



# SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

## Dell Inc.

SPECrate®2017\_fp\_base = 390

PowerEdge MX760c (Intel Xeon Silver 4514Y)

SPECrate®2017\_fp\_peak = 399

CPU2017 License: 6573

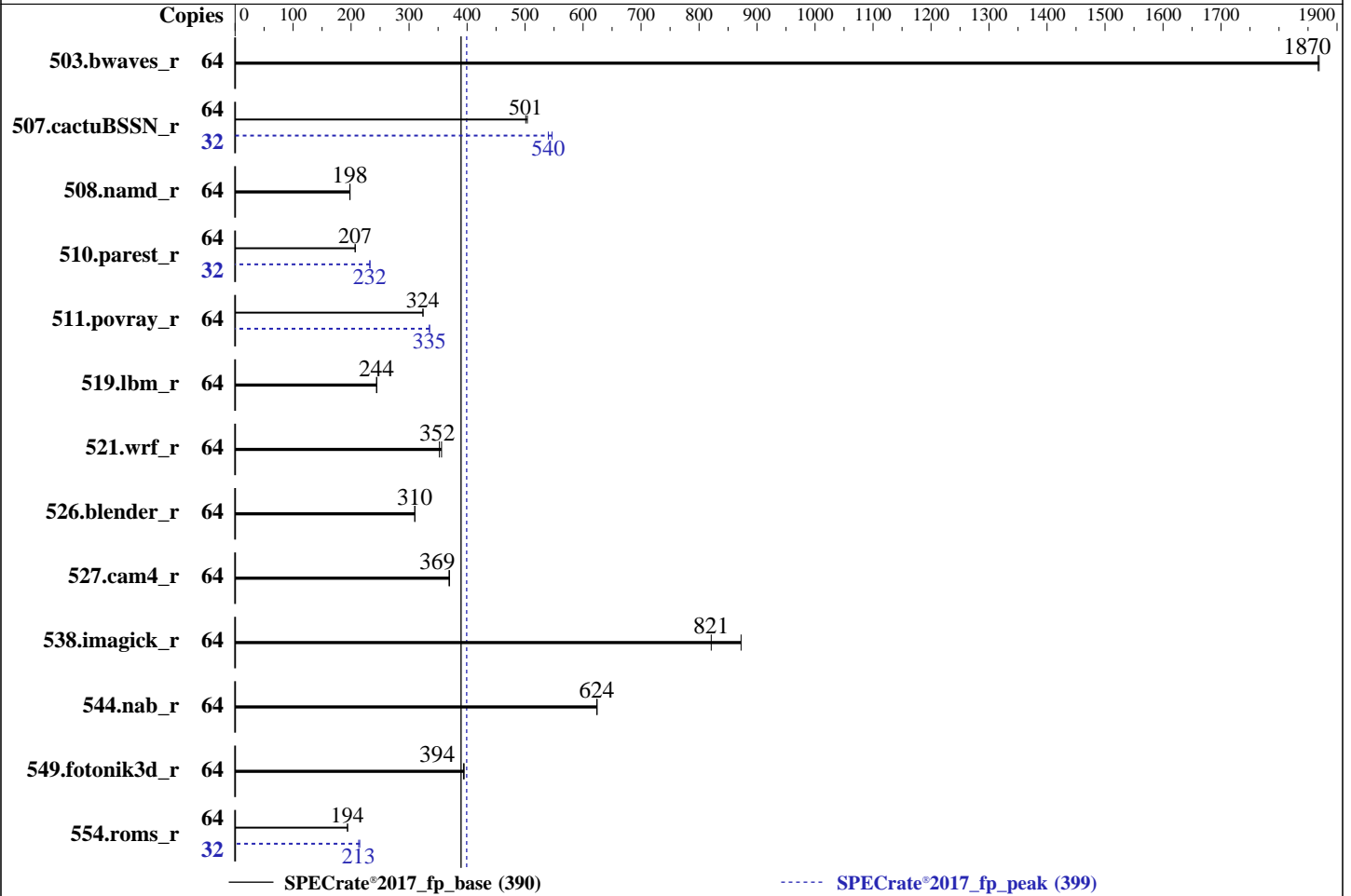
Test Date: Dec-2023

Test Sponsor: Dell Inc.

Hardware Availability: Feb-2024

Tested by: Dell Inc.

