



SPEC CPU®2017 Integer Rate Result

Copyright 2017-2021 Standard Performance Evaluation Corporation

Inspur Corporation

SPECrate®2017_int_base = 596

Inspur NF5280R6 (Ampere Altra Q80-33)

SPECrate®2017_int_peak = Not Run

CPU2017 License: 3358

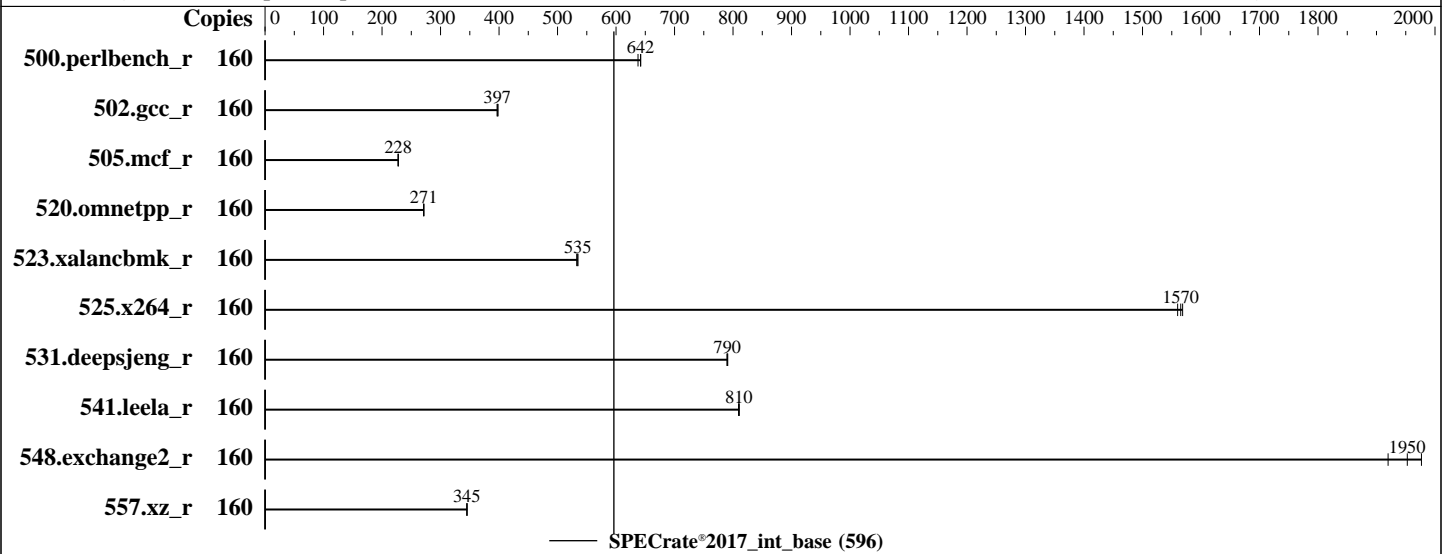
Test Sponsor: Inspur Corporation

Tested by: Inspur Corporation

Test Date: Sep-2021

Hardware Availability: Jan-2022

Software Availability: Dec-2020



Hardware

CPU Name: Ampere Altra Q80-33
 Max MHz: 3300
 Nominal: 3000
 Enabled: 160 cores, 2 chips
 Orderable: 2 chips
 Cache L1: 64 KB I + 64 KB D on chip per core
 L2: 1 MB I+D on chip per core
 L3: 32 MB I+D on chip per chip
 Other: None
 Memory: 512 GB (16 x 32 GB 2Rx8 PC4-3200AA-R)
 Storage: 1 x 480 GB SATA SSD
 Other: None

