# SPEC CPU®2017 Floating Point Rate Result

## Dell Inc.

$SPECrate^{®}2017\_fp\_base = $   939

PowerEdge C6620 (Intel Xeon Platinum 8480+)

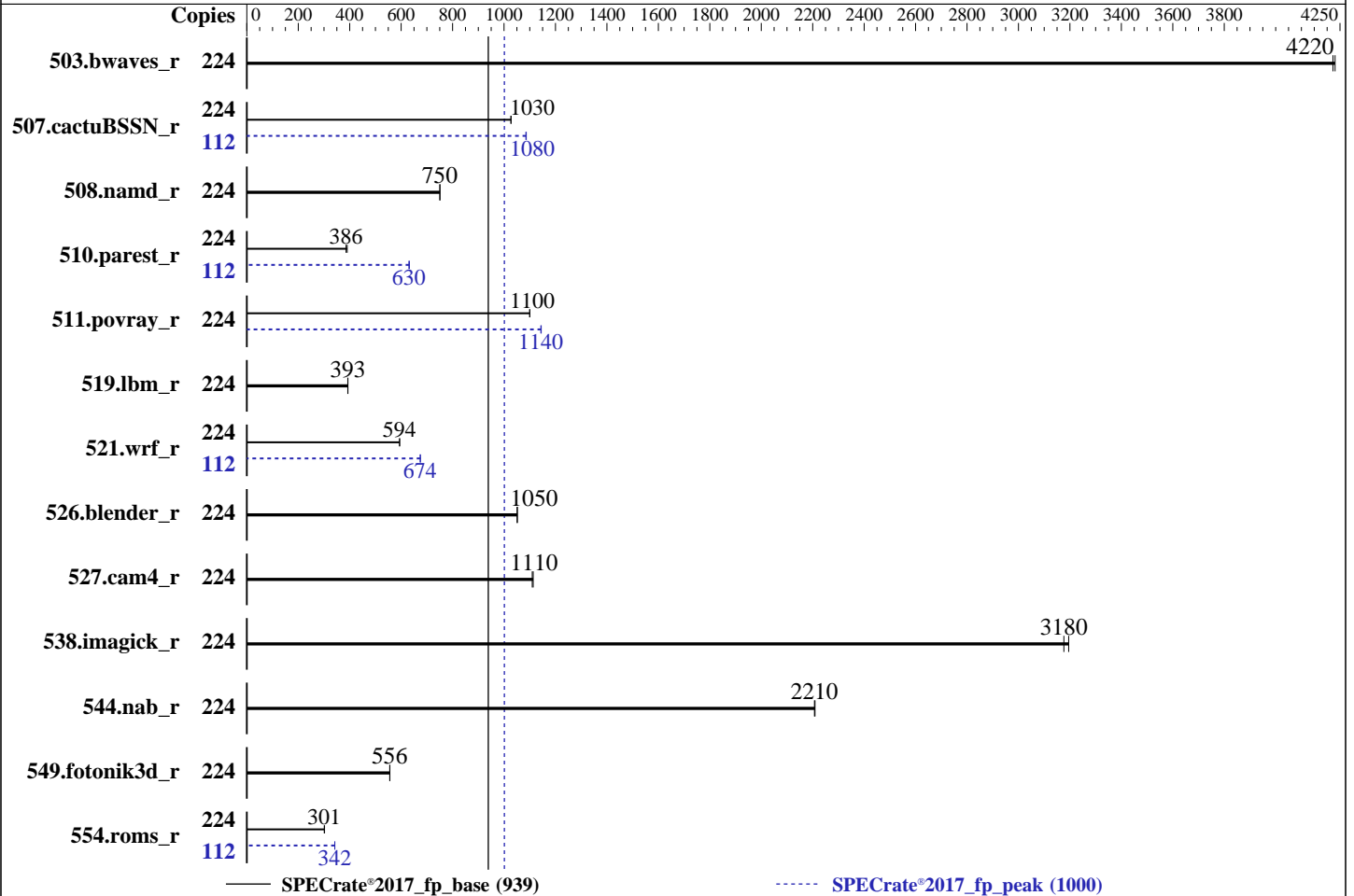$SPECrate^{®}2017\_fp\_peak = 1000$

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

**Test Date:** May-2023
**Hardware Availability:** Feb-2023
**Software Availability:** Dec-2022

| Benchmark | Copies | Base | Peak |
|---|---|---|---|
| 503.bwaves_r | 224 | 4220 | |
| 507.cactuBSSN_r | 224 | 1030 | |
| | 112 | | 1080 |
| 508.namd_r | 224 | 750 | |
| 510.parest_r | 224 | 386 | |
| | 112 | | 630 |
| 511.povray_r | 224 | 1100 | |
| | 224 | | 1140 |
| 519.lbm_r | 224 | 393 | |
| 521.wrf_r | 224 | 594 | |
| | 112 | | 674 |
| 526.blender_r | 224 | 1050 | |
| 527.cam4_r | 224 | 1110 | |
| 538.imagick_r | 224 | 3180 | |
| 544.nab_r | 224 | 2210 | |
| 549.fotonik3d_r | 224 | 556 | |
| 554.roms_r | 224 | 301 | |
| | 112 | | 342 |

