



SPEC CPU®2017 Integer Rate Result

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ZTE Corporation

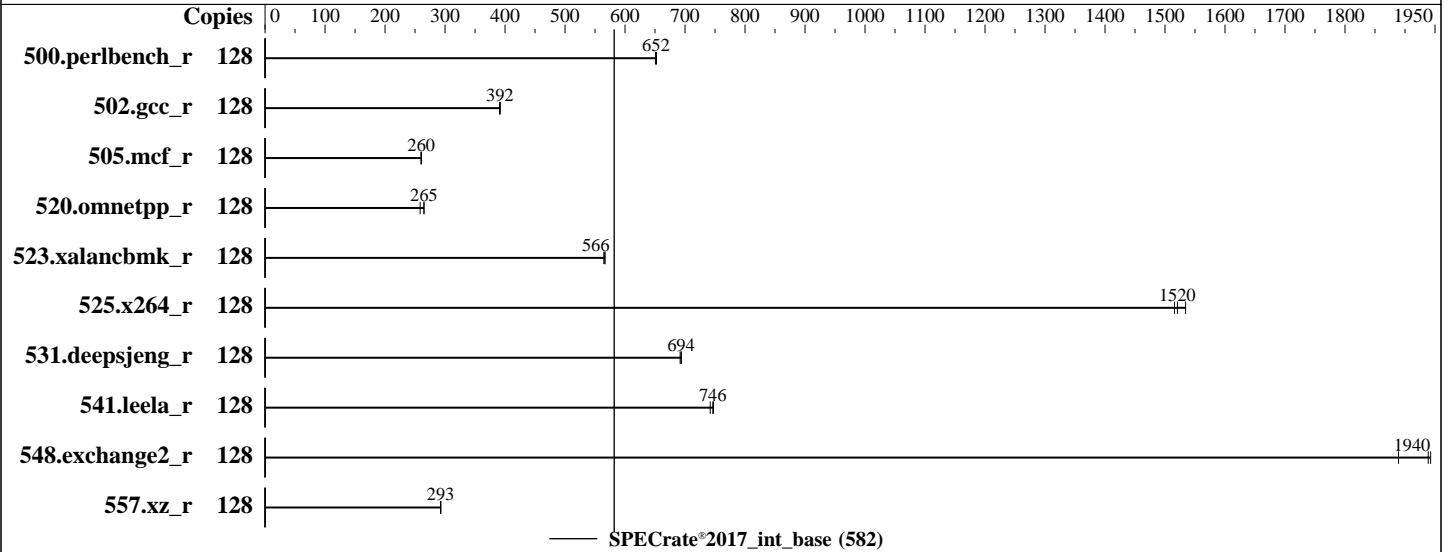
ZTE R5310G3 Server System
(3.10 GHz, ZXIC ZhuFengXin 8167)

SPECrate®2017_int_base = 582

SPECrate®2017_int_peak = Not Run

CPU2017 License: 9061
Test Sponsor: ZTE Corporation
Tested by: ZTE Corporation

Test Date: Aug-2024
Hardware Availability: Jun-2024
Software Availability: Aug-2022



Hardware

CPU Name: ZXIC ZhuFengXin 8167
Max MHz: 3100
Nominal: 3100
Enabled: 128 cores, 1 chip
Orderable: 1 chips
Cache L1: 64 KB I + 64 KB D on chip per core
L2: 1 MB I+D on chip per core
L3: 128 MB I+D on chip per chip
Other: None
Memory: 512 GB (8 x 64 GB 2Rx4 PC5-5600B-R)
Storage: 1 x 480 GB SATA SSD
Other: CPU Cooling: Air

Software

OS: CentOS Stream 8
4.18.0-408.el8.aarch64
Compiler: C/C++/Fortran: Version 12.2.0 of GCC, the GNU Compiler Collection
Parallel: No
Firmware: Version 31.24.03.00 released Jul-2024
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: 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	128	313	652	313	651	312	652							
502.gcc_r	128	462	392	463	392	464	391							
505.mcf_r	128	796	260	794	261	794	260							
520.omnetpp_r	128	650	258	634	265	634	265							
523.xalancbmk_r	128	239	565	239	566	239	566							
525.x264_r	128	146	1530	148	1520	147	1520							
531.deepsjeng_r	128	211	694	211	694	212	692							
541.leela_r	128	286	742	284	746	284	747							
548.exchange2_r	128	173	1940	178	1890	173	1940							
557.xz_r	128	472	293	472	293	472	293							