Software

OS: Red Hat Enterprise Linux release 8.3 (Ootpa) 4.18.0-240.el8.aarch64
 Compiler: C/C++/Fortran: Version 10.2.1 of Ampere GCC
 Parallel: No
 Firmware: Version 05.00.04 released Aug-2021
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: Not Applicable
 Other: Jemalloc memory allocator library v5.2.1
 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	160	397	642	400	638	397	642									
502.gcc_r	160	571	397	569	398	571	397									
505.mcf_r	160	1136	228	1136	228	1136	228									
520.omnetpp_r	160	773	272	775	271	774	271									
523.xalancbmk_r	160	316	535	316	535	317	533									
525.x264_r	160	180	1560	179	1570	179	1570									
531.deepsjeng_r	160	232	790	232	790	232	791									
541.leela_r	160	327	810	327	811	327	809									
548.exchange2_r	160	212	1980	215	1950	218	1920									
557.xz_r	160	501	345	501	345	500	345									

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

Compiler Notes

Binaries were compiled on a system with 2x Ampere Altra Q80-33 CPU chips + 256 GB Memory using CentOS 8.3.

Ampere GCC 10.2.1 is available via <https://github.com/AmpereComputing/ampere-gcc/releases>

Submit Notes

The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.

Operating System Notes

'ulimit -s unlimited' was used to set environment stack size
Set dirty_ratio=8 to limit dirty cache to 8% of memory
i.e. echo 8 | sudo tee /proc/sys/vm/dirty_ratio
Set swappiness=1 to swap only if necessary
i.e. echo 1 | sudo tee /proc/sys/vm/swappiness
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
i.e. echo 1 | sudo tee /proc/sys/vm/zone_reclaim_mode
Set drop_caches=3 to reset caches before invoking runcpu
i.e. echo 3 | sudo tee /proc/sys/vm/drop_caches
Set numa_balancing=0 to disable automatic numa balancing
i.e. echo 0 | sudo tee /proc/sys/kernel/numa_balancing
Switch off all ktune and tuned settings
i.e. sudo tuned-adm off

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Operating System Notes (Continued)

```
Transparent huge pages set to 'never'
i.e. sudo bash -c "echo never > /sys/kernel/mm/transparent_hugepage/enabled"
Enable address randomization
i.e. echo 2 | sudo tee /proc/sys/kernel/randomize_va_space

runcpu command invoked through numactl
1 chip system: numactl --interleave=0-3 runcpu <etc>
2 chip system: numactl --interleave=all runcpu <etc>
```

Environment Variables Notes

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

```
LD_LIBRARY_PATH =
"/home/CPU2017/jemalloc/install/lib:/home/CPU2017/gcc/install/lib64:/home/ampctest/ampere_spec2017/spec2017/jemalloc/install/lib:/home/ampctest/ampere_spec2017/spec2017/gcc/install/lib64:/home/ampctest/ampere_spec2017/spec2017/jemalloc/install/lib:"
```

General Notes

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.

NA: 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 v5.2.1 is available via <https://github.com/jemalloc/jemalloc/releases/download/5.2.1/jemalloc-5.2.1.tar.bz2>
It was built on CentOS 8.3 using Version 10.2.1 of Ampere GCC with configure options `--prefix=/home/ampctest/jemalloc/install --with-lg-quantum=3`

Platform Notes

BIOS configuration:
ANC Mode Set to Quadrant

Sysinfo program /home/CPU2017/bin/sysinfo
Rev: r6622 of 2021-04-07 982a61ec0915b55891ef0e16acafc64d
running on localhost.localdomain Sat Sep 18 22:21:48 2021

SUT (System Under Test) info as seen by some common utilities.
For more information on this section, see

(Continued on next page)



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Platform Notes (Continued)

<https://www.spec.org/cpu2017/Docs/config.html#sysinfo>

From /proc/cpuinfo

```

*
* Did not identify cpu model.  If you would
* like to write your own sysinfo program, see
* www.spec.org/cpu2017/config.html#sysinfo
*
*
* 0 "physical id" tags found.  Perhaps this is an older system,
* or a virtualized system.  Not attempting to guess how to
* count chips/cores for this system.
*
    160 "processors"
    cores, siblings (Caution: counting these is hw and system dependent. The following
    excerpts from /proc/cpuinfo might not be reliable.  Use with caution.)