SPECrate®2017_fp_base (939)    SPECrate®2017_fp_peak (1000)

## Hardware

CPU Name: Intel Xeon Platinum 8480+
 Max MHz: 3800
 Nominal: 2000
Enabled: 112 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: 105 MB I+D on chip per chip
 Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 120 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 1.3.2 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.

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

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SPECrate®2017_fp_peak = 1000

| | |
|---|---|
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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 | 224 | **532** | **4220** | 531 | 4230 | | | 224 | **532** | **4220** | 531 | 4230 | | |
| 507.cactuBSSN_r | 224 | **276** | **1030** | 276 | 1030 | | | 112 | **131** | **1080** | 130 | 1090 | | |
| 508.namd_r | 224 | 283 | 751 | **284** | **750** | | | 224 | 283 | 751 | **284** | **750** | | |
| 510.parest_r | 224 | **1519** | **386** | 1501 | 390 | | | 112 | **465** | **630** | 464 | 632 | | |
| 511.povray_r | 224 | 476 | 1100 | **476** | **1100** | | | 224 | 457 | 1140 | **458** | **1140** | | |
| 519.lbm_r | 224 | 601 | 393 | **601** | **393** | | | 224 | 601 | 393 | **601** | **393** | | |
| 521.wrf_r | 224 | **845** | **594** | 845 | 594 | | | 112 | 372 | 675 | **372** | **674** | | |
| 526.blender_r | 224 | **325** | **1050** | 324 | 1050 | | | 224 | **325** | **1050** | 324 | 1050 | | |
| 527.cam4_r | 224 | **353** | **1110** | 352 | 1110 | | | 224 | **353** | **1110** | 352 | 1110 | | |
| 538.imagick_r | 224 | 174 | 3200 | **175** | **3180** | | | 224 | 174 | 3200 | **175** | **3180** | | |
| 544.nab_r | 224 | **171** | **2210** | 171 | 2210 | | | 224 | **171** | **2210** | 171 | 2210 | | |
| 549.fotonik3d_r | 224 | 1570 | 556 | **1571** | **556** | | | 224 | 1570 | 556 | **1571** | **556** | | |
| 554.roms_r | 224 | 1178 | 302 | **1182** | **301** | | | 112 | 520 | 342 | **521** | **342** | | |
| SPECrate®2017_fp_base = | | **939** | | | | | | | | | | | | |
| SPECrate®2017_fp_peak = | | **1000** | | | | | | | | | | | | |

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)**

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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 120 GB ramdisk created with the cmd: "mount -t tmpfs -o size=120G 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 : 4-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  4 20:46:45 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)

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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
    20:46:45 up  4:31,  1 user,  load average: 147.88, 205.47, 215.35
    USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1     -                16:17    4:29m  1.35s  0.00s /bin/bash ./dell-run-speccpu.sh rate
   --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-VirtD=1 --define
   DL-BIOS-SNC=4 --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) 4124406
   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) 4124406
   virtual memory          (kbytes, -v) unlimited
   file locks                      (-x) unlimited

   -----------------------------------------------------------
 5. sysinfo process ancestry
  /usr/lib/systemd/systemd linux --switched-root --system --deserialize 34
  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-4.inc --define DL-BIOS-adddcD=1
    --define DL-BIOS-VirtD=1 --define DL-BIOS-SNC=4 --output_format csv,html,pdf,txt
  /bin/bash ./dell-run-speccpu.sh rate --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1
    --define DL-BIOS-VirtD=1 --define DL-BIOS-SNC=4 --output_format csv,html,pdf,txt
  runcpu --nobuild --action validate --define default-platform-flags --define numcopies=224 -c
    ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=112 --define physicalfirst
    --define invoke_with_interleave --define drop_caches --tune base,peak -o all --iterations 2 --define
```

*(Continued on next page)*

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## Platform Notes (Continued)

