SPEC CPU®2017 Integer Rate Result

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xFusion

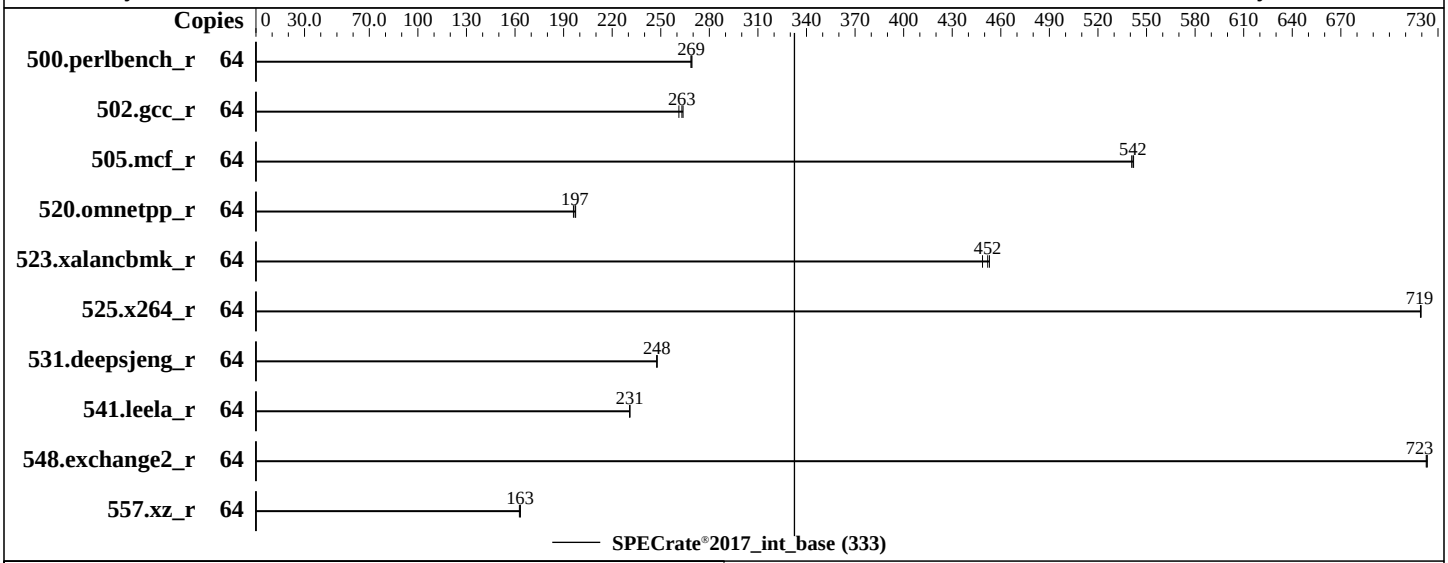
FusionServer 2288H V7 (Intel Xeon Gold 6548Y+)

SPECrate®2017_int_base = 333

SPECrate®2017_int_peak = Not Run

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

Test Date: Oct-2024
Hardware Availability: Dec-2023
Software Availability: Nov-2023



Hardware

CPU Name:	Intel Xeon Gold 6548Y+
Max MHz:	4100
Nominal:	2500
Enabled:	32 cores, 1 chip, 2 threads/core
Orderable:	1 chip
Cache L1:	32 KB I + 48 KB D on chip per core
L2:	2 MB I+D on chip per core
L3:	60 MB I+D on chip per chip
Other:	None
Memory:	640 GB (10 x 64 GB 2Rx4 PC5-4800B-R)
Storage:	1 x 3.84 TB SATA SSD
Other:	CPU Cooling: Air

Software

OS:	Red Hat Enterprise Linux 9.2 (Plow) 5.14.0-284.11.1.el9_2.x86_64
Compiler:	C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;
Parallel:	No
Firmware:	Version 01.01.03.16 Released Aug-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	64	379	269	**379**	**269**	378	269							
502.gcc_r	64	347	261	344	264	**345**	**263**							
505.mcf_r	64	**191**	**542**	191	542	191	541							
520.omnetpp_r	64	425	197	428	196	**426**	**197**							
523.xalancbmk_r	64	151	449	**150**	**452**	149	453							
525.x264_r	64	156	720	156	719	**156**	**719**							
531.deepsjeng_r	64	296	248	**296**	**248**	296	248							
541.leela_r	64	459	231	459	231	**459**	**231**							
548.exchange2_r	64	**232**	**723**	232	723	232	723							
557.xz_r	64	423	163	425	163	**424**	**163**							

SPECrate®2017_int_base = 333

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/cpu2017.2024.1/lib/intel64:/home/cpu2017.2024.1/lib/ia32:/home/cpu2017.2024.1/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)
```

(Continued on next page)

General Notes (Continued)

