



# SPEC CPU®2017 Integer Rate Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

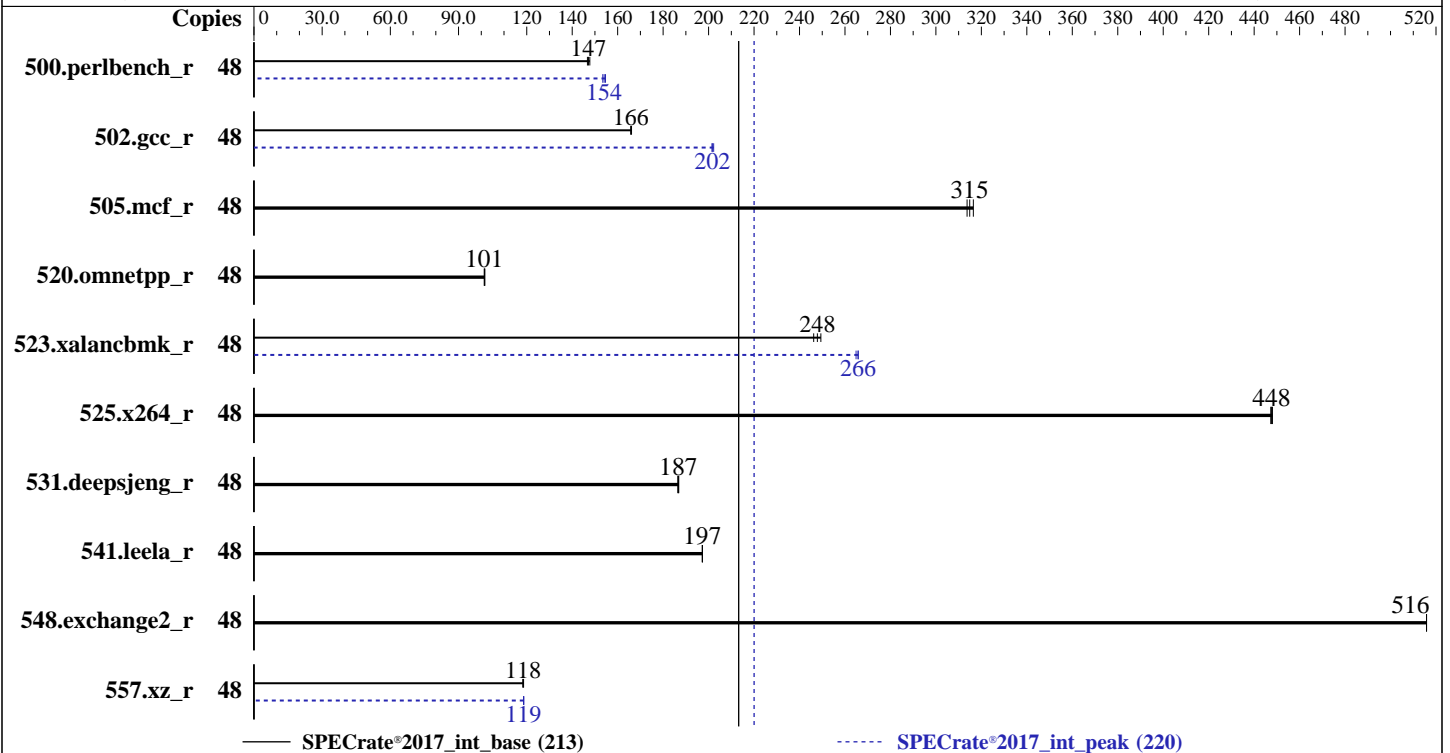
ProLiant DL345 Gen10 Plus  
(2.85 GHz, AMD EPYC 7443P)

SPECrate®2017\_int\_base = 213

SPECrate®2017\_int\_peak = 220

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

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



### Hardware

CPU Name: AMD EPYC 7443P  
 Max MHz: 4000  
 Nominal: 2850  
 Enabled: 24 cores, 1 chip, 2 threads/core  
 Orderable: 1 chip  
 Cache L1: 32 KB I + 32 KB D on chip per core  
 L2: 512 KB I+D on chip per core  
 L3: 128 MB I+D on chip per chip, 32 MB shared / 6 cores  
 Other: None  
 Memory: 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)  
 Storage: 1 x 480 GB SAS SSD, RAID 0  
 Other: None

