



SPEC® CPU2017 Integer Rate Result

Copyright 2017-2019 Standard Performance Evaluation Corporation

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen10

(2.00 GHz, AMD EPYC 7501)

SPECrate2017_int_base = 136

SPECrate2017_int_peak = Not Run

CPU2017 License: 3

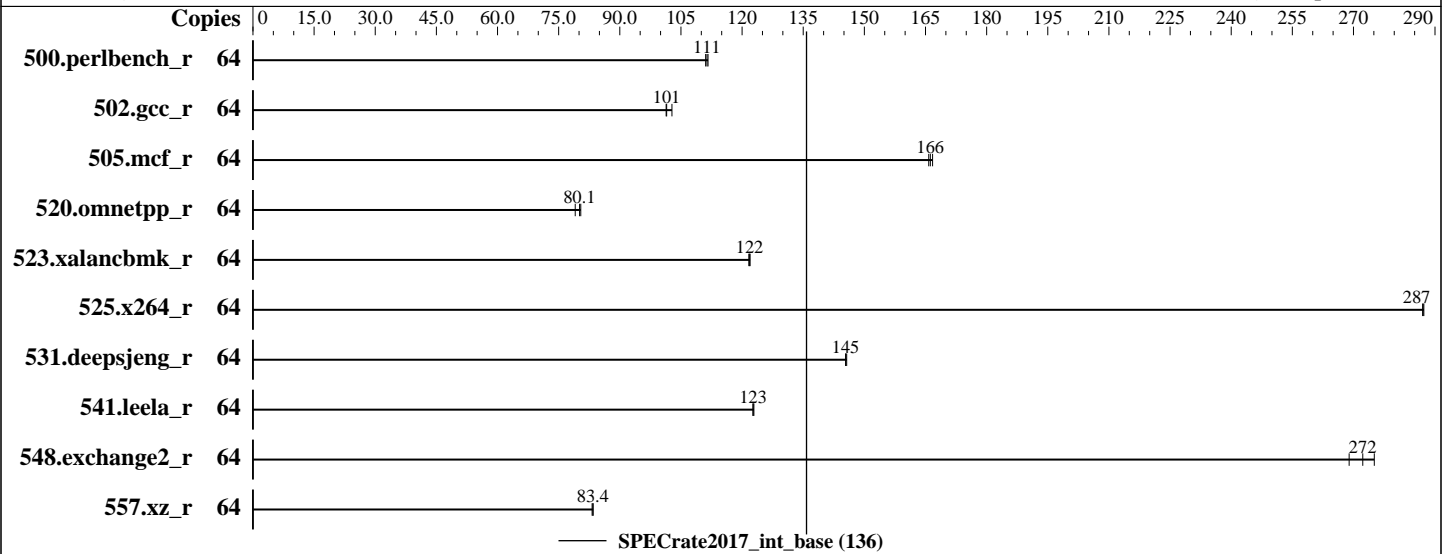
Test Sponsor: HPE

Tested by: HPE

Test Date: Jul-2018

Hardware Availability: Jul-2018

Software Availability: Apr-2018



Hardware

CPU Name: AMD EPYC 7501
 Max MHz.: 3000
 Nominal: 2000
 Enabled: 32 cores, 1 chip, 2 threads/core
 Orderable: 1 chip
 Cache L1: 64 KB I + 32 KB D on chip per core
 L2: 512 KB I+D on chip per core
 L3: 64 MB I+D on chip per chip, 8 MB shared / 4 cores
 Other: None
 Memory: 512 GB (8 x 64 GB 4Rx4 PC4-2666V-L)
 Storage: 1 x 480 GB SATA SSD, RAID 0
 Other: None

Software

OS: SUSE Linux Enterprise Server 12 (x86_64) SP3
 Kernel 4.4.131-94.25-default
 Compiler: C/C++: Version 1.0.0 of AOCC
 Fortran: Version 4.8.2 of GCC
 Parallel: No
 Firmware: HPE BIOS Version A41 04/06/2018 released Apr-2018
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: jemalloc general purpose malloc implementation v4.5.0



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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	64	913	112	915	111	917	111							
502.gcc_r	64	893	101	894	101	882	103							
505.mcf_r	64	624	166	622	166	620	167							
520.omnetpp_r	64	1044	80.4	1062	79.1	1048	80.1							
523.xalancbmk_r	64	556	122	555	122	554	122							
525.x264_r	64	390	287	391	287	390	287							
531.deepsjeng_r	64	504	145	504	145	504	146							
541.leela_r	64	864	123	864	123	862	123							
548.exchange2_r	64	623	269	616	272	610	275							
557.xz_r	64	829	83.4	828	83.4	831	83.2							

