SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

SPECrate®2017_fp_base = 1110

PowerEdge R660 (Intel Xeon Platinum 8580)

SPECrate®2017_fp_peak = 1160
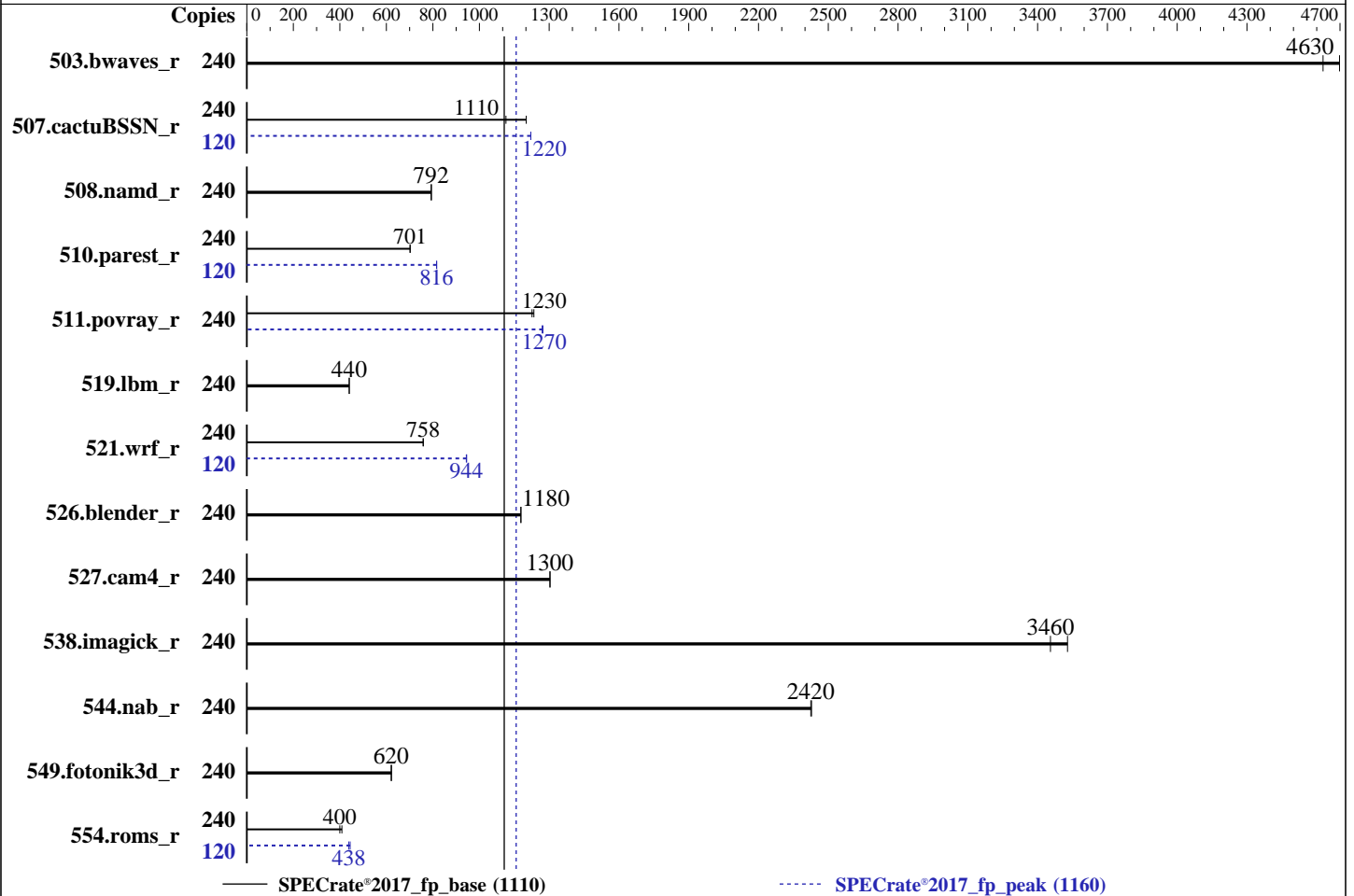
CPU2017 License: 6573
Test Sponsor: Dell Inc.
Tested by: Dell Inc.

Test Date: Nov-2023
Hardware Availability: Feb-2024
Software Availability: Jul-2023

Benchmark	Copies	Base	Peak
503.bwaves_r	240	4630	
507.cactuBSSN_r	240	1110	
507.cactuBSSN_r	120		1220
508.namd_r	240	792	
510.parest_r	240	701	
510.parest_r	120		816
511.povray_r	240	1230	
511.povray_r	240		1270
519.lbm_r	240	440	
521.wrf_r	240	758	
521.wrf_r	120		944
526.blender_r	240	1180	
527.cam4_r	240	1300	
538.imagick_r	240	3460	
544.nab_r	240	2420	
549.fotonik3d_r	240	620	
554.roms_r	240	400	
554.roms_r	120		438

SPECrate®2017_fp_base (1110)
SPECrate®2017_fp_peak (1160)

Hardware

CPU Name: Intel Xeon Platinum 8580
 Max MHz: 4000
 Nominal: 2000
Enabled: 120 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 2 MB I+D on chip per core
 L3: 300 MB I+D on chip per chip
 Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-5600B-R)
Storage: 130 GB on tmpfs
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP5
 5.14.21-150500.53-default
Compiler: C/C++: Version 2023.2 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2023.2 of Intel Fortran Compiler for Linux;
Parallel: No
Firmware: Version 1.9.11 released Oct-2023
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance at the cost of additional power usage.

SPEC CPU®2017 Floating Point Rate Result

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Dell Inc.

PowerEdge R660 (Intel Xeon Platinum 8580)

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CPU2017 License: 6573	**Test Date:** Nov-2023
Test Sponsor: Dell Inc.	**Hardware Availability:** Feb-2024
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Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	240	**520**	**4630**	512	4700			240	**520**	**4630**	512	4700		
507.cactuBSSN_r	240	**273**	**1110**	253	1200			120	124	1220	**124**	**1220**		
508.namd_r	240	**288**	**792**	287	794			240	**288**	**792**	287	794		
510.parest_r	240	**895**	**701**	893	703			120	**385**	**816**	384	817		
511.povray_r	240	**457**	**1230**	454	1230			240	440	1270	**441**	**1270**		
519.lbm_r	240	**575**	**440**	575	440			240	**575**	**440**	575	440		
521.wrf_r	240	708	759	**710**	**758**			120	**285**	**944**	284	945		
526.blender_r	240	**310**	**1180**	310	1180			240	**310**	**1180**	310	1180		
527.cam4_r	240	322	1300	**322**	**1300**			240	322	1300	**322**	**1300**		
538.imagick_r	240	169	3530	**173**	**3460**			240	169	3530	**173**	**3460**		
544.nab_r	240	166	2430	**167**	**2420**			240	166	2430	**167**	**2420**		
549.fotonik3d_r	240	**1508**	**620**	1503	622			240	**1508**	**620**	1503	622		
554.roms_r	240	**954**	**400**	933	409			120	**435**	**438**	429	444		
SPECrate®2017_fp_base =		**1110**												
SPECrate®2017_fp_peak =		**1160**												

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.x/lib/intel64:/mnt/ramdisk/cpu2017-1.1.9-ic2023.x/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)

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PowerEdge R660 (Intel Xeon Platinum 8580)

$SPECrate^{®}2017\_fp\_base = 1110$

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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 130 GB ramdisk created with the cmd: "mount -t tmpfs -o size=130G 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.x/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Thu Nov  9 15:37:53 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 (249.16+suse.171.gdad0071f15)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
```

(Continued on next page)

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Test Date: Nov-2023

Hardware Availability: Feb-2024

Software Availability: Jul-2023

Platform Notes (Continued)

```
 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 5.14.21-150500.53-default #1 SMP PREEMPT_DYNAMIC Wed May 10 07:56:26 UTC 2023 (b630043)
   x86_64 x86_64 x86_64 GNU/Linux

    -----------------------------------------------------------
 2. w
    15:37:53 up  4:16,  2 users,  load average: 158.25, 219.25, 231.12
    USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1     -                11:23    4:14m  1.04s  0.00s /bin/bash ./dell-run-speccpu.sh rate
    --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define
    DL-VERS=v4.8.1 --output_format html,pdf,txt
    root     tty2     -                13:39    1:58m  0.04s  0.04s -bash

    -----------------------------------------------------------
 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) 4125923
   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) 4125923
   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_rate.sh
  /bin/bash ./dell-run-main.sh rate
  /bin/bash ./dell-run-main.sh rate
  /bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1
    --define DL-BIOS-adddcD=1 --define DL-VERS=v4.8.1 --output_format html,pdf,txt
  /bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1
    --define DL-BIOS-adddcD=1 --define DL-VERS=v4.8.1 --output_format html,pdf,txt
  runcpu --nobuild --action validate --define default-platform-flags --define numcopies=240 -c
```

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Platform Notes (Continued)

