SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

PowerEdge R760xa (Intel Xeon Silver 4416+)

$SPECspeed^{®}2017\_fp\_base = 223$

$SPECspeed^{®}2017\_fp\_peak = 223$

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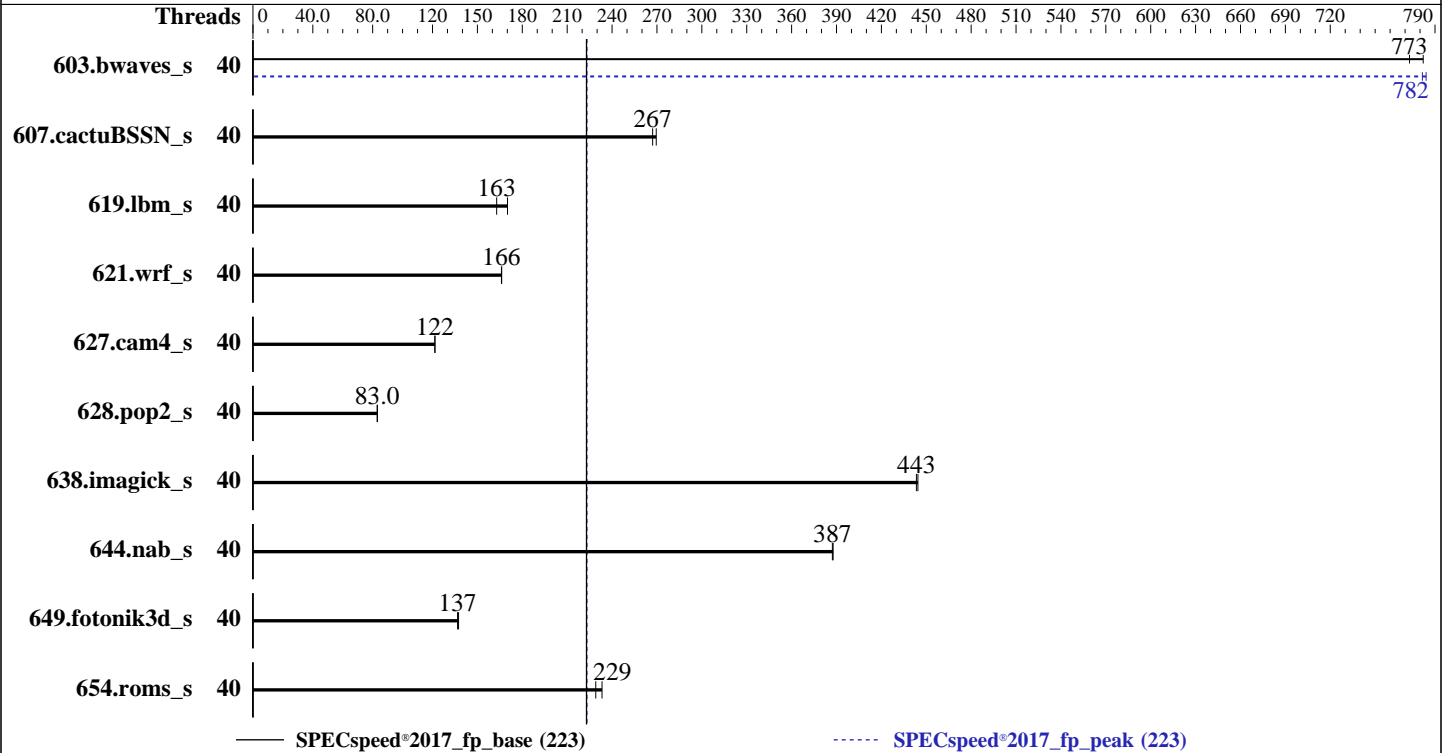**Test Sponsor:** Dell Inc.
Tested by: Dell Inc.

