**SPEC CPU®2017 Integer Rate Result**

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL385 Gen10 Plus  
(3.70 GHz, AMD EPYC 72F3)  

<table>
<thead>
<tr>
<th>Software Availability: Mar-2021</th>
<th>Test Sponsor: HPE</th>
<th>CPU2017 License: 3</th>
<th>Test Date: Apr-2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_base = 178</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SPECrate®2017_int_peak = 183</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Hardware**

<table>
<thead>
<tr>
<th>CPU Name: AMD EPYC 72F3</th>
<th>Max MHz: 4100</th>
<th>Nominal: 3700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enabled: 16 cores, 2 chips, 2 threads/core</td>
<td>Orderable: 1, 2 chip(s)</td>
<td>Cache L1: 32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>L2: 512 KB I+D on chip per core</td>
<td>L3: 256 MB I+D on chip per chip, 32 MB per core</td>
<td>Storage: 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)</td>
</tr>
<tr>
<td>Other: None</td>
<td>Memory: 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)</td>
<td>Other: None</td>
</tr>
<tr>
<td>System State: Run level 5 (multi-user)</td>
<td>Base Pointers: 64-bit</td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
</tr>
<tr>
<td>OS: Ubuntu 20.04.1 LTS (x86_64)</td>
<td>Compiler: C/C++/Fortran: Version 3.0.0 of AOCC</td>
<td>Firmware: HPE BIOS Version A42 v2.42 04/29/2021 released Apr-2021</td>
</tr>
<tr>
<td>File System: ext4</td>
<td>Other: jemalloc; jemalloc memory allocator library v5.1.0</td>
<td>Power Management: BIOS set to prefer performance at the cost of additional power usage</td>
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<td>Kernel 5.4.0-42-generic</td>
<td>Parallel: No</td>
</tr>
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<td>Firmware: HPE BIOS Version A42 v2.42 04/29/2021 released Apr-2021</td>
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<tr>
<td>System State: Run level 5 (multi-user)</td>
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<tr>
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<td>Other: jemalloc; jemalloc memory allocator library v5.1.0</td>
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**Copies**

<table>
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<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate®2017_int_base</th>
<th>SPECrate®2017_int_peak</th>
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<tbody>
<tr>
<td>perlbench_r</td>
<td>32</td>
<td>125</td>
<td>130</td>
</tr>
<tr>
<td>gcc_r</td>
<td>32</td>
<td>151</td>
<td>180</td>
</tr>
<tr>
<td>mcf_r</td>
<td>32</td>
<td>180</td>
<td>209</td>
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<tr>
<td>omnetpp_r</td>
<td>32</td>
<td>102</td>
<td>270</td>
</tr>
<tr>
<td>xalancbmk_r</td>
<td>32</td>
<td>218</td>
<td>351</td>
</tr>
<tr>
<td>x264_r</td>
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<td>32</td>
<td>398</td>
</tr>
<tr>
<td>deepsjeng_r</td>
<td>32</td>
<td>139</td>
<td>145</td>
</tr>
<tr>
<td>leela_r</td>
<td>32</td>
<td>149</td>
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<tr>
<td>exchange2_r</td>
<td>32</td>
<td>102</td>
<td>102</td>
</tr>
<tr>
<td>xz_r</td>
<td>32</td>
<td>103</td>
<td>103</td>
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**Tested by:** HPE  
**Hardware Availability:** Apr-2021  
**Software Availability:** Mar-2021
## SPEC CPU®2017 Integer Rate Result

### SpecCPU2017 Integer Rate

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant DL385 Gen10 Plus  
(3.70 GHz, AMD EPYC 72F3)

---

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

---

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
<tr>
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<td>502.gcc_r</td>
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<tr>
<td>531.deepsjeng_r</td>
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<tr>
<td>548.exchange2_r</td>
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<tr>
<td>557.xz_r</td>
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<td>337</td>
<td>102</td>
<td>337</td>
<td>103</td>
<td>335</td>
</tr>
</tbody>
</table>

**SpecCPU2017 int_base = 178**

**SpecCPU2017 int_peak = 183**

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

### Compiler Notes


### 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/cpu2017/amd_rate_aoccc300_milan_A_lib/64;/home/cpu2017/amd_rate_aoccc300_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 12:46:43 EDT 2021
Submission: cpu2017-20210524-26447.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
Thermal Configuration set to Maximum Cooling

