SPEC CPU®2017 Integer Rate Result

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xFusion

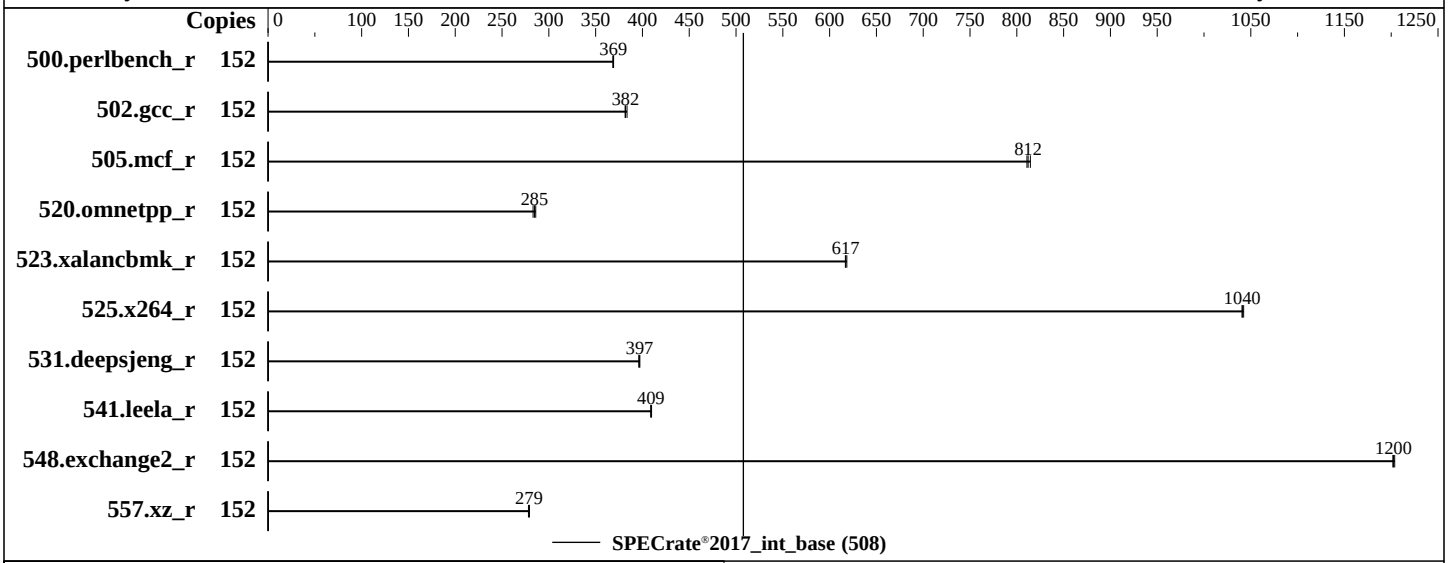
FusionServer XH321 V6 (Intel Xeon Platinum 8368)

SPECrate®2017_int_base = 508

SPECrate®2017_int_peak = Not Run

CPU2017 License: 6488
Test Sponsor: xFusion
Tested by: xFusion

Test Date: Apr-2024
Hardware Availability: Apr-2021
Software Availability: Dec-2023



Hardware

CPU Name:	Intel Xeon Platinum 8368
Max MHz:	3400
Nominal:	2400
Enabled:	76 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:	57 MB I+D on chip per chip
Other:	None
Memory:	512 GB (16 x 32 GB 2Rx4 PC4-3200AA-R)
Storage:	1 x 1920 GB SATA SSD
Other:	CPU Cooling: Air

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 1.68 Released Mar-2024
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

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	152	657	368	655	369	**656**	**369**							
502.gcc_r	152	**563**	**382**	564	381	561	384							
505.mcf_r	152	**302**	**812**	303	811	302	814							
520.omnetpp_r	152	697	286	704	283	**700**	**285**							
523.xalancbmk_r	152	260	618	260	617	**260**	**617**							
525.x264_r	152	**256**	**1040**	255	1040	256	1040							
531.deepsjeng_r	152	439	397	**439**	**397**	440	396							
541.leela_r	152	616	409	614	410	**615**	**409**							
548.exchange2_r	152	331	1200	**331**	**1200**	331	1200							
557.xz_r	152	588	279	590	278	**589**	**279**							

SPECrate®2017_int_base = 508

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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"
```

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 Enabled SNC2 (2-clusters)

Sysinfo program /home/speccpu/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Sun Apr 21 22:28:01 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
   22:28:01 up 6 min,  2 users,  load average: 0.00, 0.16, 0.11
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                22:27    9.00s  1.35s  0.06s -bash
  root     pts/0    70.167.0.2       22:25   41.00s  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) 2060957
   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) 2060957
   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 152 -c ic2023.2.3-lin-core-avx512-rate-20231121.cfg --define
   smt-on --define cores=76 --define physicalfirst --define invoke_with_interleave --define drop_caches
   --tune base -o all intrate
 runcpu --define default-platform-flags --copies 152 --configfile
   ic2023.2.3-lin-core-avx512-rate-20231121.cfg --define smt-on --define cores=76 --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/CPU2017.028/templogs/preenv.intrate.028.0.log --lognum 028.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/speccpu

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Platinum 8368 CPU @ 2.40GHz
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 106
    stepping        : 6
    microcode       : 0xd0003b9
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 38
    siblings        : 76
    2 physical ids (chips)
    152 processors (hardware threads)
    physical id 0: core ids 0-37
    physical id 1: core ids 0-37
    physical id 0: apicids 0-75
    physical id 1: apicids 128-203
  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):              152
  On-line CPU(s) list: 0-151
  Thread(s) per core:  2
```

(Continued on next page)

Platform Notes (Continued)

```
  Core(s) per socket:  38
  Socket(s):           2
  NUMA node(s):        2
  Vendor ID:           GenuineIntel
  BIOS Vendor ID:      Intel(R) Corporation
  CPU family:          6
  Model:               106
  Model name:          Intel(R) Xeon(R) Platinum 8368 CPU @ 2.40GHz
  BIOS Model name:     Intel(R) Xeon(R) Platinum 8368 CPU @ 2.40GHz
  Stepping:            6
  CPU MHz:             3200.000
  BogoMIPS:            4800.00
  Virtualization:      VT-x
  L1d cache:           48K
  L1i cache:           32K
  L2 cache:            1280K
  L3 cache:            58368K
  NUMA node0 CPU(s):   0-37,76-113
  NUMA node1 CPU(s):   38-75,114-151
  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: 2 nodes (0-1)
  node 0 cpus: 0-37,76-113
  node 0 size: 257251 MB
  node 0 free: 256428 MB
  node 1 cpus: 38-75,114-151
  node 1 size: 258027 MB
  node 1 free: 257568 MB
  node distances:
  node   0   1
    0:  10  20
    1:  20  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       527645132 kB

------------------------------------------------------------
10. who -r
  run-level 3 Apr 21 22:22

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

(Continued on next page)

Platform Notes (Continued)

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

(Continued on next page)

Platform Notes (Continued)

```
  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   73G  300G  20% /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
  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


------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:       XFUSION
```

(Continued on next page)

Platform Notes (Continued)

```
    BIOS Version:      1.68
    BIOS Date:         03/14/2024
    BIOS Revision:     1.68
```

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

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Base Portability Flags (Continued)

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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For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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