SPEC CPU®2017 Integer Rate Result

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xFusion

FusionServer 2288H V7 (Intel Xeon Platinum 8592+)

$SPECrate®2017_int_base = $ 1130

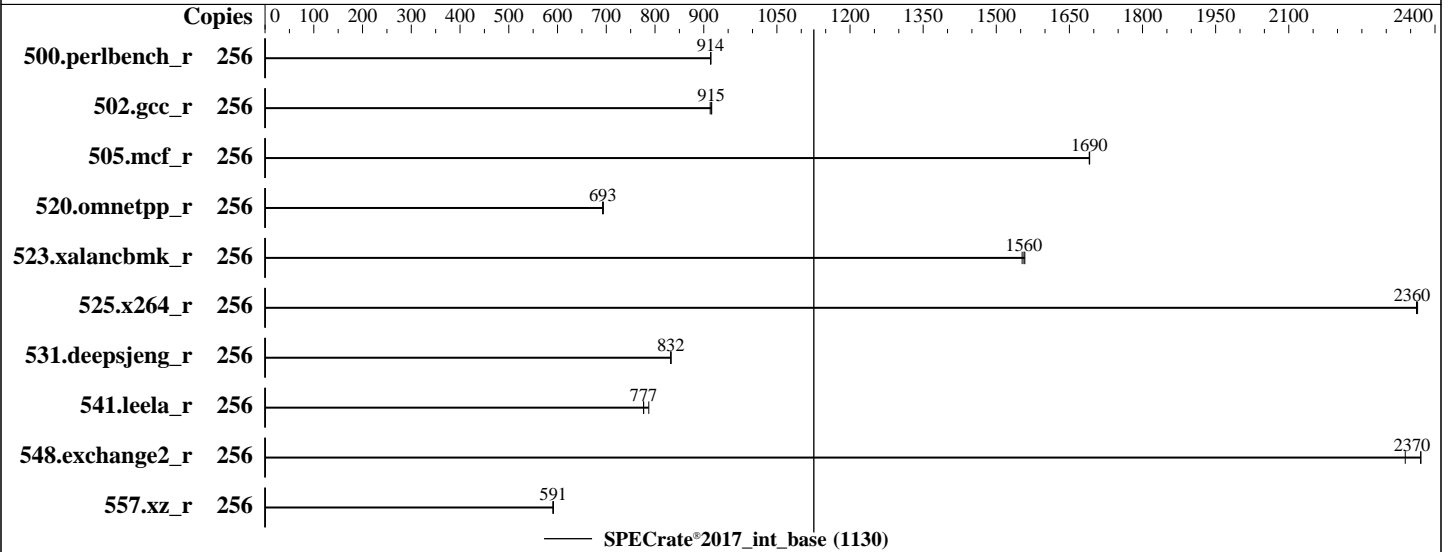$SPECrate®2017_int_peak = $ Not Run

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

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

Copies

Benchmark	Copies	Result
500.perlbench_r	256	914
502.gcc_r	256	915
505.mcf_r	256	1690
520.omnetpp_r	256	693
523.xalancbmk_r	256	1560
525.x264_r	256	2360
531.deepsjeng_r	256	832
541.leela_r	256	777
548.exchange2_r	256	2370
557.xz_r	256	591

SPECrate®2017_int_base (1130)

Hardware

CPU Name: Intel Xeon Platinum 8592+
 Max MHz: 3900
 Nominal: 1900
Enabled: 128 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: 320 MB I+D on chip per chip
 Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-5600B-R)
Storage: 1 x 960 GB 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 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 01.01.03.05 Released Apr-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	256	446	914	446	915	**446**	**914**							
502.gcc_r	256	**396**	**915**	397	913	396	916							
505.mcf_r	256	245	1690	**245**	**1690**	245	1690							
520.omnetpp_r	256	485	693	484	694	**485**	**693**							
523.xalancbmk_r	256	**174**	**1560**	174	1550	173	1560							
525.x264_r	256	190	2360	190	2360	**190**	**2360**							
531.deepsjeng_r	256	352	833	**352**	**832**	352	832							
541.leela_r	256	546	776	**546**	**777**	539	787							
548.exchange2_r	256	287	2340	**283**	**2370**	283	2370							
557.xz_r	256	467	591	468	591	**468**	**591**							
SPECrate®2017_int_base =		**1130**												
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"
Kernel Boot Parameter set with : nohz_full=1-255
```

Environment Variables Notes

```
Environment variables set by runcpu before the start of the run:
LD_LIBRARY_PATH = "/home/2023/lib/intel64:/home/2023/lib/ia32:/home/2023/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)
```

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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
LLC dead line alloc Set to Disabled
Stale AtoS Set to Disabled

 Sysinfo program /home/2023/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Tue Jun 25 10:15:18 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. 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. tuned-adm active
 17. sysctl
 18. /sys/kernel/mm/transparent_hugepage
 19. /sys/kernel/mm/transparent_hugepage/khugepaged
 20. OS release
 21. Disk information
 22. /sys/devices/virtual/dmi/id
 23. dmidecode
 24. 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
    10:15:18 up 7 min,  1 user,  load average: 0.20, 0.16, 0.10
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1       10:14   14.00s  1.33s  0.04s sh run_rate_ic2023.sh

 ---------------------------------------------------------------
 3. Username
```

