SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8368, 2.40 GHz)

$SPECrate^®2017\_fp\_base = 538$

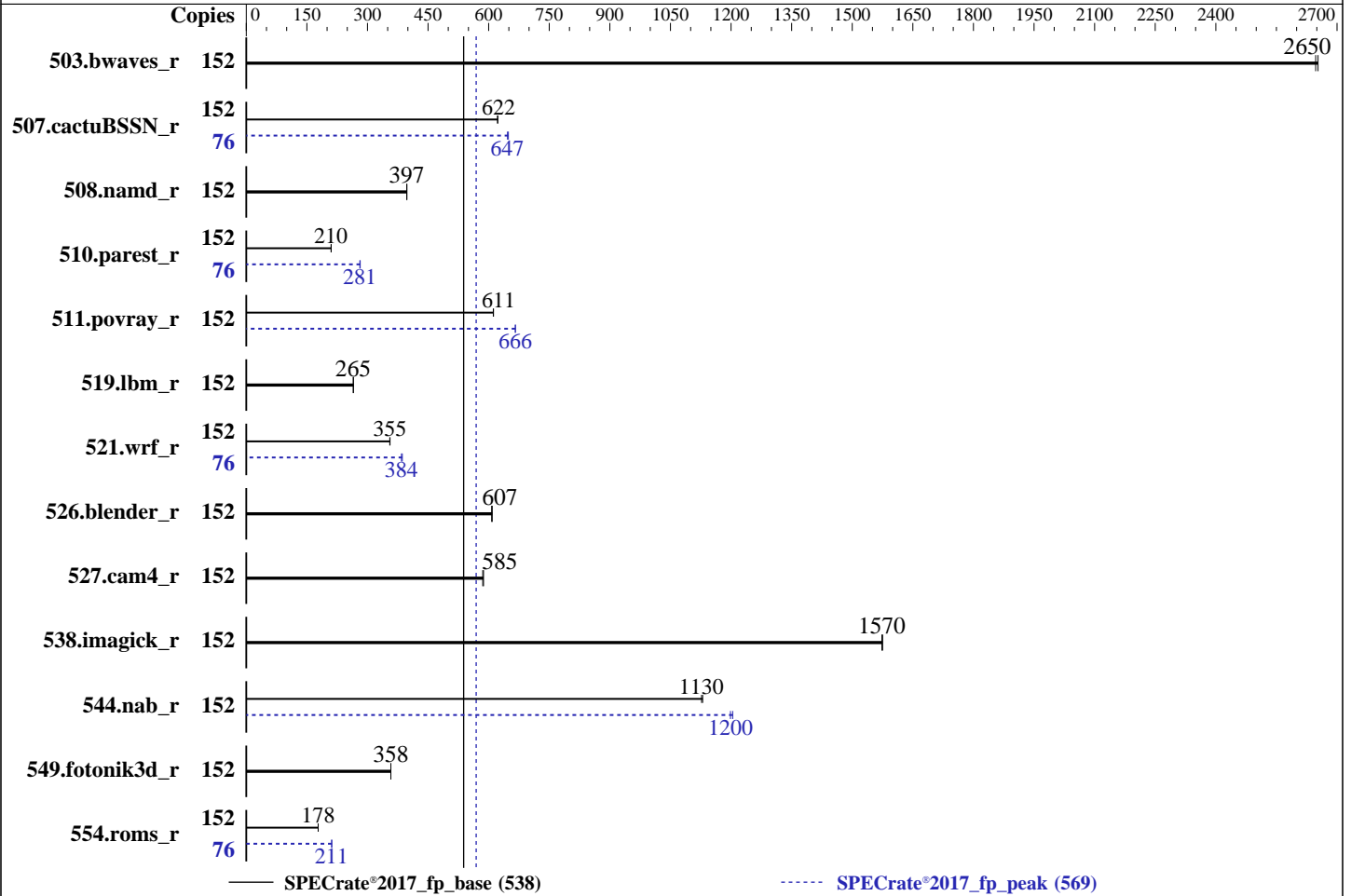$SPECrate^®2017\_fp\_peak = 569$

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

Test Date: May-2023
Hardware Availability: May-2021
Software Availability: Dec-2022

Benchmark	Copies	base	peak
503.bwaves_r	152	2650	
507.cactuBSSN_r	152 / 76	622	647
508.namd_r	152	397	
510.parest_r	152 / 76	210	281
511.povray_r	152 / 76	611	666
519.lbm_r	152	265	
521.wrf_r	152 / 76	355	384
526.blender_r	152	607	
527.cam4_r	152	585	
538.imagick_r	152	1570	
544.nab_r	152	1130	1200
549.fotonik3d_r	152	358	
554.roms_r	152 / 76	178	211

SPECrate®2017_fp_base (538) ----- SPECrate®2017_fp_peak (569)

Hardware

CPU Name: Intel Xeon Platinum 8368
Max MHz: 3400
Nominal: 2400
Enabled: 76 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
L2: 1.25 MB I+D on chip per core
L3: 57 MB I+D on chip per chip
Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R)
Storage: 90 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: No
Firmware: Version 1.9.2 released Nov-2022
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.

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

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SPECrate®2017_fp_peak = 569

CPU2017 License: 6573	**Test Date:** May-2023
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Results Table

Benchmark	Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
503.bwaves_r	152	575	2650	**576**	**2650**			152	575	2650	**576**	**2650**		
507.cactuBSSN_r	152	309	623	**309**	**622**			76	**149**	**647**	148	649		
508.namd_r	152	363	397	**363**	**397**			152	363	397	**363**	**397**		
510.parest_r	152	1891	210	**1895**	**210**			76	**707**	**281**	705	282		
511.povray_r	152	**580**	**611**	580	612			152	**533**	**666**	533	666		
519.lbm_r	152	**605**	**265**	604	265			152	**605**	**265**	604	265		
521.wrf_r	152	957	356	**958**	**355**			76	441	386	**443**	**384**		
526.blender_r	152	**381**	**607**	380	609			152	**381**	**607**	380	609		
527.cam4_r	152	**454**	**585**	453	587			152	**454**	**585**	453	587		
538.imagick_r	152	**240**	**1570**	240	1580			152	**240**	**1570**	240	1580		
544.nab_r	152	**227**	**1130**	226	1130			152	212	1200	**213**	**1200**		
549.fotonik3d_r	152	**1655**	**358**	1655	358			152	**1655**	**358**	1655	358		
554.roms_r	152	1356	178	**1357**	**178**			76	571	212	**571**	**211**		
SPECrate®2017_fp_base =		**538**												
SPECrate®2017_fp_peak =		**569**												

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-ic2023.0/lib/intel64:/mnt/ramdisk/cpu2017-1.1.9-ic2023.0/je5.0.1-64"
MALLOC_CONF = "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

(Continued on next page)

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

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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 90 GB ramdisk created with the cmd: "mount -t tmpfs -o size=90G tmpfs /mnt/ramdisk"
```

Platform Notes

```
BIOS settings:
                ADDDC 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
                          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 Thu May 11 13:06:55 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
```

(Continued on next page)

Dell Inc.

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Platform Notes (Continued)

```
 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
  13:06:55 up  5:14,  1 user,  load average: 81.73, 133.86, 144.74
  USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
  root     tty1     -                07:53    5:11m  2.22s  0.00s /bin/bash ./dell-run-speccpu.sh rate
  --define DL-BIOSinc=Dell-BIOS_Xeon-3.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-VirtD=1 --output_format
  csv,html,pdf,txt


-----------------------------------------------------------
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) 4125256
  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) 4125256
  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-3.inc --define DL-BIOS-adddcD=1
   --define DL-BIOS-VirtD=1 --output_format csv,html,pdf,txt
 /bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_Xeon-3.inc --define DL-BIOS-adddcD=1
   --define DL-BIOS-VirtD=1 --output_format csv,html,pdf,txt
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=152 -c
   ic2023.0-lin-core-avx512-rate-20221201.cfg --define smt-on --define cores=76 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak -o all --iterations 2 --define
```

(Continued on next page)

Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8368, 2.40 GHz)

SPECrate®2017_fp_base = 538

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Platform Notes (Continued)

```
    DL-BIOSinc=Dell-BIOS_Xeon-3.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-VirtD=1 --output_format
    csv,html,pdf,txt fprate
  runcpu --nobuild --action validate --define default-platform-flags --define numcopies=152 --configfile
    ic2023.0-lin-core-avx512-rate-20221201.cfg --define smt-on --define cores=76 --define physicalfirst
    --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --iterations 2
    --define DL-BIOSinc=Dell-BIOS_Xeon-3.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-VirtD=1
    --output_format csv,html,pdf,txt --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-ic2023.0