```

From lscpu from util-linux 2.32.1:

```

Architecture:      aarch64
Byte Order:        Little Endian
CPU(s):            160
On-line CPU(s) list: 0-159
Thread(s) per core: 1
Core(s) per socket: 80
Socket(s):         2
NUMA node(s):     8
Vendor ID:         ARM
Model:             1
Stepping:          r3p1
CPU max MHz:       3300.0000
CPU min MHz:       1000.0000
BogoMIPS:          50.00
L1d cache:         64K
L1i cache:         64K
L2 cache:          1024K
L3 cache:          32768K
NUMA node0 CPU(s): 0-19
NUMA node1 CPU(s): 20-39
NUMA node2 CPU(s): 40-59
NUMA node3 CPU(s): 60-79
NUMA node4 CPU(s): 80-99
NUMA node5 CPU(s): 100-119
NUMA node6 CPU(s): 120-139
NUMA node7 CPU(s): 140-159
Flags:             fp asimd evtstrm aes pmull sha1 sha2 crc32 atomics fphp asimdhp
cpuid asimdrdm lrcpc dcpop asimddp ssbs

```

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Platform Notes (Continued)

```

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 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19
node 0 size: 64974 MB
node 0 free: 60258 MB
node 1 cpus: 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
node 1 size: 65459 MB
node 1 free: 60782 MB
node 2 cpus: 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59
node 2 size: 65459 MB
node 2 free: 60832 MB
node 3 cpus: 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79
node 3 size: 65459 MB
node 3 free: 60873 MB
node 4 cpus: 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99
node 4 size: 64436 MB
node 4 free: 59727 MB
node 5 cpus: 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117
118 119
node 5 size: 65459 MB
node 5 free: 61051 MB
node 6 cpus: 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137
138 139
node 6 size: 65421 MB
node 6 free: 60989 MB
node 7 cpus: 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157
158 159
node 7 size: 65390 MB
node 7 free: 60882 MB
node distances:
node 0 1 2 3 4 5 6 7
0: 10 11 11 12 20 20 21 21
1: 11 10 12 11 20 20 21 21
2: 11 12 10 11 21 21 22 22
3: 12 11 11 10 21 21 22 22
4: 20 20 21 21 10 11 11 12
5: 20 20 21 21 11 10 12 11
6: 21 21 22 22 11 12 10 11
7: 21 21 22 22 12 11 11 10

```

```

From /proc/meminfo
MemTotal: 534589632 kB
HugePages_Total: 0
Hugepagesize: 524288 kB

```

/sbin/tuned-adm active

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Platform Notes (Continued)

No current active profile.

```
/sys/devices/system/cpu/cpu*/cpufreq/scaling_governor has performance
```

```
From /etc/*release* /etc/*version*
```

```
os-release:
```

```
NAME="Red Hat Enterprise Linux"
```

```
VERSION="8.3 (Ootpa)"
```

```
ID="rhel"
```

```
ID_LIKE="fedora"
```

```
VERSION_ID="8.3"
```

```
PLATFORM_ID="platform:el8"
```

```
PRETTY_NAME="Red Hat Enterprise Linux 8.3 (Ootpa)"
```

```
ANSI_COLOR="0;31"
```

```
redhat-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
```

```
system-release: Red Hat Enterprise Linux release 8.3 (Ootpa)
```

```
system-release-cpe: cpe:/o:redhat:enterprise_linux:8.3:ga
```

```
uname -a:
```

```
Linux localhost.localdomain 4.18.0-240.el8.aarch64 #1 SMP Wed Sep 23 05:09:38 EDT 2020 aarch64 aarch64 aarch64 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
CVE-2017-5753 (Spectre variant 1):	Mitigation: __user pointer sanitization
CVE-2017-5715 (Spectre variant 2):	Not affected
CVE-2020-0543 (Special Register Buffer Data Sampling):	Not affected
CVE-2019-11135 (TSX Asynchronous Abort):	Not affected

```
run-level 3 Sep 18 05:19
```

```
SPEC is set to: /home/CPU2017
```

Filesystem	Type	Size	Used	Avail	Use%	Mounted on
/dev/mapper/rhel-home	xfs	372G	40G	333G	11%	/home

```
From /sys/devices/virtual/dmi/id
```

```
Vendor: Inspur
```

```
Product: NF5280R6
```

```
Product Family: ARM
```

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Platform Notes (Continued)

Serial: 221624226

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 frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

Memory:

```
2x Array 1 Manufacturer 10 Array 1 Part Number 10
2x Array 1 Manufacturer 12 Array 1 Part Number 12
2x Array 1 Manufacturer 14 Array 1 Part Number 14
2x Array 1 Manufacturer 16 Array 1 Part Number 16
2x Array 1 Manufacturer 2 Array 1 Part Number 2
2x Array 1 Manufacturer 4 Array 1 Part Number 4
2x Array 1 Manufacturer 6 Array 1 Part Number 6
2x Array 1 Manufacturer 8 Array 1 Part Number 8
16x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200
```

BIOS:

```
BIOS Vendor: American Megatrends Inc.
BIOS Version: 05.00.04
BIOS Date: 08/23/2021
BIOS Revision: 5.15
Firmware Revision: 1.7
```

(End of data from sysinfo program)

Compiler Version Notes

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

```
gcc (Ampere Computing Build 11923 20201215) 10.2.1 20201216  
Copyright (C) 2020 Free Software Foundation, Inc.  
This is free software; see the source for copying conditions. There is NO  
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.  
-----
```

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

```
g++ (Ampere Computing Build 11923 20201215) 10.2.1 20201216  
Copyright (C) 2020 Free Software Foundation, Inc.  
This is free software; see the source for copying conditions. There is NO  
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

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Compiler Version Notes (Continued)

=====
Fortran | 548.exchange2_r(base)

GNU Fortran (Ampere Computing Build 11923 20201215) 10.2.1 20201216
Copyright (C) 2020 Free Software Foundation, Inc.
This is free software; see the source for copying conditions. There is NO
warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

Base Compiler Invocation

C benchmarks:

gcc

C++ benchmarks:

g++

Fortran benchmarks:

gfortran

Base Portability Flags

500.perlbench_r: -DSPEC_LINUX_AARCH64 -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:

-mabi=lp64 -std=c99
-L/home/ampctest/ampere_spec2017/spec2017/gcc/install/lib64
-L/home/ampctest/ampere_spec2017/spec2017/gcc/install/lib

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-L/home/ampctest/ampere_spec2017/spec2017/jemalloc/install/lib -g -O3
-mcpu=neoverse-n1 -funroll-loops -flto=32
--param early-inlining-insns=96 --param max-inline-insns-auto=64
--param inline-unit-growth=96 -fgnu89-inline -ljemalloc
```

C++ benchmarks:

```
-mabi=lp64 -std=c++03
-L/home/ampctest/ampere_spec2017/spec2017/gcc/install/lib64
-L/home/ampctest/ampere_spec2017/spec2017/gcc/install/lib
-L/home/ampctest/ampere_spec2017/spec2017/jemalloc/install/lib -g -O3
-mcpu=neoverse-n1 -funroll-loops -flto=32
--param early-inlining-insns=256 --param max-inline-insns-auto=128
--param inline-unit-growth=256 -ffinite-loops -ljemalloc
```

Fortran benchmarks:

```
-mabi=lp64 -L/home/ampctest/ampere_spec2017/spec2017/gcc/install/lib64
-L/home/ampctest/ampere_spec2017/spec2017/gcc/install/lib
-L/home/ampctest/ampere_spec2017/spec2017/jemalloc/install/lib -g -O3
-mcpu=neoverse-n1 -funroll-loops -flto=32
--param ipa-cp-eval-threshold=1 --param ipa-cp-unit-growth=80
--param ipa-cp-max-recursive-depth=8 -fno-inline-functions-called-once
-fstack-arrays -flto-partition=one -ljemalloc
```

Base Other Flags

C benchmarks:

```
-fcommon -Wl,-Map,mapfile
```

C++ benchmarks:

```
-Wl,-Map,mapfile
```

Fortran benchmarks:

```
-Wl,-Map,mapfile
```

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/gcc.2021-07-21.html>

<http://www.spec.org/cpu2017/flags/Inspur-platform-settings-Amp-v1.1.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/gcc.2021-07-21.xml>

<http://www.spec.org/cpu2017/flags/Inspur-platform-settings-Amp-v1.1.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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