NUMA node6 CPU(s):** 48-55, 176-183
- **NUMA node7 CPU(s):** 56-63, 184-191
- **NUMA node8 CPU(s):** 64-71, 192-199
- **NUMA node9 CPU(s):** 72-79, 200-207
- **NUMA node10 CPU(s):** 80-87, 208-215
- **NUMA node11 CPU(s):** 88-95, 216-223
- **NUMA node12 CPU(s):** 96-103, 224-231
- **NUMA node13 CPU(s):** 104-111, 232-239
- **NUMA node14 CPU(s):** 112-119, 240-247
- **NUMA node15 CPU(s):** 120-127, 248-255

**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 retropoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
**Vulnerability Srbds:** Not affected
**Vulnerability Tsx async abort:** Not affected

**Flags:**
```plaintext
cmp cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt pdpe1gb rdtscp lm constant_tsc rep_good norbit nop1 nonstop_tsc cpuid extd_apicid aperfmperf pni pclmulqdq monitor ssse3 fma cx16 pcid sse4_1 sse4_2 x2apic movbe popcnt aes xsave avx f16c rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch osfw ibs skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invvpid_single hw_pstate ssbd mba ibrs ibpb stibp vmcall fsgsbase bmi1 avx2 smep bmi2 invpcid cmpl rdtd a rdseed adx smap clflushopt clwb sha_ni xsaveopt xsaves xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbb_total cqm_mbb_local clzero irperf xsavesprtr wboinvd arat npt lbrv svm_lock nrip_save tsc_scale vmcb_clean flushbyasid decodeassist psfthreshold v_vmsave_vmload vgif umip pkub ospke vaes vpclmulqdq rdpid overflow_recov succor smca
```

From numactl --hardware WARNING: a numactl 'node' might or might not correspond to a
### SPEC CPU®2017 Integer Rate Result

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</tbody>
</table>

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**Platform Notes (Continued)**

- **Available physical chip:** 16 nodes (0-15)
  - **Node 0**
    - CPUs: 0, 2, 3, 4, 5, 6, 7, 128, 129, 130, 131, 132, 133, 134, 135
    - Size: 128774 MB
    - Free: 128303 MB
  - **Node 1**
    - CPUs: 8, 9, 10, 11, 12, 13, 14, 16, 17, 18, 19, 20, 21, 22, 23
    - Size: 129018 MB
    - Free: 128635 MB
  - **Node 2**
    - CPUs: 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38
    - Size: 129020 MB
    - Free: 128607 MB
  - **Node 3**
    - CPUs: 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61
    - Size: 129020 MB
    - Free: 128648 MB
  - **Node 4**
    - CPUs: 64, 65, 66, 67, 68, 69, 70, 71
    - Size: 129007 MB
    - Free: 128637 MB
  - **Node 5**
    - CPUs: 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93
    - Size: 129020 MB
    - Free: 128645 MB
  - **Node 6**
    - Size: 129018 MB
    - Free: 128626 MB
  - **Node 7**
    - CPUs: 128, 129, 130, 131, 132, 133, 134, 135, 136, 137
    - Size: 129020 MB
    - Free: 128652 MB
  - **Node 8**
    - CPUs: 140, 141, 142, 143, 144, 145, 146, 147, 148, 149
    - Size: 129020 MB
    - Free: 128541 MB

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Platform Notes (Continued)

node 15 cpus: 120 121 122 123 124 125 126 127 248 249 250 251 252 253 254 255
node 15 size: 129017 MB
node 15 free: 128521 MB

node distances:
node   0   1   2   3   4   5   6   7   8   9  10  11  12  13  14  15
0:  10  11  12  12  12  12  12  12  32  32  32  32  32  32  32  32
1:  11  10  12  12  12  12  12  12  32  32  32  32  32  32  32  32
2:  12  12  11  10  12  12  12  12  32  32  32  32  32  32  32  32
3:  12  12  11  10  12  12  12  12  32  32  32  32  32  32  32  32
4:  12  12  12  12  10  11  12  12  32  32  32  32  32  32  32  32
5:  12  12  12  12  11  10  12  12  32  32  32  32  32  32  32  32
6:  12  12  12  12  12  11  10  12  12  32  32  32  32  32  32  32
7:  12  12  12  12  12  11  10  12  12  32  32  32  32  32  32  32
8:  32  32  32  32  32  32  32  32  10  11  12  12  12  12  12  12
9:  32  32  32  32  32  32  32  32  11  10  12  12  12  12  12  12
10: 32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
11: 32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
12: 32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
13: 32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
14: 32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
15: 32  32  32  32  32  32  32  32  12  12  12  12  12  12  12  12
From /proc/meminfo
MemTotal:       2113569276 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

