



SPEC CPU®2017 Integer Speed Result

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xFusion

SPECspeed®2017_int_base = 15.0

FusionServer 5288 V7 (Intel Xeon Platinum 8444H)

SPECspeed®2017_int_peak = 15.3

CPU2017 License: 6488

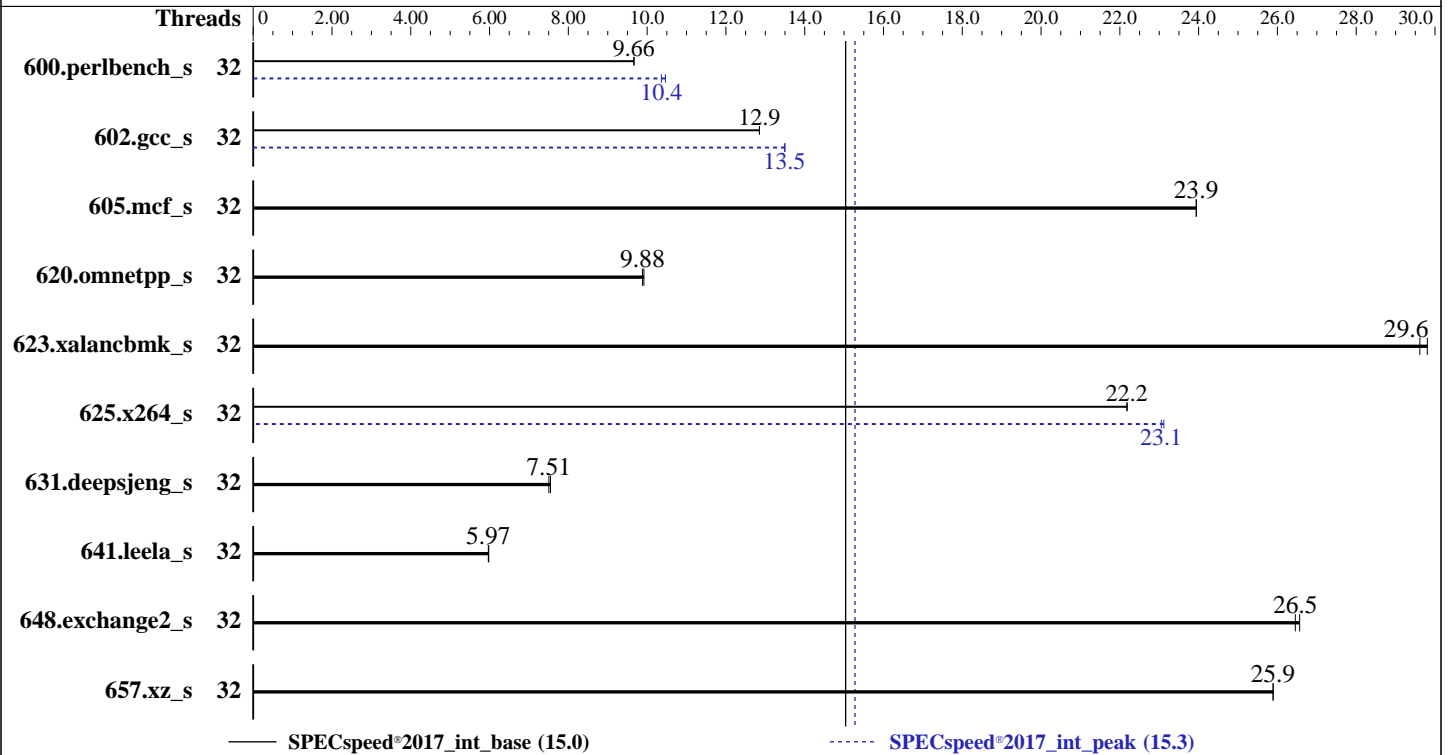
Test Sponsor: xFusion

Tested by: xFusion

Test Date: Jul-2023

Hardware Availability: Jan-2023

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Platinum 8444H
 Max MHz: 4000
 Nominal: 2900
 Enabled: 32 cores, 2 chips
 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: 45 MB I+D on chip per chip
 Other: None
 Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
 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: Yes
 Firmware: Version 2.00.55 Released Mar-2023
 File System: xfs
 System State: Run level 3 (multi-user)
 Base Pointers: 64-bit
 Peak Pointers: 64-bit
 Other: jemalloc memory allocator V5.0.1
 Power Management: OS set to prefer performance at the cost of
 additional power usage



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Results Table

Benchmark	Base						Peak							
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	32	184	9.66	184	9.67			32	170	10.5	171	10.4		
602.gcc_s	32	310	12.9	310	12.9			32	295	13.5	295	13.5		
605.mcf_s	32	197	23.9	197	23.9			32	197	23.9	197	23.9		
620.omnetpp_s	32	164	9.92	165	9.88			32	164	9.92	165	9.88		
623.xalancbmk_s	32	47.8	29.6	47.5	29.8			32	47.8	29.6	47.5	29.8		
625.x264_s	32	79.5	22.2	79.5	22.2			32	76.5	23.1	76.3	23.1		
631.deepsjeng_s	32	191	7.51	190	7.55			32	191	7.51	190	7.55		
641.leela_s	32	285	5.98	286	5.97			32	285	5.98	286	5.97		
648.exchange2_s	32	111	26.6	111	26.5			32	111	26.6	111	26.5		
657.xz_s	32	239	25.9	239	25.9			32	239	25.9	239	25.9		

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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.

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:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/home/spec2017-1.1.9-ic2023/lib/intel64:/home/spec2017-1.1.9-ic2023/je5.0.1-64"
MALLOCONF = "retain:true"
OMP_STACKSIZE = "192M"

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

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General Notes (Continued)

Filesystem page cache synced and cleared with:
sync; echo 3> /proc/sys/vm/drop_caches
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.
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5
