



SPEC CPU®2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

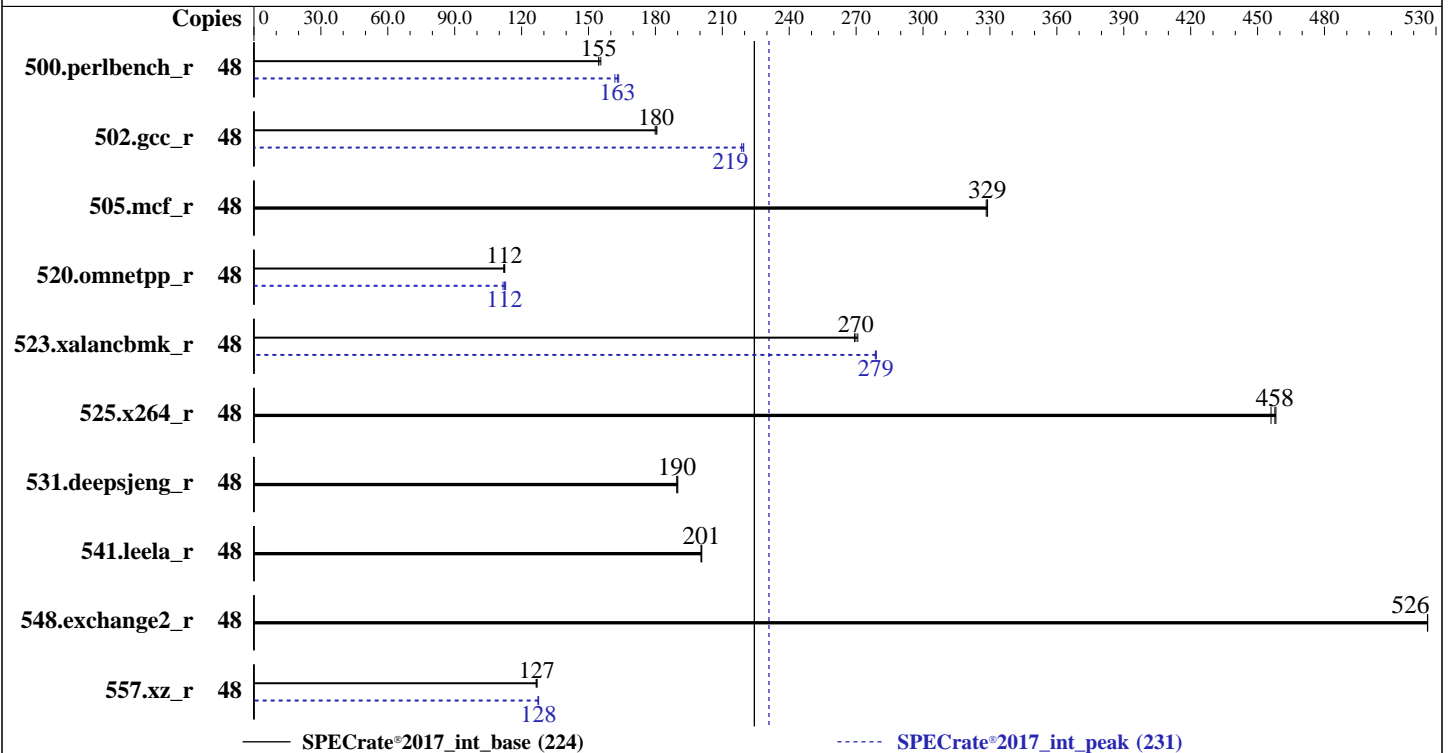
ProLiant DL345 Gen10 Plus
(3.20 GHz, AMD EPYC 74F3)

SPECrate®2017_int_base = 224

SPECrate®2017_int_peak = 231

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 74F3
 Max MHz: 4000
 Nominal: 3200
 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: 256 MB I+D on chip per chip, 32 MB shared / 3 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	494	155	491	156	494	155	48	472	162	469	163	467	164
502.gcc_r	48	376	181	378	180	377	180	48	310	219	309	220	311	219
505.mcf_r	48	236	329	236	329	236	328	48	236	329	236	329	236	328
520.omnetpp_r	48	561	112	560	112	562	112	48	564	112	560	112	558	113
523.xalancbmk_r	48	188	270	188	269	187	271	48	182	279	182	279	182	279
525.x264_r	48	184	456	184	458	183	458	48	184	456	184	458	183	458
531.deepsjeng_r	48	289	190	290	190	290	190	48	289	190	290	190	290	190
541.leela_r	48	396	201	397	200	396	201	48	396	201	397	200	396	201
548.exchange2_r	48	239	526	239	526	239	526	48	239	526	239	526	239	526
557.xz_r	48	408	127	409	127	410	127	48	407	127	406	128	406	128

SPECrate®2017_int_base = **224**

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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 12:30:16 EDT 2021
Submission: cpu2017-20210524-26409.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 17:34:24 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
 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 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):                 48
On-line CPU(s) list:   0-47
Thread(s) per core:    2
Core(s) per socket:    24
Socket(s):              1
NUMA node(s):          8
Vendor ID:              AuthenticAMD
CPU family:             25
Model:                  1
Model name:             AMD EPYC 74F3 24-Core Processor
Stepping:               1
CPU MHz:                2394.582
BogoMIPS:               6387.73
Virtualization:        AMD-V
L1d cache:              768 KiB
L1i cache:              768 KiB
L2 cache:                12 MiB
L3 cache:                256 MiB
```

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Platform Notes (Continued)

