SPEC CPU®2017 Integer Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

xFusion

FusionServer 5885H V6 (Intel Xeon Gold 6328H)

$SPECrate^®2017\_int\_base =$ **503**

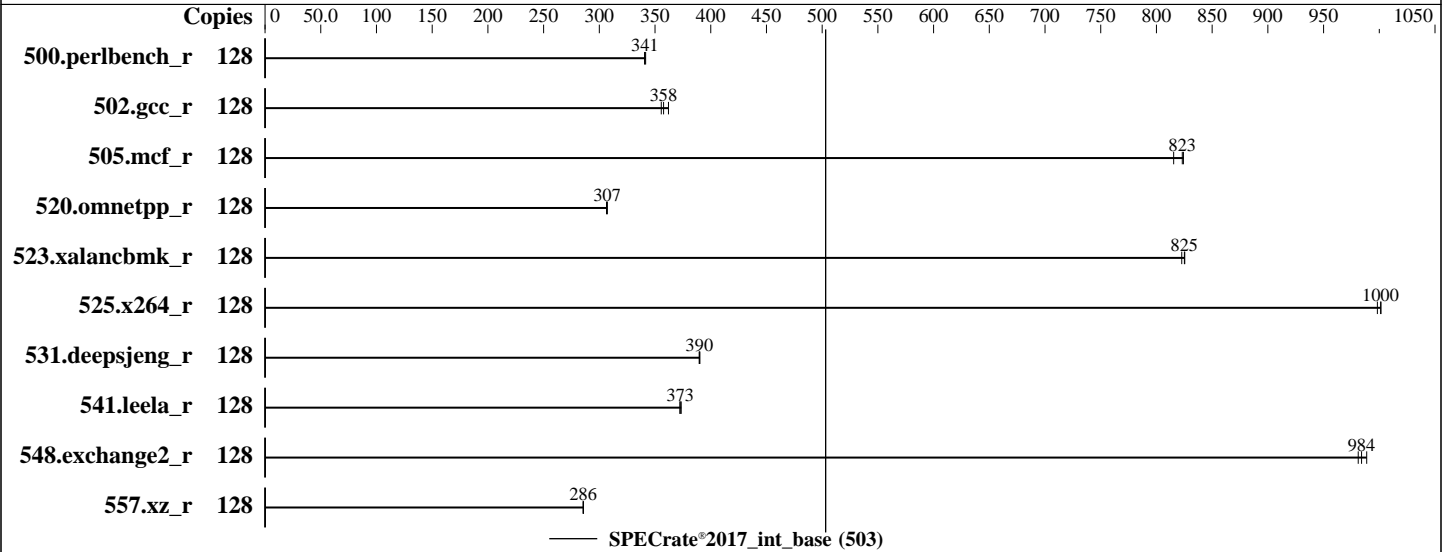$SPECrate^®2017\_int\_peak =$ Not Run

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

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

Benchmark	Copies	Result
500.perlbench_r	128	341
502.gcc_r	128	358
505.mcf_r	128	823
520.omnetpp_r	128	307
523.xalancbmk_r	128	825
525.x264_r	128	1000
531.deepsjeng_r	128	390
541.leela_r	128	373
548.exchange2_r	128	984
557.xz_r	128	286

SPECrate®2017_int_base (503)

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

Standard Performance Evaluation Corporation (info@spec.org)
https://www.spec.org/

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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	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"
```

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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.

-----------------------------------------------------------
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. 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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xFusion

FusionServer 5885H V6 (Intel Xeon Gold 6328H)

SPECrate®2017_int_base =   503

SPECrate®2017_int_peak = Not Run

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

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

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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