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

Threads — scale: 0, 40.0, 80.0, 120, 150, 180, 210, 240, 270, 300, 330, 360, 390, 420, 450, 480, 510, 540, 570, 600, 630, 660, 690, 720, 790

Benchmark	Threads	Base result	Peak result
603.bwaves_s	40	773	782
607.cactuBSSN_s	40	267	
619.lbm_s	40	163	
621.wrf_s	40	166	
627.cam4_s	40	122	
628.pop2_s	40	83.0	
638.imagick_s	40	443	
644.nab_s	40	387	
649.fotonik3d_s	40	137	
654.roms_s	40	229	

——— SPECspeed®2017_fp_base (223)   - - - - - SPECspeed®2017_fp_peak (223)

Hardware

CPU Name: Intel Xeon Silver 4416+
 Max MHz: 3900
 Nominal: 2000
Enabled: 40 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: 37.5 MB I+D on chip per chip
 Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 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 1.0.0 released Mar-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	40	75.4	782	**76.3**	**773**			40	**75.5**	**782**	75.2	784		
607.cactuBSSN_s	40	**62.4**	**267**	61.8	270			40	**62.4**	**267**	61.8	270		
619.lbm_s	40	30.8	170	**32.2**	**163**			40	30.8	170	**32.2**	**163**		
621.wrf_s	40	79.6	166	**79.6**	**166**			40	79.6	166	**79.6**	**166**		
627.cam4_s	40	72.8	122	**72.9**	**122**			40	72.8	122	**72.9**	**122**		
628.pop2_s	40	143	83.2	**143**	**83.0**			40	143	83.2	**143**	**83.0**		
638.imagick_s	40	32.5	444	**32.5**	**443**			40	32.5	444	**32.5**	**443**		
644.nab_s	40	45.1	388	**45.1**	**387**			40	45.1	388	**45.1**	**387**		
649.fotonik3d_s	40	66.3	137	**66.7**	**137**			40	66.3	137	**66.7**	**137**		
654.roms_s	40	67.5	233	**68.7**	**229**			40	67.5	233	**68.7**	**229**		
SPECspeed®2017_fp_base =	**223**													
SPECspeed®2017_fp_peak =	**223**													

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"

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

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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-spa-1 Sat Apr  1 01:56:43 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. 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. 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-spa-1 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
```

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Platform Notes (Continued)

```
   01:56:43 up  2:25,  1 user,  load average: 6.06, 5.73, 3.41
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                23:35    2:20m  1.23s  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) 2060285
     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) 2060285
     virtual memory          (kbytes, -v) unlimited
     file locks                      (-x) unlimited

   ------------------------------------------------------------
   5. sysinfo process ancestry
    /usr/lib/systemd/systemd --switched-root --system --deserialize 34
    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=40 --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=40 --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 refspeed 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) Silver 4416+
     vendor_id       : GenuineIntel
     cpu family      : 6
     model           : 143
```

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Platform Notes (Continued)

```
   stepping        : 8
   microcode       : 0x2b0001b0
   bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores       : 20
   siblings        : 20
   2 physical ids (chips)
   40 processors (hardware threads)
   physical id 0: core ids 0-19
   physical id 1: core ids 0-19
   physical id 0: apicids 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38
   physical id 1: apicids 128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166
  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):                   40
  On-line CPU(s) list:      0-39
  Vendor ID:                GenuineIntel
  Model name:               Intel(R) Xeon(R) Silver 4416+
  CPU family:               6
  Model:                    143
  Thread(s) per core:       1
  Core(s) per socket:       20
  Socket(s):                2
  Stepping:                 8
  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_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:                1.9 MiB (40 instances)
  L1i cache:                1.3 MiB (40 instances)
  L2 cache:                 80 MiB (40 instances)
  L3 cache:                 75 MiB (2 instances)
  NUMA node(s):             4
  NUMA node0 CPU(s):        0,4,8,12,16,20,24,28,32,36
  NUMA node1 CPU(s):        2,6,10,14,18,22,26,30,34,38
  NUMA node2 CPU(s):        1,5,9,13,17,21,25,29,33,37
  NUMA node3 CPU(s):        3,7,11,15,19,23,27,31,35,39
  Vulnerability Itlb multihit:    Not affected
  Vulnerability L1tf:             Not affected
```

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Platform Notes (Continued)