```

NUMA node0 CPU(s):          0-2,24-26
NUMA node1 CPU(s):          3-5,27-29
NUMA node2 CPU(s):          6-8,30-32
NUMA node3 CPU(s):          9-11,33-35
NUMA node4 CPU(s):          12-14,36-38
NUMA node5 CPU(s):          15-17,39-41
NUMA node6 CPU(s):          18-20,42-44
NUMA node7 CPU(s):          21-23,45-47
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/swaps 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.

```

available: 8 nodes (0-7)
node 0 cpus: 0 1 2 24 25 26
node 0 size: 128776 MB
node 0 free: 128263 MB
node 1 cpus: 3 4 5 27 28 29
node 1 size: 128996 MB
node 1 free: 128797 MB
node 2 cpus: 6 7 8 30 31 32
node 2 size: 129022 MB

```

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Platform Notes (Continued)

```

node 2 free: 128867 MB
node 3 cpus: 9 10 11 33 34 35
node 3 size: 129021 MB
node 3 free: 128878 MB
node 4 cpus: 12 13 14 36 37 38
node 4 size: 129022 MB
node 4 free: 128875 MB
node 5 cpus: 15 16 17 39 40 41
node 5 size: 129021 MB
node 5 free: 128864 MB
node 6 cpus: 18 19 20 42 43 44
node 6 size: 129022 MB
node 6 free: 128874 MB
node 7 cpus: 21 22 23 45 46 47
node 7 size: 129008 MB
node 7 free: 128847 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  10  11  12  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:      1056657932 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/"

```

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Platform Notes (Continued)

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
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

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Platform Notes (Continued)

Firmware Revision: 2.40

(End of data from sysinfo program)

Compiler Version Notes

=====
C | 502.gcc_r(peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

=====
C | 500.perlbench_r(base, peak) 502.gcc_r(base) 505.mcf_r(base, peak)
525.x264_r(base, peak) 557.xz_r(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

=====
C | 502.gcc_r(peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
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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)

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Compiler Version Notes (Continued)

=====
C++ | 523.xalancbmk_r(peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

=====
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

=====
C++ | 523.xalancbmk_r(peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: i386-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

=====
C++ | 520.omnetpp_r(base, peak) 523.xalancbmk_r(base)
531.deepsjeng_r(base, peak) 541.leela_r(base, peak)

AMD clang version 12.0.0 (CLANG: AOCC_3.0.0-Build#78 2020_12_10) (based on LLVM Mirror.Version.12.0.0)
Target: x86_64-unknown-linux-gnu
Thread model: posix
InstalledDir: /opt/AMD/aocc-compiler-3.0.0/bin

=====
Fortran | 548.exchange2_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

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

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-fremap-arrays -mllvm -function-specialize -flv-function-specialization
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true
-mllvm -enable-licm-vrp -mllvm -reduce-array-computations=3 -z muldefs
-lamdlibm -ljemalloc -lflang -lflangrti
```

C++ benchmarks:

```
-m64 -std=c++98 -Wl,-mllvm -Wl,-do-block-reorder=aggressive -flto
-Wl,-mllvm -Wl,-region-vectorize -Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -mllvm -enable-partial-unswitch
-mllvm -unroll-threshold=100 -finline-aggressive
-flv-function-specialization -mllvm -loop-unswitch-threshold=200000
-mllvm -reroll-loops -mllvm -aggressive-loop-unswitch
-mllvm -extra-vectorizer-passes -mllvm -reduce-array-computations=3
-mllvm -global-vectorize-slp=true -mllvm -convert-pow-exp-to-int=false
-z muldefs -mllvm -do-block-reorder=aggressive
-fvirtual-function-elimination -fvisibility=hidden -lamdlibm
-ljemalloc -lflang -lflangrti
```

Fortran benchmarks:

```
-m64 -Wl,-mllvm -Wl,-inline-recursion=4
-Wl,-mllvm -Wl,-lsr-in-nested-loop -Wl,-mllvm -Wl,-enable-iv-split
-flto -Wl,-mllvm -Wl,-region-vectorize
-Wl,-mllvm -Wl,-function-specialize
-Wl,-mllvm -Wl,-align-all-nofallthru-blocks=6
-Wl,-mllvm -Wl,-reduce-array-computations=3 -O3 -ffast-math
-march=znver3 -fveclib=AMDLIBM -z muldefs -mllvm -unroll-aggressive
-mllvm -unroll-threshold=500 -lamdlibm -ljemalloc -lflang -lflangrti
```

Base Other Flags

C benchmarks:

```
-Wno-unused-command-line-argument
```

C++ benchmarks:

```
-Wno-unused-command-line-argument
```



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SPECrate®2017_int_peak = 231

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

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

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
-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
```

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Peak Optimization Flags (Continued)

502.gcc_r (continued):

```
-Wl,-mllvm -Wl,-function-specialize -Ofast -march=znver3  
-fveclib=AMDLIBM -fstruct-layout=7  
-mllvm -unroll-threshold=50 -fremap-arrays  
-flv-function-specialization -mllvm -inline-threshold=1000  
-mllvm -enable-gvn-hoist -mllvm -global-vectorize-slp=true  
-mllvm -function-specialize -mllvm -enable-licm-vrp  
-mllvm -reduce-array-computations=3 -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: -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 -fvirtual-function-visibility=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
```

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Peak Optimization Flags (Continued)

523.xalancbmk_r (continued):

```
-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>

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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