



SPEC CPU®2017 Floating Point Speed Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Dell Inc.

SPECspeed®2017_fp_base = 265

PowerEdge R660 (Intel Xeon Gold 6428N)

SPECspeed®2017_fp_peak = 265

CPU2017 License: 6573

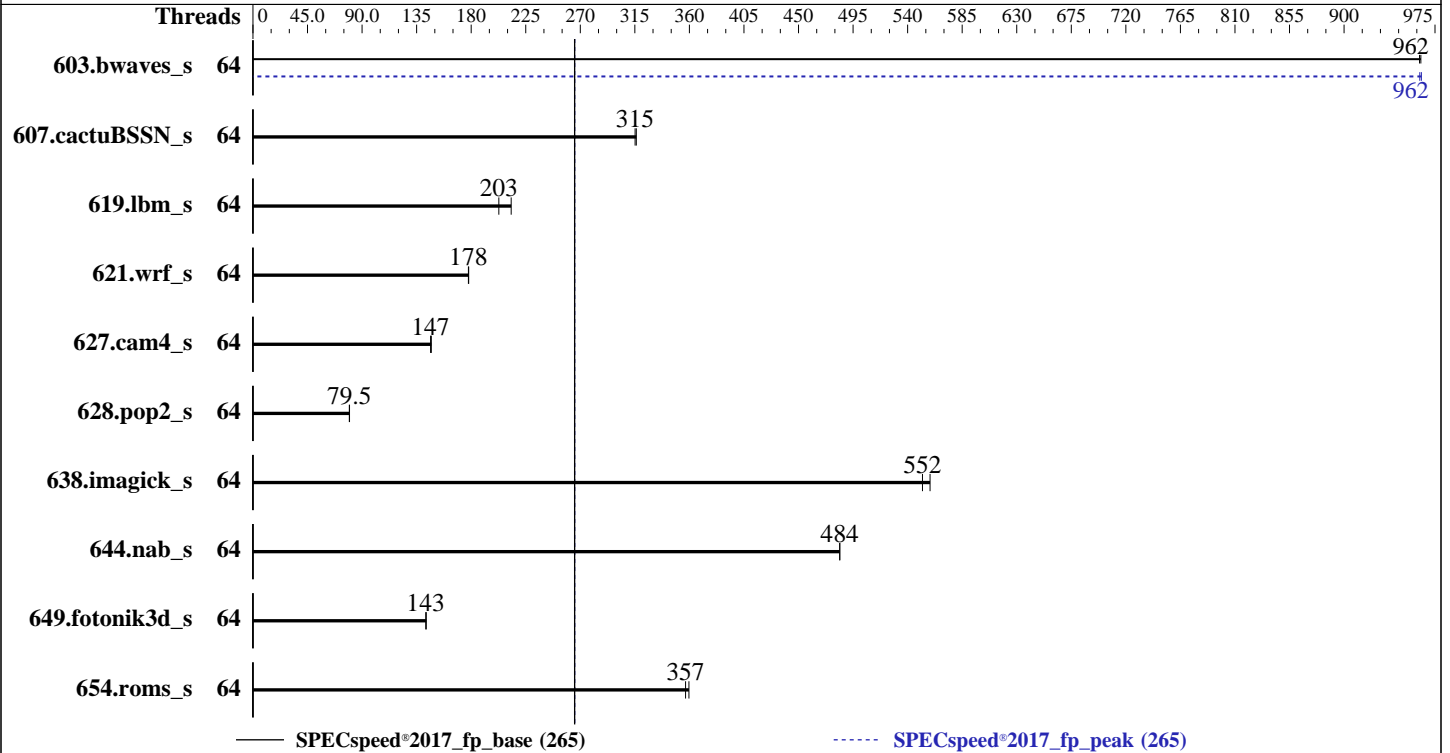
Test Date: Mar-2023

Test Sponsor: Dell Inc.

Hardware Availability: Apr-2023

Tested by: Dell Inc.

Software Availability: Dec-2022



Hardware

CPU Name: Intel Xeon Gold 6428N
 Max MHz: 3800
 Nominal: 1800
 Enabled: 64 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: 60 MB I+D on chip per chip
 Other: None
 Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R, running at 4000)
 Storage: 125 GB on tmpfs
 Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
 5.14.21-150400.22-default
 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 1.2.1 released Feb-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						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
603.bwaves_s	64	61.3	962	61.2	963			64	61.3	962	61.2	964		
607.cactuBSSN_s	64	52.7	316	52.9	315			64	52.7	316	52.9	315		
619.lbm_s	64	25.8	203	24.6	213			64	25.8	203	24.6	213		
621.wrf_s	64	74.4	178	74.3	178			64	74.4	178	74.3	178		
627.cam4_s	64	60.2	147	60.5	147			64	60.2	147	60.5	147		
628.pop2_s	64	149	79.6	149	79.5			64	149	79.6	149	79.5		
638.imagick_s	64	26.1	552	25.8	558			64	26.1	552	25.8	558		
644.nab_s	64	36.1	484	36.1	484			64	36.1	484	36.1	484		
649.fotonik3d_s	64	63.8	143	64.0	143			64	63.8	143	64.0	143		
654.roms_s	64	44.1	357	43.8	360			64	44.1	357	43.8	360		

