SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

PowerEdge R760xa (Intel Xeon Platinum 8470)

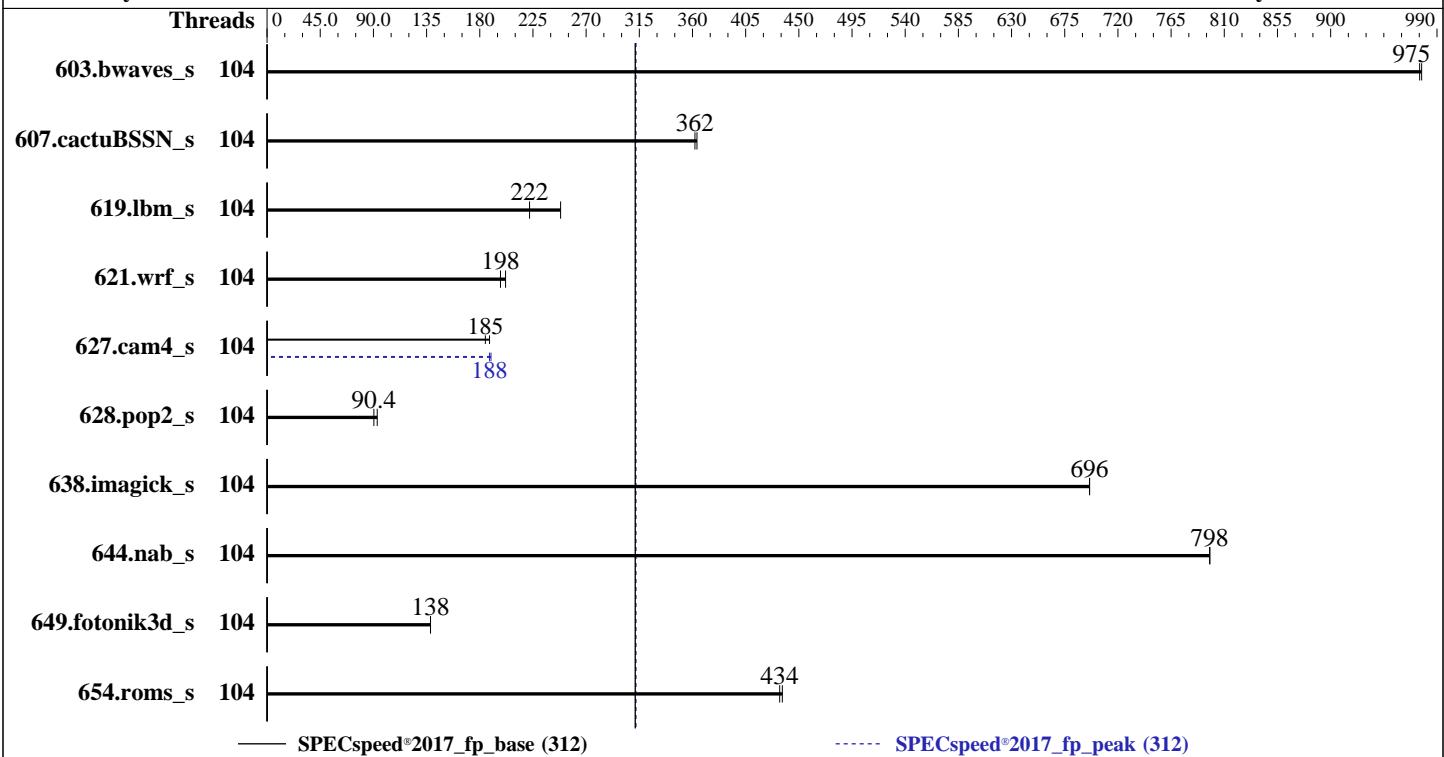$SPECspeed^®2017\_fp\_base = 312$

$SPECspeed^®2017\_fp\_peak = 312$

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

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

Threads — scale: 0 45.0 90.0 135 180 225 270 315 360 405 450 495 540 585 630 675 720 765 810 855 900 990

Benchmark	Threads	Result
603.bwaves_s	104	975
607.cactuBSSN_s	104	362
619.lbm_s	104	222
621.wrf_s	104	198
627.cam4_s	104	185 / 188
628.pop2_s	104	90.4
638.imagick_s	104	696
644.nab_s	104	798
649.fotonik3d_s	104	138
654.roms_s	104	434

