**SPEC CPU®2017 Integer Rate Result**

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL345 Gen10 Plus  
(2.00 GHz, AMD EPYC 7663)  

| SPECrate®2017_int_base = 351 | SPECrate®2017_int_peak = 368 |

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

<table>
<thead>
<tr>
<th>Copies</th>
<th>SPECrate®2017_int_base (351)</th>
<th>SPECrate®2017_int_peak (368)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>250</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>265 268</td>
<td></td>
</tr>
<tr>
<td>500.perlbench_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>502.gcc_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>505.mcf_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>520.omnetpp_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>523.xalancbmk_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>525.x264_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>531.deepsjeng_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>541.leela_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>548.exchange2_r</td>
<td>112</td>
<td></td>
</tr>
<tr>
<td>557.xz_r</td>
<td>112</td>
<td></td>
</tr>
</tbody>
</table>

**Software**

<table>
<thead>
<tr>
<th>OS:</th>
<th>Ubuntu 20.04.1 LTS (x86_64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++/Fortran: Version 3.0.0 of AOCC</td>
</tr>
<tr>
<td>Parallel:</td>
<td>No</td>
</tr>
<tr>
<td>Firmware:</td>
<td>HPE BIOS Version A43 v2.40 02/15/2021 released Feb-2021</td>
</tr>
<tr>
<td>File System:</td>
<td>ext4</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 5 (multi-user)</td>
</tr>
<tr>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Power Management:</td>
<td>BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
</tbody>
</table>

**Hardware**

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>AMD EPYC 7663</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max MHz:</td>
<td>3500</td>
</tr>
<tr>
<td>Nominal:</td>
<td>2000</td>
</tr>
<tr>
<td>Enabled:</td>
<td>56 cores, 1 chip, 2 threads/core</td>
</tr>
<tr>
<td>Orderable:</td>
<td>1 chip</td>
</tr>
<tr>
<td>Cache L1:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2:</td>
<td>512 KB I+D on chip per core</td>
</tr>
<tr>
<td>L3:</td>
<td>256 MB I+D on chip per chip, 32 MB shared / 7 cores</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)</td>
</tr>
<tr>
<td>Storage:</td>
<td>1 x 480 GB SAS SSD, RAID 0</td>
</tr>
<tr>
<td>Other:</td>
<td>None</td>
</tr>
</tbody>
</table>
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>590</td>
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<td>112</td>
<td>468</td>
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<td>470</td>
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<td>169</td>
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<td>870</td>
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<td>870</td>
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<td>523.xalanckbmk_r</td>
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<td>289</td>
<td>410</td>
<td>112</td>
<td>272</td>
<td>434</td>
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<td>435</td>
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<td>750</td>
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<td>548.exchange2_r</td>
<td>112</td>
<td>353</td>
<td>832</td>
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<td>557.xz_r</td>
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</tr>
</tbody>
</table>

**SPECrate®2017_int_base = 351**

**SPECrate®2017_int_peak = 368**

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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SPECrate®2017_int_peak = 368

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

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 12:30:41 EDT 2021
Submission: cpu2017-20210524-26403.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

(Continued on next page)
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Platform Notes (Continued)

NUMA memory domains per socket set to Four memory domains per socket
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 18:04:58 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 7663 56-Core Processor
  1 "physical id"s (chips)
  112 "processors"
core, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)
  cpu cores : 56
  siblings : 112
  physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24 25 26 27
  28 29 30 32 33 34 35 36 37 38 40 41 42 43 44 45 46 48 49 50 51 52 53 54 56 57 58 59
  60 61 62

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): 112
On-line CPU(s) list: 0-111
Thread(s) per core: 2
Core(s) per socket: 56
Socket(s): 1
NUMA node(s): 8
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 7663 56-Core Processor
Stepping: 1
CPU MHz: 2373.029
BogoMIPS: 3992.45
Virtualization: AMD-V
L1d cache: 1.8 MiB

