SPEC CPU®2017 Integer Rate Result

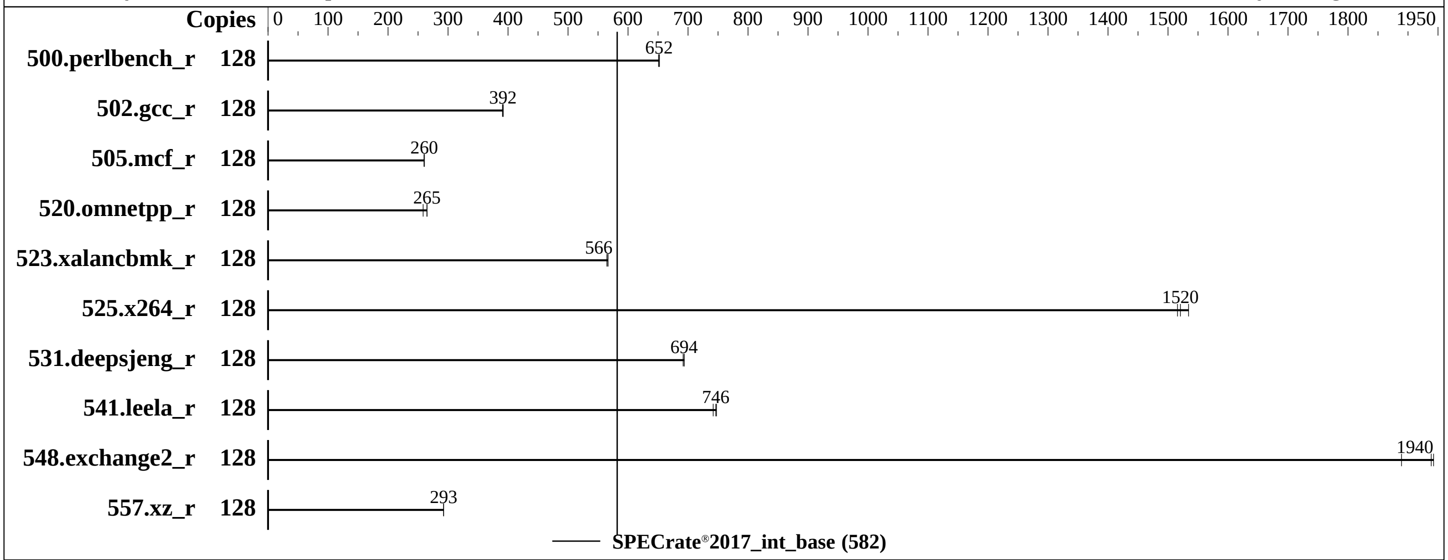
ZTE Corporation

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 Date:**	Aug-2024
Test Sponsor:	ZTE Corporation	**Hardware Availability:**	Jun-2024
Tested by:	ZTE Corporation	**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

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

Results Table

Benchmark	Base Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak 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							

SPECrate®2017_int_base = 582

SPECrate®2017_int_peak = Not Run

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/lo
     cal/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.
```

(Continued on next page)

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.

------------------------------------------------------------
Table of contents
------------------------------------------------------------
 1. uname -a
 2. w
 3. Username
 4. ulimit -a
 5. sysinfo process ancestry
 6. /proc/cpuinfo
 7. lscpu
 8. numactl --hardware
 9. /proc/meminfo
10. who -r
11. Systemd service manager version: systemd 239 (239-69.el8)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. tuned-adm active
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities
21. Disk information
22. /sys/devices/virtual/dmi/id
23. dmidecode
24. BIOS
------------------------------------------------------------

------------------------------------------------------------
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
```

(Continued on next page)

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.co
   m,aes128-ctr,aes128-cbc
   -oMACs=hmac-sha2-256-etm@openssh.com,hmac-sha1-etm@openssh.com,umac-128-etm@openssh.com,hmac-sha2-512-etm@
   openssh.com,hmac-sha2-256,hmac-sha1,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
```

(Continued on next page)

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 nvmefc-boot-connections ostree-remount qemu-guest-agent rsyslog rtkit-daemon
             selinux-autorelabel-mark smartd sshd sssd syslog timedatex tuned udisks2 vdo
  disabled   arp-ethers blk-availability brltty 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 ebtables firewalld initial-setup
             initial-setup-reconfiguration iprdump iprinit iprupdate iscsid iscsiuio kpatch kvm_stat ledmon
             man-db-restart-cache-update ndctl-monitor nftables nvmf-autoconnect podman podman-auto-update
             podman-kube@ podman-restart psacct ras-mc-ctl rasdaemon rdisc speech-dispatcherd sshd-keygen@
```

(Continued on next page)

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

Platform Notes (Continued)

```
           switcheroo-control systemd-resolved tcsd upower wpa_supplicant
generated  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+madvise [madvise] never
  enabled         always madvise [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
```

(Continued on next page)

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
```

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
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.
------------------------------------------------------------------------------
```

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

(Continued on next page)

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
```

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

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 PS formatter v6716.
Originally published on 2024-09-10.