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

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

x86_64 x86_64 GNU/Linux

Kernel self-reported vulnerability status:

<table>
<thead>
<tr>
<th>Vulnerability</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>CVE-2018-12207 (iTLB Multihit)</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2018-3620 (L1 Terminal Fault)</td>
<td>Not affected</td>
</tr>
<tr>
<td>Microarchitectural Data Sampling:</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2017-5754 (Meltdown):</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2018-3639 (Speculative Store Bypass):</td>
<td>Mitigation: Speculative Store Bypass disabled via prctl and seccomp</td>
</tr>
<tr>
<td>CVE-2017-5753 (Spectre variant 1):</td>
<td>Mitigation: usercopy/swapgs barriers and __user pointer sanitization</td>
</tr>
<tr>
<td>CVE-2017-5715 (Spectre variant 2):</td>
<td>Mitigation: Full AMD retpoline, IBPB: conditional, IBRS_FW, STIBP: always-on, RSB filling</td>
</tr>
<tr>
<td>CVE-2020-0543 (Special Register Buffer Data Sampling):</td>
<td>Not affected</td>
</tr>
<tr>
<td>CVE-2019-11135 (TSX Asynchronous Abort):</td>
<td>Not affected</td>
</tr>
</tbody>
</table>

run-level 5 Feb 25 01:35

SPEC is set to: /home/cpu2017

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:
- 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
Hewlett Packard Enterprise
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Platform Notes (Continued)
(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
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       | 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
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)

==============================================================================
C++     | 523.xalancbmk_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++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
         | 531.deepsjeng_r(base, peak) 541.leela_r(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++     | 523.xalancbmk_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++     | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
         | 531.deepsjeng_r(base, peak) 541.leela_r(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 | 548.exchange2_r(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)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus v2
(2.45 GHz, AMD EPYC 7763)

SPECrater®2017_int_base = 821
SPECrater®2017_int_peak = 872

Compiler Version Notes (Continued)
Target: x86_64-unknown-linux-gnu
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:
-ml64 -Wl,-allow-multiple-definition -Wl,-mlllvm -Wl,-enable-licm-vrp
-fflto -Wl,-mlllvm -Wl,-region-vectorize
-Wl,-mlllvm -Wl,-function-specialize
-Wl,-mlllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -fstruct-layout=5
-mlllvm -unroll-threshold=50 -mlllvm -inline-threshold=1000
-freemap-arrays -mlllvm -function-specialize -flv-function-specialization
-mlllvm -enable-gvn-hoist -mlllvm -global-vectorize-slp=true

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus v2
(2.45 GHz, AMD EPYC 7763)

SPECrate®2017_int_base = 821
SPECrate®2017_int_peak = 872

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

Base Optimization Flags (Continued)

C benchmarks:
-mlir -enable-licm-vrp -mlir -reduce-array-computations=3 -Z muldefs
-ldlmlib -ljemalloc -lflang -lflangrti

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

Fortran benchmarks:
-mlir -Wl,-mlir -Wl,-inline-recursion=4
-Wl,-mlir -Wl,-lsr-in-nested-loop -Wl,-mlir -Wl,-enable-iv-split
-flto -Wl,-mlir -Wl,-region-vectorize
-Wl,-mlir -Wl,-function-specialize
-Wl,-mlir -Wl,-align-all-nofallthru-blocks=6
-Wl,-mlir -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=x86 -fveclib=AMDLIBM -Z muldefs -mlir -unroll-aggressive
-mlir -unroll-threshold=500 -ldlmlib -ljemalloc -lflang -lflangrti