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>L1i cache:</td>
<td>1.8 MiB</td>
</tr>
<tr>
<td>L2 cache:</td>
<td>28 MiB</td>
</tr>
<tr>
<td>L3 cache:</td>
<td>256 MiB</td>
</tr>
<tr>
<td>NUMA node0 CPU(s):</td>
<td>0-6, 56-62</td>
</tr>
<tr>
<td>NUMA node1 CPU(s):</td>
<td>7-13, 63-69</td>
</tr>
<tr>
<td>NUMA node2 CPU(s):</td>
<td>14-20, 70-76</td>
</tr>
<tr>
<td>NUMA node3 CPU(s):</td>
<td>21-27, 77-83</td>
</tr>
<tr>
<td>NUMA node4 CPU(s):</td>
<td>28-34, 84-90</td>
</tr>
<tr>
<td>NUMA node5 CPU(s):</td>
<td>35-41, 91-97</td>
</tr>
<tr>
<td>NUMA node6 CPU(s):</td>
<td>42-48, 98-104</td>
</tr>
<tr>
<td>NUMA node7 CPU(s):</td>
<td>49-55, 105-111</td>
</tr>
<tr>
<td>Vulnerability Itlb multihit:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability L1tf:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability Mds:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability Meltdown:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability Spec store bypass:</td>
<td>Mitigation; Speculative Store Bypass disabled via prctl and seccomp</td>
</tr>
<tr>
<td>Vulnerability Spectre v1:</td>
<td>Mitigation; usercopy/swapgs barriers and __user pointer sanitization</td>
</tr>
<tr>
<td>Vulnerability Spectre v2:</td>
<td>Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling</td>
</tr>
<tr>
<td>Vulnerability Srbds:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Vulnerability Tsx async abort:</td>
<td>Not affected</td>
</tr>
<tr>
<td>Flags:</td>
<td>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 rdtsscp 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 ibr skinit wdt tce topoext perfctr_core perfctr_nb bpest perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsqsb mbi1 avx2 smep bmi2 invpcid cmp qt a rsdseed adx map cfu flushopt clwb sha ni xsaveopt xsavec xgetbv1 xsaves cmp_llc cmp_occu llc cmp_mbb_total cmp_mbb_local clzero irperf xsaveepr wbnoiwvd arat npt lbv svm_lock nrp save tsc_scale vmcb_clean flushbyaid decodeassists pausefilter ptthreshold v_vmsave_vmload vgif umip pk pu ospkea vps vcpu mulmldq rdpid overflow_recov succor smca</td>
</tr>
</tbody>
</table>

/proc/cpuinfo cache data

```bash
    cache size : 512 KB
```

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

<table>
<thead>
<tr>
<th>Field</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>available:</td>
<td>8 nodes (0-7)</td>
</tr>
<tr>
<td>node 0 cpus:</td>
<td>0 1 2 3 4 5 6 56 57 58 59 60 61 62</td>
</tr>
<tr>
<td>node 0 size:</td>
<td>128775 MB</td>
</tr>
<tr>
<td>node 0 free:</td>
<td>128139 MB</td>
</tr>
<tr>
<td>node 1 cpus:</td>
<td>7 8 9 10 11 12 13 63 64 65 66 67 68 69</td>
</tr>
<tr>
<td>node 1 size:</td>
<td>129018 MB</td>
</tr>
</tbody>
</table>

(Continued on next page)
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Platform Notes (Continued)