(Continued on next page)
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SPECrate

2017_int_base = 178
2017_int_peak = 183

Platform Notes (Continued)

Memory PStates set to Disabled
Workload Profile set to Custom
Infinity Fabric Power Management set to Disabled
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 Wed Apr 1 12:27:45 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 72F3 8-Core Processor
  2 "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 : 8
siblings : 16
physical 0: cores 0 1 2 3 4 5 6 7
physical 1: cores 0 1 2 3 4 5 6 7

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: 8
Socket(s): 2
NUMA node(s): 16
Vendor ID: AuthenticAMD
CPU family: 25
Model: 1
Model name: AMD EPYC 72F3 8-Core Processor
Stepping: 1
CPU MHz: 1794.137
BogoMIPS: 7386.52
Virtualization: AMD-V
L1d cache: 512 KiB
L1i cache: 512 KiB
L2 cache: 8 MiB

(Continued on next page)
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Platform Notes (Continued)

L3 cache: 512 MiB
NUMA node0 CPU(s): 0,16
NUMA node1 CPU(s): 1,17
NUMA node2 CPU(s): 2,18
NUMA node3 CPU(s): 3,19
NUMA node4 CPU(s): 4,20
NUMA node5 CPU(s): 5,21
NUMA node6 CPU(s): 6,22
NUMA node7 CPU(s): 7,23
NUMA node8 CPU(s): 8,24
NUMA node9 CPU(s): 9,25
NUMA node10 CPU(s): 10,26
NUMA node11 CPU(s): 11,27
NUMA node12 CPU(s): 12,28
NUMA node13 CPU(s): 13,29
NUMA node14 CPU(s): 14,30
NUMA node15 CPU(s): 15,31
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 retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability Srbdsl: Not affected
Vulnerability Tsz 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 pdp1gb rdscp 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 ibr smpdom wt cpo etopo perfctor_core perfctor_nb bext perfctor_llc mwaitx cpb cat_13 cdp_13 invpcid_single hw_pstate ssbd mba ibrs ibpb stibp vmmcall fsqsig base bmi1 avx2 smep bmi2 invpcid cqm rdt_a rseed adx smap clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occu11c cqm_mbb_total cqm_mbb_local clzero irperf xsaveerrptr wbinvd arat npt ibrv svm_lock nrip_save tsc_scale vmcb_clean flushbyaid decodeassist pflushfilter pfthreshold v_vmsave_vmload vgif umip pkup oske vaes vcpuclmulqdp rdpid overflow_recov succor smca

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

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

```plaintext
available: 16 nodes (0-15)
node 0 cpus: 0 16
node 0 size: 128776 MB
node 0 free: 128667 MB
node 1 cpus: 1 17
node 1 size: 129021 MB
node 1 free: 128934 MB
node 2 cpus: 2 18
node 2 size: 129023 MB
node 2 free: 128930 MB
node 3 cpus: 3 19
node 3 size: 129022 MB
node 3 free: 128942 MB
node 4 cpus: 4 20
node 4 size: 129023 MB
node 4 free: 128947 MB
node 5 cpus: 5 21
node 5 size: 129022 MB
node 5 free: 128948 MB
node 6 cpus: 6 22
node 6 size: 129023 MB
node 6 free: 128942 MB
node 7 cpus: 7 23
node 7 size: 129010 MB
node 7 free: 128927 MB
node 8 cpus: 8 24
node 8 size: 128999 MB
node 8 free: 128917 MB
node 9 cpus: 9 25
node 9 size: 129022 MB
node 9 free: 128948 MB
node 10 cpus: 10 26
node 10 size: 129023 MB
node 10 free: 128932 MB
node 11 cpus: 11 27
node 11 size: 129022 MB
node 11 free: 128941 MB
node 12 cpus: 12 28
node 12 size: 129023 MB
node 12 free: 128950 MB
node 13 cpus: 13 29
node 13 size: 129022 MB
node 13 free: 128950 MB
node 14 cpus: 14 30
node 14 size: 129023 MB
node 14 free: 128867 MB
node 15 cpus: 15 31
```