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"
OS set to performance mode via cpupower frequency-set -g performance

Environment Variables Notes

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

```
LD_LIBRARY_PATH =
"/usr/local/jemalloc-5.2.1_install/lib:/usr/local/gcc-12.2.0/lib64:/usr/local/gcc-12.2.0/lib:/usr/local/gcc-12.2.0/lib64:"
```

General Notes

Binaries compiled on a system with 1x ZXIC ZhuFengXin 8167 CPU + 512 GB RAM
memory using CentOS Stream 8
Transparent Huge Pages enabled by default
Prior to runcpu invocation
Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
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.

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General Notes (Continued)

jemalloc, a general purpose malloc implementation
built with the CentOS Stream 8, and the system compiler gcc 12.2.0
sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

Platform Notes

Sysinfo program /home/zfu/speccpu2017/speccpu2017_install/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Sat Aug 17 15:39:57 2024

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

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4. ulimit -a
5. sysinfo process ancestry
6. /proc/cpuinfo
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10. who -r
11. Systemd service manager version: systemd 239 (239-69.el8)
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1. uname -a
Linux localhost.localdomain 4.18.0-408.el8.aarch64 #1 SMP Mon Jul 18 15:47:44 UTC 2022 aarch64 aarch64
aarch64 GNU/Linux

2. w
15:39:57 up 2 min, 1 user, load average: 0.15, 0.16, 0.07
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root pts/0 198.168.42.111 15:38 8.00s 0.99s 0.04s -bash

3. Username
From environment variable \$USER: root

4. ulimit -a

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Platform Notes (Continued)

```

core file size      (blocks, -c) 0
data seg size      (kbytes, -d) unlimited
scheduling priority (-e) 0
file size          (blocks, -f) unlimited
pending signals    (-i) 513400
max locked memory  (kbytes, -l) 64
max memory size    (kbytes, -m) unlimited
open files         (-n) 1024
pipe size          (512 bytes, -p) 8
POSIX message queues (bytes, -q) 819200
real-time priority (-r) 0
stack size        (kbytes, -s) unlimited
cpu time          (seconds, -t) unlimited
max user processes (-u) 513400
virtual memory     (kbytes, -v) unlimited
file locks        (-x) unlimited

```

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 17
/usr/sbin/sshd -D
-oCiphers=aes256-gcm@openssh.com,chacha20-poly1305@openssh.com,aes256-ctr,aes256-cbc,aes128-gcm@openssh.com,aes128-ctr,aes128-cbc
-oMACs= hmac-sha2-256-etm@openssh.com,hmac-shal-etm@openssh.com,umac-128-etm@openssh.com,hmac-sha2-512-etm@openssh.com,hmac-sha2-256,hmac-shal,umac-128@openssh.com,hmac-sha2-512...
sshd: root [priv]
sshd: root@pts/0
-bash
runcpu --config=zfx-gcc12.2-armv9-128core.cfg --reportable --copies=128 --threads=128 --iterations=3
--tune=base --action=run intrate
runcpu --configfile zfx-gcc12.2-armv9-128core.cfg --reportable --copies 128 --threads 128 --iterations 3
--tune base --action run --nopower --runmode rate --tune base --size refrate intrate --nopreenv
--note-preenv --logfile $SPEC/tmp/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0
--from_runcpu 2
specperl $SPEC/bin/sysinfo
$SPEC = /home/zfu/speccpu2017/speccpu2017_install

```

```

-----
6. /proc/cpuinfo
CPU implementer : 0x41
CPU architecture: 8
CPU variant : 0x0
CPU part : 0xd49
CPU revision : 1
Features : fp asimd evtstrm crc32 atomics fphp asimdhp cpuid asimdrdm jscvt fcma lrcpc dcpop
asimddp sve asimdfhm dit uscat ilrcpc flagm ssbs sb dcpodp sve2 svebitperm flagm2 frint
svei8mm svebf16 i8mm bf16 dgh

```