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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,compact"
LD_LIBRARY_PATH =
"/mnt/ramdisk/cpu2017-1.1.9-ic2023.0/lib/intel64:/mnt/ramdisk/cpu2017-1.1.9-ic2023.0/je5.0.1-64"
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 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"



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Platform Notes

BIOS settings:

```

      ADDDC Setting : Disabled
      DIMM Self Healing on
Uncorrectable Memory Error : Disabled
      Logical Processor : Disabled
      Virtualization Technology : Disabled
      Sub NUMA Cluster : 2-way Clustering
      Optimizer Mode : Enabled

      System Profile : Custom
      CPU Power Management : Maximum Performance
      C1E : 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-ic2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Wed Mar  8 02:35:10 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
 02:35:10 up 2:19, 1 user, load average: 6.72, 6.22, 3.64

```

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## Platform Notes (Continued)

```

USER TTY FROM LOGIN@ IDLE JCPU PCPU WHAT
root tty1 - 00:17 2:17m 1.18s 0.00s /bin/bash ./dell-run-specspeed.sh
--iterations 2 --output_format csv,html,pdf,txt -define Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc --define Dell-BIOS-LogProcD=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) 4126161
 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) 4126161
 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-specspeed.sh --iterations 2 --output_format csv,html,pdf,txt -define Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc --define Dell-BIOS-LogProcD=1
 /bin/bash ./dell-run-specspeed.sh --iterations 2 --output_format csv,html,pdf,txt -define Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc --define Dell-BIOS-LogProcD=1
 runcpu --nobuild --action validate --define default-platform-flags -c ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=64 --tune base,peak -o all --define drop_caches --iterations 2 --output_format csv,html,pdf,txt -define Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc --define Dell-BIOS-LogProcD=1 fpspeed
 runcpu --nobuild --action validate --define default-platform-flags --configfile ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=64 --tune base,peak --output_format all --define drop_caches --iterations 2 --output_format csv,html,pdf,txt --define Dell-BIOS-inc=Dell-BIOS_Xeon-4.inc --define Dell-BIOS-LogProcD=1 --nopower --runmode speed --tune base:peak --size refspped fpspeed --nopreenv --note-preenv --logfile $SPEC/tmp/CPU2017.002/templogs/preenv.fpspeed.002.0.log --lognum 002.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /mnt/ramdisk/cpu2017-1.1.9-ic2023.0

```

```

6. /proc/cpuinfo
 model name : Intel(R) Xeon(R) Gold 6428N
 vendor_id : GenuineIntel
 cpu family : 6
 model : 143
 stepping : 8

```

(Continued on next page)



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## Platform Notes (Continued)

```
microcode : 0x2b000190
bugs : spectre_v1 spectre_v2 spec_store_bypass swapgs
cpu cores : 32
siblings : 32
2 physical ids (chips)
64 processors (hardware threads)
physical id 0: core ids 0-31
physical id 1: core ids 0-31
physical id 0: apicids
0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62
physical id 1: apicids
128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,180,182,184,186,188,190
```

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) Gold 6428N
CPU family: 6
Model: 143
Thread(s) per core: 1
Core(s) per socket: 32
Socket(s): 2
Stepping: 8
BogoMIPS: 3600.00
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_l3 cat_l2 cdp_l3 invpcid_single
 cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced fsgsbase tsc_adjust bmi1 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
 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_vpopcntdq la57 rdpid
 bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear serialize
 tsxldtrk pconfig arch_lbr avx512_fp16 amx_tile flush_l1d arch_capabilities

L1d cache: 3 MiB (64 instances)
L1i cache: 2 MiB (64 instances)
L2 cache: 128 MiB (64 instances)
L3 cache: 120 MiB (2 instances)
NUMA node(s): 4
NUMA node0 CPU(s): 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60
NUMA node1 CPU(s): 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62
NUMA node2 CPU(s): 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61
NUMA node3 CPU(s): 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63
```

(Continued on next page)



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## Platform Notes (Continued)

|                                  |                                                                     |
|----------------------------------|---------------------------------------------------------------------|
| Vulnerability Itlb multihit:     | Not affected                                                        |
| Vulnerability Lltf:              | 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      | 3M       | 12   | Data        | 1     | 64    | 1        | 64             |
| L1i  | 32K      | 2M       | 8    | Instruction | 1     | 64    | 1        | 64             |
| L2   | 2M       | 128M     | 16   | Unified     | 2     | 2048  | 1        | 64             |
| L3   | 60M      | 120M     | 15   | Unified     | 3     | 65536 | 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: 0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60
node 0 size: 257496 MB
node 0 free: 256832 MB
node 1 cpus: 2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62
node 1 size: 258043 MB
node 1 free: 242622 MB
node 2 cpus: 1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61
node 2 size: 258009 MB
node 2 free: 257854 MB
node 3 cpus: 3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63
node 3 size: 258014 MB
node 3 free: 256972 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: 1056321768 kB

10. who -r

run-level 3 Mar 8 00:16

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 auditd cron display-manager getty@ haveged irqbalance issue-generator kbdsettings klog lvm2-monitor nscd nvme-fc-boot-connections postfix purge-kernels rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny |

(Continued on next page)



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## Platform Notes (Continued)