Software Availability: Dec-2023



### Hardware

CPU Name: Intel Xeon Silver 4514Y  
 Max MHz: 3400  
 Nominal: 2000  
 Enabled: 32 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: 30 MB I+D on chip per chip  
 Other: None  
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R, running at 4400)  
 Storage: 60 GB on tmpfs  
 Other: None

### Software

OS: SUSE Linux Enterprise Server 15 SP4 5.14.21-150400.22-default  
 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 1.9.11 released Oct-2023  
 File System: tmpfs  
 System State: Run level 3 (multi-user)  
 Base Pointers: 64-bit  
 Peak Pointers: 64-bit  
 Other: jemalloc memory allocator V5.0.1  
 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
503.bwaves_r	64	343	1870	<b><u>344</u></b>	<b><u>1870</u></b>			64	343	1870	<b><u>344</u></b>	<b><u>1870</u></b>		
507.cactuBSSN_r	64	161	504	<b><u>162</u></b>	<b><u>501</u></b>			32	74.1	547	<b><u>75.0</u></b>	<b><u>540</u></b>		
508.namd_r	64	<b><u>307</u></b>	<b><u>198</u></b>	307	198			64	<b><u>307</u></b>	<b><u>198</u></b>	307	198		
510.parest_r	64	808	207	<b><u>809</u></b>	<b><u>207</u></b>			32	<b><u>360</u></b>	<b><u>232</u></b>	360	233		
511.povray_r	64	<b><u>461</u></b>	<b><u>324</u></b>	461	324			64	<b><u>446</u></b>	<b><u>335</u></b>	446	335		
519.lbm_r	64	<b><u>277</u></b>	<b><u>244</u></b>	276	244			64	<b><u>277</u></b>	<b><u>244</u></b>	276	244		
521.wrf_r	64	<b><u>407</u></b>	<b><u>352</u></b>	403	356			64	<b><u>407</u></b>	<b><u>352</u></b>	403	356		
526.blender_r	64	315	310	<b><u>315</u></b>	<b><u>310</u></b>			64	315	310	<b><u>315</u></b>	<b><u>310</u></b>		
527.cam4_r	64	303	370	<b><u>303</u></b>	<b><u>369</u></b>			64	303	370	<b><u>303</u></b>	<b><u>369</u></b>		
538.imagick_r	64	182	872	<b><u>194</u></b>	<b><u>821</u></b>			64	182	872	<b><u>194</u></b>	<b><u>821</u></b>		
544.nab_r	64	173	624	<b><u>173</u></b>	<b><u>624</u></b>			64	173	624	<b><u>173</u></b>	<b><u>624</u></b>		
549.fotonik3d_r	64	<b><u>633</u></b>	<b><u>394</u></b>	632	395			64	<b><u>633</u></b>	<b><u>394</u></b>	632	395		
554.roms_r	64	524	194	<b><u>525</u></b>	<b><u>194</u></b>			32	<b><u>239</u></b>	<b><u>213</u></b>	237	215		

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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"

## Environment Variables Notes

Environment variables set by runcpu before the start of the run:

```
LD_LIBRARY_PATH =
    "/mnt/ramdisk/cpu2017-1.1.9-ic2023.2.3/lib/intel64:/mnt/ramdisk/cpu2017-1.1.9-ic2023.2.3/je5.0.1-64"
MALLOCCONF = "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>  
jemalloc, a general purpose malloc implementation

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## General Notes (Continued)

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 60 GB ramdisk created with the cmd: "mount -t tmpfs -o size=60G tmpfs /mnt/ramdisk"

## Platform Notes

BIOS settings:

ADDC Setting : Disabled  
DIMM Self Healing on  
Uncorrectable Memory Error : Disabled

Virtualization Technology : Disabled  
DCU Streamer Prefetcher : Disabled  
Sub NUMA Cluster : 2-way Clustering  
LLC Prefetch : Disabled  
Dead Line LLC Alloc : Disabled  
Optimizer Mode : Enabled

System Profile : Custom  
CPU Power Management : Maximum Performance  
CIE : Disabled  
C States : Autonomous  
Memory Patrol Scrub : Disabled  
Energy Efficiency Policy : Performance  
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 Wed Dec 6 02:15:23 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. cpubower frequency-info

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## Platform Notes (Continued)

```

15. tuned-adm active
16. sysctl
17. /sys/kernel/mm/transparent_hugepage
18. /sys/kernel/mm/transparent_hugepage/khugepaged
19. OS release
20. Disk information
21. /sys/devices/virtual/dmi/id
22. dmidecode
23. 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
02:15:23 up 4:39, 1 user, load average: 45.77, 59.51, 62.26
USER      TTY      FROM          LOGIN@      IDLE        JCPU   PCPU   WHAT
root      tty1    -             21:50      4:25m      1.86s   0.00s  /bin/bash ./dell-run-speccpu.sh rate
--define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define
DL-VERS=v4.8.4 --output_format html,pdf,txt --define DL-LQC=1

```

