SPEC CPU®2017 Integer Rate Result

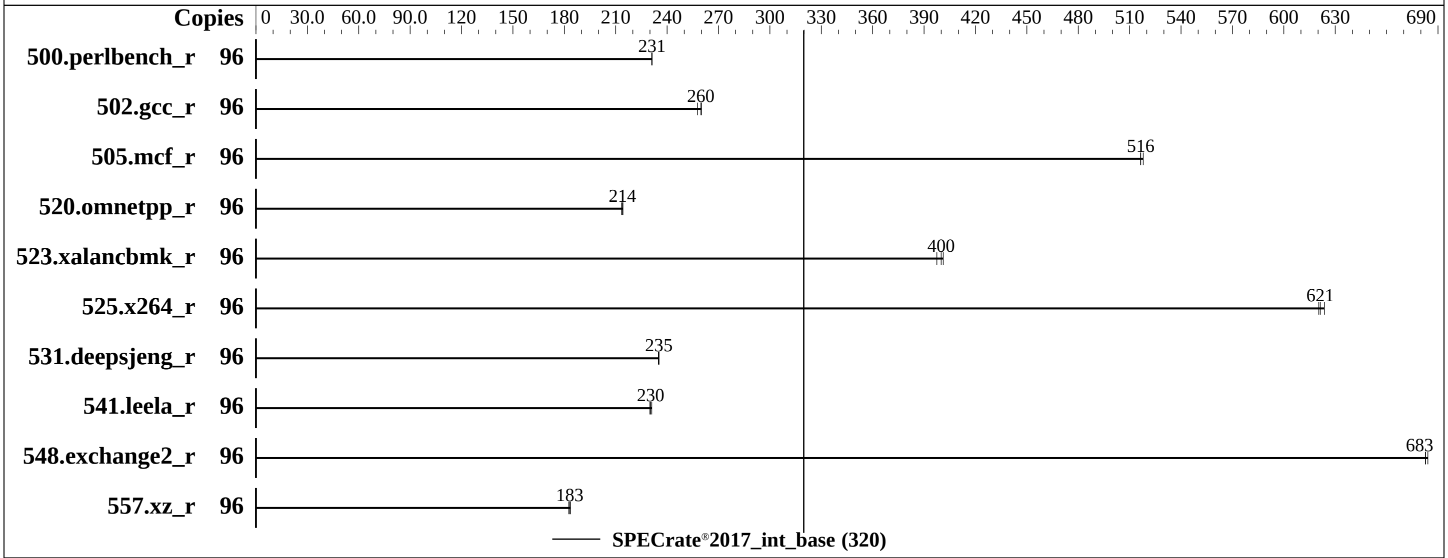
xFusion

xFusion XH321 V6 (Intel Xeon Gold 5318Y)

SPECrate®2017_int_base = 320

SPECrate®2017_int_peak = Not Run

CPU2017 License:	6488	**Test Date:**	Feb-2024
Test Sponsor:	xFusion	**Hardware Availability:**	Apr-2021
Tested by:	xFusion	**Software Availability:**	Dec-2023



Hardware

CPU Name:	Intel Xeon Gold 5318Y
Max MHz:	3400
Nominal:	2100
Enabled:	48 cores, 2 chips, 2 threads/core
Orderable:	1,2 chips
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	1.25 MB I+D on chip per core
L3:	36 MB I+D on chip per chip
Other:	None
Memory:	512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R, running at 2933)
Storage:	1 x 480 GB SATA SSD
Other:	None

Software

OS:	Red Hat Enterprise Linux 8.4 (Ootpa) 4.18.0-305.el8.x86_64
Compiler:	C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;
Parallel:	No
Firmware:	Version 1.05 released May-2022
File System:	xfs
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	Not Applicable
Other:	None
Power Management:	BIOS and OS set to prefer performance at the cost of additional power usage

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Results Table

	Base							Peak						
Benchmark	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Copies**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**
500.perlbench_r	96	661	231	**661**	**231**	662	231							
502.gcc_r	96	527	258	**523**	**260**	523	260							
505.mcf_r	96	300	518	300	516	**300**	**516**							
520.omnetpp_r	96	**589**	**214**	588	214	590	213							
523.xalancbmk_r	96	**253**	**400**	253	401	255	397							
525.x264_r	96	271	620	**271**	**621**	270	624							
531.deepsjeng_r	96	**468**	**235**	468	235	468	235							
541.leela_r	96	688	231	**690**	**230**	691	230							
548.exchange2_r	96	368	683	368	684	**368**	**683**							
557.xz_r	96	**566**	**183**	568	183	565	184							

SPECrate®2017_int_base = 320

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"
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/speccpu/lib/intel64:/home/speccpu/lib/ia32:/home/speccpu/je5.0.1-32"
MALLOC_CONF = "retain:true"
```

General Notes

```
Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4
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
runcpu command invoked through numactl i.e.:
numactl --interleave=all runcpu <etc>
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.
```

Platform Notes

```
BIOS configuration:
Performance Profile Set to Performance
SNC Set to Enable SNC2 (2-clusters)

Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Sun Feb  4 04:56:08 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 (239-45.el8)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS
------------------------------------------------------------

------------------------------------------------------------
1. uname -a
  Linux localhost.localdomain 4.18.0-305.el8.x86_64 #1 SMP Thu Apr 29 08:54:30 EDT 2021 x86_64 x86_64 x86_64
  GNU/Linux

------------------------------------------------------------
2. w
   04:56:08 up 2 min,  2 users,  load average: 0.34, 0.24, 0.09
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                04:54    8.00s  1.54s  0.03s -bash
  root     pts/0    70.167.0.2       04:55   16.00s  0.00s  0.00s -bash

------------------------------------------------------------
3. Username
  From environment variable $USER:  root

------------------------------------------------------------
4. ulimit -a
  core file size          (blocks, -c) 0
  data seg size           (kbytes, -d) unlimited
  scheduling priority             (-e) 0
  file size               (blocks, -f) unlimited
```

(Continued on next page)

Platform Notes (Continued)

```
  pending signals                 (-i) 2060539
  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) 2060539
  virtual memory          (kbytes, -v) unlimited
  file locks                      (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 18
 login -- root
 -bash
 -bash
 runcpu --define default-platform-flags --copies 96 -c ic2023.2.3-lin-core-avx512-rate-20231121.cfg --define
   smt-on --define cores=48 --define physicalfirst --define invoke_with_interleave --define drop_caches
   --tune base -o all intrate
 runcpu --define default-platform-flags --copies 96 --configfile ic2023.2.3-lin-core-avx512-rate-20231121.cfg
   --define smt-on --define cores=48 --define physicalfirst --define invoke_with_interleave --define
   drop_caches --tune base --output_format all --nopower --runmode rate --tune base --size refrate intrate
   --nopreenv --note-preenv --logfile $SPEC/tmp/CPU2017.010/templogs/preenv.intrate.010.0.log --lognum 010.0
   --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/speccpu

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Gold 5318Y CPU @ 2.10GHz
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 106
    stepping        : 6
    microcode       : 0xd000230
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 24
    siblings        : 48
    2 physical ids (chips)
    96 processors (hardware threads)
    physical id 0: core ids 0-23
    physical id 1: core ids 0-23
    physical id 0: apicids 0-47
    physical id 1: apicids 64-111
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.

------------------------------------------------------------
7. lscpu

From lscpu from util-linux 2.32.1:
  Architecture:        x86_64
  CPU op-mode(s):      32-bit, 64-bit
  Byte Order:          Little Endian
  CPU(s):              96
  On-line CPU(s) list: 0-95
  Thread(s) per core:  2
```

(Continued on next page)

Platform Notes (Continued)

```
  Core(s) per socket:  24
  Socket(s):           2
  NUMA node(s):        4
  Vendor ID:           GenuineIntel
  BIOS Vendor ID:      Intel(R) Corporation
  CPU family:          6
  Model:               106
  Model name:          Intel(R) Xeon(R) Gold 5318Y CPU @ 2.10GHz
  BIOS Model name:     Intel(R) Xeon(R) Gold 5318Y CPU @ 2.10GHz
  Stepping:            6
  CPU MHz:             2600.000
  BogoMIPS:            4200.00
  Virtualization:      VT-x
  L1d cache:           48K
  L1i cache:           32K
  L2 cache:            1280K
  L3 cache:            36864K
  NUMA node0 CPU(s):   0-11,48-59
  NUMA node1 CPU(s):   12-23,60-71
  NUMA node2 CPU(s):   24-35,72-83
  NUMA node3 CPU(s):   36-47,84-95
  Flags:               fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts
                       acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp lm constant_tsc art
                       arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperfmperf pni
                       pclmulqdq dtes64 ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1
                       sse4_2 x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm
                       3dnowprefetch cpuid_fault epb cat_l3 invpcid_single ssbd mba ibrs ibpb stibp
                       ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1
                       hle avx2 smep bmi2 erms invpcid cqm rdt_a avx512f avx512dq rdseed adx smap avx512ifma
                       clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl xsaveopt xsavec xgetbv1
                       xsaves cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local split_lock_detect wbnoinvd
                       dtherm ida arat pln pts hwp_epp avx512vbmi umip pku ospke avx512_vbmi2 gfni vaes
                       vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57 rdpid fsrm md_clear
                       pconfig flush_l1d arch_capabilities

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 4 nodes (0-3)
  node 0 cpus: 0-11,48-59
  node 0 size: 128120 MB
  node 0 free: 127871 MB
  node 1 cpus: 12-23,60-71
  node 1 size: 129018 MB
  node 1 free: 128787 MB
  node 2 cpus: 24-35,72-83
  node 2 size: 129018 MB
  node 2 free: 128773 MB
  node 3 cpus: 36-47,84-95
  node 3 size: 129016 MB
  node 3 free: 128604 MB
  node distances:
  node   0   1   2   3
    0:  10  11  20  20
    1:  11  10  20  20
    2:  20  20  10  11
    3:  20  20  11  10

------------------------------------------------------------
9. /proc/meminfo
```

(Continued on next page)

Platform Notes (Continued)

