SPEC CPU®2017 Integer Rate Result

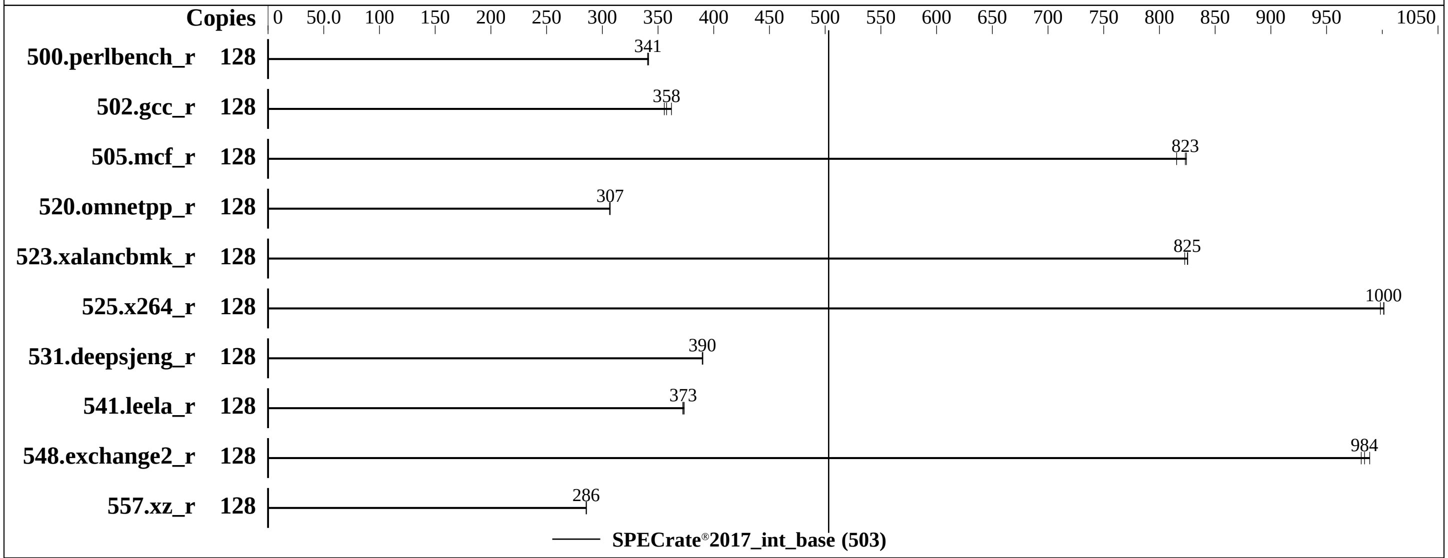
xFusion

FusionServer 5885H V6 (Intel Xeon Gold 6328H)

SPECrate®2017_int_base = 503

SPECrate®2017_int_peak = Not Run

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



Hardware

CPU Name:	Intel Xeon Gold 6328H
Max MHz:	4300
Nominal:	2800
Enabled:	64 cores, 4 chips, 2 threads/core
Orderable:	1,2,4 chips
Cache L1:	32 KB I + 32 KB D on chip per core
L2:	1 MB I+D on chip per core
L3:	22 MB I+D on chip per chip
Other:	None
Memory:	1536 GB (48 x 32 GB 2Rx8 PC4-3200AA-R, running at 2933)
Storage:	1 x 960 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 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux; Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
Parallel:	No
Firmware:	Version 1.07 Released May-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

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
500.perlbench_r	128	**598**	**341**	597	342	598	341							
502.gcc_r	128	501	362	510	356	**507**	**358**							
505.mcf_r	128	**251**	**823**	251	824	254	815							
520.omnetpp_r	128	547	307	548	306	**547**	**307**							
523.xalancbmk_r	128	164	823	**164**	**825**	164	825							
525.x264_r	128	224	1000	225	998	**224**	**1000**							
531.deepsjeng_r	128	376	390	**376**	**390**	376	390							
541.leela_r	128	568	374	569	372	**569**	**373**							
548.exchange2_r	128	**341**	**984**	342	981	339	989							
557.xz_r	128	484	285	**484**	**286**	484	286							

SPECrate®2017_int_base = **503**

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 = "/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 Thu May 18 08:52:54 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 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. tuned-adm active
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Kernel self-reported vulnerability status, from /sys/devices/system/cpu/vulnerabilities
21. Disk information
22. /sys/devices/virtual/dmi/id
23. dmidecode
24. 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
```

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Platform Notes (Continued)

```
  GNU/Linux

------------------------------------------------------------
2. w
   08:52:54 up  5:13,  2 users,  load average: 0.00, 0.00, 0.06
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     pts/0    70.167.0.2       03:41    5:10m  0.03s  0.03s -bash
  root     pts/1    70.167.0.2       03:48   14.00s  1.25s  0.00s bash test-rate-cpu2017.sh

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

------------------------------------------------------------
4. ulimit -a
  core file size          (blocks, -c) unlimited
  data seg size           (kbytes, -d) unlimited
  scheduling priority             (-e) 0
  file size               (blocks, -f) unlimited
  pending signals                 (-i) 6185118
  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) 6185118
  virtual memory          (kbytes, -v) unlimited
  file locks                      (-x) unlimited

------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 18
 /usr/sbin/sshd -D
   -oCiphers=aes256-gcm@openssh.com,chacha20-poly1305@openssh.com,aes256-ctr,aes256-cbc,aes128-gcm@openssh.co
   m,aes128-ctr,aes128-cbc
   -oMACs=hmac-sha2-256-etm@openssh.com,hmac-sha1-etm@openssh.com,umac-128-etm@openssh.com,hmac-sha2-512-etm@
   openssh.com,hmac-sha2-256,hmac-sha1,umac-128@openssh.com,hmac-sha2-512...
 sshd: root [priv]
 sshd: root@pts/1
 -bash
 bash test-rate-cpu2017.sh
 runcpu --define default-platform-flags --copies 128 -c ic2023.0-lin-core-avx512-rate-20221201.cfg --define
   smt-on --define cores=64 --define physicalfirst --define invoke_with_interleave --define drop_caches
   --tune base -o all intrate
 runcpu --define default-platform-flags --copies 128 --configfile ic2023.0-lin-core-avx512-rate-20221201.cfg
   --define smt-on --define cores=64 --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/CPU2017.004/templogs/preenv.intrate.004.0.log --lognum 004.0
   --from_runcpu 2
 specperl $SPEC/bin/sysinfo
$SPEC = /home/speccpu

------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Gold 6328H CPU @ 2.80GHz
    vendor_id       : GenuineIntel
    cpu family      : 6
```

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Platform Notes (Continued)

```
    model           : 85
    stepping        : 11
    microcode       : 0x7002302
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 16
    siblings        : 32
    4 physical ids (chips)
    128 processors (hardware threads)
    physical id 0: core ids 0-15
    physical id 1: core ids 0-15
    physical id 2: core ids 0-15
    physical id 3: core ids 0-15
    physical id 0: apicids 0-31
    physical id 1: apicids 32-63
    physical id 2: apicids 64-95
    physical id 3: apicids 96-127
  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):              128
  On-line CPU(s) list: 0-127
  Thread(s) per core:  2
  Core(s) per socket:  16
  Socket(s):           4
  NUMA node(s):        8
  Vendor ID:           GenuineIntel
  BIOS Vendor ID:      Intel(R) Corporation
  CPU family:          6
  Model:               85
  Model name:          Intel(R) Xeon(R) Gold 6328H CPU @ 2.80GHz
  BIOS Model name:     Intel(R) Xeon(R) Gold 6328H CPU @ 2.80GHz
  Stepping:            11
  CPU MHz:             3699.750
  BogoMIPS:            5600.00
  Virtualization:      VT-x
  L1d cache:           32K
  L1i cache:           32K
  L2 cache:            1024K
  L3 cache:            22528K
  NUMA node0 CPU(s):   0-3,8-11,64-67,72-75
  NUMA node1 CPU(s):   4-7,12-15,68-71,76-79
  NUMA node2 CPU(s):   16-19,24-27,80-83,88-91
  NUMA node3 CPU(s):   20-23,28-31,84-87,92-95
  NUMA node4 CPU(s):   32-35,40-43,96-99,104-107
  NUMA node5 CPU(s):   36-39,44-47,100-103,108-111
  NUMA node6 CPU(s):   48-51,56-59,112-115,120-123
  NUMA node7 CPU(s):   52-55,60-63,116-119,124-127
  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 cdp_l3 invpcid_single ssbd mba ibrs ibpb stibp
```

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Platform Notes (Continued)