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

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
'ulimit -l 2097152' was used to set environment locked pages in memory limit

runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu
Linux governor set to performance with cpupower "cpupower frequency-set -r -g performance"
dirty_ratio, swappiness, zone_reclaim_mode and drop_caches were
all set using privileged echo (e.g. echo 1 > /proc/sys/vm/swappiness).
Transparent huge pages were enabled for this run (OS default)
Huge pages were not configured for this run.
IRQ balance service stopped using "systemctl stop irqbalance.service"
Tuned profile set with "tuned-adm profile throughput-performance"



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General Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH = "/home/cpu2017/amd1704-rate-libs-revC/64;/home/cpu2017/amd1704-rate-libs-revC/32:"  
MALLOCONF = "lg_chunk:26"
```

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

Binaries were compiled on a system with 2x AMD EPYC 7601 CPU + 512GB Memory using RHEL 7.4

The AOCC Gold Linker plugin was installed and used for the link stage.

The AOCC Fortran Plugin version 1.0 was used to leverage AOCC optimizers with gfortran. It is available here:
<http://developer.amd.com/amd-aocc/>

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, a general purpose malloc implementation, was obtained at
<https://github.com/jemalloc/jemalloc/releases/download/4.5.0/jemalloc-4.5.0.tar.bz2>
jemalloc was built with GCC v4.8.5 in RHEL v7.2 under default conditions.
jemalloc uses environment variable MALLOCONF with values narenas and lg_chunk:
narenas: sets the maximum number of arenas to use for automatic multiplexing of threads and arenas.
lg_chunk: set the virtual memory chunk size (log base 2). For example, lg_chunk:21 sets the default chunk size to 2²¹ = 2MiB.

Platform Notes

BIOS Configuration:

Thermal Configuration set to Maximum Cooling
Memory Patrol Scrubbing set to Disabled
Performance Determinism set to Power Deterministic
Processor Power and Utilization Monitoring set to Disabled
Workload Profile set to General Throughput Compute
Minimum Processor Idle Power Core C-State set to C6 State
Sysinfo program /home/cpu2017/bin/sysinfo
Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
running on dl325g10-7501 Fri Jan 5 10:13:25 2001

SUT (System Under Test) info as seen by some common utilities.

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Platform Notes (Continued)

For more information on this section, see
<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

model name : AMD EPYC 7501 32-Core Processor

1 "physical id"s (chips)

64 "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 : 32

siblings : 64

physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
25 26 27 28 29 30 31

From lscpu:

Architecture: x86_64

CPU op-mode(s): 32-bit, 64-bit

Byte Order: Little Endian

CPU(s): 64

On-line CPU(s) list: 0-63

Thread(s) per core: 2

Core(s) per socket: 32

Socket(s): 1

NUMA node(s): 4

Vendor ID: AuthenticAMD

CPU family: 23

Model: 1

Model name: AMD EPYC 7501 32-Core Processor

Stepping: 2

CPU MHz: 2000.000

CPU max MHz: 2000.0000

CPU min MHz: 1200.0000

BogoMIPS: 3992.40

Virtualization: AMD-V

L1d cache: 32K

L1i cache: 64K

L2 cache: 512K

L3 cache: 8192K

NUMA node0 CPU(s): 0-7,32-39

NUMA node1 CPU(s): 8-15,40-47

NUMA node2 CPU(s): 16-23,48-55

NUMA node3 CPU(s): 24-31,56-63

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 extd_apicid amd_dcm aperfmperf eagerfpu pni
pclmulqdq monitor ssse3 fma cx16 sse4_1 sse4_2 movbe popcnt aes xsave avx f16c
rdrand lahf_lm cmp_legacy svm extapic cr8_legacy abm sse4a misalignsse 3dnowprefetch

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Platform Notes (Continued)

