



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

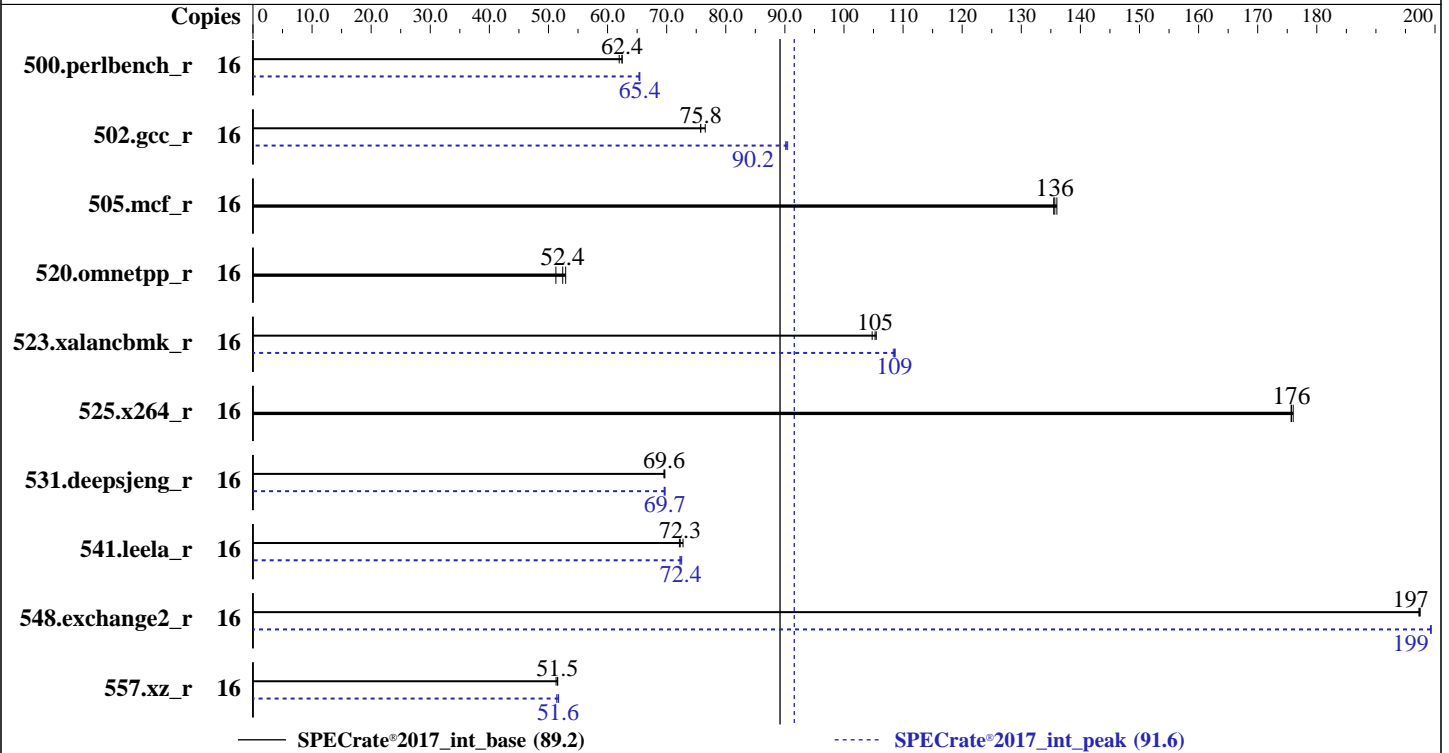
ProLiant DL325 Gen10 Plus v2
(3.70 GHz, AMD EPYC 72F3)

SPECrate®2017_int_base = 89.2

SPECrate®2017_int_peak = 91.6

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

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



Hardware

CPU Name: AMD EPYC 72F3
 Max MHz: 4100
 Nominal: 3700
 Enabled: 8 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: 256 MB I+D on chip per chip, 32 MB per core
 Other: None
 Memory: 1 TB (8 x 128 GB 4Rx4 PC4-3200AA-L)
 Storage: 1 x 800 GB SAS SSD, RAID 0
 Other: None