```
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)
LLC Prefetch Set to Disabled

 Sysinfo program /home/cpu2017.2024.1/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Thu Oct 10 18:02:49 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 252 (252-13.el9_2)
 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. Disk information
 21. /sys/devices/virtual/dmi/id
 22. dmidecode
 23. BIOS
 ------------------------------------------------------------

 ------------------------------------------------------------
 1. uname -a
   Linux localhost.localdomain 5.14.0-284.11.1.el9_2.x86_64 #1 SMP PREEMPT_DYNAMIC Wed Apr 12 10:45:03 EDT
   2023 x86_64 x86_64 x86_64 GNU/Linux

 ------------------------------------------------------------
 2. w
    18:02:49 up 2 min,  2 users,  load average: 0.27, 0.29, 0.12
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1      18:02    9.00s  1.03s  0.06s -bash
   root     pts/0     18:01    1:13   0.00s  0.00s -bash

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

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Platform Notes (Continued)

```
------------------------------------------------------------
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) 2578369
  max locked memory           (kbytes, -l) 8192
  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) 2578369
  virtual memory              (kbytes, -v) unlimited
  file locks                          (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 31
 login -- root
 -bash
 -bash
 runcpu --define default-platform-flags --copies 64 -c ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define
   smt-on --define cores=32 --define physicalfirst --define invoke_with_interleave --define drop_caches
   --tune base -o all intrate
 runcpu --define default-platform-flags --copies 64 --configfile
   ic2024.1-lin-sapphirerapids-rate-20240308.cfg --define smt-on --define cores=32 --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/CPU2017.001/templogs/preenv.intrate.001.0.log --lognum 001.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017.2024.1

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : INTEL(R) XEON(R) GOLD 6548Y+
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 207
    stepping        : 2
    microcode       : 0x21000200
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
    cpu cores       : 32
    siblings        : 64
    1 physical ids (chips)
    64 processors (hardware threads)
    physical id 0: core ids 0-31
    physical id 0: apicids 0-63
  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 2.37.4:
  Architecture:                    x86_64
```

(Continued on next page)

Platform Notes (Continued)

```
  CPU op-mode(s):                  32-bit, 64-bit
  Address sizes:                   46 bits physical, 57 bits virtual
  Byte Order:                      Little Endian
  CPU(s):                          64
  On-line CPU(s) list:             0-63
  Vendor ID:                       GenuineIntel
  BIOS Vendor ID:                  Intel(R) Corporation
  Model name:                      INTEL(R) XEON(R) GOLD 6548Y+
  BIOS Model name:                 INTEL(R) XEON(R) GOLD 6548Y+
  CPU family:                      6
  Model:                           207
  Thread(s) per core:              2
  Core(s) per socket:              32
  Socket(s):                       1
  Stepping:                        2
  BogoMIPS:                        5000.00
  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 tsc_known_freq 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 cat_l2 cdp_l3 invpcid_single
                                   cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vnmi flexpriority
                                   ept vpid ept_ad fsgsbase tsc_adjust bmi1 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 avx_vnni avx512_bf16 wbnoinvd
                                   dtherm ida arat pln pts hfi avx512vbmi umip pku ospke waitpkg avx512_vbmi2
                                   gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme avx512_vpopcntdq la57
                                   rdpid bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear
                                   serialize tsxldtrk pconfig arch_lbr ibt amx_bf16 avx512_fp16 amx_tile
                                   amx_int8 flush_l1d arch_capabilities
  Virtualization:                  VT-x
  L1d cache:                       1.5 MiB (32 instances)
  L1i cache:                       1 MiB (32 instances)
  L2 cache:                        64 MiB (32 instances)
  L3 cache:                        60 MiB (1 instance)
  NUMA node(s):                    2
  NUMA node0 CPU(s):               0-15,32-47
  NUMA node1 CPU(s):               16-31,48-63
  Vulnerability Itlb multihit:     Not affected
  Vulnerability L1tf:              Not affected
  Vulnerability Mds:               Not affected
  Vulnerability Meltdown:          Not affected
  Vulnerability Mmio stale data:   Not affected
  Vulnerability Retbleed:          Not affected
  Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
  Vulnerability Spectre v1:        Mitigation; usercopy/swapgs barriers and __user pointer sanitization
  Vulnerability Spectre v2:        Mitigation; Enhanced IBRS, IBPB conditional, RSB filling, PBRSB-eIBRS SW
                                   sequence
  Vulnerability Srbds:             Not affected
  Vulnerability Tsx async abort:   Not affected

 From lscpu --cache:
      NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL  SETS PHY-LINE COHERENCY-SIZE
      L1d       48K     1.5M   12 Data            1    64        1             64
      L1i       32K       1M    8 Instruction     1    64        1             64
      L2         2M      64M   16 Unified         2  2048        1             64
      L3        60M      60M   15 Unified         3 65536        1             64
```