—— **SPECspeed®2017_fp_base (312)**   ------ **SPECspeed®2017_fp_peak (312)**

Hardware

CPU Name: Intel Xeon Platinum 8470
 Max MHz: 3800
 Nominal: 2000
Enabled: 104 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: 105 MB I+D on chip per chip
 Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
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	104	60.4	977	**60.5**	**975**			104	60.4	977	**60.5**	**975**		
607.cactuBSSN_s	104	**46.0**	**362**	45.8	364			104	**46.0**	**362**	45.8	364		
619.lbm_s	104	21.1	248	**23.6**	**222**			104	21.1	248	**23.6**	**222**		
621.wrf_s	104	65.5	202	**67.0**	**198**			104	65.5	202	**67.0**	**198**		
627.cam4_s	104	**48.0**	**185**	47.1	188			104	46.8	189	**47.1**	**188**		
628.pop2_s	104	**131**	**90.4**	127	93.2			104	**131**	**90.4**	127	93.2		
638.imagick_s	104	**20.7**	**696**	20.7	696			104	**20.7**	**696**	20.7	696		
644.nab_s	104	**21.9**	**798**	21.9	798			104	**21.9**	**798**	21.9	798		
649.fotonik3d_s	104	**65.9**	**138**	65.9	138			104	**65.9**	**138**	65.9	138		
654.roms_s	104	36.1	436	**36.3**	**434**			104	36.1	436	**36.3**	**434**		
SPECspeed®2017_fp_base =	**312**													
SPECspeed®2017_fp_peak =	**312**													

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 Tue Mar 21 13:12:31 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/lp)
  x86_64 x86_64 x86_64 GNU/Linux


------------------------------------------------------------
2. w
   13:12:31 up  2:18,  1 user,  load average: 5.91, 6.38, 3.78
```

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Platform Notes (Continued)

```
   USER     TTY      FROM              LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                 10:55    2:16m  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) 2060178
     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) 2060178
     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=104 --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=104 --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) Platinum 8470
       vendor_id       : GenuineIntel
       cpu family      : 6
       model           : 143
       stepping        : 8
```

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Platform Notes (Continued)

```
      microcode       : 0x2b0001b0
      bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
      cpu cores       : 52
      siblings        : 52
      2 physical ids (chips)
      104 processors (hardware threads)
      physical id 0: core ids 0-51
      physical id 1: core ids 0-51
      physical id 0: apicids
      0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
      ,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102
      physical id 1: apicids
      128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,1
      80,182,184,186,188,190,192,194,196,198,200,202,204,206,208,210,212,214,216,218,220,222,224,226,228,230
   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):                   104
      On-line CPU(s) list:      0-103
      Vendor ID:                GenuineIntel
      Model name:               Intel(R) Xeon(R) Platinum 8470
      CPU family:               6
      Model:                    143
      Thread(s) per core:       1
      Core(s) per socket:       52
      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:                4.9 MiB (104 instances)
      L1i cache:                3.3 MiB (104 instances)
      L2 cache:                 208 MiB (104 instances)
      L3 cache:                 210 MiB (2 instances)
      NUMA node(s):             8
      NUMA node0 CPU(s):        0,4,8,12,16,20,24,28,32,36,40,44,48
      NUMA node1 CPU(s):        52,56,60,64,68,72,76,80,84,88,92,96,100
      NUMA node2 CPU(s):        2,6,10,14,18,22,26,30,34,38,42,46,50
```

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Platform Notes (Continued)

```
  NUMA node3 CPU(s):                  54,58,62,66,70,74,78,82,86,90,94,98,102
  NUMA node4 CPU(s):                  1,5,9,13,17,21,25,29,33,37,41,45,49
  NUMA node5 CPU(s):                  53,57,61,65,69,73,77,81,85,89,93,97,101
  NUMA node6 CPU(s):                  3,7,11,15,19,23,27,31,35,39,43,47,51
  NUMA node7 CPU(s):                  55,59,63,67,71,75,79,83,87,91,95,99,103
  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/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     4.9M   12 Data            1     64       1              64
    L1i       32K     3.3M    8 Instruction     1     64       1              64
    L2         2M     208M   16 Unified         2   2048       1              64
    L3       105M     210M   15 Unified         3 114688       1              64