Software

OS: Ubuntu 20.04.1 LTS (x86_64)
 Kernel 5.4.0-54-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, GUI disabled)
 Base Pointers: 64-bit
 Peak Pointers: 32/64-bit
 Other: jemalloc: jemalloc memory allocator library v5.1.0
 Power Management: BIOS and OS 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 | 16 | 411 | 62.0 | <u>408</u> | <u>62.4</u> | 408 | 62.5 | 16 | 389 | 65.4 | 390 | 65.3 | <u>389</u> | <u>65.4</u> |
| 502.gcc_r | 16 | 296 | 76.5 | <u>299</u> | <u>75.8</u> | 299 | 75.7 | 16 | <u>251</u> | <u>90.2</u> | 251 | 90.2 | 250 | 90.5 |
| 505.mcf_r | 16 | 190 | 136 | <u>191</u> | <u>136</u> | 191 | 135 | 16 | 190 | 136 | <u>191</u> | <u>136</u> | 191 | 135 |
| 520.omnetpp_r | 16 | 397 | 52.9 | 410 | 51.3 | <u>401</u> | <u>52.4</u> | 16 | 397 | 52.9 | 410 | 51.3 | <u>401</u> | <u>52.4</u> |
| 523.xalancbmk_r | 16 | 160 | 105 | <u>161</u> | <u>105</u> | 161 | 105 | 16 | 155 | 109 | 156 | 108 | <u>156</u> | <u>109</u> |
| 525.x264_r | 16 | 159 | 176 | <u>159</u> | <u>176</u> | 159 | 176 | 16 | 159 | 176 | <u>159</u> | <u>176</u> | 159 | 176 |
| 531.deepsjeng_r | 16 | <u>264</u> | <u>69.6</u> | 264 | 69.6 | 263 | 69.7 | 16 | 263 | 69.7 | <u>263</u> | <u>69.7</u> | 264 | 69.6 |
| 541.leela_r | 16 | 367 | 72.2 | 364 | 72.8 | <u>367</u> | <u>72.3</u> | 16 | 365 | 72.5 | <u>366</u> | <u>72.4</u> | 367 | 72.2 |
| 548.exchange2_r | 16 | 212 | 197 | <u>212</u> | <u>197</u> | 212 | 197 | 16 | 210 | 199 | <u>210</u> | <u>199</u> | 210 | 199 |
| 557.xz_r | 16 | <u>335</u> | <u>51.5</u> | 337 | 51.3 | 335 | 51.6 | 16 | <u>335</u> | <u>51.6</u> | 334 | 51.7 | 336 | 51.4 |

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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
'echo always > /sys/kernel/mm/transparent_hugepage/defrag' run as root for peak
```

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Operating System Notes (Continued)

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 =
"/cpu2017/amd_rate_aocc300_milan_A_lib/64;/cpu2017/amd_rate_aocc300_mila
n_A_lib/32:"
MALLOCONF = "retain:true"

Environment variables set by runcpu during the 523.xalanbmk_r peak run:
MALLOCONF = "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: "Bucek, James" <james.bucek@hpe.com>
Submitted: Mon May 24 19:14:14 EDT 2021
Submission: cpu2017-20210524-26569.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
Memory PStates set to Disabled
Data Fabric C-State Enable set to Force Enabled

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Platform Notes (Continued)

Thermal Configuration set to Maximum Cooling
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

The system ROM used for this result contains AMD microcode version 0xa00111d for the AMD EPYC 72F3 processor.

```
sysinfo program /cpu2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on dl325gen10plus Wed Apr 1 12:24:50 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
1 "physical id"s (chips)
16 "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
```

```
From lscpu from util-linux 2.34:
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):                 16
On-line CPU(s) list:   0-15
Thread(s) per core:    2
Core(s) per socket:    8
Socket(s):              1
NUMA node(s):          8
Vendor ID:              AuthenticAMD
CPU family:             25
Model:                  1
Model name:             AMD EPYC 72F3 8-Core Processor
Stepping:               1
CPU MHz:                3249.389
BogoMIPS:                7386.50
Virtualization:         AMD-V
L1d cache:              256 KiB
```

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Platform Notes (Continued)