    ------------------------------------------------------------
6. /proc/cpuinfo
    model name      : Intel(R) Xeon(R) Platinum 8368 CPU @ 2.40GHz
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 106
    stepping        : 6
    microcode       : 0xd000389
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 38
    siblings        : 76
    2 physical ids (chips)
    152 processors (hardware threads)
    physical id 0: core ids 0-37
    physical id 1: core ids 0-37
    physical id 0: apicids 0-75
    physical id 1: apicids 128-203
  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):                    152
  On-line CPU(s) list:       0-151
  Vendor ID:                 GenuineIntel
  Model name:                Intel(R) Xeon(R) Platinum 8368 CPU @ 2.40GHz
  CPU family:                6
  Model:                     106
  Thread(s) per core:        2
  Core(s) per socket:        38
  Socket(s):                 2
  Stepping:                  6
  CPU max MHz:               3400.0000
  CPU min MHz:               800.0000
  BogoMIPS:                  4800.00
  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 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 invpcid_single intel_ppin ssbd mba
```

(Continued on next page)

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Platform Notes (Continued)

```
                          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 wbnoinvd dtherm ida arat pln pts avx512vbmi umip pku
                          ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
                          avx512_vpopcntdq la57 rdpid fsrm md_clear pconfig flush_l1d
                          arch_capabilities
  L1d cache:              3.6 MiB (76 instances)
  L1i cache:              2.4 MiB (76 instances)
  L2 cache:               95 MiB (76 instances)
  L3 cache:               114 MiB (2 instances)
  NUMA node(s):           2
  NUMA node0 CPU(s):      0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,5
                          2,54,56,58,60,62,64,66,68,70,72,74,76,78,80,82,84,86,88,90,92,94,96,98,100
                          ,102,104,106,108,110,112,114,116,118,120,122,124,126,128,130,132,134,136,1
                          38,140,142,144,146,148,150
  NUMA node1 CPU(s):      1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,5
                          3,55,57,59,61,63,65,67,69,71,73,75,77,79,81,83,85,87,89,91,93,95,97,99,101
                          ,103,105,107,109,111,113,115,117,119,121,123,125,127,129,131,133,135,137,1
                          39,141,143,145,147,149,151
  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     3.6M   12 Data             1    64      1             64
      L1i      32K     2.4M    8 Instruction      1    64      1             64
      L2      1.3M      95M   20 Unified          2  1024      1             64
      L3       57M     114M   12 Unified          3 77824      1             64

  ------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus:
  0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72,7
  4,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110,112,114,116,118,120,122,124,126,128,130,132,1
  34,136,138,140,142,144,146,148,150
  node 0 size: 515306 MB
  node 0 free: 513816 MB
  node 1 cpus:
  1,3,5,7,9,11,13,15,17,19,21,23,25,27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59,61,63,65,67,69,71,73,7
  5,77,79,81,83,85,87,89,91,93,95,97,99,101,103,105,107,109,111,113,115,117,119,121,123,125,127,129,131,133,1
  35,137,139,141,143,145,147,149,151
  node 1 size: 516029 MB
  node 1 free: 506233 MB
  node distances:
  node   0   1
    0:  10  20
    1:  20  10

  ------------------------------------------------------------
```

(Continued on next page)

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Platform Notes (Continued)

```
 9. /proc/meminfo
    MemTotal:       1056088724 kB


   ------------------------------------------------------------
10. who -r
   run-level 3 May 11 07:53


   ------------------------------------------------------------
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
                      postfix purge-kernels rollback sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6
                      wickedd-nanny
    enabled-runtime   systemd-remount-fs
    disabled          bmc-snmp-proxy boot-sysctl ca-certificates chrony-wait chronyd console-getty debug-shell
                      ebtables exchange-bmc-os-info grub2-once haveged-switch-root ipmievd ipvsadm
                      issue-add-ssh-keys kexec-load lunmask netlabel racoon racoon-setkey rdisc rpmconfigcheck
                      rsyncd serial-getty@ snmpd snmptrapd systemd-boot-check-no-failures
                      systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd
    indirect          wickedd