```
osvw skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx arat
hw_pstate rds retpoline retpoline_amd npt lbrv svm_lock nrip_save tsc_scale
vmcb_clean flushbyasid decodeassists pausefilter pfthreshold vmmcall avic fsgsbase
bmi1 avx2 smep bmi2 rdseed adx smap clflushopt sha_ni xsaveopt xsavec xgetbv1 clzero
irperf ibpb 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 6 7 32 33 34 35 36 37 38 39
node 0 size: 128768 MB
node 0 free: 128547 MB
node 1 cpus: 8 9 10 11 12 13 14 15 40 41 42 43 44 45 46 47
node 1 size: 129020 MB
node 1 free: 128827 MB
node 2 cpus: 16 17 18 19 20 21 22 23 48 49 50 51 52 53 54 55
node 2 size: 129020 MB
node 2 free: 128827 MB
node 3 cpus: 24 25 26 27 28 29 30 31 56 57 58 59 60 61 62 63
node 3 size: 128899 MB
node 3 free: 128704 MB
node distances:
node  0  1  2  3
  0:  10  16  16  16
  1:  16  10  16  16
  2:  16  16  10  16
  3:  16  16  16  10
```

```
From /proc/meminfo
MemTotal:      528087260 kB
HugePages_Total:      0
Hugepagesize:    2048 kB
```

```
/usr/bin/lsb_release -d
SUSE Linux Enterprise Server 12 SP3
```

```
From /etc/*release* /etc/*version*
SuSE-release:
SUSE Linux Enterprise Server 12 (x86_64)
VERSION = 12
PATCHLEVEL = 3
# This file is deprecated and will be removed in a future service pack or release.
# Please check /etc/os-release for details about this release.
os-release:
```

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Platform Notes (Continued)

```

NAME="SLES"
VERSION="12-SP3"
VERSION_ID="12.3"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp3"

```

uname -a:

```

Linux dl325g10-7501 4.4.131-94.25-default #1 SMP Mon May 7 11:22:19 UTC 2018 (9700bac)
x86_64 x86_64 x86_64 GNU/Linux

```

run-level 3 Jan 5 10:08

SPEC is set to: /home/cpu2017

```

Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda3        xfs   407G  6.0G  401G   2% /home

```

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.

BIOS HPE A41 04/06/2018

Memory:

8x UNKNOWN NOT AVAILABLE

8x UNKNOWN NOT AVAILABLE 64 GB 4 rank 2666

(End of data from sysinfo program)

Compiler Version Notes

```

=====
CC 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base)
557.xz_r(base)
=====

```

```

AOCCLLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
AOCCLLVM.4.0.0.B35.2017_04_26)

```

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin

```

=====
CXXC 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base)
541.leela_r(base)
=====

```

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AOCC.LLVM.4.0.0.B35.2017_04_26 clang version 4.0.0 (CLANG:) (based on LLVM
AOCC.LLVM.4.0.0.B35.2017_04_26)

Target: x86_64-unknown-linux-gnu

Thread model: posix

InstalledDir: /root/work/compilers/AOCC-1.0-Compiler/bin

FC 548.exchange2_r(base)

GNU Fortran (GCC) 4.8.2

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Base Compiler Invocation

C benchmarks:

clang

C++ benchmarks:

clang++

Fortran benchmarks:

clang gfortran

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:

```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop  
-disable-vect-cmp -O3 -ffast-math -march=znver1 -fstruct-layout=2  
-mllvm -unroll-threshold=100 -fremap-arrays -mno-avx2  
-inline-threshold=1000 -z muldefs -ljemalloc
```

C++ benchmarks:

```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop  
-disable-vect-cmp -O3 -march=znver1 -mllvm -unroll-threshold=100  
-finline-aggressive -fremap-arrays -inline-threshold=1000 -z muldefs  
-ljemalloc
```

Fortran benchmarks:

```
-flto -Wl, -plugin-opt= -merge-constant -lsr-in-nested-loop  
-disable-vect-cmp -O3 -mavx -madox -funroll-loops -ffast-math  
-z muldefs -Ofast -fdefault-integer-8 -fplugin=dragonegg.so  
-fplugin-arg-dragonegg-llvm-option=" -enable-iv-split  
-inline-threshold:1000 -disable-vect-cmp" -ljemalloc -lgfortran  
-lamdlibm
```

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-revD.html>

<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-02-16.html>

<http://www.spec.org/cpu2017/flags/gcc.2018-02-16.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-revD.xml>

<http://www.spec.org/cpu2017/flags/aocc100-flags-revC-I.2018-02-16.xml>

<http://www.spec.org/cpu2017/flags/gcc.2018-02-16.xml>

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

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