```

L1i cache:                256 KiB
L2 cache:                  4 MiB
L3 cache:                  256 MiB
NUMA node0 CPU(s):        0,8
NUMA node1 CPU(s):        1,9
NUMA node2 CPU(s):        2,10
NUMA node3 CPU(s):        3,11
NUMA node4 CPU(s):        4,12
NUMA node5 CPU(s):        5,13
NUMA node6 CPU(s):        6,14
NUMA node7 CPU(s):        7,15
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

```

From lscpu --cache:

| NAME | ONE-SIZE | ALL-SIZE | WAYS | TYPE | LEVEL |
|------|----------|----------|------|-------------|-------|
| L1d | 32K | 256K | 8 | Data | 1 |
| L1i | 32K | 256K | 8 | Instruction | 1 |
| L2 | 512K | 4M | 8 | Unified | 2 |
| L3 | 32M | 256M | 16 | Unified | 3 |

/proc/cpuinfo cache data
cache size : 512 KB

From numactl --hardware

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Platform Notes (Continued)

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

```

available: 8 nodes (0-7)
node 0 cpus: 0 8
node 0 size: 128776 MB
node 0 free: 128644 MB
node 1 cpus: 1 9
node 1 size: 129021 MB
node 1 free: 128893 MB
node 2 cpus: 2 10
node 2 size: 129023 MB
node 2 free: 128890 MB
node 3 cpus: 3 11
node 3 size: 128998 MB
node 3 free: 128873 MB
node 4 cpus: 4 12
node 4 size: 129023 MB
node 4 free: 128817 MB
node 5 cpus: 5 13
node 5 size: 129022 MB
node 5 free: 128902 MB
node 6 cpus: 6 14
node 6 size: 129023 MB
node 6 free: 128868 MB
node 7 cpus: 7 15
node 7 size: 129010 MB
node 7 free: 128888 MB
node distances:
node  0  1  2  3  4  5  6  7
  0:  10 11 12 12 12 12 12 12
  1:  11 10 12 12 12 12 12 12
  2:  12 12 10 11 12 12 12 12
  3:  12 12 11 10 12 12 12 12
  4:  12 12 12 12 12 10 11 12
  5:  12 12 12 12 11 10 12 12
  6:  12 12 12 12 12 12 10 11
  7:  12 12 12 12 12 12 11 10

```

```

From /proc/meminfo
MemTotal:      1056664476 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

```

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Platform Notes (Continued)

```
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 dl325gen10plus 5.4.0-54-generic #60-Ubuntu SMP Fri Nov 6 10:37:59 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/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 12:23
```

```
SPEC is set to: /cpu2017
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb2       ext4  733G   27G  669G   4% /
```

```
From /sys/devices/virtual/dmi/id
Vendor:          HPE
Product:         ProLiant DL325 Gen10 Plus
Product Family: ProLiant
Serial:          CN79290FKQ
```

Additional information from dmidecode 3.2 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

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Platform Notes (Continued)

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)

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
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Target: i386-unknown-linux-gnu

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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)
=====

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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

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



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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
-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
```

(Continued on next page)



SPEC CPU®2017 Integer Rate Result

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(3.70 GHz, AMD EPYC 72F3)

SPECrate®2017_int_base = 89.2

SPECrate®2017_int_peak = 91.6

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

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

Base Other Flags (Continued)

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
```

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
```

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Peak Optimization Flags (Continued)

500.perlbench_r (continued):

```
-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:

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
```

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Tested by: HPE

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Software Availability: Mar-2021

Peak Optimization Flags (Continued)

523.xalancbmk_r (continued):

```
-mllvm -global-vectorize-slp=true
-mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden
-ljemalloc
```

531.deepsjeng_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
```

541.leela_r: Same as 531.deepsjeng_r

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
```

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Peak Other Flags (Continued)

```
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/aocc300-flags-A1.html>

<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/aocc300-flags-A1.xml>

<http://www.spec.org/cpu2017/flags/HPE-Platform-Flags-AMD-V1.2-EPYC-revP.xml>

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