### 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 A43 v2.42 04/15/2021 released Apr-2021  
 File System: ext4  
 System State: Run level 5 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 32/64-bit  
 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	48	517	148	521	147	<b>519</b>	<b>147</b>	48	<b>496</b>	<b>154</b>	498	153	494	155
502.gcc_r	48	<b>410</b>	<b>166</b>	409	166	410	166	48	337	202	<b>337</b>	<b>202</b>	336	202
505.mcf_r	48	245	316	247	314	<b>246</b>	<b>315</b>	48	245	316	247	314	<b>246</b>	<b>315</b>
520.omnetpp_r	48	621	101	<b>621</b>	<b>101</b>	620	102	48	621	101	<b>621</b>	<b>101</b>	620	102
523.xalancbmk_r	48	206	246	<b>205</b>	<b>248</b>	203	249	48	<b>191</b>	<b>266</b>	191	266	191	265
525.x264_r	48	188	448	188	447	<b>188</b>	<b>448</b>	48	188	448	188	447	<b>188</b>	<b>448</b>
531.deepsjeng_r	48	294	187	295	186	<b>295</b>	<b>187</b>	48	294	187	295	186	<b>295</b>	<b>187</b>
541.leela_r	48	<b>403</b>	<b>197</b>	403	197	403	197	48	<b>403</b>	<b>197</b>	403	197	403	197
548.exchange2_r	48	244	516	<b>244</b>	<b>516</b>	244	516	48	244	516	<b>244</b>	<b>516</b>	244	516
557.xz_r	48	<b>438</b>	<b>118</b>	438	118	437	119	48	<b>437</b>	<b>119</b>	437	119	437	119

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

## Compiler Notes

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

## Submit Notes

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

## Operating System Notes

```
'ulimit -s unlimited' was used to set environment stack size limit
'ulimit -l 2097152' was used to set environment locked pages in memory limit
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
'echo 8 > /proc/sys/vm/dirty_ratio' run as root to limit dirty cache to 8% of
memory.
'echo 1 > /proc/sys/vm/swappiness' run as root to limit swap usage to minimum
necessary.
'echo 1 > /proc/sys/vm/zone_reclaim_mode' run as root to free node-local memory
and avoid remote memory usage.
'sync; echo 3 > /proc/sys/vm/drop_caches' run as root to reset filesystem caches.
'sysctl -w kernel.randomize_va_space=0' run as root to disable address space layout
randomization (ASLR) to reduce run-to-run variability.
'echo always > /sys/kernel/mm/transparent_hugepage/enabled' and
```

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## Operating System Notes (Continued)

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

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:  
LD\_LIBRARY\_PATH =  
"/home/SPEC\_CPU2017/cpu2017/amd\_rate\_aocc300\_milan\_A\_lib/64;/home/SPEC\_CPU2017/cpu2017/amd\_rate\_aocc300\_milan\_A\_lib/32:"  
MALLOC\_CONF = "retain:true"

Environment variables set by runcpu during the 523.xalancbmk\_r peak run:  
MALLOC\_CONF = "thp:never"

## General Notes

Binaries were compiled on a system with 2x AMD EPYC 7742 CPU + 512GiB Memory using OpenSUSE 15.2

NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1) is mitigated in the system as tested and documented.

Yes: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2) is mitigated in the system as tested and documented.

jemalloc: configured and built with GCC v4.8.2 in RHEL 7.4 (No options specified)  
jemalloc 5.1.0 is available here:  
<https://github.com/jemalloc/jemalloc/releases/download/5.1.0/jemalloc-5.1.0.tar.bz2>

Submitted\_by: "Bhatnagar, Prateek" <prateek.bhatnagar@hpe.com>  
Submitted: Mon May 24 12:35:35 EDT 2021  
Submission: cpu2017-20210524-26426.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/cpu2017/bin/sysinfo  
Rev: r6538 of 2020-09-24 e8664e66d2d7080afeaa89d4b38e2f1c  
running on admin Wed Apr 1 17:27:06 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 7443P 24-Core Processor  
1 "physical id"s (chips)  
48 "processors"  
cores, siblings (Caution: counting these is hw and system dependent. The following excerpts from /proc/cpuinfo might not be reliable. Use with caution.)  
cpu cores : 24  
siblings : 48  
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26 27 28 29

From lscpu:  
Architecture: x86\_64  
CPU op-mode(s): 32-bit, 64-bit  
Byte Order: Little Endian  
Address sizes: 48 bits physical, 48 bits virtual  
CPU(s): 48  
On-line CPU(s) list: 0-47  
Thread(s) per core: 2  
Core(s) per socket: 24  
Socket(s): 1  
NUMA node(s): 4  
Vendor ID: AuthenticAMD  
CPU family: 25  
Model: 1  
Model name: AMD EPYC 7443P 24-Core Processor  
Stepping: 1  
CPU MHz: 2393.783  
BogoMIPS: 5689.80  
Virtualization: AMD-V  
L1d cache: 768 KiB  
L1i cache: 768 KiB  
L2 cache: 12 MiB  
L3 cache: 128 MiB

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## Platform Notes (Continued)

```

NUMA node0 CPU(s):          0-5,24-29
NUMA node1 CPU(s):          6-11,30-35
NUMA node2 CPU(s):          12-17,36-41
NUMA node3 CPU(s):          18-23,42-47
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:         Not affected
Vulnerability Mds:          Not affected
Vulnerability Meltdown:     Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
Vulnerability Spectre v1:    Mitigation; usercopy/swapgs barriers and __user pointer sanitization
Vulnerability Spectre v2:    Mitigation; Full AMD retpoline, IBPB conditional, IBRS_FW, STIBP always-on, RSB filling
Vulnerability 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_omsave_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.