   ------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=0b46c224-29bd-4ee7-a1a0-fda5256c0c9a
    splash=silent
    mitigations=auto
    quiet
    security=apparmor


   ------------------------------------------------------------
14. cpupower frequency-info
    analyzing CPU 0:
      current policy: frequency should be within 800 MHz and 3.40 GHz.
                      The governor "powersave" may decide which speed to use
                      within this range.
      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
```

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Platform Notes (Continued)

```
   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   90G  4.2G   86G   5% /mnt/ramdisk


  ---------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
     Vendor:         Dell Inc.
     Product:        PowerEdge R650
     Product Family: PowerEdge
     Serial:         DFLTSTG


  ---------------------------------------------------------------
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:
    1x 002C069D002C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200
    12x 00AD063200AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200
    1x 00AD069D00AD HMAA8GR7AJR4N-XN 64 GB 2 rank 3200
    2x 00CE063200CE M393A8G40AB2-CWE 64 GB 2 rank 3200


  ---------------------------------------------------------------
22. BIOS
(This section combines info from /sys/devices and dmidecode.)
   BIOS Vendor:     Dell Inc.
   BIOS Version:    1.9.2
```

(Continued on next page)

Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8368, 2.40 GHz)

$SPECrate^{®}2017\_fp\_base = 538$

$SPECrate^{®}2017\_fp\_peak = 569$

CPU2017 License: 6573		**Test Date:**	May-2023
Test Sponsor:	Dell Inc.	**Hardware Availability:**	May-2021
Tested by:	Dell Inc.	**Software Availability:**	Dec-2022

Platform Notes (Continued)

```
     BIOS Date:        11/17/2022
     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 2023.0.0 Build 20221201
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----------------------------------------------------------------------------------------------


==============================================================================================
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 2023.0.0 Build 20221201
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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 2023.0.0 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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----------------------------------------------------------------------------------------------


==============================================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
----------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ 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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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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----------------------------------------------------------------------------------------------


==============================================================================================
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 2023.0.0 Build 20221201
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----------------------------------------------------------------------------------------------


==============================================================================================
Fortran, C    | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
----------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 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
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----------------------------------------------------------------------------------------------
```

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8368, 2.40 GHz)

SPECrate®2017_fp_base = 538

SPECrate®2017_fp_peak = 569

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 -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

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Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8368, 2.40 GHz)

SPECrate®2017_fp_base = 538

SPECrate®2017_fp_peak = 569

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

Test Date: May-2023
Hardware Availability: May-2021
Software Availability: Dec-2022

Base Optimization Flags (Continued)

C++ benchmarks:
```
-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -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 -xCORE-AVX512 -Ofast -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-Wno-implicit-int -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 -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -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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Standard Performance Evaluation Corporation (info@spec.org)   https://www.spec.org/

Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8368, 2.40 GHz)

SPECrate®2017_fp_base = 538

SPECrate®2017_fp_peak = 569

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

Test Date: May-2023
Hardware Availability: May-2021
Software Availability: Dec-2022

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: `-w -std=c11 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int -qopt-zmm-usage=high -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

C++ benchmarks:

508.namd_r: `basepeak = yes`

510.parest_r: `-w -std=c++14 -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -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 -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -nostandard-realloc-lhs`

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Dell Inc.

PowerEdge R650 (Intel Xeon Platinum 8368, 2.40 GHz)

SPECrate®2017_fp_base = 538

SPECrate®2017_fp_peak = 569

CPU2017 License: 6573		**Test Date:**	May-2023
Test Sponsor:	Dell Inc.	**Hardware Availability:**	May-2021
Tested by:	Dell Inc.	**Software Availability:**	Dec-2022

Peak Optimization Flags (Continued)

554.roms_r (continued):
```
-align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using both Fortran and C:

521.wrf_r: `-w -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast`
`-ffast-math -flto -mfpmath=sse -funroll-loops`
`-qopt-mem-layout-trans=4 -Wno-implicit-int`
`-nostandard-realloc-lhs -align array32byte -auto`
`-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

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.profdata`(pass 2) `-xCORE-AVX2`(pass 1)
`-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse`
`-funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int`
`-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -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-ic2023-official-linux64.html
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.4.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-v1.4.xml

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

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