```
   MemTotal:       527538004 kB

 ------------------------------------------------------------
 10. who -r
   run-level 3 Feb 4 04:54

 ------------------------------------------------------------
 11. Systemd service manager version: systemd 239 (239-45.el8)
   Default Target  Status
   multi-user      running

 ------------------------------------------------------------
 12. Services, from systemctl list-unit-files
   STATE      UNIT FILES
   enabled    NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd autovt@ chronyd crond
              firewalld getty@ import-state kdump loadmodules lvm2-monitor mdmonitor microcode nis-domainname
              rhsmcertd rsyslog selinux-autorelabel-mark sshd sssd syslog timedatex udisks2
   disabled   blk-availability chrony-wait console-getty cpupower debug-shell ebtables iprdump iprinit
              iprupdate kvm_stat nftables rdisc rhcd rhsm rhsm-facts serial-getty@ sshd-keygen@
              systemd-resolved tcsd
   generated  SystemTap compile-server gcc-toolset-10-stap-server gcc-toolset-10-systemtap
              gcc-toolset-9-stap-server gcc-toolset-9-systemtap scripts startup
   indirect   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-4.18.0-305.el8.x86_64
   root=/dev/mapper/rhel-root
   ro
   crashkernel=auto
   resume=/dev/mapper/rhel-swap
   rd.lvm.lv=rhel/root
   rd.lvm.lv=rhel/swap
   rhgb
   quiet

 ------------------------------------------------------------
 14. cpupower frequency-info
   analyzing CPU 0:
     Unable to determine current policy
     boost state support:
       Supported: yes
       Active: yes

 ------------------------------------------------------------
 15. sysctl
   kernel.numa_balancing                  1
   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                        20
   vm.dirty_writeback_centisecs         500
   vm.dirtytime_expire_seconds        43200
   vm.extfrag_threshold                 500
   vm.min_unmapped_ratio                  1
   vm.nr_hugepages                        0
```

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Platform Notes (Continued)

```
    vm.nr_hugepages_mempolicy          0
    vm.nr_overcommit_hugepages         0
    vm.swappiness                     60
    vm.watermark_boost_factor      15000
    vm.watermark_scale_factor         10
    vm.zone_reclaim_mode               0

  ------------------------------------------------------------
  16. /sys/kernel/mm/transparent_hugepage
    defrag          always defer defer+madvise [madvise] never
    enabled         [always] madvise never
    hpage_pmd_size  2097152
    shmem_enabled   always within_size advise [never] deny force

  ------------------------------------------------------------
  17. /sys/kernel/mm/transparent_hugepage/khugepaged
    alloc_sleep_millisecs   60000
    defrag                      1
    max_ptes_none             511
    max_ptes_swap              64
    pages_to_scan            4096
    scan_sleep_millisecs    10000

  ------------------------------------------------------------
  18. OS release
    From /etc/*-release /etc/*-version
    os-release     Red Hat Enterprise Linux 8.4 (Ootpa)
    redhat-release Red Hat Enterprise Linux release 8.4 (Ootpa)
    system-release Red Hat Enterprise Linux release 8.4 (Ootpa)

  ------------------------------------------------------------
  19. 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 and seccomp
    spectre_v1           Mitigation: usercopy/swapgs barriers and __user pointer sanitization
    spectre_v2           Mitigation: Enhanced IBRS, IBPB: conditional, RSB filling
    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

  ------------------------------------------------------------
  20. Disk information
  SPEC is set to: /home/speccpu
    Filesystem            Type  Size  Used Avail Use% Mounted on
    /dev/mapper/rhel-home xfs   372G   21G  352G   6% /home

  ------------------------------------------------------------
  21. /sys/devices/virtual/dmi/id
      Vendor:         XFUSION
      Product:        XH321 V6
      Product Family: Whitley

  ------------------------------------------------------------
  22. dmidecode
    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
```

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Platform Notes (Continued)

```
   determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
   "DMTF SMBIOS" standard.
   Memory:
     16x Samsung M393A4K40DB3-CWE 32 GB 2 rank 3200, configured at 2933


 ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       INSYDE Corp.
    BIOS Version:      1.05
    BIOS Date:         05/16/2022
    BIOS Revision:     1.5
```

Compiler Version Notes

```
==============================================================================================================
C       | 500.perlbench_r(base) 502.gcc_r(base) 505.mcf_r(base) 525.x264_r(base) 557.xz_r(base)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
C++     | 520.omnetpp_r(base) 523.xalancbmk_r(base) 531.deepsjeng_r(base) 541.leela_r(base)
--------------------------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran | 548.exchange2_r(base)
--------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

Base Portability Flags

500.perlbench_r: -DSPEC_LP64 -DSPEC_LINUX_X64
502.gcc_r: -DSPEC_LP64
505.mcf_r: -DSPEC_LP64
520.omnetpp_r: -DSPEC_LP64
523.xalancbmk_r: -DSPEC_LP64 -DSPEC_LINUX
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:
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

Fortran benchmarks:
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto
-L/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-lqkmalloc

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.html
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.2.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-ICX-V1.2.xml

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