sources available from jemalloc.net or <https://github.com/jemalloc/jemalloc/releases>

Platform Notes

BIOS configuration:
Performance Profile Set to Load Balance
Enable LP [Global] Set to Single LP
SNC Set to Enable SNC2 (2-clusters)

Sysinfo program /home/spec2017-1.1.9-ic2023/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost.localdomain Thu Jul 13 14:22:38 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
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 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. 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 5.14.0-70.13.1.el9_0.x86_64 #1 SMP PREEMPT Thu Apr 14 12:42:38 EDT 2022 x86_64 x86_64 x86_64 GNU/Linux

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Platform Notes (Continued)

```
-----
2. w
   14:22:38 up 1 min,  1 user,  load average: 1.06, 0.65, 0.25
USER      TTY      LOGIN@  IDLE   JCPU   PCPU WHAT
root      tty1    14:21   1:02   0.85s  0.00s -bash
```

```
-----
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) 2060250
   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) 2060250
   virtual memory               (kbytes, -v) unlimited
   file locks                   (-x) unlimited
```

```
-----
5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 28
   login -- root
   -bash
   -bash
   runcpu --define default-platform-flags -c ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=32
   --tune base,peak --iterations 2 -o all --define intspeedaffinity --define drop_caches intspeed
   runcpu --define default-platform-flags --configfile ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define
   cores=32 --tune base,peak --iterations 2 --output_format all --define intspeedaffinity --define
   drop_caches --nopower --runmode speed --tune base:peak --size refspeed intspeed --nopreenv --note-preenv
   --logfile $SPEC/tmp/CPU2017.133/temlogs/preenv.intspeed.133.0.log --lognum 133.0 --from_runcpu 2
   specperl $SPEC/bin/sysinfo
   $SPEC = /home/spec2017-1.1.9-ic2023
```

```
-----
6. /proc/cpuinfo
   model name      : Intel(R) Xeon(R) Platinum 8444H
   vendor_id       : GenuineIntel
   cpu family      : 6
   model           : 143
   stepping        : 6
   microcode       : 0x2b000111
   bugs             : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores       : 16
   siblings        : 16
   2 physical ids (chips)
   32 processors (hardware threads)
   physical id 0:  core ids 0-15
   physical id 1:  core ids 0-15
```