```
  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/swapgs 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     1.9M   12 Data          1    64      1          64
      L1i      32K     1.3M    8 Instruction   1    64      1          64
      L2        2M      80M   16 Unified       2  2048      1          64
      L3     37.5M      75M   15 Unified       3 40960      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
  node 0 size: 128401 MB
  node 0 free: 120876 MB
  node 1 cpus: 2,6,10,14,18,22,26,30,34,38
  node 1 size: 129021 MB
  node 1 free: 120195 MB
  node 2 cpus: 1,5,9,13,17,21,25,29,33,37
  node 2 size: 128986 MB
  node 2 free: 128576 MB
  node 3 cpus: 3,7,11,15,19,23,27,31,35,39
  node 3 size: 128685 MB
  node 3 free: 128338 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:      527457572 kB

  --------------------------------------------------------------
10. who -r
  run-level 3 Mar 31 23:33

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

  --------------------------------------------------------------
12. Failed units, from systemctl list-units --state=failed
     UNIT         LOAD   ACTIVE SUB    DESCRIPTION
   * nmb.service loaded failed failed Samba NMB Daemon

  --------------------------------------------------------------
13. Services, from systemctl list-unit-files
  STATE             UNIT FILES
  enabled           YaST2-Firstboot YaST2-Second-Stage apparmor auditd avahi-daemon bluetooth cron
```

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Platform Notes (Continued)

```
                    display-manager getty@ haveged irqbalance iscsi issue-generator kbdsettings kdump
                    kdump-early klog lvm2-monitor nmb nscd postfix purge-kernels rollback rsyslog smartd smb
                    sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
   enabled-runtime  systemd-remount-fs
   disabled         accounts-daemon appstream-sync-cache autofs autoyast-initscripts avahi-dnsconfd
                    blk-availability bluetooth-mesh boot-sysctl ca-certificates chrony-wait chronyd
                    console-getty cups cups-browsed debug-shell ebtables exchange-bmc-os-info firewalld gpm
                    grub2-once haveged-switch-root hwloc-dump-hwdata ipmi ipmievd iscsi-init iscsid iscsiuio
                    issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap
                    ostree-remount rdisc rpcbind rpmconfigcheck rsyncd rtkit-daemon serial-getty@
                    smartd_generate_opts snmpd snmptrapd speech-dispatcherd systemd-boot-check-no-failures
                    systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd udisks2
                    upower
   indirect         wickedd

   ----------------------------------------------------------
14. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=6ffe7499-98f8-44df-af80-649be1e7136a
   splash=silent
   resume=/dev/disk/by-uuid/780791c2-a58b-4181-8bae-2afdf293ebb6
   mitigations=auto
   quiet
   security=apparmor
   crashkernel=316M,high
   crashkernel=72M,low

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

   ----------------------------------------------------------
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
   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

   ----------------------------------------------------------
17. /sys/kernel/mm/transparent_hugepage
   defrag           always defer defer+madvise [madvise] never
```

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Platform Notes (Continued)

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


  ----------------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge R760xa
    Product Family: PowerEdge
    Serial:         1234567


  ----------------------------------------------------------------
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 002C00B3002C MTC20F2085S1RC48BA1 32 GB 2 rank 4800, configured at 4000



  ----------------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:     Dell Inc.
    BIOS Version:    1.0.0
    BIOS Date:       03/10/2023
    BIOS Revision:   1.0
```

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

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Dell Inc.

PowerEdge R760xa (Intel Xeon Silver 4416+)

SPECspeed®2017_fp_base = 223

SPECspeed®2017_fp_peak = 223

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

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

Compiler Version Notes (Continued)

```
==============================================================================
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.
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.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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------------------------------------------------------------------------------


==============================================================================
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
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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------------------------------------------------------------------------------
```

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`

(Continued on next page)

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

SPEC CPU®2017 Floating Point Speed Result

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Base Portability Flags (Continued)

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`

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`

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

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
```
ifx icx
```

Benchmarks using Fortran, C, and C++:
```
icpx icx ifx
```

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`

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Peak Optimization Flags (Continued)

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-v1.5.html

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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-v1.5.xml

For questions about this result, please contact the tester. For other inquiries, please contact info@spec.org.

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