```

-----
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) 4124623
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) 4124623
virtual memory          (kbytes, -v) unlimited
file locks              (-x) unlimited

```

```

-----
5. sysinfo process ancestry
/usr/lib/systemd/systemd --switched-root --system --deserialize 29
login -- root
-bash
/bin/bash ./DELL_rate.sh
/bin/bash ./dell-run-main.sh rate
/bin/bash ./dell-run-main.sh rate
/bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1
--define DL-BIOS-adddcD=1 --define DL-VERS=v4.8.4 --output_format html,pdf,txt --define DL-LQC=1
/bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1
--define DL-BIOS-adddcD=1 --define DL-VERS=v4.8.4 --output_format html,pdf,txt --define DL-LQC=1
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 -c

```

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## Platform Notes (Continued)

```
ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=32 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak -o all --define DL-BIOS-SNC=2
--iterations 2 --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1 --define
DL-BIOS-addcd=1 --define DL-VERS=v4.8.4 --output_format html,pdf,txt --define DL-LQC=1 fprate
runcpu --nobuild --action validate --define default-platform-flags --define numcopies=64 --configfile
ic2023.2.3-lin-sapphirerapids-rate-20231121.cfg --define smt-on --define cores=32 --define physicalfirst
--define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --define
DL-BIOS-SNC=2 --iterations 2 --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1 --define
DL-BIOS-addcd=1 --define DL-VERS=v4.8.4 --output_format html,pdf,txt --define DL-LQC=1 --nopower
--runmode rate --tune base:peak --size refrate fprate --nopreenv --note-preenv --logfile
$SPEC/tmp/CPU2017.002/templogs/preenv.fprate.002.0.log --lognum 002.0 --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) SILVER 4514Y
vendor_id      : GenuineIntel
cpu family     : 6
model          : 207
stepping       : 2
microcode      : 0x210001a0
bugs           : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores      : 16
siblings       : 32
2 physical ids (chips)
64 processors (hardware threads)
physical id 0: core ids 0-15
physical id 1: core ids 0-15
physical id 0: apicids 0-31
physical id 1: apicids 128-159
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:      46 bits physical, 57 bits virtual
Byte Order:        Little Endian
CPU(s):            64
On-line CPU(s) list: 0-63
Vendor ID:         GenuineIntel
Model name:        INTEL(R) XEON(R) SILVER 4514Y
CPU family:        6
Model:            207
Thread(s) per core: 2
Core(s) per socket: 16
Socket(s):         2
Stepping:         2
BogoMIPS:          4000.00
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 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_13 cat_12 cdp_13 invpcid_single
```

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## Platform Notes (Continued)

cdp\_l2 ssbd mba ibrs ibpb stibp ibrs\_enhanced fsgsbase tsc\_adjust bml hle  
avx2 smep bmi2 erms invpcid rtm cqm rdt\_a avx512f avx512dq rdseed adx smap  
avx512ifma clflushopt clwb intel\_pt avx512cd sha\_ni avx512bw avx512vl  
xsavesopt 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 avx512\_fp16 amx\_tile flush\_lld arch\_capabilities

L1d cache: 1.5 MiB (32 instances)  
L1i cache: 1 MiB (32 instances)  
L2 cache: 64 MiB (32 instances)  
L3 cache: 60 MiB (2 instances)  
NUMA node(s): 4  
NUMA node0 CPU(s): 0,2,6,12,16,20,22,26,32,34,38,44,48,52,54,58  
NUMA node1 CPU(s): 4,8,10,14,18,24,28,30,36,40,42,46,50,56,60,62  
NUMA node2 CPU(s): 1,7,11,19,21,25,27,29,33,39,43,51,53,57,59,61  
NUMA node3 CPU(s): 3,5,9,13,15,17,23,31,35,37,41,45,47,49,55,63  
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	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	30M	60M	15	Unified	3	32768	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: 0,2,6,12,16,20,22,26,32,34,38,44,48,52,54,58  
node 0 size: 257389 MB  
node 0 free: 245340 MB  
node 1 cpus: 4,8,10,14,18,24,28,30,36,40,42,46,50,56,60,62  
node 1 size: 258043 MB  
node 1 free: 257122 MB  
node 2 cpus: 1,7,11,19,21,25,27,29,33,39,43,51,53,57,59,61  
node 2 size: 258043 MB  
node 2 free: 257400 MB  
node 3 cpus: 3,5,9,13,15,17,23,31,35,37,41,45,47,49,55,63  
node 3 size: 257700 MB  
node 3 free: 257062 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

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## Platform Notes (Continued)

MemTotal: 1055926104 kB

10. who -r  
run-level 3 Dec 5 21:36

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 apparmor auditd cron firewalld getty@ haveged irqbalance issue-generator kbdsettings kdump  
kdump-early lvm2-monitor postfix purge-kernels rollback sshd tuned wicked wickedd-auto4  
wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny  
enabled-runtime systemd-remount-fs  
disabled blk-availability boot-sysctl ca-certificates chrony-wait chronyd console-getty debug-shell  
ebtables grub2-once haveged-switch-root issue-add-ssh-keys kexec-load lunmask nfs  
nfs-blkmap rpcbind rpmconfigcheck rsyncd serial-getty@ 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=4068cb7a-41a3-4eea-ab49-bc6f15bea24c  
splash=silent  
mitigations=auto  
quiet  
security=apparmor  
crashkernel=314M,high  
crashkernel=72M,low

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 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

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### Platform Notes (Continued)

```

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

```

```

-----
17. /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

```

```

-----
18. /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

```

```

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

```

```

-----
20. 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 60G 5.1G 55G 9% /mnt/ramdisk

```

```

-----
21. /sys/devices/virtual/dmi/id
Vendor:      Dell Inc.
Product:     PowerEdge MX760c
Product Family: PowerEdge
Serial:      SMX76S8

```

```

-----
22. 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:
16x 002C0632002C MTC40F2046S1RC56BG1 64 GB 2 rank 5600, configured at 4400

```

```

-----
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor:      Dell Inc.
BIOS Version:     1.9.11
BIOS Date:        10/26/2023

```

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CPU2017 License: 6573  
Test Sponsor: Dell Inc.  
Tested by: Dell Inc.

Test Date: Dec-2023  
Hardware Availability: Feb-2024  
Software Availability: Dec-2023

## Platform Notes (Continued)

BIOS Revision: 1.9

## Compiler Version Notes

```

=====
C | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(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++ | 508.namd_r(base, peak) 510.parest_r(base, peak)
-----
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
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-----

=====
C++, C | 511.povray_r(base, peak) 526.blender_r(base, peak)
-----
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
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-----

=====
C++, C, Fortran | 507.cactuBSSN_r(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.
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.
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.
-----

=====
Fortran | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(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.
-----

=====
Fortran, C | 521.wrf_r(base, peak) 527.cam4_r(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.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.3 Build x
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-----

```



# SPEC CPU®2017 Floating Point Rate Result

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## Base Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

## Base Portability Flags

```

503.bwaves_r: -DSPEC_LP64
507.cactuBSSN_r: -DSPEC_LP64
508.namd_r: -DSPEC_LP64
510.parest_r: -DSPEC_LP64
511.povray_r: -DSPEC_LP64
519.lbm_r: -DSPEC_LP64
521.wrf_r: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
526.blender_r: -DSPEC_LP64 -DSPEC_LINUX -funsigned-char
527.cam4_r: -DSPEC_LP64 -DSPEC_CASE_FLAG
538.imagick_r: -DSPEC_LP64
544.nab_r: -DSPEC_LP64
549.fotonik3d_r: -DSPEC_LP64
554.roms_r: -DSPEC_LP64

```

## Base Optimization Flags

C benchmarks:

```

-w -std=c11 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib

```

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Software Availability: Dec-2023

## Base Optimization Flags (Continued)

C++ benchmarks:

```
-w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

```
-w -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -mprefer-vector-width=512 -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both C and C++:

```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsapphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

## Peak Compiler Invocation

C benchmarks:

icx

C++ benchmarks:

icpx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

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## Peak Compiler Invocation (Continued)

Benchmarks using both C and C++:

icpx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

519.lbm\_r: basepeak = yes

538.imagick\_r: basepeak = yes

544.nab\_r: basepeak = yes

C++ benchmarks:

508.namd\_r: basepeak = yes

510.parest\_r: -w -std=c++14 -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -mprefer-vector-width=512 -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

Fortran benchmarks:

503.bwaves\_r: basepeak = yes

549.fotonik3d\_r: basepeak = yes

554.roms\_r: -w -m64 -Wl,-z,muldefs -xsapphirerapids -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -nostandard-realloc-lhs -align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib

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## Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

521.wrf\_r: basepeak = yes

527.cam4\_r: basepeak = yes

Benchmarks using both C and C++:

```
511.povray_r: -w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs
-fprofile-generate(pass 1)
-fprofile-use=default.profddata(pass 2) -xCORE-AVX2(pass 1)
-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse
-funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int
-mprefer-vector-width=512 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

526.blender\_r: basepeak = yes

Benchmarks using Fortran, C, and C++:

```
-w -m64 -std=c++14 -std=c11 -Wl,-z,muldefs -xsaphirerapids -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -mprefer-vector-width=512
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

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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