Base Other Flags

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

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

Peak Compiler Invocation

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL385 Gen10 Plus v2
(2.45 GHz, AMD EPYC 7763)

SPECrate®2017_int_base = 821
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

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

Peak Compiler Invocation (Continued)

C++ benchmarks:
clang++

Fortran benchmarks:
flang

Peak Portability Flags

500.perlbench_r: -DSPEC_LINUX_X64 -DSPEC_LP64
502.gcc_r: -D_FILE_OFFSET_BITS=64
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

Peak Optimization Flags

C benchmarks:

500.perlbench_r: -m64 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3
-fprofile-instr-generate(pass 1)
-fprofile-instr-use(pass 2) -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays
-flv-function-specialization -mllvm -inline-threshold=1000
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=false
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc

502.gcc_r: -m32 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-licm-vrp -flto
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3
-fveclib=AMDLIBM -fstruct-layout=7
-mllvm -unroll-threshold=50 -fremap-arrays

(Continued on next page)
SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise

ProLiant DL385 Gen10 Plus v2

(2.45 GHz, AMD EPYC 7763)

SPECrate®2017_int_base = 821

SPECrate®2017_int_peak = 872

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

Peak Optimization Flags (Continued)

502.gcc_r (continued):
- 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
- fgnu89-inline
- ljemalloc

505.mcf_r: -m64
- Wl,-allow-multiple-definition
- Wl,-mllvm
- Wl,-enable-lcm-vrp
- fflto
- Wl,-mllvm
- Wl,-function-specialize
- Wl,-mllvm
- Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm
- Wl,-reduce-array-computations=3
- fOfast
- mach=znver3
- fveclib=AMDLIBM
- fstruct-layout=7
- 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
- lamdlibm
- ljemalloc

525.x264_r: basepeak = yes

557.xz_r: Same as 505.mcf_r

C++ benchmarks:

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

523.xalancbmk_r: -m32
- Wl,-mllvm
- Wl,-do-block-reorder=aggressive
- fflto
- Wl,-mllvm
- Wl,-function-specialize
- Wl,-mllvm
- Wl,-align-all-nofallthru-blocks=6
- Wl,-mllvm
- Wl,-reduce-array-computations=3
- fOfast
- mach=znver3
- fveclib=AMDLIBM
- finline-aggressive
- mllvm
- unroll-threshold=100
- flv-function-specialization

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**SPEC CPU®2017 Integer Rate Result**

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL385 Gen10 Plus v2  
(2.45 GHz, AMD EPYC 7763)

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<tr>
<th>SPECrate®2017_int_base</th>
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CPU2017 License: 3  
Test Date: Feb-2021  
Test Sponsor: HPE  
Hardware Availability: Apr-2021  
Tested by: HPE  
Software Availability: Mar-2021

**Peak Optimization Flags (Continued)**

523.xalancbmk_r (continued):
-mlvm -enable-licm-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  
-ljemalloc

531.deepsjeng_r: basepeak = yes

541.leela_r: Same as 520.omnetpp_r

Fortran benchmarks:
-m64 -Wl,-mlvm -Wl,-inline-recursion=4  
-Wl,-mllvvm -Wl,-lsr-in-nested-loop -Wl,-mllvvm -Wl,-enable-iv-split  
-ffto -Wl,-mllvvm -Wl,-function-specialize  
-Wl,-mllvvm -Wl,-align-all-nofallthru-blocks=6  
-Wl,-mllvvm -Wl,-reduce-array-computations=3 -03 -ffast-math  
-march=znver3 -fveclib=AMDLIBM -mllvvm -unroll-aggressive  
-mllvvm -unroll-threshold=500 -lamlidlibm -ljemalloc -lflang -lflangrti

**Peak Other Flags**

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

502.gcc_r: -L/usr/lib -Whno-unused-command-line-argument  
-L/sppo/bin/cpu2017v115aoccc3/amd_rate_aocc300_milan_A_lib/32

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

523.xalancbmk_r: -L/usr/lib -Whno-unused-command-line-argument  
-L/sppo/bin/cpu2017v115aoccc3/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

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL385 Gen10 Plus v2  
(2.45 GHz, AMD EPYC 7763)

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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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