SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)
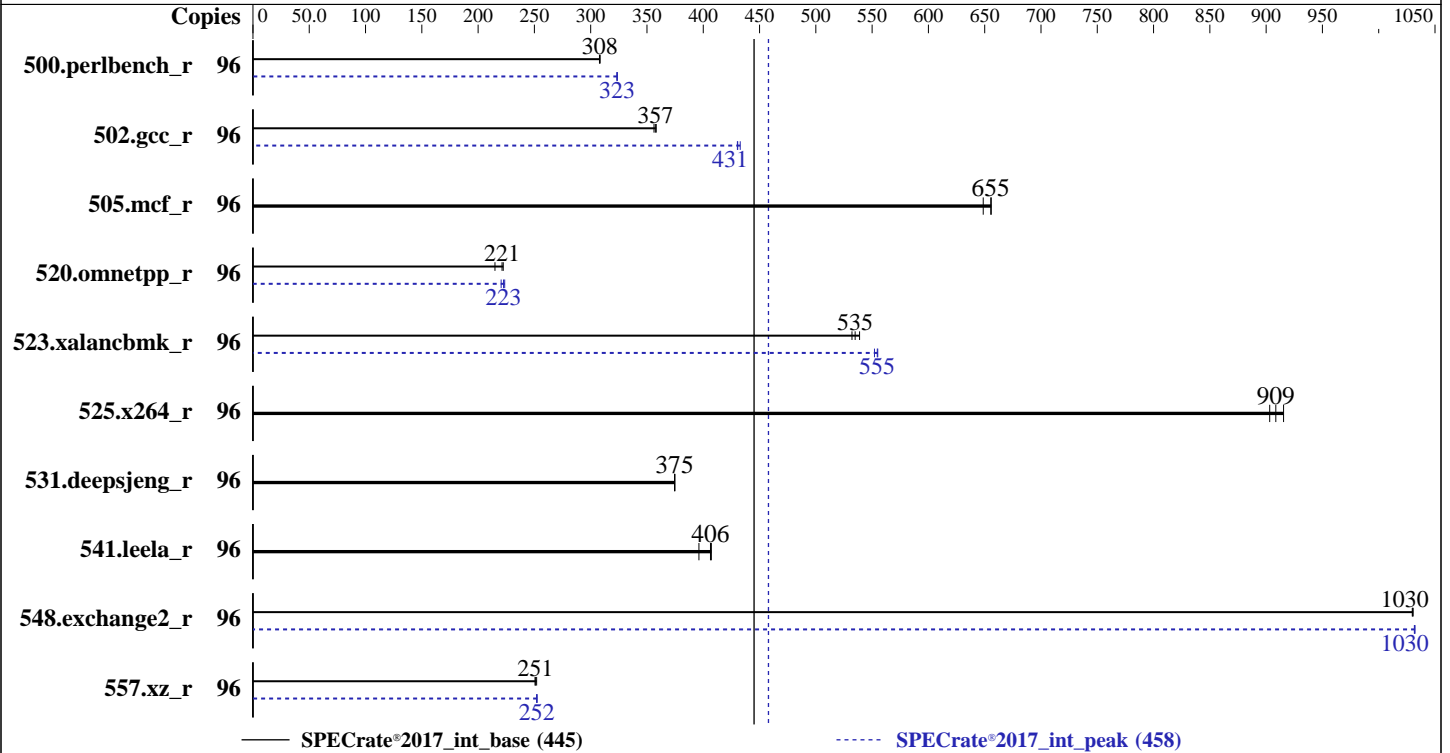
ProLiant DL365 Gen10 Plus
(3.20 GHz, AMD EPYC 74F3)

$SPECrate®2017\_int\_base = 445$

$SPECrate®2017\_int\_peak = 458$

CPU2017 License: 3

Test Sponsor: HPE

Tested by: HPE

Test Date: Jun-2021

Hardware Availability: Jun-2021

Software Availability: Mar-2021

Benchmark	Copies	base	peak
500.perlbench_r	96	308	323
502.gcc_r	96	357	431
505.mcf_r	96	655	
520.omnetpp_r	96	221	223
523.xalancbmk_r	96	535	555
525.x264_r	96	909	
531.deepsjeng_r	96	375	
541.leela_r	96	406	
548.exchange2_r	96	1030	1030
557.xz_r	96	251	252

SPECrate®2017_int_base (445)   SPECrate®2017_int_peak (458)

Hardware

CPU Name: AMD EPYC 74F3
 Max MHz: 4000
 Nominal: 3200
Enabled: 48 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 / 3 cores
 Other: None
Memory: 2 TB (16 x 128 GB 4Rx4 PC4-3200AA-L)
Storage: 1 x 196 GB SATA SSD, RAID 0
Other: None