```

-----
7. lscpu
From lscpu from util-linux 2.32.1:
Architecture: aarch64
Byte Order: Little Endian
CPU(s): 128
On-line CPU(s) list: 0-127
Thread(s) per core: 1
Core(s) per socket: 128
Socket(s): 1
NUMA node(s): 2

```

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Platform Notes (Continued)

```

Vendor ID:                ARM
BIOS Vendor ID:          SANECHIPS
Model:                    1
BIOS Model name:         ZXIC(R) ZhuFengXin 8167 Processor
Stepping:                 r0p1
CPU max MHz:              3100.0000
CPU min MHz:              800.0000
BogoMIPS:                 250.00
L1d cache:                64K
L1i cache:                64K
L2 cache:                 1024K
L3 cache:                 131072K
NUMA node0 CPU(s):       0-63
NUMA node1 CPU(s):       64-127
Flags:                    fp asimd evtstrm crc32 atomics fphp asimdhp cpuid asimdrdm jscvt fcma lrcpc dcpop
                          asimddp sve asimdfhm dit uscat ilrcpc flagm ssbs sb dcpodp sve2 svebitperm flagm2
                          frint svei8mm svebf16 i8mm bf16 dgh

```

8. numactl --hardware

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

```

available: 2 nodes (0-1)
node 0 cpus: 0-63
node 0 size: 256001 MB
node 0 free: 252763 MB
node 1 cpus: 64-127
node 1 size: 257450 MB
node 1 free: 256565 MB
node distances:
node  0  1
  0:  10  16
  1:  16  10

```

9. /proc/meminfo

MemTotal: 525775296 kB

10. who -r

run-level 3 Aug 17 15:38

11. Systemd service manager version: systemd 239 (239-69.el8)

```

Default Target  Status
multi-user      running

```

12. Services, from systemctl list-unit-files

```

STATE      UNIT FILES
enabled    ModemManager NetworkManager NetworkManager-dispatcher NetworkManager-wait-online accounts-daemon
           atd auditd autovt@ avahi-daemon bluetooth crond cups display-manager gdm getty@ import-state
           irqbalance iscsi iscsi-onboot kdump libstoragemgmt loadmodules lvm2-monitor mdmonitor multipathd
           nis-domainname nvme-fc-boot-connections ostree-remount gemu-guest-agent rsyslog rtkit-daemon
           selinux-autorelabel-mark smartd sshd sssd syslog timedatex tuned udisks2 vdo
disabled   arp-ethers blk-availability brltyt canberra-system-bootup canberra-system-shutdown
           canberra-system-shutdown-reboot chrony-wait chronyd cni-dhcp console-getty cpupower cups-browsed
           debug-shell dnf-system-upgrade dnsmasq ebttables firewalld initial-setup
           initial-setup-reconfiguration iprdump iprinit iprupdate iscsid iscsiuiio kpatch kvm_stat ledmon
           man-db-restart-cache-update ndctl-monitor nftables nvme-fc-autoconnect podman podman-auto-update
           podman-kube@ podman-restart psacct ras-mc-ctl rasdaemon rdisc speech-dispatcherd sshd-keygen@

```

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Platform Notes (Continued)

```

generated switcheroo-control systemd-resolved tcsd upower wpa_supplicant
SystemTap compile-server gcc-toolset-10-stap-server gcc-toolset-10-systemtap
gcc-toolset-11-stap-server gcc-toolset-11-systemtap gcc-toolset-9-stap-server
gcc-toolset-9-systemtap scripts startup
indirect serial-getty@ spice-vdagentd sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo
masked systemd-timedated

```

```

-----
13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd0,gpt2)/vmlinuz-4.18.0-408.el8.aarch64
root=UUID=79328569-298c-45f2-af56-924299e4920d
ro
crashkernel=auto
skew_tick=1

```

```

-----
14. cpupower frequency-info
analyzing CPU 0:
current policy: frequency should be within 800 MHz and 3.10 GHz.
The governor "performance" may decide which speed to use
within this range.

```

```

-----
15. tuned-adm active
No current active profile.

```

```

-----
16. sysctl
kernel.numa_balancing          0
kernel.randomize_va_space      2
vm.compaction_proactiveness    0
vm.dirty_background_bytes      0
vm.dirty_background_ratio     10
vm.dirty_bytes                 0
vm.dirty_expire_centisecs     3000
vm.dirty_ratio                 8
vm.dirty_writeback_centisecs  500
vm.dirtytime_expire_seconds   43200
vm.extfrag_threshold          500
vm.min_unmapped_ratio         1
vm.nr_hugepages               0
vm.nr_hugepages_mempolicy     0
vm.nr_overcommit_hugepages    0
vm.swappiness                  1
vm.watermark_boost_factor     15000
vm.watermark_scale_factor     10
vm.zone_reclaim_mode          1

```