```
    DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-VirtD=1 --define DL-BIOS-SNC=4
    --output_format csv,html,pdf,txt fprate
 runcpu --nobuild --action validate --define default-platform-flags --define numcopies=224 --configfile
    ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=112 --define physicalfirst
    --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --iterations 2
    --define DL-BIOSinc=Dell-BIOS_Xeon-4.inc --define DL-BIOS-adddcD=1 --define DL-BIOS-VirtD=1 --define
    DL-BIOS-SNC=4 --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 8480+
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 8
    microcode       : 0x2b0001b0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 56
    siblings        : 112
    2 physical ids (chips)
    224 processors (hardware threads)
    physical id 0: core ids 0-55
    physical id 1: core ids 0-55
    physical id 0: apicids 0-111
    physical id 1: apicids 128-239
  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):                 224
  On-line CPU(s) list:    0-223
  Vendor ID:              GenuineIntel
  Model name:             Intel(R) Xeon(R) Platinum 8480+
  CPU family:             6
  Model:                  143
  Thread(s) per core:     2
  Core(s) per socket:     56
  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
```

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## Platform Notes (Continued)

```
                          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:             5.3 MiB (112 instances)
   L1i cache:             3.5 MiB (112 instances)
   L2 cache:              224 MiB (112 instances)
   L3 cache:              210 MiB (2 instances)
   NUMA node(s):          8
   NUMA node0 CPU(s):     0,4,8,12,16,20,24,28,32,36,40,44,48,52,112,116,120,124,128,132,136,140,144
                          ,148,152,156,160,164
   NUMA node1 CPU(s):     56,60,64,68,72,76,80,84,88,92,96,100,104,108,168,172,176,180,184,188,192,1
                          96,200,204,208,212,216,220
   NUMA node2 CPU(s):     2,6,10,14,18,22,26,30,34,38,42,46,50,54,114,118,122,126,130,134,138,142,14
                          6,150,154,158,162,166
   NUMA node3 CPU(s):     58,62,66,70,74,78,82,86,90,94,98,102,106,110,170,174,178,182,186,190,194,1
                          98,202,206,210,214,218,222
   NUMA node4 CPU(s):     1,5,9,13,17,21,25,29,33,37,41,45,49,53,113,117,121,125,129,133,137,141,145
                          ,149,153,157,161,165
   NUMA node5 CPU(s):     57,61,65,69,73,77,81,85,89,93,97,101,105,109,169,173,177,181,185,189,193,1
                          97,201,205,209,213,217,221
   NUMA node6 CPU(s):     3,7,11,15,19,23,27,31,35,39,43,47,51,55,115,119,123,127,131,135,139,143,14
                          7,151,155,159,163,167
   NUMA node7 CPU(s):     59,63,67,71,75,79,83,87,91,95,99,103,107,111,171,175,179,183,187,191,195,1
                          99,203,207,211,215,219,223
   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     5.3M   12 Data             1     64        1             64
     L1i       32K     3.5M    8 Instruction      1     64        1             64
     L2         2M     224M   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: 0,4,8,12,16,20,24,28,32,36,40,44,48,52,112,116,120,124,128,132,136,140,144,148,152,156,160,164
   node 0 size: 128397 MB
   node 0 free: 126024 MB
   node 1 cpus:
 56,60,64,68,72,76,80,84,88,92,96,100,104,108,168,172,176,180,184,188,192,196,200,204,208,212,216,220
   node 1 size: 129016 MB
   node 1 free: 128152 MB
   node 2 cpus:
 2,6,10,14,18,22,26,30,34,38,42,46,50,54,114,118,122,126,130,134,138,142,146,150,154,158,162,166
   node 2 size: 129016 MB
   node 2 free: 128140 MB
```

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## Platform Notes (Continued)

```
   node 3 cpus:
   58,62,66,70,74,78,82,86,90,94,98,102,106,110,170,174,178,182,186,190,194,198,202,206,210,214,218,222
   node 3 size: 129016 MB
   node 3 free: 128155 MB
   node 4 cpus: 1,5,9,13,17,21,25,29,33,37,41,45,49,53,113,117,121,125,129,133,137,141,145,149,153,157,161,165
   node 4 size: 128982 MB
   node 4 free: 128132 MB
   node 5 cpus:
   57,61,65,69,73,77,81,85,89,93,97,101,105,109,169,173,177,181,185,189,193,197,201,205,209,213,217,221
   node 5 size: 129016 MB
   node 5 free: 119357 MB
   node 6 cpus:
   3,7,11,15,19,23,27,31,35,39,43,47,51,55,115,119,123,127,131,135,139,143,147,151,155,159,163,167
   node 6 size: 129016 MB
   node 6 free: 128163 MB
   node 7 cpus:
   59,63,67,71,75,79,83,87,91,95,99,103,107,111,171,175,179,183,187,191,195,199,203,207,211,215,219,223
   node 7 size: 128660 MB
   node 7 free: 127783 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


   ---------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1055872336 kB


   ---------------------------------------------------------------
10. who -r
   run-level 3 May 4 16:16