```
    ic2023.2-lin-sapphirerapids-rate-20230622.cfg --define smt-on --define cores=120 --define physicalfirst
    --define invoke_with_interleave --define drop_caches --tune base,peak -o all --define DL-BIOS-SNC=2
    --define DL-LQC=1 --iterations 2 --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define DL-BIOS-LogProc=1
    --define DL-BIOS-adddcD=1 --define DL-VERS=v4.8.1 --output_format html,pdf,txt fprate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=240 --configfile
    ic2023.2-lin-sapphirerapids-rate-20230622.cfg --define smt-on --define cores=120 --define physicalfirst
    --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --define
    DL-BIOS-SNC=2 --define DL-LQC=1 --iterations 2 --define DL-BIOSinc=Dell-BIOS_Xeon-5.inc --define
    DL-BIOS-LogProc=1 --define DL-BIOS-adddcD=1 --define DL-VERS=v4.8.1 --output_format 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.x


    --------------------------------------------------------
6. /proc/cpuinfo
    model name      : INTEL(R) XEON(R) PLATINUM 8580
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 207
    stepping        : 2
    microcode       : 0x210001a0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs eibrs_pbrsb
    cpu cores       : 60
    siblings        : 120
    2 physical ids (chips)
    240 processors (hardware threads)
    physical id 0: core ids 0-59
    physical id 1: core ids 0-59
    physical id 0: apicids 0-119
    physical id 1: apicids 128-247
  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 2.37.4:
  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):                  240
  On-line CPU(s) list:     0-239
  Vendor ID:               GenuineIntel
  Model name:              INTEL(R) XEON(R) PLATINUM 8580
  CPU family:              6
  Model:                   207
  Thread(s) per core:      2
  Core(s) per socket:      60
  Socket(s):               2
  Stepping:                2
  BogoMIPS:                4000.00
  Flags:                   fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                           clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
                           lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
                           nonstop_tsc cpuid aperfmperf tsc_known_freq pni pclmulqdq dtes64 monitor
                           ds_cpl smx est tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2
                           x2apic movbe popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm
                           abm 3dnowprefetch cpuid_fault epb cat_l3 cat_l2 cdp_l3 invpcid_single
```

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Platform Notes (Continued)

```
                          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 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:            5.6 MiB (120 instances)
    L1i cache:            3.8 MiB (120 instances)
    L2 cache:             240 MiB (120 instances)
    L3 cache:             600 MiB (2 instances)
    NUMA node(s):         4
    NUMA node0 CPU(s):    0,4,8,12,16,20,24,28,32,36,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,10
                          2,106,108,112,116,120,124,128,132,136,140,144,148,152,156,162,166,170,174,
                          178,182,186,190,194,198,202,206,210,214,218,222,226,228,232,236
    NUMA node1 CPU(s):    2,6,10,14,18,22,26,30,34,38,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,1
                          00,104,110,114,118,122,126,130,134,138,142,146,150,154,158,160,164,168,172
                          ,176,180,184,188,192,196,200,204,208,212,216,220,224,230,234,238
    NUMA node2 CPU(s):    1,5,7,11,15,19,23,25,29,33,37,41,45,49,53,57,61,65,69,73,77,83,87,91,95,99
                          ,103,109,113,117,121,125,127,131,135,139,143,145,149,153,157,161,165,169,1
                          73,177,181,185,189,193,197,203,207,211,215,219,223,229,233,237
    NUMA node3 CPU(s):    3,9,13,17,21,27,31,35,39,43,47,51,55,59,63,67,71,75,79,81,85,89,93,97,101,
                          105,107,111,115,119,123,129,133,137,141,147,151,155,159,163,167,171,175,17
                          9,183,187,191,195,199,201,205,209,213,217,221,225,227,231,235,239
    Vulnerability Itlb multihit:    Not affected
    Vulnerability L1tf:             Not affected
    Vulnerability Mds:              Not affected
    Vulnerability Meltdown:         Not affected
    Vulnerability Mmio stale data:  Not affected
    Vulnerability Retbleed:         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, PBRSB-eIBRS SW
                                    sequence
    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     5.6M   12 Data              1     64        1             64
      L1i       32K     3.8M    8 Instruction       1     64        1             64
      L2         2M     240M   16 Unified           2   2048        1             64
      L3       300M     600M   20 Unified           3 245760        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:
    0,4,8,12,16,20,24,28,32,36,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102,106,108,112,116,120,124,128,132
    ,136,140,144,148,152,156,162,166,170,174,178,182,186,190,194,198,202,206,210,214,218,222,226,228,232,236
    node 0 size: 257485 MB
    node 0 free: 256400 MB
    node 1 cpus:
    2,6,10,14,18,22,26,30,34,38,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,100,104,110,114,118,122,126,130,13
    4,138,142,146,150,154,158,160,164,168,172,176,180,184,188,192,196,200,204,208,212,216,220,224,230,234,238
    node 1 size: 257998 MB
    node 1 free: 256661 MB
```

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Platform Notes (Continued)