(Continued on next page)

Platform Notes (Continued)

```
------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0-15,32-47
  node 0 size: 322083 MB
  node 0 free: 321010 MB
  node 1 cpus: 16-31,48-63
  node 1 size: 322547 MB
  node 1 free: 321687 MB
  node distances:
  node   0   1
    0:  10  12
    1:  12  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       660102512 kB

------------------------------------------------------------
10. who -r
  run-level 3 Oct 10 18:00

------------------------------------------------------------
11. Systemd service manager version: systemd 252 (252-13.el9_2)
  Default Target  Status
  multi-user      running

------------------------------------------------------------
12. Services, from systemctl list-unit-files
  STATE            UNIT FILES
  enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
                   dbus-broker getty@ insights-client-boot irqbalance kdump low-memory-monitor mdmonitor
                   microcode nis-domainname rhsmcertd rsyslog rtkit-daemon selinux-autorelabel-mark smartd
                   sshd sssd sysstat systemd-boot-update systemd-network-generator tuned udisks2 upower
  enabled-runtime  systemd-remount-fs
  disabled         canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot
                   chrony-wait console-getty cpupower debug-shell dnf-system-upgrade firewalld kvm_stat
                   man-db-restart-cache-update nftables pesign rdisc rhcd rhsm rhsm-facts rpmdb-rebuild
                   selinux-check-proper-disable serial-getty@ sshd-keygen@ systemd-boot-check-no-failures
                   systemd-pstore systemd-sysext
  indirect         sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate
                   systemd-sysupdate-reboot

------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
  BOOT_IMAGE=(hd0,gpt6)/boot/vmlinuz-5.14.0-284.11.1.el9_2.x86_64
  root=UUID=2c4c0a7a-ce7b-40a5-9fc9-b71e7be9cfc1
  ro
  resume=UUID=f5d8d58b-abe6-4c27-b405-e29a8cde3f34
  nohz_full=1-63

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

(Continued on next page)

Platform Notes (Continued)

```
------------------------------------------------------------
15. tuned-adm active
  Current active profile: throughput-performance

------------------------------------------------------------
16. sysctl
  kernel.numa_balancing              1
  kernel.randomize_va_space          2
  vm.compaction_proactiveness       20
  vm.dirty_background_bytes          0
  vm.dirty_background_ratio         10
  vm.dirty_bytes                     0
  vm.dirty_expire_centisecs       3000
  vm.dirty_ratio                    40
  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                     10
  vm.watermark_boost_factor      15000
  vm.watermark_scale_factor         10
  vm.zone_reclaim_mode               0

------------------------------------------------------------
17. /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

------------------------------------------------------------
18. /sys/kernel/mm/transparent_hugepage/khugepaged
  alloc_sleep_millisecs   60000
  defrag                      1
  max_ptes_none             511
  max_ptes_shared           256
  max_ptes_swap              64
  pages_to_scan            4096
  scan_sleep_millisecs    10000

------------------------------------------------------------
19. OS release
  From /etc/*-release /etc/*-version
  os-release     Red Hat Enterprise Linux 9.2 (Plow)
  redhat-release Red Hat Enterprise Linux release 9.2 (Plow)
  system-release Red Hat Enterprise Linux release 9.2 (Plow)

------------------------------------------------------------
20. Disk information
SPEC is set to: /home/cpu2017.2024.1
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/sda6      xfs   686G   31G  656G   5% /

------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         XFUSION
```

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Platform Notes (Continued)

```
     Product:        2288H V7
     Product Family: Eagle Stream
     Serial:         2106182101X3N8000005

 ------------------------------------------------------------
 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:
     10x Micron MTC40F2046S1RC48BA1 64 GB 2 rank 4800


 ------------------------------------------------------------
 23. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       XFUSION
    BIOS Version:      01.01.03.16
    BIOS Date:         08/09/2024
    BIOS Revision:     3.16
```

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 2024.1.0 Build 20240308
Copyright (C) 1985-2024 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 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
Fortran | 548.exchange2_r(base)
--------------------------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

C++ benchmarks:
icpx

(Continued on next page)

Base Compiler Invocation (Continued)

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 -xsapphirerapids -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/opt/intel/oneapi/compiler/2024.1/lib -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/opt/intel/oneapi/compiler/2024.1/lib -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/opt/intel/oneapi/compiler/2024.1/lib -lqkmalloc

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-EMR-V1.1.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml
http://www.spec.org/cpu2017/flags/xFusion-Platform-Settings-EMR-V1.1.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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