```

enabled-runtime systemd-remount-fs
disabled autofs autoyast-initscripts blk-availability boot-sysctl ca-certificates chrony-wait
 chronyd console-getty cups cups-browsed debug-shell ebttables exchange-bmc-os-info
 firewallld gpm grub2-once haveged-switch-root ipmi ipmievd issue-add-ssh-keys kexec-load
 lunmask man-db-create multipathd nfs nfs-blkmap nvme-autoconnect 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 udisks2
indirect wickedd

```

```

13. Linux kernel boot-time arguments, from /proc/cmdline
BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
root=UUID=4b9d6da9-b8b6-435a-9c93-05a14fddaf7b
splash=silent
resume=/dev/disk/by-uuid/fb25668a-33ba-4c89-afb9-79ca6e9354ff
mitigations=auto
quiet
security=

```

```

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

```

```

15. 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
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

```

(Continued on next page)



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## Platform Notes (Continued)

```
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-ic2023.0  
Filesystem Type Size Used Avail Use% Mounted on  
tmpfs tmpfs 125G 11G 115G 9% /mnt/ramdisk

20. /sys/devices/virtual/dmi/id  
Vendor: Dell Inc.  
Product: PowerEdge R660  
Product Family: PowerEdge  
Serial: SLR6603

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:  
16x 00AD063200AD HMC94MEBRA109N 64 GB 2 rank 4800, configured at 4000

22. BIOS  
(This section combines info from /sys/devices and dmidecode.)  
BIOS Vendor: Dell Inc.  
BIOS Version: 1.2.1  
BIOS Date: 02/13/2023  
BIOS Revision: 1.2

## Compiler Version Notes

C | 619.lbm\_s(base, peak) 638.imagick\_s(base, peak) 644.nab\_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.

C++, C, Fortran | 607.cactuBSSN\_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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(Continued on next page)





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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.

=====  
Fortran | 603.bwaves\_s(base, peak) 649.fotonik3d\_s(base, peak) 654.roms\_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.

=====  
Fortran, C | 621.wrf\_s(base, peak) 627.cam4\_s(base, peak) 628.pop2\_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.  
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.

## Base Compiler Invocation

C benchmarks:

icx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx

## Base Portability Flags

603.bwaves\_s: -DSPEC\_LP64  
607.cactuBSSN\_s: -DSPEC\_LP64  
619.lbm\_s: -DSPEC\_LP64  
621.wrf\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big\_endian  
627.cam4\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG  
628.pop2\_s: -DSPEC\_LP64 -DSPEC\_CASE\_FLAG -convert big\_endian  
-assume byterecl  
638.imagick\_s: -DSPEC\_LP64  
644.nab\_s: -DSPEC\_LP64  
649.fotonik3d\_s: -DSPEC\_LP64  
654.roms\_s: -DSPEC\_LP64



# SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

SPECspeed®2017\_fp\_base = 265

PowerEdge R660 (Intel Xeon Gold 6428N)

SPECspeed®2017\_fp\_peak = 265

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

Test Date: Mar-2023  
Hardware Availability: Apr-2023  
Software Availability: Dec-2022

## Base Optimization Flags

C benchmarks:

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

Fortran benchmarks:

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

Benchmarks using both Fortran and C:

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

Benchmarks using Fortran, C, and C++:

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

## Peak Compiler Invocation

C benchmarks:

icx

Fortran benchmarks:

ifx

Benchmarks using both Fortran and C:

ifx icx

Benchmarks using Fortran, C, and C++:

icpx icx ifx



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## Peak Portability Flags

Same as Base Portability Flags

## Peak Optimization Flags

C benchmarks:

619.lbm\_s: basepeak = yes

638.imagick\_s: basepeak = yes

644.nab\_s: basepeak = yes

Fortran benchmarks:

603.bwaves\_s: -m64 -Wl,-z,muldefs -DSPEC\_OPENMP -xsapphirerapids  
-Ofast -ffast-math -flto -mfpmath=sse -funroll-loops  
-qopt-mem-layout-trans=4 -fiopenmp -nostandard-realloc-lhs  
-align array32byte -auto -L/usr/local/jemalloc64-5.0.1/lib  
-ljemalloc

649.fotonik3d\_s: basepeak = yes

654.roms\_s: basepeak = yes

Benchmarks using both Fortran and C:

621.wrf\_s: basepeak = yes

627.cam4\_s: basepeak = yes

628.pop2\_s: basepeak = yes

Benchmarks using Fortran, C, and C++:

607.cactuBSSN\_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/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.3.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/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.3.xml>



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