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


   ---------------------------------------------------------------
12. Services, from systemctl list-unit-files
   STATE           UNIT FILES
   enabled         YaST2-Firstboot YaST2-Second-Stage apparmor auditd cron display-manager firewalld getty@
                   haveged irqbalance issue-generator kbdsettings kdump kdump-early klog lvm2-monitor nscd
                   nvmefc-boot-connections postfix purge-kernels rollback rsyslog smartd sshd 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-switch-root ipmi ipmievd issue-add-ssh-keys kexec-load lunmask
                   man-db-create multipathd nfs nfs-blkmap nvmf-autoconnect rdisc rpcbind rpmconfigcheck
                   rsyncd serial-getty@ smartd_generate_opts snmpd snmptrapd systemd-boot-check-no-failures
                   systemd-network-generator systemd-sysext systemd-time-wait-sync systemd-timesyncd
   indirect        wickedd


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

**(Continued on next page)**

## Dell Inc.

PowerEdge C6620 (Intel Xeon Platinum 8480+)

$SPECrate®2017\_fp\_base = $ 939

$SPECrate®2017\_fp\_peak = 1000$

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

**Test Date:** May-2023
**Hardware Availability:** Feb-2023
**Software Availability:** Dec-2022

## Platform Notes (Continued)

```
13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=16362246-1892-42a0-9119-ef57f22891af
    linux
    splash=silent
    resume=/dev/disk/by-uuid/c0830e3c-adf5-4663-81bb-2d24c777d423
    mitigations=auto
    quiet
    security=apparmor
    crashkernel=309M,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
    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

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

(Continued on next page)

## Dell Inc.

PowerEdge C6620 (Intel Xeon Platinum 8480+)

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**CPU2017 License:** 6573
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**Test Date:**        May-2023
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**Software Availability:**  Dec-2022

## Platform Notes (Continued)

```
  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  120G  4.2G  116G   4% /mnt/ramdisk

  --------------------------------------------------------------
  20. /sys/devices/virtual/dmi/id
      Vendor:         Dell Inc.
      Product:        PowerEdge C6620
      Product Family: PowerEdge
      Serial:         SC662L1

  --------------------------------------------------------------
  21. dmidecode
    Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you interpret this section.
    The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
    determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
    "DMTF SMBIOS" standard.
    Memory:
      16x 00AD063200AD HMCG94MEBRA109N 64 GB 2 rank 4800


  --------------------------------------------------------------
  22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
      BIOS Vendor:       Dell Inc.
      BIOS Version:      1.3.2
      BIOS Date:         03/28/2023
      BIOS Revision:     1.3
```

## 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
Copyright (C) 1985-2022 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 2023.0.0 Build 20221201
Copyright (C) 1985-2022 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 2023.0.0 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.
------------------------------------------------------------------------------
```

**(Continued on next page)**

# SPEC CPU®2017 Floating Point Rate Result

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## Dell Inc.

PowerEdge C6620 (Intel Xeon Platinum 8480+)

$\text{SPECrate}^{\circledR}\text{2017\_fp\_base} = 939$

$\text{SPECrate}^{\circledR}\text{2017\_fp\_peak} = 1000$

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

**Test Date:** May-2023
**Hardware Availability:** Feb-2023
**Software Availability:** Dec-2022

## Compiler Version Notes (Continued)

```
==============================================================================
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
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        | 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
Copyright (C) 1985-2022 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 2023.0.0 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`

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`

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

# SPEC CPU®2017 Floating Point Rate Result

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## Dell Inc.

PowerEdge C6620 (Intel Xeon Platinum 8480+)

SPECrate®2017_fp_base = 939

SPECrate®2017_fp_peak = 1000

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

**Test Date:** May-2023
**Hardware Availability:** Feb-2023
**Software Availability:** Dec-2022

## 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 -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

**(Continued on next page)**

## Dell Inc.

PowerEdge C6620 (Intel Xeon Platinum 8480+)

SPECrate®2017_fp_base =   939

SPECrate®2017_fp_peak = 1000

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

**Test Date:**               May-2023
**Hardware Availability:** Feb-2023
**Software Availability:**   Dec-2022

## Base Optimization Flags (Continued)

Benchmarks using both C and C++ (continued):
```
-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
```

## 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

**(Continued on next page)**

## Dell Inc.

PowerEdge C6620 (Intel Xeon Platinum 8480+)

SPECrate®2017_fp_base = 939

SPECrate®2017_fp_peak = 1000

**CPU2017 License:** 6573
**Test Sponsor:** Dell Inc.
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**Hardware Availability:** Feb-2023
**Software Availability:** Dec-2022

# Peak Optimization Flags (Continued)

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`

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`

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# SPEC CPU®2017 Floating Point Rate Result

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## Dell Inc.

PowerEdge C6620 (Intel Xeon Platinum 8480+)

SPECrate®2017_fp_base =   939

SPECrate®2017_fp_peak = 1000

**CPU2017 License:** 6573
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**Test Date:** May-2023
**Hardware Availability:** Feb-2023
**Software Availability:** Dec-2022

# Peak Optimization Flags (Continued)

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-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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