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Platform Notes (Continued)

```
  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) 2060025
   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) 2060025
   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
 sh run_rate_ic2023.sh
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=256 -c
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=128 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base -o all intrate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=256 --configfile
   ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=128 --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/CPU2017.002/templogs/preenv.intrate.002.0.log --lognum 002.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/2023


    ----------------------------------------------------------
6. /proc/cpuinfo
    model name       : INTEL(R) XEON(R) PLATINUM 8592+
    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        : 64
    siblings         : 128
    2 physical ids (chips)
    256 processors (hardware threads)
    physical id 0: core ids 0-63
    physical id 1: core ids 0-63
    physical id 0: apicids 0-127
    physical id 1: apicids 128-255
  Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
  virtualized systems.  Use the above data carefully.

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

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Platform Notes (Continued)

```
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):                    256
  On-line CPU(s) list:       0-255
  Vendor ID:                 GenuineIntel
  BIOS Vendor ID:            Intel(R) Corporation
  Model name:                INTEL(R) XEON(R) PLATINUM 8592+
  BIOS Model name:           INTEL(R) XEON(R) PLATINUM 8592+
  CPU family:                6
  Model:                     207
  Thread(s) per core:        2
  Core(s) per socket:        64
  Socket(s):                 2
  Stepping:                  2
  Frequency boost:           enabled
  CPU max MHz:               1901.0000
  CPU min MHz:               800.0000
  BogoMIPS:                  3800.00
  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 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:                 6 MiB (128 instances)
  L1i cache:                 4 MiB (128 instances)
  L2 cache:                  256 MiB (128 instances)
  L3 cache:                  640 MiB (2 instances)
  NUMA node(s):              4
  NUMA node0 CPU(s):         0-31,128-159
  NUMA node1 CPU(s):         32-63,160-191
  NUMA node2 CPU(s):         64-95,192-223
  NUMA node3 CPU(s):         96-127,224-255
  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
```

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Platform Notes (Continued)

```
  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       6M   12 Data              1     64        1             64
     L1i       32K       4M    8 Instruction       1     64        1             64
     L2         2M     256M   16 Unified           2   2048        1             64
     L3       320M     640M   20 Unified           3 262144        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: 0-31,128-159
  node 0 size: 128068 MB
  node 0 free: 127408 MB
  node 1 cpus: 32-63,160-191
  node 1 size: 129010 MB
  node 1 free: 128513 MB
  node 2 cpus: 64-95,192-223
  node 2 size: 128970 MB
  node 2 free: 128440 MB
  node 3 cpus: 96-127,224-255
  node 3 size: 128996 MB
  node 3 free: 128353 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:      527406000 kB

-------------------------------------------------------------
10. who -r
   run-level 3 Jun 25 10:08

-------------------------------------------------------------
11. Systemd service manager version: systemd 252 (252-13.el9_2)
  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 auditd chronyd crond
                    dbus-broker firewalld getty@ insights-client-boot irqbalance kdump low-memory-monitor
                    mdmonitor microcode nis-domainname rhsmcertd rsyslog rtkit-daemon selinux-autorelabel-mark
                    sep5 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
```

(Continued on next page)

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Platform Notes (Continued)

```
                   chrony-wait console-getty cpupower debug-shell dnf-system-upgrade 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

   ----------------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=(hd0,gpt5)/boot/vmlinuz-5.14.0-284.11.1.el9_2.x86_64
    root=UUID=e7cc1b7d-5946-4ed4-8306-b2d382dc5709
    ro
    crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
    resume=UUID=937c2e4e-930c-4489-9a6c-cd05c9a2c08a
    nohz_full=1-255

   ----------------------------------------------------------------
15. cpupower frequency-info
    analyzing CPU 0:
      current policy: frequency should be within 800 MHz and 1.90 GHz.
                      The governor "performance" may decide which speed to use
                      within this range.
      boost state support:
        Supported: yes
        Active: yes

   ----------------------------------------------------------------
16. tuned-adm active
    Current active profile: throughput-performance

   ----------------------------------------------------------------
17. sysctl
    kernel.numa_balancing            0
    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

   ----------------------------------------------------------------
18. /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

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

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Platform Notes (Continued)

```
19. /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


-------------------------------------------------------------
20. 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)

-------------------------------------------------------------
21. Disk information
SPEC is set to: /home/2023
  Filesystem    Type  Size  Used Avail Use% Mounted on
  /dev/sda5     xfs   690G  132G  559G  20% /

-------------------------------------------------------------
22. /sys/devices/virtual/dmi/id
    Product:        2288H V7
    Product Family: Eagle Stream

-------------------------------------------------------------
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:
    6x Samsung M321R4GA3PB0-CWMCH 32 GB 2 rank 5600
    8x Samsung M321R4GA3PB0-CWMJH 32 GB 2 rank 5600
    2x Samsung M321R4GA3PB0-CWMKH 32 GB 2 rank 5600


-------------------------------------------------------------
24. BIOS
(This section combines info from /sys/devices and dmidecode.)
  BIOS Vendor:      INSYDE Corp.
  BIOS Version:     01.01.03.05
  BIOS Date:        04/12/2024
  BIOS Revision:    3.5
```

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)
----------------------------------------------------------------------------------------------
```

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Compiler Version Notes (Continued)

```
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 -xsapphirerapids -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
```

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Base Optimization Flags (Continued)

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/home/specdev/new_compilers/ic2023.2.3/compiler/lib/intel64_lin
-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/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/xFusion-Platform-Settings-EMR-V1.1.html
  http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html

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

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

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