------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 8 nodes (0-7)
  node 0 cpus: 0,4,8,12,16,20,24,28,32,36,40,44,48
  node 0 size: 63888 MB
  node 0 free: 57090 MB
  node 1 cpus: 52,56,60,64,68,72,76,80,84,88,92,96,100
  node 1 size: 64508 MB
  node 1 free: 55572 MB
  node 2 cpus: 2,6,10,14,18,22,26,30,34,38,42,46,50
  node 2 size: 64508 MB
  node 2 free: 58602 MB
  node 3 cpus: 54,58,62,66,70,74,78,82,86,90,94,98,102
  node 3 size: 64508 MB
  node 3 free: 64196 MB
  node 4 cpus: 1,5,9,13,17,21,25,29,33,37,41,45,49
  node 4 size: 64508 MB
  node 4 free: 64133 MB
  node 5 cpus: 53,57,61,65,69,73,77,81,85,89,93,97,101
  node 5 size: 64508 MB
  node 5 free: 64250 MB
  node 6 cpus: 3,7,11,15,19,23,27,31,35,39,43,47,51
  node 6 size: 64508 MB
  node 6 free: 64178 MB
  node 7 cpus: 55,59,63,67,71,75,79,83,87,91,95,99,103
  node 7 size: 64131 MB
  node 7 free: 63691 MB
  node distances:
  node   0   1   2   3   4   5   6   7
    0:  10  12  12  12  21  21  21  21
    1:  12  10  12  12  21  21  21  21
    2:  12  12  10  12  21  21  21  21
    3:  12  12  12  10  21  21  21  21
    4:  21  21  21  21  10  12  12  12
    5:  21  21  21  21  12  10  12  12
    6:  21  21  21  21  12  12  10  12
    7:  21  21  21  21  12  12  12  10
```

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Platform Notes (Continued)

```
   --------------------------------------------------------
   9. /proc/meminfo
      MemTotal:       527432968 kB


   --------------------------------------------------------
   10. who -r
      run-level 3 Mar 21 10:55


   --------------------------------------------------------
   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         ModemManager YaST2-Firstboot YaST2-Second-Stage apparmor auditd avahi-daemon bluetooth
                      cron display-manager getty@ haveged irqbalance iscsi issue-generator kbdsettings kdump
                      kdump-early klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog smartd sshd
                      wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny wpa_supplicant
      enabled-runtime systemd-remount-fs
      disabled        NetworkManager NetworkManager-dispatcher NetworkManager-wait-online 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 dnsmasq 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
                      nm-cloud-setup nmb openvpn@ ostree-remount pppoe pppoe-server rdisc rpcbind rpmconfigcheck
                      rsyncd rtkit-daemon serial-getty@ smartd_generate_opts smb snmpd snmptrapd
                      speech-dispatcherd systemd-boot-check-no-failures systemd-network-generator systemd-sysext
                      systemd-time-wait-sync systemd-timesyncd udisks2 upower wpa_supplicant@
      indirect        pcscd saned@ wickedd

   --------------------------------------------------------
   13. Linux kernel boot-time arguments, from /proc/cmdline
      BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
      root=UUID=d2478c1d-ad56-4880-94a4-2c23c20dc4ec
      splash=silent
      resume=/dev/disk/by-uuid/1d85ce73-4447-4a5a-b6f2-67571d657dff
      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. sysctl
      kernel.numa_balancing           1
      kernel.randomize_va_space       2
      vm.compaction_proactiveness     20
      vm.dirty_background_bytes       0
```

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Platform Notes (Continued)

```
     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-ic2023.0
   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 R760xa
     Product Family: PowerEdge
     Serial:         1234567


   ----------------------------------------------------------
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 00CE00B300CE M321R4GA3BB6-CQKEG 32 GB 2 rank 4800
```

(Continued on next page)

Dell Inc.

SPECspeed®2017_fp_base = 312

PowerEdge R760xa (Intel Xeon Platinum 8470)

SPECspeed®2017_fp_peak = 312

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

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

Platform Notes (Continued)

```
    ------------------------------------------------------------
    22. 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.
------------------------------------------------------------------------------


==============================================================================
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
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
```

(Continued on next page)

Dell Inc.

PowerEdge R760xa (Intel Xeon Platinum 8470)

$SPECspeed^{®}2017\_fp\_base = 312$

$SPECspeed^{®}2017\_fp\_peak = 312$

CPU2017 License: 6573		**Test Date:**	Mar-2023
Test Sponsor:	Dell Inc.	**Hardware Availability:**	Mar-2023
Tested by:	Dell Inc.	**Software Availability:**	Dec-2022

Base Compiler Invocation (Continued)

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`

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
```

(Continued on next page)

SPEC CPU®2017 Floating Point Speed Result

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Dell Inc.

PowerEdge R760xa (Intel Xeon Platinum 8470)

$SPECspeed®2017\_fp\_base = 312$

$SPECspeed®2017\_fp\_peak = 312$

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

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

Base Optimization Flags (Continued)

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
```

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: `basepeak = yes`

(Continued on next page)

Standard Performance Evaluation Corporation (info@spec.org)

https://www.spec.org/

Dell Inc.

PowerEdge R760xa (Intel Xeon Platinum 8470)

SPECspeed®2017_fp_base = 312

SPECspeed®2017_fp_peak = 312

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

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

Peak Optimization Flags (Continued)

649.fotonik3d_s: `basepeak = yes`

654.roms_s: `basepeak = yes`

Benchmarks using both Fortran and C:

621.wrf_s: `basepeak = yes`

627.cam4_s: `-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`

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-v1.5.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-v1.5.xml`

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

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