



SPEC® CPU2017 Integer Rate Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL325 Gen10

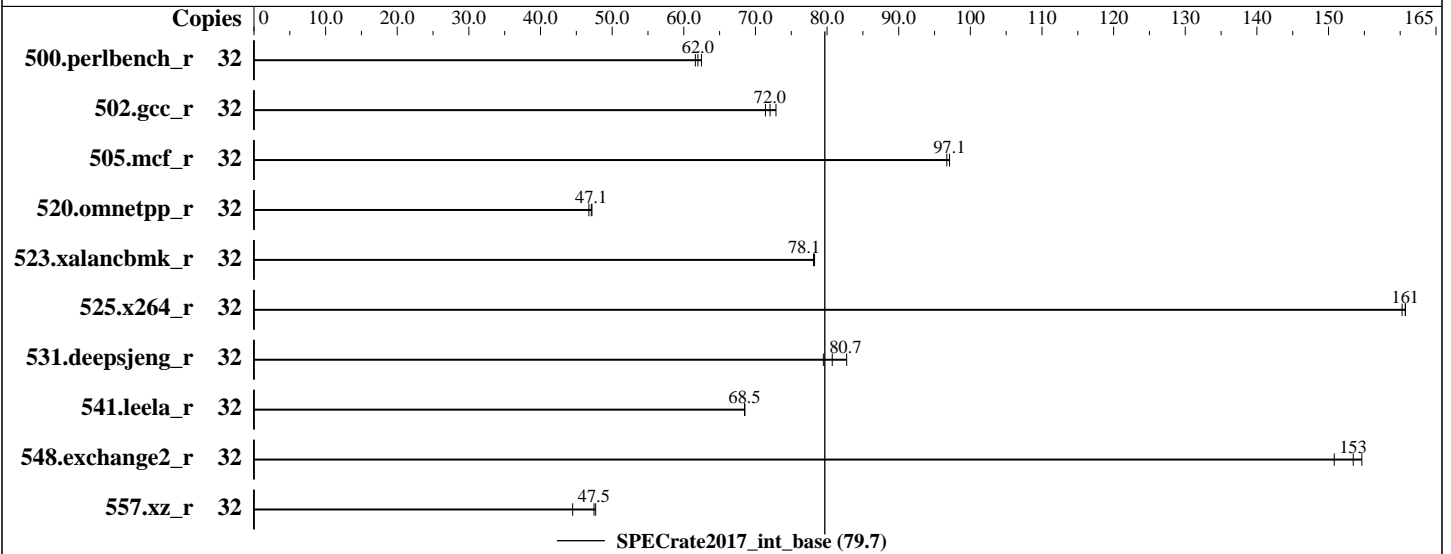
(2.40 GHz, AMD EPYC 7351P)

SPECrate2017_int_base = 79.7

SPECrate2017_int_peak = Not Run

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

Test Date: Jun-2018
Hardware Availability: Jul-2018
Software Availability: Feb-2018



Hardware

CPU Name: AMD EPYC 7351P
Max MHz.: 2900
Nominal: 2400
Enabled: 16 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 / 2 cores
Other: None
Memory: 128 GB (8 x 16 GB 1Rx4 PC4-2666V-R, running at 2400)
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	32	816	62.5	<u>822</u>	<u>62.0</u>	827	61.6							
502.gcc_r	32	622	72.9	<u>629</u>	<u>72.0</u>	635	71.4							
505.mcf_r	32	535	96.7	<u>533</u>	<u>97.1</u>	533	97.1							
520.omnetpp_r	32	898	46.7	890	47.2	<u>892</u>	<u>47.1</u>							
523.xalancbmk_r	32	432	78.3	433	78.1	<u>432</u>	<u>78.1</u>							
525.x264_r	32	349	161	<u>349</u>	<u>161</u>	350	160							
531.deepsjeng_r	32	<u>454</u>	<u>80.7</u>	443	82.7	461	79.5							
541.leela_r	32	773	68.5	774	68.5	<u>774</u>	<u>68.5</u>							
548.exchange2_r	32	542	155	<u>546</u>	<u>153</u>	556	151							
557.xz_r	32	725	47.7	<u>728</u>	<u>47.5</u>	777	44.5							

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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 /source/home/cpu2017/bin/sysinfo
 Rev: r5797 of 2017-06-14 96c45e4568ad54c135fd618bcc091c0f
 running on dl325-gen10 Tue Jun 26 01:06:22 2018

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 7351P 16-Core Processor

1 "physical id"s (chips)

32 "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 : 16

siblings : 32

physical 0: cores 0 1 4 5 8 9 12 13 16 17 20 21 24 25 28 29

From lscpu:

Architecture: x86_64

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

Byte Order: Little Endian

CPU(s): 32

On-line CPU(s) list: 0-31

Thread(s) per core: 2

Core(s) per socket: 16

Socket(s): 1

NUMA node(s): 4

Vendor ID: AuthenticAMD

CPU family: 23

Model: 1

Model name: AMD EPYC 7351P 16-Core Processor

Stepping: 2

CPU MHz: 2400.000

CPU max MHz: 2400.0000

CPU min MHz: 1200.0000

BogoMIPS: 4790.96

Virtualization: AMD-V

L1d cache: 32K

L1i cache: 64K

L2 cache: 512K

L3 cache: 8192K

NUMA node0 CPU(s): 0-3,16-19

NUMA node1 CPU(s): 4-7,20-23

NUMA node2 CPU(s): 8-11,24-27

NUMA node3 CPU(s): 12-15,28-31

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 osvw skinit wdt tce topoext perfctr_core perfctr_nb bpext perfctr_l2 mwaitx arat cpb

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Platform Notes (Continued)

```
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 16 17 18 19
node 0 size: 32074 MB
node 0 free: 31903 MB
node 1 cpus: 4 5 6 7 20 21 22 23
node 1 size: 32254 MB
node 1 free: 32115 MB
node 2 cpus: 8 9 10 11 24 25 26 27
node 2 size: 32254 MB
node 2 free: 32119 MB
node 3 cpus: 12 13 14 15 28 29 30 31
node 3 size: 32254 MB
node 3 free: 32116 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:      131928672 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:
NAME="SLES"
```

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Platform Notes (Continued)

```

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 dl325-gen10 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 03:30

SPEC is set to: /source/home/cpu2017

```

Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sdb4        xfs   445G  5.8G  439G   2% /source/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 16 GB 1 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)
=====

```

```

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

```

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

```

```

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

```

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Compiler Version Notes (Continued)

```
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
Copyright (C) 2013 Free Software Foundation, Inc.
GNU Fortran comes with NO WARRANTY, to the extent permitted by law.
You may redistribute copies of GNU Fortran
under the terms of the GNU General Public License.
For more information about these matters, see the file named COPYING
-----
```

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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