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Platform Notes (Continued)

physical id 0: apicids 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
physical id 1: apicids 128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158
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
CPU op-mode(s):              32-bit, 64-bit
Address sizes:                46 bits physical, 57 bits virtual
Byte Order:                  Little Endian
CPU(s):                       32
On-line CPU(s) list:         0-31
Vendor ID:                   GenuineIntel
BIOS Vendor ID:              Intel(R) Corporation
Model name:                   Intel(R) Xeon(R) Platinum 8444H
BIOS Model name:             Intel(R) Xeon(R) Platinum 8444H
CPU family:                   6
Model:                       143
Thread(s) per core:          1
Core(s) per socket:          16
Socket(s):                    2
Stepping:                     6
Frequency boost:              enabled
CPU max MHz:                  2901.0000
CPU min MHz:                  800.0000
BogoMIPS:                     5800.00
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 monitor
                                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 intel_ppin 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 split_lock_detect 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_vpoperntdq la57 rdpid
                                bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear serialize
                                tsxldtrk pconfig arch_lbr avx512_fp16 amx_tile flush_lld 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:                     90 MiB (2 instances)
NUMA node(s):                 4
NUMA node0 CPU(s):           0-7
NUMA node1 CPU(s):           8-15
NUMA node2 CPU(s):           16-23
NUMA node3 CPU(s):           24-31
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:          Not affected
Vulnerability Mds:           Not affected
Vulnerability Meltdown:     Not affected

```

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Platform Notes (Continued)

Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl
Vulnerability Spectre v1: Mitigation; usercopy/swaps barriers and __user pointer sanitization
Vulnerability Spectre v2: Mitigation; Enhanced IBRS, IBPB conditional, RSB filling
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	45M	90M	15	Unified	3	49152	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: 0-7
node 0 size: 128083 MB
node 0 free: 127718 MB
node 1 cpus: 8-15
node 1 size: 128985 MB
node 1 free: 128542 MB
node 2 cpus: 16-23
node 2 size: 129022 MB
node 2 free: 127851 MB
node 3 cpus: 24-31
node 3 size: 129011 MB
node 3 free: 125795 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: 527465168 kB

10. who -r

run-level 3 Jul 13 14:21

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 auditd chronyd crond
                dbus-broker getty@ irqbalance kdump lvm2-monitor mdmonitor microcode nis-domainname
                rhsmcertd rsyslog selinux-autorelabel-mark sep5 sshd sssd sysstat

```

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Platform Notes (Continued)

```

enabled-runtime systemd-network-generator tuned udisks2 upower
disabled        systemd-remount-fs
                 arp-ethers blk-availability canberra-system-bootup canberra-system-shutdown
                 canberra-system-shutdown-reboot chrony-wait console-getty cpupower debug-shell firewallld
                 kvm_stat man-db-restart-cache-update nftables powertop rdisc rhsm rhsm-facts rpmdb-rebuild
                 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

```

```

-----
14. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=(hd0,gpt2)/vmlinuz-5.14.0-70.13.1.el9_0.x86_64
root=/dev/mapper/rhel-root
ro
crashkernel=1G-4G:192M,4G-64G:256M,64G-:512M
resume=/dev/mapper/rhel-swap
rd.lvm.lv=rhel/root
rd.lvm.lv=rhel/swap

```

```

-----
15. cpupower frequency-info
analyzing CPU 0:
  current policy: frequency should be within 800 MHz and 2.90 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          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