```
                    ibrs_enhanced tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1
                    hle avx2 smep bmi2 erms invpcid cqm mpx rdt_a avx512f avx512dq rdseed adx smap
                    clflushopt clwb intel_pt avx512cd avx512bw avx512vl xsaveopt xsavec xgetbv1 xsaves
                    cqm_llc cqm_occup_llc cqm_mbm_total cqm_mbm_local avx512_bf16 dtherm ida arat pln pts
                    hwp_epp pku ospke avx512_vnni md_clear flush_l1d arch_capabilities

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 8 nodes (0-7)
  node 0 cpus: 0-3,8-11,64-67,72-75
  node 0 size: 191630 MB
  node 0 free: 185211 MB
  node 1 cpus: 4-7,12-15,68-71,76-79
  node 1 size: 193532 MB
  node 1 free: 189035 MB
  node 2 cpus: 16-19,24-27,80-83,88-91
  node 2 size: 193532 MB
  node 2 free: 188799 MB
  node 3 cpus: 20-23,28-31,84-87,92-95
  node 3 size: 193532 MB
  node 3 free: 188755 MB
  node 4 cpus: 32-35,40-43,96-99,104-107
  node 4 size: 193532 MB
  node 4 free: 189047 MB
  node 5 cpus: 36-39,44-47,100-103,108-111
  node 5 size: 193495 MB
  node 5 free: 188962 MB
  node 6 cpus: 48-51,56-59,112-115,120-123
  node 6 size: 193532 MB
  node 6 free: 189042 MB
  node 7 cpus: 52-55,60-63,116-119,124-127
  node 7 size: 193531 MB
  node 7 free: 189022 MB
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  11  20  20  20  20  20  20
    1:  11  10  20  20  20  20  20  20
    2:  20  20  10  11  20  20  20  20
    3:  20  20  11  10  20  20  20  20
    4:  20  20  20  20  10  11  20  20
    5:  20  20  20  20  11  10  20  20
    6:  20  20  20  20  20  20  10  11
    7:  20  20  20  20  20  20  11  10

------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1583431084 kB

------------------------------------------------------------
10. who -r
  run-level 3 May 18 03:39

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

------------------------------------------------------------
12. Services, from systemctl list-unit-files
```

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Platform Notes (Continued)

```
  STATE      UNIT FILES
  enabled    NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd autovt@ chronyd crond
             firewalld getty@ import-state irqbalance kdump loadmodules lvm2-monitor mdmonitor microcode
             nis-domainname rhsmcertd rpcbind rsyslog selinux-autorelabel-mark sshd sssd syslog timedatex
             tuned udisks2
  disabled   blk-availability chrony-wait console-getty cpupower debug-shell ebtables gssproxy iprdump
             iprinit iprupdate kvm_stat nfs-blkmap nfs-convert nfs-server 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. tuned-adm active
  Current active profile: throughput-performance

------------------------------------------------------------
16. 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                     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

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

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Platform Notes (Continued)

```
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_swap              64
  pages_to_scan            4096
  scan_sleep_millisecs    10000

------------------------------------------------------------
19. 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)

------------------------------------------------------------
20. 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

------------------------------------------------------------
21. Disk information
SPEC is set to: /home/speccpu
  Filesystem            Type  Size  Used Avail Use% Mounted on
  /dev/mapper/rhel-home xfs   819G   75G  744G  10% /home

------------------------------------------------------------
22. /sys/devices/virtual/dmi/id
    Vendor:         Huawei
    Product:        5885H V6
    Product Family: Cedar Island

------------------------------------------------------------
23. 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:
    4x Micron 18ASF4G72PDZ-3G2E1 32 GB 2 rank 3200, configured at 2933
    44x Samsung M393A4G43AB3-CWE 32 GB 2 rank 3200, configured at 2933


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

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Platform Notes (Continued)

```
 24. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       Byosoft Corporation
    BIOS Version:      1.07
    BIOS Date:         02/06/2023
```

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
Copyright (C) 1985-2022 Intel Corporation. All rights reserved.
--------------------------------------------------------------------------------------------------------------

==============================================================================================================
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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Base Portability Flags (Continued)

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/usr/local/intel/compiler/2023.0.0/linux/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/usr/local/intel/compiler/2023.0.0/linux/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/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/xFusion-Platform-Settings-CPX-V1.4.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/xFusion-Platform-Settings-CPX-V1.4.xml

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

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