```

available: 4 nodes (0-3)
node 0 cpus: 0 1 2 3 4 5 24 25 26 27 28 29
node 0 size: 257797 MB
node 0 free: 257271 MB
node 1 cpus: 6 7 8 9 10 11 30 31 32 33 34 35
node 1 size: 258044 MB
node 1 free: 257766 MB
node 2 cpus: 12 13 14 15 16 17 36 37 38 39 40 41
node 2 size: 258044 MB
node 2 free: 257607 MB
node 3 cpus: 18 19 20 21 22 23 42 43 44 45 46 47
node 3 size: 258007 MB
node 3 free: 257698 MB

```

(Continued on next page)



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## Platform Notes (Continued)

node distances:

node	0	1	2	3
0:	10	12	12	12
1:	12	10	12	12
2:	12	12	10	12
3:	12	12	12	10

From /proc/meminfo

MemTotal: 1056660680 kB  
HugePages\_Total: 0  
Hugepagesize: 2048 kB

/usr/bin/lsb\_release -d  
Ubuntu 20.04.1 LTS

From /etc/\*release\* /etc/\*version\*

debian\_version: bullseye/sid  
os-release:  
NAME="Ubuntu"  
VERSION="20.04.1 LTS (Focal Fossa)"  
ID=ubuntu  
ID\_LIKE=debian  
PRETTY\_NAME="Ubuntu 20.04.1 LTS"  
VERSION\_ID="20.04"  
HOME\_URL="https://www.ubuntu.com/"  
SUPPORT\_URL="https://help.ubuntu.com/"

uname -a:

Linux admin 5.4.0-56-generic #62-Ubuntu SMP Mon Nov 23 19:20:19 UTC 2020 x86\_64 x86\_64 x86\_64 GNU/Linux

Kernel self-reported vulnerability status:

CVE-2018-12207 (iTLB Multihit):	Not affected
CVE-2018-3620 (L1 Terminal Fault):	Not affected
Microarchitectural Data Sampling:	Not affected
CVE-2017-5754 (Meltdown):	Not affected
CVE-2018-3639 (Speculative Store Bypass):	Mitigation: Speculative Store Bypass disabled via prctl and seccomp
CVE-2017-5753 (Spectre variant 1):	Mitigation: usercopy/swaps 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

(Continued on next page)



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## Platform Notes (Continued)

CVE-2019-11135 (TSX Asynchronous Abort): Not affected

run-level 5 Apr 1 17:23

SPEC is set to: /home/SPEC\_CPU2017/cpu2017

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/ubuntu--vg-ubuntu--lv	ext4	196G	83G	104G	45%	/

From /sys/devices/virtual/dmi/id

Vendor: HPE  
Product: ProLiant DL345 Gen10 Plus  
Product Family: ProLiant  
Serial: J20APP000K

Additional information from dmidecode follows. WARNING: Use caution when you interpret this section. The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

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

BIOS:

BIOS Vendor: HPE  
BIOS Version: A43  
BIOS Date: 04/15/2021  
BIOS Revision: 2.42  
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)

(Continued on next page)



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## Compiler Version Notes (Continued)

-----  
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)  
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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)  
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  
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Target: x86\_64-unknown-linux-gnu  
Thread model: posix  
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## Compiler Version Notes (Continued)

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

## Base Compiler Invocation

C benchmarks:  
clang

C++ benchmarks:  
clang++

Fortran benchmarks:  
flang



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## 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
-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
```

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# SPEC CPU®2017 Integer Rate Result

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**Hewlett Packard Enterprise**

(Test Sponsor: HPE)

**ProLiant DL345 Gen10 Plus**  
(2.85 GHz, AMD EPYC 7443P)

**SPECrate®2017\_int\_base = 213**

**SPECrate®2017\_int\_peak = 220**

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

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

## Base Optimization Flags (Continued)

Fortran benchmarks (continued):

```
-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
```

## 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
```



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## 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

```
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:

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## Peak Optimization Flags (Continued)

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: 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>  
<http://www.spec.org/cpu2017/flags/aocc300-flags-A1.html>



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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>

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