### SPEC CPU®2017 Integer Rate Result

**xFusion**

FusionServer 5288 V7 (Intel Xeon Silver 4410Y)

<table>
<thead>
<tr>
<th>SPECrate®2017_int_base =</th>
<th>221</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECrate®2017_int_peak =</td>
<td>Not Run</td>
</tr>
</tbody>
</table>

**CPU2017 License:** 6488  
**Test Date:** Aug-2023  
**Test Sponsor:** xFusion  
**Hardware Availability:** Jan-2023  
**Tested by:** xFusion  
**Software Availability:** Dec-2022

### SPECrate®2017_int_base (221)

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECrate®2017_int_base</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench_r</td>
<td>500</td>
<td>156</td>
</tr>
<tr>
<td>gcc_r</td>
<td>502</td>
<td>190</td>
</tr>
<tr>
<td>mcf_r</td>
<td>505</td>
<td>166</td>
</tr>
<tr>
<td>omnetpp_r</td>
<td>520</td>
<td>363</td>
</tr>
<tr>
<td>xalancbmk_r</td>
<td>523</td>
<td>443</td>
</tr>
<tr>
<td>x264_r</td>
<td>525</td>
<td>405</td>
</tr>
<tr>
<td>deepsjeng_r</td>
<td>531</td>
<td>436</td>
</tr>
<tr>
<td>leela_r</td>
<td>541</td>
<td>405</td>
</tr>
<tr>
<td>exchange2_r</td>
<td>548</td>
<td>423</td>
</tr>
<tr>
<td>xz_r</td>
<td>557</td>
<td>101</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon Silver 4410Y  
- **Max MHz:** 3900  
- **Nominal:** 2000  
- **Enabled:** 24 cores, 2 chips, 2 threads/core  
- **Orderable:** 1,2 chips  
- **Cache L1:** 32 KB I + 48 KB D on chip per core  
- **L2:** 2 MB I+D on chip per core  
- **L3:** 30 MB I+D on chip per chip  
- **Other:** None  
- **Memory:** 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R, running at 4000)  
- **Storage:** 1 x 1920 GB SATA SSD  
- **Other:** None  

### Software

- **OS:** Red Hat Enterprise Linux release 9.0 (Plow)  
  5.14.0-70.13.1.el9_0.x86_64  
- **Compiler:** C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;  
- **Parallel:** No  
- **Firmware:** Version 2.00.55 Released Mar-2023  
- **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

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<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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<tbody>
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<td>156</td>
<td>490</td>
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<td>491</td>
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<td>196</td>
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<td>505.mcf_r</td>
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<td>525.x264_r</td>
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<td></td>
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<tr>
<td>541.leela_r</td>
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</table>

**SPECrate®2017_int_base = 221**

**SPECrate®2017_int_peak = Not Run**

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

### Compiler Notes

SPEC has ruled that the compiler used for this result was performing a compilation that specifically improves the performance of the 523.xalancbmk_r / 623.xalancbmk_s benchmarks using a priori knowledge of the SPEC code and dataset to perform a transformation that has narrow applicability.

In order to encourage optimizations that have wide applicability (see rule 1.4 https://www.spec.org/cpu2017/Docs/runrules.html#rule_1.4), SPEC will no longer publish results using this optimization.

This result is left in the SPEC results database for historical reference.