Software

OS: Ubuntu 20.04.1 LTS (x86_64)
Kernel 5.4.0-56-generic
Compiler: C/C++/Fortran: Version 3.0.0 of AOCC
Parallel: No
Firmware: HPE BIOS Version A42 v2.42 04/29/2021 released Apr-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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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	96	496	308	497	308	**496**	**308**	96	472	324	473	323	**473**	**323**
502.gcc_r	96	379	358	382	356	**380**	**357**	96	314	433	316	430	**316**	**431**
505.mcf_r	96	**237**	**655**	237	656	239	649	96	**237**	**655**	237	656	239	649
520.omnetpp_r	96	567	222	586	215	**569**	**221**	96	563	224	**566**	**223**	571	220
523.xalancbmk_r	96	191	532	188	539	**190**	**535**	96	**183**	**555**	183	555	184	552
525.x264_r	96	184	915	186	903	**185**	**909**	96	184	915	186	903	**185**	**909**
531.deepsjeng_r	96	294	375	294	375	**294**	**375**	96	294	375	294	375	**294**	**375**
541.leela_r	96	390	407	**391**	**406**	401	396	96	390	407	**391**	**406**	401	396
548.exchange2_r	96	**244**	**1030**	244	1030	244	1030	96	244	1030	**244**	**1030**	244	1030
557.xz_r	96	**413**	**251**	411	252	414	251	96	**411**	**252**	411	252	411	252
SPECrate®2017_int_base =		**445**												
SPECrate®2017_int_peak =		**458**												

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
```

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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/amd_rate_aocc300_milan_A_lib/64;/home/SPEC_CPU2017/a
     md_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 Jun 21 10:16:41 EDT 2021
Submission: cpu2017-20210621-27524.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
```

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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/bin/sysinfo
 Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c
 running on admin Wed Apr  1 17:27:05 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
       2  "physical id"s (chips)
       96 "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
       physical 1: 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):                96
    On-line CPU(s) list:   0-95
    Thread(s) per core:    2
    Core(s) per socket:    24
    Socket(s):             2
    NUMA node(s):          16
    Vendor ID:             AuthenticAMD
    CPU family:            25
    Model:                 1
    Model name:            AMD EPYC 74F3 24-Core Processor
    Stepping:              1
    CPU MHz:               3808.083
    BogoMIPS:              6387.81
    Virtualization:        AMD-V
    L1d cache:             1.5 MiB
    L1i cache:             1.5 MiB
    L2 cache:              24 MiB
```

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Platform Notes (Continued)

```
    L3 cache:                        512 MiB
    NUMA node0 CPU(s):               0-2,48-50
    NUMA node1 CPU(s):               3-5,51-53
    NUMA node2 CPU(s):               6-8,54-56
    NUMA node3 CPU(s):               9-11,57-59
    NUMA node4 CPU(s):               12-14,60-62
    NUMA node5 CPU(s):               15-17,63-65
    NUMA node6 CPU(s):               18-20,66-68
    NUMA node7 CPU(s):               21-23,69-71
    NUMA node8 CPU(s):               24-26,72-74
    NUMA node9 CPU(s):               27-29,75-77
    NUMA node10 CPU(s):              30-32,78-80
    NUMA node11 CPU(s):              33-35,81-83
    NUMA node12 CPU(s):              36-38,84-86
    NUMA node13 CPU(s):              39-41,87-89
    NUMA node14 CPU(s):              42-44,90-92
    NUMA node15 CPU(s):              45-47,93-95
    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 Srbds:             Not affected
    Vulnerability Tsx async abort:   Not affected
    Flags:                           fpu vme de pse tsc msr pae mce cx8 apic sep mtrr
    pge mca cmov pat pse36 clflush mmx fxsr sse sse2 ht syscall nx mmxext fxsr_opt
    pdpe1gb rdtscp 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 ibs skinit wdt tce topoext perfctr_core perfctr_nb
    bpext perfctr_llc mwaitx cpb cat_l3 cdp_l3 invpcid_single hw_pstate ssbd mba ibrs
    ibpb stibp vmmcall fsgsbase bmi1 avx2 smep bmi2 invpcid cqm rdt_a rdseed adx smap
    clflushopt clwb sha_ni xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc
    cqm_mbm_total cqm_mbm_local clzero irperf xsaveerptr wbnoinvd arat npt lbrv svm_lock
    nrip_save tsc_scale vmcb_clean flushbyasid decodeassists pausefilter pfthreshold
    v_vmsave_vmload vgif umip pku ospke 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.
```

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Platform Notes (Continued)

```
available: 16 nodes (0-15)
node 0 cpus: 0 1 2 48 49 50
node 0 size: 128775 MB
node 0 free: 128575 MB
node 1 cpus: 3 4 5 51 52 53
node 1 size: 128996 MB
node 1 free: 128846 MB
node 2 cpus: 6 7 8 54 55 56
node 2 size: 129022 MB
node 2 free: 128875 MB
node 3 cpus: 9 10 11 57 58 59
node 3 size: 129021 MB
node 3 free: 128903 MB
node 4 cpus: 12 13 14 60 61 62
node 4 size: 129022 MB
node 4 free: 128911 MB
node 5 cpus: 15 16 17 63 64 65
node 5 size: 129021 MB
node 5 free: 128901 MB
node 6 cpus: 18 19 20 66 67 68
node 6 size: 129022 MB
node 6 free: 128807 MB
node 7 cpus: 21 22 23 69 70 71
node 7 size: 129009 MB
node 7 free: 128830 MB
node 8 cpus: 24 25 26 72 73 74
node 8 size: 129022 MB
node 8 free: 128920 MB
node 9 cpus: 27 28 29 75 76 77
node 9 size: 129021 MB
node 9 free: 128906 MB
node 10 cpus: 30 31 32 78 79 80
node 10 size: 129022 MB
node 10 free: 128923 MB
node 11 cpus: 33 34 35 81 82 83
node 11 size: 129021 MB
node 11 free: 128916 MB
node 12 cpus: 36 37 38 84 85 86
node 12 size: 129022 MB
node 12 free: 128909 MB
node 13 cpus: 39 40 41 87 88 89
node 13 size: 129021 MB
node 13 free: 128897 MB
node 14 cpus: 42 43 44 90 91 92
node 14 size: 129022 MB
node 14 free: 128922 MB
node 15 cpus: 45 46 47 93 94 95
```

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Platform Notes (Continued)

```
   node 15 size: 129020 MB
   node 15 free: 128913 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   11   10   12   12   32   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   10   11   12   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   11   10   12   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:       2113604324 kB
     HugePages_Total:         0
     Hugepagesize:         2048 kB


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

  /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 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
```

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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):                           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 17:24

  SPEC is set to: /home/SPEC_CPU2017
     Filesystem                      Type  Size  Used Avail Use% Mounted on
     /dev/mapper/ubuntu--vg-ubuntu--lv ext4  196G   42G  145G  23% /

  From /sys/devices/virtual/dmi/id
      Vendor:         HPE
      Product:        ProLiant DL365 Gen10 Plus
      Product Family: ProLiant
      Serial:         CN70430NKR


  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: 2.50

  (End of data from sysinfo program)
```

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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
--------------------------------------------------------------------------------


================================================================================
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)
```

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Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

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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
--------------------------------------------------------------------------


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

SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

ProLiant DL365 Gen10 Plus
(3.20 GHz, AMD EPYC 74F3)

$\text{SPECrate}^{®}\text{2017\_int\_base} = 445$

$\text{SPECrate}^{®}\text{2017\_int\_peak} = 458$

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

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

SPECrate®2017_int_base = 445

ProLiant DL365 Gen10 Plus
(3.20 GHz, AMD EPYC 74F3)

SPECrate®2017_int_peak = 458

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

Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-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
```

Peak Compiler Invocation

C benchmarks:
```
clang
```

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

Fortran benchmarks:
```
flang
```

SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

SPECrate®2017_int_base = 445

ProLiant DL365 Gen10 Plus
(3.20 GHz, AMD EPYC 74F3)

SPECrate®2017_int_peak = 458

CPU2017 License: 3		**Test Date:**	Jun-2021
Test Sponsor:	HPE	**Hardware Availability:**	Jun-2021
Tested by:	HPE	**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-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
-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 -fgnu89-inline
-ljemalloc
```

505.mcf_r: `basepeak = yes`

525.x264_r: `basepeak = yes`

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Hewlett Packard Enterprise
(Test Sponsor: HPE)

SPECrate®2017_int_base = 445

ProLiant DL365 Gen10 Plus
(3.20 GHz, AMD EPYC 74F3)

SPECrate®2017_int_peak = 458

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

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

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: -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

 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

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ProLiant DL365 Gen10 Plus
(3.20 GHz, AMD EPYC 74F3)

SPECrate®2017_int_base = 445

SPECrate®2017_int_peak = 458

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

Peak Optimization Flags (Continued)

541.leela_r: basepeak = yes

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,-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 -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang -lflangrti
```

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
http://www.spec.org/cpu2017/flags/aocc300-flags-A1.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
http://www.spec.org/cpu2017/flags/aocc300-flags-A1.xml
```

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

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