```
   node 2 cpus:
   1,5,7,11,15,19,23,25,29,33,37,41,45,49,53,57,61,65,69,73,77,83,87,91,95,99,103,109,113,117,121,125,127,131,
   135,139,143,145,149,153,157,161,165,169,173,177,181,185,189,193,197,203,207,211,215,219,223,229,233,237
   node 2 size: 258032 MB
   node 2 free: 245947 MB
   node 3 cpus:
   3,9,13,17,21,27,31,35,39,43,47,51,55,59,63,67,71,75,79,81,85,89,93,97,101,105,107,111,115,119,123,129,133,1
   37,141,147,151,155,159,163,167,171,175,179,183,187,191,195,199,201,205,209,213,217,221,225,227,231,235,239
   node 3 size: 257994 MB
   node 3 free: 256918 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:       1056267160 kB


   --------------------------------------------------------------
10. who -r
   run-level 3 Nov 9 11:22


   --------------------------------------------------------------
11. Systemd service manager version: systemd 249 (249.16+suse.171.gdad0071f15)
   Default Target  Status
   multi-user      running


   --------------------------------------------------------------
12. Services, from systemctl list-unit-files
   STATE             UNIT FILES
   enabled           YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager firewalld getty@
                     irqbalance issue-generator kbdsettings klog lvm2-monitor nscd nvmefc-boot-connections
                     postfix purge-kernels rollback rsyslog smartd sshd systemd-pstore wicked wickedd-auto4
                     wickedd-dhcp4 wickedd-dhcp6 wickedd-nanny
   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 ebtables exchange-bmc-os-info gpm
                     grub2-once haveged haveged-switch-root ipmi ipmievd issue-add-ssh-keys kexec-load lunmask
                     man-db-create multipathd nfs nfs-blkmap nvmf-autoconnect 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
                     vncserver@
   indirect          wickedd


   --------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150500.53-default
   root=UUID=82355f4d-2e04-4782-abe6-e74fd4ec4ef7
   splash=silent
   mitigations=auto
   quiet
   security=apparmor


   --------------------------------------------------------------
14. cpupower frequency-info
   analyzing CPU 0:
     Unable to determine current policy
```

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Hardware Availability: Feb-2024
Software Availability: Jul-2023

Platform Notes (Continued)

```
      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
      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 SP5

    ----------------------------------------------------------
    19. Disk information
    SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-ic2023.x
      Filesystem     Type   Size  Used Avail Use% Mounted on
      tmpfs          tmpfs  130G  5.4G  125G   5% /mnt/ramdisk


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

(Continued on next page)

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CPU2017 License: 6573
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Test Date: Nov-2023
Hardware Availability: Feb-2024
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Platform Notes (Continued)

```
   ----------------------------------------------------------
   21. dmidecode
     Additional information from dmidecode 3.4 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 HMCG94AGBRA181N 64 GB 2 rank 5600


   ----------------------------------------------------------
   22. BIOS
   (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:      Dell Inc.
     BIOS Version:     1.9.11
     BIOS Date:        10/26/2023
     BIOS Revision:    1.9
```

Compiler Version Notes

```
==============================================================================
C             | 519.lbm_r(base, peak) 538.imagick_r(base, peak) 544.nab_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++           | 508.namd_r(base, peak) 510.parest_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C        | 511.povray_r(base, peak) 526.blender_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
C++, C, Fortran | 507.cactuBSSN_r(base, peak)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------


==============================================================================
Fortran       | 503.bwaves_r(base, peak) 549.fotonik3d_r(base, peak) 554.roms_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
```

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Compiler Version Notes (Continued)

```
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------

==============================================================================
Fortran, C    | 521.wrf_r(base, peak) 527.cam4_r(base, peak)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.2.0 Build 20230622
Copyright (C) 1985-2023 Intel Corporation. All rights reserved.
------------------------------------------------------------------------------
```

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`

(Continued on next page)

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Base Portability Flags (Continued)

549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

Base Optimization Flags

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

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

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

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

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

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

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Peak 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`

Peak Portability Flags

```
Same as Base Portability Flags
```

Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

544.nab_r: `basepeak = yes`

C++ benchmarks:

508.namd_r: `basepeak = yes`

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

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Peak Optimization Flags (Continued)

Fortran benchmarks:

503.bwaves_r: `basepeak = yes`

549.fotonik3d_r: `basepeak = yes`

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

Benchmarks using both Fortran and C:

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

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`
`-mprefer-vector-width=512 -ljemalloc`
`-L/usr/local/jemalloc64-5.0.1/lib`

526.blender_r: `basepeak = yes`

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

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.html
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.6.html

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You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2023p2-official-linux64.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.6.xml

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