(Continued on next page)
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HPE

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Platform Notes (Continued)

node 15 size: 129022 MB
node 15 free: 128934 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 10 11 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 12 11 10 12 12 32 32 32 32 32 32 32
6:  12 12 12 12 12 12 10 11 32 32 32 32 32 32 32 32
7:  12 12 12 12 12 12 11 10 32 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 10 11 12 12 12
11: 32 32 32 32 32 32 32 32 12 12 11 10 12 12 12 12
12: 32 32 32 32 32 32 32 32 12 12 12 12 10 11 12 12
13: 32 32 32 32 32 32 32 32 12 12 12 12 12 11 10 12
14: 32 32 32 32 32 32 32 32 12 12 12 12 12 12 10 11
15: 32 32 32 32 32 32 32 32 12 12 12 12 12 12 11 10

From /proc/meminfo
MemTotal:       2113619800 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
ox86_64 x86_64 GNU/Linux

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

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/swapsgs barriers and __user pointer sanitization
CVE-2017-5753 (Spectre variant 1): Mitigation: Full AMD retpoline, IBPB: 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 12:23

SPEC is set to: /home/cpu2017
Filesystem Type Size Used Avail Use% Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv ext4 182G 53G 120G 31% /

From /sys/devices/virtual/dmi/id
Vendor: HPE
Product: ProLiant DL385 Gen10 Plus
Product Family: ProLiant
Serial: CN79340HC3

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

BIOS:
BIOS Vendor: HPE
BIOS Version: A42
BIOS Date: 04/29/2021
BIOS Revision: 2.42
Firmware Revision: 2.40

(End of data from sysinfo program)
Hewlett Packard Enterprise
(Tests Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(3.70 GHz, AMD EPYC 72F3)

SPEC CPU®2017 Integer Rate Result
Copyright 2017-2021 Standard Performance Evaluation Corporation

SPECrate®2017_int_base = 178
SPECrate®2017_int_peak = 183

Hewlett Packard Enterprise
(Tests Sponsor: HPE)
ProLiant DL385 Gen10 Plus
(3.70 GHz, AMD EPYC 72F3)

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

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++     | 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: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

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Hewlett Packard Enterprise
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ProLiant DL385 Gen10 Plus
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**SPEC CPU®2017 Integer Rate Result**

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**SPECrate®2017_int_peak = 183**

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

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**Compiler Version Notes (Continued)**

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

---

```cpp
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

---

```cpp
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

---

```cpp
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
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)
**Target:** x86_64-unknown-linux-gnu
**Thread model:** posix
**InstalledDir:** /opt/AMD/aocc-compiler-3.0.0/bin

---
SPEC CPU®2017 Integer Rate Result

Hewlett Packard Enterprise
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CPU2017 License: 3
Test Sponsor: HPE
Tested by: HPE

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
-freemap-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

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### Base Optimization Flags (Continued)

C++ benchmarks (continued):
- `march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch`  
- `mllvm -unroll-threshold=100 -finline-aggressive`  
- `f16v-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`  
- `f16virtual-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`  
- `-f1to -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`

### Peak Compiler Invocation

C benchmarks:  
- `clang`

C++ benchmarks:  
- `clang++`

Fortran benchmarks:  
- `flang`
SPEC CPU®2017 Integer Rate Result
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SPECrate®2017_int_peak = 183

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

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

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-lcvm-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-lcvm-vrp
-mllvm -reduce-array-computations=3 -lamdlibm -ljemalloc

502.gcc_r: -m32 -Wl,-allow-multiple-definition
-Wl,-mllvm -Wl,-enable-lcvm-vrp -flto
-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-lcvm-vrp
-mllvm -reduce-array-computations=3 -fgnu89-inline
-ljemalloc

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

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

557.xz_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

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

541.leela_r: -m64 -std=c++98
-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
-lamdlibm -ljemalloc

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Test Sponsor: HPE
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Test Date: Apr-2021
Hardware Availability: Apr-2021
Software Availability: Mar-2021

Peak Optimization Flags (Continued)

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/cpu2017v115aoc3/ 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/cpu2017v115aoc3/ 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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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