node 1 free: 128721 MB
node 2 cpus: 14 15 16 17 18 19 20 70 71 72 73 74 75 76
node 2 size: 129020 MB
node 2 free: 128760 MB
node 3 cpus: 21 22 23 24 25 26 27 77 78 79 80 81 82 83
node 3 size: 129019 MB
node 3 free: 128762 MB
node 4 cpus: 28 29 30 31 32 33 34 84 85 86 87 88 89 90
node 4 size: 129020 MB
node 4 free: 128726 MB
node 5 cpus: 35 36 37 38 39 40 41 91 92 93 94 95 96 97
node 5 size: 129019 MB
node 5 free: 128753 MB
node 6 cpus: 42 43 44 45 46 47 48 98 99 100 101 102 103 104
node 6 size: 129020 MB
node 6 free: 128674 MB
node 7 cpus: 49 50 51 52 53 54 55 105 106 107 108 109 110 111
node 7 size: 128982 MB
node 7 free: 128709 MB
node distances:
node 0 1 2 3 4 5 6 7
0: 10 11 12 12 12 12 12
1: 11 10 12 12 12 12 12
2: 12 12 10 11 12 12 12
3: 12 12 11 10 12 12 12
4: 12 12 12 12 10 11 12
5: 12 12 12 12 11 10 12
6: 12 12 12 12 12 12 10
7: 12 12 12 12 12 12 11

From /proc/meminfo
MemTotal: 1056643580 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"

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Platform Notes (Continued)

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, IBFB: conditional, IBRS_FW, STIBP: always-on, RSB filling
CVE-2017-5715 (Spectre variant 2):
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
/proc/uptime

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

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

BIOS:
BIOS Vendor: HPE

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Platform Notes (Continued)

BIOS Version: A43
BIOS Date: 02/15/2021
BIOS Revision: 2.40
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 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)

(Continued on next page)
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7663)

SPEC CPU®2017 Integer Rate Result
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Compiler Version Notes (Continued)

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

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
Hewlett Packard Enterprise
ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7663)

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

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

== 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

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SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL345 Gen10 Plus
(2.00 GHz, AMD EPYC 7663)

| SPECrate®2017_int_base = 351 |
| SPECrate®2017_int_peak = 368 |

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

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

Base Optimization Flags (Continued)

C benchmarks (continued):
- -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
- -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-nofallthru-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
- -fvirtual-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-nofallthru-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
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL345 Gen10 Plus  
(2.00 GHz, AMD EPYC 7663)  

SPECrate®2017_int_base = 351  
SPECrate®2017_int_peak = 368  

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

Peak Compiler Invocation  

C benchmarks:  
clang  

C++ benchmarks:  
clang++  

Fortran benchmarks:  
flang  

Peak Portability Flags  

500.perlbmk_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.perlbmk_r: -m64 -Wl,-allow-multiple-definition  
-Wl,-mllvm -Wl,-enable-lcum-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  
-fllvm-function-specialization -mllvm -inline-threshold=1000  
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=false  
-mllvm -function-specialize -mllvm -enable-lcum-vrp  
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc  

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502.gcc_r (continued):
-Wl,-mllvm -Wl,-function-specialize -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=true
-mllvm -function-specialize -mllvm -enable-licm-vrp
-mllvm -reduce-array-computations=3 -flggnu89-inline
-ljemalloc

505.mcf_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 -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=true
-mllvm -function-specialize -mllvm -enable-licm-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: basepeak = yes

523.xalancbmk_r: -m32 -Wl,-mllvm -Wl,-do-block-reorder-aggressive -flto
-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 -finline-aggressive
-mllvm -unroll-threshold=100 -flv-function-specialization
-mllvm -enable-licm-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
-ljemalloc

531.deepsjeng_r: basepeak = yes

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SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise  
(2.00 GHz, AMD EPYC 7663)

ProLiant DL345 Gen10 Plus  
(Test Sponsor: HPE)

SPECratenew_int_base = 351  
SPECratenew_int_peak = 368

Hewlett Packard Enterprise  
(2.00 GHz, AMD EPYC 7663)

ProLiant DL345 Gen10 Plus  
(Test Sponsor: HPE)

SPECratenew_int_base = 351  
SPECratenew_int_peak = 368

Peak Optimization Flags (Continued)

541.leela_r: basepeak = yes

Fortran benchmarks:

548.exchange2_r: basepeak = yes

Peak Other Flags

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

502.gcc_r: -L/usr/lib -Wno-unused-command-line-argument
   -L/sppo/bin/cpu2017v115aocc3/amd_rate_aocc300_milan_A_lib/32

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

523.xalancbmk_r: -L/usr/lib -Wno-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

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