```

```

-----
18. /sys/kernel/mm/transparent_hugepage
defrag      always defer defer+madvice [madvice] never
enabled     [always] madvice 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 9.0 (Plow)
   redhat-release  Red Hat Enterprise Linux release 9.0 (Plow)
   system-release  Red Hat Enterprise Linux release 9.0 (Plow)
-----
```

```
-----
21. Disk information
   SPEC is set to: /home/spec2017-1.1.9-ic2023
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs   1.7T  75G  1.6T   5% /home
-----
```

```
-----
22. /sys/devices/virtual/dmi/id
   Vendor:      XFUSION
   Product:     5288 V7
   Product Family: Eagle Stream
   Serial:      serial
-----
```

```
-----
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:
     16x Samsung M321R4GA3BB6-CQKDG 32 GB 2 rank 4800
-----
```

```
-----
24. 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      | 600.perlbench_s(base, peak) 602.gcc_s(base, peak) 605.mcf_s(base, peak) 625.x264_s(base, peak)
      | 657.xz_s(base, peak)
-----
```

```
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.
-----
```

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Compiler Version Notes (Continued)

C++ | 620.omnetpp_s(base, peak) 623.xalancbmk_s(base, peak) 631.deepsjeng_s(base, peak)
641.leela_s(base, peak)

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 | 648.exchange2_s(base, peak)

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

600.perlbench_s: -DSPEC_LP64 -DSPEC_LINUX_X64
602.gcc_s: -DSPEC_LP64
605.mcf_s: -DSPEC_LP64
620.omnetpp_s: -DSPEC_LP64
623.xalancbmk_s: -DSPEC_LP64 -DSPEC_LINUX
625.x264_s: -DSPEC_LP64
631.deepsjeng_s: -DSPEC_LP64
641.leela_s: -DSPEC_LP64
648.exchange2_s: -DSPEC_LP64
657.xz_s: -DSPEC_LP64

Base Optimization Flags

C benchmarks:
-m64 -std=c11 -Wl,-z,muldefs -xsaphirerapids -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp

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Base Optimization Flags (Continued)

C benchmarks (continued):

```
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:

```
-m64 -std=c++14 -Wl,-z,muldefs -xsaphirerapids -O3 -ffast-math  
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:

```
-m64 -Wl,-z,muldefs -xsaphirerapids -O3 -ffast-math -flto  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-nostandard-realloc-lhs -align array32byte  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Peak Compiler Invocation

C benchmarks:

```
icx
```

C++ benchmarks:

```
icpx
```

Fortran benchmarks:

```
ifx
```

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)  
-fprofile-use=default.profddata(pass 2) -xCORE-AVX2(pass 1)  
-flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math  
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4  
-fiopenmp -DSPEC_OPENMP -fno-strict-overflow  
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

(Continued on next page)



SPEC CPU®2017 Integer Speed Result

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xFusion

SPECspeed®2017_int_base = 15.0

FusionServer 5288 V7 (Intel Xeon Platinum 8444H)

SPECspeed®2017_int_peak = 15.3

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

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

Peak Optimization Flags (Continued)

```
602.gcc_s: -m64 -std=c11 -Wl,-z,muldefs -fprofile-generate(pass 1)
-fprofile-use=default.profddata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast(pass 1) -xCORE-AVX512 -O3 -ffast-math
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-fiopenmp -DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib
-ljemalloc
```

605.mcf_s: basepeak = yes

```
625.x264_s: -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -O3
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP
-fno-alias -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

657.xz_s: basepeak = yes

C++ benchmarks:

620.omnetpp_s: basepeak = yes

623.xalancbmk_s: basepeak = yes

631.deepsjeng_s: basepeak = yes

641.leela_s: basepeak = yes

Fortran benchmarks:

648.exchange2_s: basepeak = yes

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-SPR-V1.1-revC.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-SPR-V1.1-revC.xml>

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