### 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 = "/spec2017-icc2023.0/lib/intel64:/spec2017-icc2023.0/lib/ia32:/spec2017-icc2023.0/je5.0.1-32"
MALLOCS_CONF = "retain:true"
```
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SPECrate®2017_int_peak = Not Run

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Tested by: xFusion

Test Date: Aug-2023
Hardware Availability: Jan-2023
Software Availability: Dec-2022

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Red Hat Enterprise Linux 8.4

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 /spec2017-icc2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Wed Aug 16 11:51:12 2023

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

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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 250 (250-6.el9_0)
12. Failed units, from systemctl list-units --state=failed
13. Services, from systemctl list-unit-files
14. Linux kernel boot-time arguments, from /proc/cmdline
15. cpupower frequency-info
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. BIOS

1. uname -a
   Linux localhost.localdomain 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64
   x86_64 x86_64 GNU/Linux

2. w
   1:15:12 up 2 min, 1 user, load average: 0.09, 0.03, 0.00
   USER  TTY   LOGIN@   IDLE   JCPU   PCPU WHAT
   root tty1 11:50   8.00s   1.30s   0.04s -bash

(Continued on next page)
Platform Notes (Continued)

3. Username
   From environment variable $USER: root

4. ulimit -a
   real-time non-blocking time (microseconds, -R) unlimited
   core file size (blocks, -c) 0
   data seg size (kbytes, -d) unlimited
   scheduling priority (-e) 0
   file size (blocks, -f) unlimited
   pending signals (-i) 2060169
   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) 2060169
   virtual memory (kbytes, -v) unlimited
   file locks (-x) unlimited

5. /usr/lib/systemd/systemd rhgb --switched-root --system --deserialize 31
   login -- root
   -bash
   bash
   runcpu --define default-platform-flags --copies 48 -c ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define
   smt-on --define cores=24 --define physicalfirst --define invoke_with_interleave --define drop_caches
   --tune base --iterations 3 -o all intrate
   runcpu --define default-platform-flags --copies 48 --configfile
   ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=24 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base --iterations 3 --output_format all
   --nopower --runmode rate --tune base --size refrate intrate --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.156/templogs/preenv.intrate.156.0.log --lognum 156.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /spec2017-icc2023.0

6. /proc/cpuinfo
   model name : Intel(R) Xeon(R) Silver 4410Y
   vendor_id : GenuineIntel
   cpu family : 6
   model : 143
   stepping : 7
   microcode : 0x2b000111
   bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores : 12
   siblings : 24
   2 physical ids (chips)
   48 processors (hardware threads)
   physical id 0: core ids 0-11
   physical id 1: core ids 0-11
   physical id 0: apicids 0-23
   physical id 1: apicids 128-151
   Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
## SPEC CPU®2017 Integer Rate Result

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<tr>
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### Platform Notes (Continued)

Use the above data carefully.

---

7. lscpu

From lscpu from util-linux 2.37.4:

- **Architecture:** x86_64
- **CPU op-mode(s):** 32-bit, 64-bit
- **Address sizes:** 46 bits physical, 57 bits virtual
- **Byte Order:** Little Endian
- **CPU(s):** 48
- **On-Line CPU(s) list:** 0-47
- **Vendor ID:** GenuineIntel
- **BIOS Vendor ID:** Intel(R) Corporation
- **Model name:** Intel(R) Xeon(R) Silver 4410Y
- **CPU family:** 6
- **Model:** 143
- **Thread(s) per core:** 2
- **Core(s) per socket:** 12
- **Socket(s):** 2
- **Stepping:** 7
- **BogoMIPS:** 4000.00
- **Flags:** fpu vme de pse mcexsse43 x86e3 motherboardcache

---

### Virtualization

- **Virtualization:** VT-x

---

### Hardware Information

- **NUMA node(s):**
  - **CPU(s):**
    - Node 0: 0-4
    - Node 1: 5-9
    - Node 2: 10-14
    - Node 3: 15-19
- **Vulnerability Itlb multihit:** Not affected
- **Vulnerability Mds:** Not affected
- **Vulnerability Meltdown:** Not affected

---

### Software Information

- **CPU2017 License:** 6488
- **Test Sponsor:** xFusion
- **Test Date:** Aug-2023
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Platform Notes (Continued)

From lscpu --cache:
 NAME ONE-SIZE ALL-SIZE WAYS TYPE LEVEL SETS PHY-LINE COHERENCY-SIZE
L1d 48K 1.1M 12 Data 1 64 1 64
L1i 32K 768K 8 Instruction 1 64 1 64
L2 2M 48M 16 Unified 2 2048 1 64
L3 30M 60M 15 Unified 3 32768 1 64

8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 4 nodes (0-3)
node 0 cpus: 0-5,24-29
node 0 size: 128046 MB
node 0 free: 127572 MB
node 1 cpus: 6-11,30-35
node 1 size: 129021 MB
node 1 free: 128412 MB
node 2 cpus: 12-17,36-41
node 2 size: 129021 MB
node 2 free: 128659 MB
node 3 cpus: 18-23,42-47
node 3 size: 129010 MB
node 3 free: 128638 MB
node distances:
 node  0   1   2   3
 0: 10  12  21  21
 1: 12  10  21  21
 2: 21  21  10  12
 3: 21  21  12  10

9. /proc/meminfo
MemTotal: 527462252 kB

10. who -r
run-level 3 Aug 16 11:48

11. Systemd service manager version: systemd 250 (250-6.el9_0)
Default Target Status
multi-user degraded

12. Failed units, from systemctl list-units --state=failed
UNIT LOAD ACTIVE SUB DESCRIPTION
* sep5.service loaded failed failed systemd script to load sep5 driver at boot time

13. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled NetworkManager NetworkManager-dispatcher NetworkManager-wait-online
 accounts-daemon auditd avahi-daemon bluetooth chronyd crond cups dbus-broker gdm
getty@ insights-client-boot irqbalance iscsi iscsi-onboot kdump libstoragemgmt
low-memory-monitor lvm2-monitor mcelog mdmonitor microcode multipathd nis-domainname
nvme-boot-connections ostree-remount power-profiles-daemon qemu-guest-agent rhsmcertd
radoslog rtkit-daemon selinux-autorelabel-mark sep5 smartd sshd ssad swicheroo-control
sysstat systemd-network-generator udisks2 upower vgaathd vmtoolsd

enabled-runtime systemd-remount-fs
disabled arpethers blk-availability britty canberra-system-bootup canberra-system-shutdown

(Continued on next page)
<table>
<thead>
<tr>
<th>Platform Notes (Continued)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. Linux kernel boot-time arguments, from /proc/cmdline</td>
</tr>
<tr>
<td>BOOT_IMAGE=(hd0,gpt3)/boot/vmlinuz-5.14.0-70.13.1.el9_0.x86_64</td>
</tr>
<tr>
<td>root=UUID=cc4bab05-907e-44ef-b818-2b2874390234 ro</td>
</tr>
<tr>
<td>crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M</td>
</tr>
<tr>
<td>resume=UUID=5ba347ca-8beb-4f6e-9c11-de63dc4ddf5f rhgb quiet</td>
</tr>
<tr>
<td>15. cpupower frequency-info</td>
</tr>
<tr>
<td>analyzing CPU 0:</td>
</tr>
<tr>
<td>Unable to determine current policy boost state support:</td>
</tr>
<tr>
<td>Supported: yes Active: yes</td>
</tr>
<tr>
<td>16. sysctl</td>
</tr>
<tr>
<td>kernel.numa_balancing</td>
</tr>
<tr>
<td>kernel.randomize_va_space</td>
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<td>vm.compaction_proactiveness</td>
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<td>vm.dirty_background_bytes</td>
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<td>vm.watermark_scale_factor</td>
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<td>vm.zone_reclaim_mode</td>
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<tr>
<td>17. /sys/kernel/mm/transparent_hugepage</td>
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<tr>
<td>defrag</td>
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<td>shmem_enabled</td>
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<tr>
<td>18. /sys/kernel/mm/transparent_hugepage/khugepaged</td>
</tr>
<tr>
<td>alloc_sleep_millisecs</td>
</tr>
<tr>
<td>defrag</td>
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<tr>
<td>max_ptes_none</td>
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Platform Notes (Continued)

max_p tes_shared 256
max_p tes_swap 64
pages_to_scan 4096
scan_slee p_m illiseconds 10000

19. OS release
From /etc/*-release /etc/*-version
os-release Red Hat Enterprise Linux 9.0 (Plow)
redhat-release Red Hat Enterprise Linux release 9.0 (Plow)
system-release Red Hat Enterprise Linux release 9.0 (Plow)

20. Disk information
SPEC is set to: /spec2017-icc2023.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 420G 62G 358G 15% /

21. /sys/devices/virtual/dmi/id
Vendor: XFUSION
Product: 5288 V7
Product Family: Eagle Stream
Serial:

22. 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:
16x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800, configured at 4000

23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: XFUSION
BIOS Version: 2.00.55
BIOS Date: 03/07/2023
BIOS Revision: 0.55

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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
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Compiler Version Notes (Continued)
Fortran | 548.exchange2_r(base)
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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
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541.leea_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 -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin
-lqkmalloc

C++ benchmarks:
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/intel/compiler/2023.0.0/linux/compiler/lib/intel64_lin

(Continued on next page)
## Base Optimization Flags (Continued)

C++ benchmarks (continued):
- `-lqkmalloc`

Fortran benchmarks:
- `-w -m64 -Wl,-z,muldefs -xsapphirerapids -O3 -ffast-math -flto`
- `-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4`
- `-nostandard-realloc-lhs -align array32byte -auto`
- `-L/usr/local/intel/compiler/2023.0.0/linux/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-ic2023-official-linux64.html](http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html)

You can also download the XML flags sources by saving the following links:
- [http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml](http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml)