



SPEC CPU®2017 Integer Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Dell Inc.

SPECSpeed®2017_int_base = 14.8

PowerEdge T360 (Intel Xeon E-2488)

SPECSpeed®2017_int_peak = 15.1

CPU2017 License: 6573

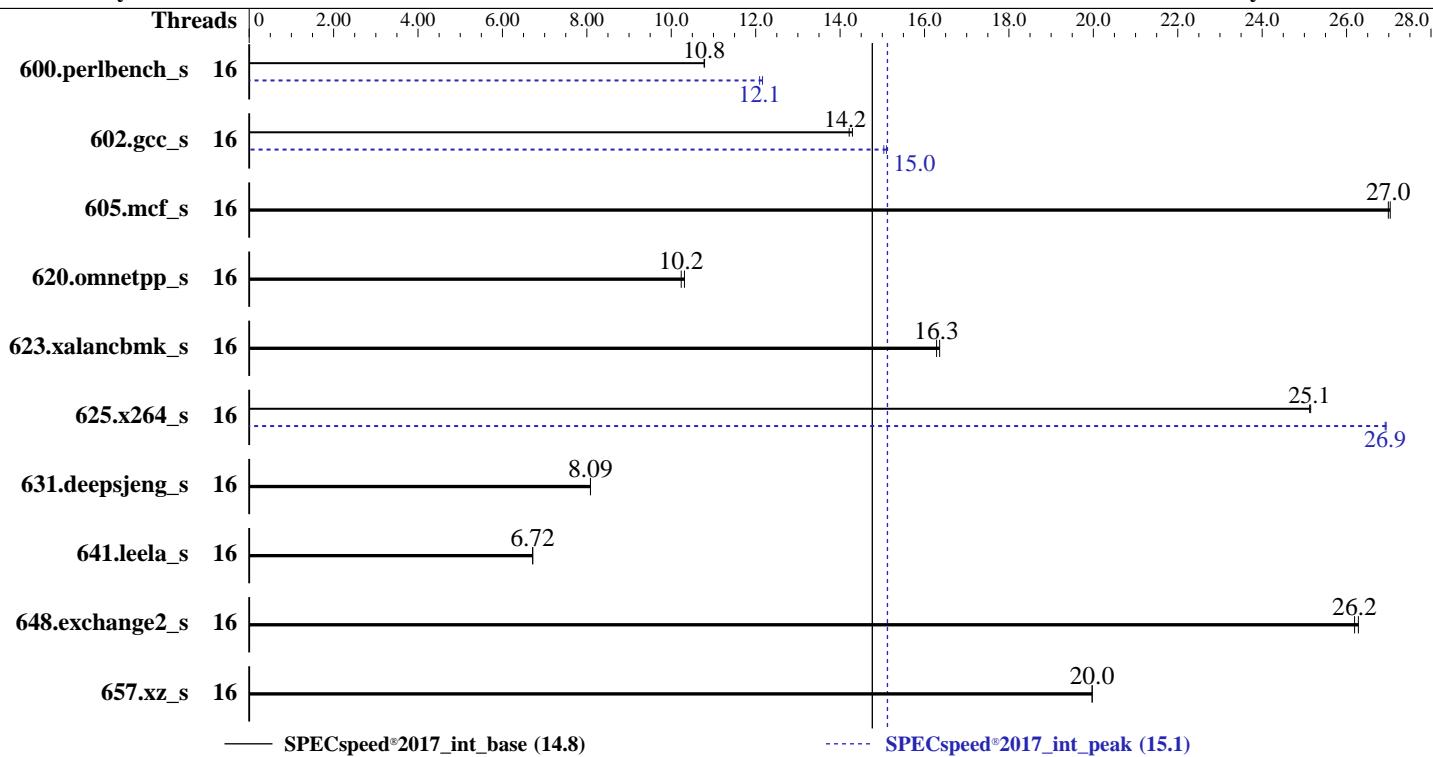
Test Date: Nov-2023

Test Sponsor: Dell Inc.

Hardware Availability: Dec-2023

Tested by: Dell Inc.

Software Availability: Dec-2023



Hardware		Software	
CPU Name:	Intel Xeon E-2488	OS:	SUSE Linux Enterprise Server 15 SP4
Max MHz:	5600	Compiler:	5.14.21-150400.22-default
Nominal:	3200	Parallel:	C/C++: Version 2023.2.3 of Intel oneAPI DPC++/C++ Compiler for Linux;
Enabled:	8 cores, 1 chip, 2 threads/core	Firmware:	Fortran: Version 2023.2.3 of Intel Fortran Compiler for Linux;
Orderable:	1 chip	File System:	Yes
Cache L1:	32 KB I + 48 KB D on chip per core	System State:	Version 1.0.0 released Oct-2023
L2:	2 MB I+D on chip per core	Base Pointers:	tmpfs
L3:	24 MB I+D on chip per chip	Peak Pointers:	Run level 3 (multi-user)
Other:	None	Other:	64-bit
Memory:	64 GB (2 x 32 GB 2Rx8 PC5-4800B-E, running at 4400)	Power Management:	64-bit
Storage:	40 GB on tmpfs		jemalloc memory allocator V5.0.1
Other:	None		BIOS and 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	16	165	10.8	<u>165</u>	<u>10.8</u>			16	<u>147</u>	<u>12.1</u>	146	12.2		
602.gcc_s	16	279	14.3	<u>280</u>	<u>14.2</u>			16	264	15.1	<u>265</u>	<u>15.0</u>		
605.mcf_s	16	<u>175</u>	<u>27.0</u>	175	27.0			16	<u>175</u>	<u>27.0</u>	175	27.0		
620.omnetpp_s	16	<u>159</u>	<u>10.2</u>	158	10.3			16	<u>159</u>	<u>10.2</u>	158	10.3		
623.xalancbmk_s	16	86.6	16.4	<u>87.0</u>	<u>16.3</u>			16	86.6	16.4	<u>87.0</u>	<u>16.3</u>		
625.x264_s	16	70.1	25.1	<u>70.2</u>	<u>25.1</u>			16	<u>65.5</u>	<u>26.9</u>	65.5	26.9		
631.deepsjeng_s	16	<u>177</u>	<u>8.09</u>	177	8.09			16	<u>177</u>	<u>8.09</u>	177	8.09		
641.leela_s	16	<u>254</u>	<u>6.72</u>	254	6.72			16	<u>254</u>	<u>6.72</u>	254	6.72		
648.exchange2_s	16	112	26.3	<u>112</u>	<u>26.2</u>			16	112	26.3	<u>112</u>	<u>26.2</u>		
657.xz_s	16	310	20.0	<u>310</u>	<u>20.0</u>			16	310	20.0	<u>310</u>	<u>20.0</u>		
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Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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 =
    "/mnt/ramdisk/cpu2017-1.1.9-ic2023.2.3/lib/intel64:/mnt/ramdisk/cpu2017-1.1.9-ic2023.2.3/lib/ia32:/mnt
    /ramdisk/cpu2017-1.1.9-ic2023.2.3/jet5.0.1-64"
MALLOC_CONF = "retain:true"
OMP_STACKSIZE = "192M"
```

General Notes

Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM
memory using Redhat Enterprise Linux 8.0

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
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>

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.

Benchmark run from a 40 GB ramdisk created with the cmd: "mount -t tmpfs -o size=40G tmpfs /mnt/ramdisk"



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Platform Notes

BIOS settings:
DIMM Self Healing on
Uncorrectable Memory Error : Disabled

Virtualization Technology : Disabled

System Profile : Custom
CPU Power Management : Maximum Performance
C1E : Disabled
C States : Autonomous
PCI ASPM L1 Link
Power Management : Disabled

Sysinfo program /mnt/ramdisk/cpu2017-1.1.9-ic2023.2.3/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Sun Nov 26 12:32:33 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 249 (249.11+suse.124.g2bc0b2c447)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS
-

1. uname -a
Linux localhost 5.14.21-150400.22-default #1 SMP PREEMPT_DYNAMIC Wed May 11 06:57:18 UTC 2022 (49db222)
x86_64 x86_64 x86_64 GNU/Linux

2. w
12:32:33 up 3:12, 2 users, load average: 0.36, 6.95, 12.19
USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root ttym1 - 09:21 49.00s 0.99s 0.00s /bin/bash ./dell-run-speccpu.sh speed
--define DL-BIOSinc=Dell-BIOS_Xeon-4E.inc --define DL-BIOS-LogProc=1 --define DL-VERS=v4.8.4
--output_format html,pdf,txt --define DL-LQC=1
root ttym2 - 09:22 3:08m 0.01s 0.01s -bash

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Platform Notes (Continued)

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) 255234
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) 255234
virtual memory	(kbytes, -v) unlimited
file locks	(-x) unlimited

5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 30
login -- root
-bash
/bin/bash ./DELL_speed.sh
/bin/bash ./dell-run-main.sh speed
/bin/bash ./dell-run-main.sh speed
/bin/bash ./dell-run-speccpu.sh speed --define DL-BIOSInc=Dell-BIOS_Xeon-4E.inc --define DL-BIOS-LogProc=1
--define DL-VERS=v4.8.4 --output_format html,pdf,txt --define DL-LQC=1
/bin/bash ./dell-run-speccpu.sh speed --define DL-BIOSInc=Dell-BIOS_Xeon-4E.inc --define DL-BIOS-LogProc=1
--define DL-VERS=v4.8.4 --output_format html,pdf,txt --define DL-LQC=1
runcpu --nobuild --action validate --define default-platform-flags -c
ic2023.2.3-lin-core-avx2-speed-20231121.cfg --define cores=8 --tune base,peak -o all --define
intspeedaffinity --define smt-on --define drop_caches --iterations 2 --define
DL-BIOSInc=Dell-BIOS_Xeon-4E.inc --define DL-BIOS-LogProc=1 --define DL-VERS=v4.8.4 --output_format
html,pdf,txt --define DL-LQC=1 intspeed
runcpu --nobuild --action validate --define default-platform-flags --configfile
ic2023.2.3-lin-core-avx2-speed-20231121.cfg --define cores=8 --tune base,peak --output_format all --define
intspeedaffinity --define smt-on --define drop_caches --iterations 2 --define
DL-BIOSInc=Dell-BIOS_Xeon-4E.inc --define DL-BIOS-LogProc=1 --define DL-VERS=v4.8.4 --output_format
html,pdf,txt --define DL-LQC=1 --nopower --runmode speed --tune base:peak --size refspeed intspeed
--nopreenv --note-preenv --logfile \$SPEC/tmp/CPU2017.001/templogs/preenv.intspeed.001.0.log --lognum 001.0
--from_runcpu 2
specperl \$SPEC/bin/sysinfo
\$SPEC = /mnt/ramdisk/cpu2017-1.1.9-ic2023.2.3

6. /proc/cpuinfo

model name	: Intel(R) Xeon(R) E E-2488
vendor_id	: GenuineIntel
cpu family	: 6
model	: 183
stepping	: 1
microcode	: 0x11f
bugs	: spectre_v1 spectre_v2 spec_store_bypass swapgs

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Platform Notes (Continued)

```
cpu cores      : 8
siblings       : 16
1 physical ids (chips)
16 processors (hardware threads)
physical id 0: core ids 0-7
physical id 0: apicids 0-15
```

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 2.37.2:

```
Architecture:          x86_64
CPU op-mode(s):       32-bit, 64-bit
Address sizes:        42 bits physical, 48 bits virtual
Byte Order:           Little Endian
CPU(s):               16
On-line CPU(s) list: 0-15
Vendor ID:            GenuineIntel
Model name:           Intel(R) Xeon(R) E E-2488
CPU family:           6
Model:                183
Thread(s) per core:  2
Core(s) per socket:  8
Socket(s):           1
Stepping:             1
BogoMIPS:             6374.40
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 aperf mperf tsc_known_freq pn1 pclmulqdq dtes64 monitor
                     ds_cpl smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic
                     movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm
                     3dnowprefetch cpuid_fault invpcid_single ssbd ibrs ibpb stibp
                     ibrs_enhanced fsgsbase tsc_adjust bm1 avx2 smep bmi2 erms invpcid rdseed
                     adx smap clflushopt clwb intel_pt sha_ni xsaveopt xsavec xgetbv1 xsaves
                     avx_vnni dtherm ida arat pln pts umip pku ospke waitpkg gfni vaes
                     vpclmulqdq tme rdpid movdiri movdir64b fsrm md_clear serialize pconfig
                     arch_lbr flush_ll1d arch_capabilities
L1d cache:            384 KiB (8 instances)
L1i cache:            256 KiB (8 instances)
L2 cache:             16 MiB (8 instances)
L3 cache:             24 MiB (1 instance)
NUMA node(s):          1
NUMA node0 CPU(s):    0-15
Vulnerability Itlb multihit: Not affected
Vulnerability L1tf:    Not affected
Vulnerability Mds:    Not affected
Vulnerability Meltdown: Not affected
Vulnerability Spec store bypass: Mitigation; Speculative Store Bypass disabled via prctl and seccomp
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	384K	12	Data	1	64	1	64
L1i	32K	256K	8	Instruction	1	64	1	64

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Platform Notes (Continued)

L2	2M	16M	16	Unified	2	2048	1	64
L3	24M	24M	12	Unified	3	32768	1	64

8. numactl --hardware

NOTE: a numactl 'node' might or might not correspond to a physical chip.
available: 1 nodes (0)
node 0 cpus: 0-15
node 0 size: 63832 MB
node 0 free: 52600 MB
node distances:
node 0
0: 10

9. /proc/meminfo
MemTotal: 65364476 kB

10. who -r
run-level 3 Nov 26 09:20

11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
Default Target Status
multi-user running

12. Services, from systemctl list-unit-files
STATE UNIT FILES
enabled YaST2-Firstboot YaST2-Second-Stage apparmor auditd chronyd cron display-manager firewalld
getty@ haveged irqbalance issue-generator kbdsettings kdump kdump-early klog lvm2-monitor
nsqd postfix purge-kernels rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4
wickedd-dhcp6 wickedd-nanny
enabled-runtime systemd-remount-fs
disabled autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info gpm grub2-once
haveged-switch-root ipmi ipmievfd issue-add-ssh-keys kexec-load lunmask man-db-create
multipathd nfs nfs-blkmap rdisc rpcbind rpmconfigcheck rsyncd serial-getty@
smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd
indirect wickedd

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=2927c481-4b28-4dff-91cd-49e4759e703c
splash=silent
mitigations=auto
quiet
security=apparmor
crashkernel=230M,high
crashkernel=72M,low

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

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Platform Notes (Continued)

Active: yes

```
-----  
15. 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                20  
    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                 60  
    vm.watermark_boost_factor     15000  
    vm.watermark_scale_factor     10  
    vm.zone_reclaim_mode          0
```

```
-----  
16. /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
```

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

```
-----  
18. OS release  
    From /etc/*-release /etc/*-version  
    os-release SUSE Linux Enterprise Server 15 SP4
```

```
-----  
19. Disk information  
    SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-ic2023.2.3  
    Filesystem  Type  Size  Used  Avail Use% Mounted on  
    tmpfs       tmpfs  40G   5.1G  35G  13% /mnt/ramdisk
```

```
-----  
20. /sys/devices/virtual/dmi/id  
    Vendor:        Dell Inc.  
    Product:       PowerEdge T360  
    Product Family: PowerEdge  
    Serial:        SLT3605
```

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Platform Notes (Continued)

21. 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:

2x 002C00001201 MTC20C2085S1EC48BA1 32 GB 2 rank 4800, configured at 4400

22. BIOS

(This section combines info from /sys/devices and dmidecode.)

BIOS Vendor: Dell Inc.
BIOS Version: 1.0.0
BIOS Date: 10/13/2023
BIOS Revision: 1.0

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 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

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 2023.2.3 Build x
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.

Fortran | 648.exchange2_s(base, peak)

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



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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:

```
-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -floop-parallelize-all -fno-loop-optimize -mfpmath=sse -funroll-loops -fopt-mem-layout-trans=4 -fopenmp -DSPEC OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks

Fortran benchmarks:

```
-w -m64 -Wl,-z,muldefs -xCORE-AVX2 -O3 -ffast-math -fno-mfpmpath=sse -funroll-loops -fopt-mem-layout-trans=4  
-fno-standard-realloc-lhs -falign array32byte  
-L/usr/local/jemalloc64-5.0.1/lib -fjemalloc
```

Peak Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx



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Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

```
600.perlbench_s: -w -m64 -std=c11 -Wl,-z,muldefs  
-fprofile-generate(pass 1)  
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2 -flto  
-Ofast(pass 1) -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

602.gcc_s: -w -m64 -std=c11 -Wl,-z,muldefs  
-fprofile-generate(pass 1)  
-fprofile-use=default.profdata(pass 2) -xCORE-AVX2 -flto  
-Ofast(pass 1) -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: -w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX2 -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
```



SPEC CPU®2017 Integer Speed Result

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SPECspeed®2017_int_base = 14.8

PowerEdge T360 (Intel Xeon E-2488)

SPECspeed®2017_int_peak = 15.1

CPU2017 License: 6573

Test Date: Nov-2023

Test Sponsor: Dell Inc.

Hardware Availability: Dec-2023

Tested by: Dell Inc.

Software Availability: Dec-2023

The flags files that were used to format this result can be browsed at

<http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.html>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.6.html>

You can also download the XML flags sources by saving the following links:

<http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml>

<http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.6.xml>

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