```

-----
17. /sys/kernel/mm/transparent_hugepage
defrag          always defer defer+madvice [madvice] never
enabled         always madvice [never]
hpage_pmd_size 536870912
shmem_enabled   always within_size advise [never] deny force

```

```

-----
18. /sys/kernel/mm/transparent_hugepage/khugepaged
alloc_sleep_millisecs 60000
defrag                 1
max_ptes_none         8191

```

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Platform Notes (Continued)

```
max_ptes_swap      1024
pages_to_scan      65536
scan_sleep_millisecs 10000
```

19. OS release

```
From /etc/*-release /etc/*-version
os-release      CentOS Stream 8
redhat-release  CentOS Stream release 8
system-release  CentOS Stream release 8
```

20. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities

```
itlb_multihit    Not affected
l1tf              Not affected
mds              Not affected
meltdown         Not affected
spec_store_bypass Mitigation: Speculative Store Bypass disabled via prctl
spectre_v1       Mitigation: __user pointer sanitization
spectre_v2       Not affected
srbds            Not affected
tsx_async_abort  Not affected
```

For more information, see the Linux documentation on hardware vulnerabilities, for example <https://www.kernel.org/doc/html/latest/admin-guide/hw-vuln/index.html>

21. Disk information

```
SPEC is set to: /home/zfu/speccpu2017/speccpu2017_install
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda4       xfs   430G   50G  381G  12% /
```

22. /sys/devices/virtual/dmi/id

```
Vendor:      ZTE
Product:     R5310 G3
Product Family: Server
Serial:      219537921268
```

23. dmidecode

Additional information from dmidecode 3.3 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 M321R8GA0PB0-CWMXH 64 GB 2 rank 5600

24. BIOS

(This section combines info from /sys/devices and dmidecode.)

```
BIOS Vendor:      Byosoft
BIOS Version:     31.24.03.00 (SCP:24.03.01.49.02)
BIOS Date:        07/25/2024
BIOS Revision:    31.24
Firmware Revision: 1.49
```



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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 (GCC) 12.2.0
Copyright (C) 2022 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++ (GCC) 12.2.0
Copyright (C) 2022 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.

Fortran | 548.exchange2_r(base)

GNU Fortran (GCC) 12.2.0
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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

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Base Portability Flags (Continued)

548.exchange2_r: -DSPEC_LP64
557.xz_r: -DSPEC_LP64

Base Optimization Flags

C benchmarks:

```
-mabi=lp64 -std=c99 -L/usr/local/gcc-12.2.0/lib64
-L/usr/local/gcc-12.2.0/lib -L/usr/local/jemalloc-5.2.1_install/lib -g
-O3 -mcpu=neoverse-n1 -march=armv9-a -funroll-loops -flto=32
--param early-inlining-insns=96 --param max-inline-insns-auto=64
--param inline-unit-growth=96 -fno-strict-aliasing
-fno-unsafe-math-optimizations -fno-finite-math-only -fgnu89-inline
-ljemalloc
```

C++ benchmarks:

```
-mabi=lp64 -std=c++03 -L/usr/local/gcc-12.2.0/lib64
-L/usr/local/gcc-12.2.0/lib -L/usr/local/jemalloc-5.2.1_install/lib -g
-O3 -mcpu=neoverse-n1 -march=armv9-a -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/usr/local/gcc-12.2.0/lib64 -L/usr/local/gcc-12.2.0/lib
-L/usr/local/jemalloc-5.2.1_install/lib -g -O3 -mcpu=neoverse-n1
-march=armv9-a -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
```



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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/ZTE-Platform-Settings-ZXIC-V1.0.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/ZTE-Platform-Settings-ZXIC-V1.0.xml>

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Tested with SPEC CPU®2017 v1.1.9 on 2024-08-17 03:39:57-0400.

Report generated on 2024-09-11 09:31:54 by CPU2017 PDF formatter v6716.

Originally published on 2024-09-10.