SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge XR7620 (Intel Xeon Gold 6448Y)

$SPECrate®2017\_fp\_base = 688$

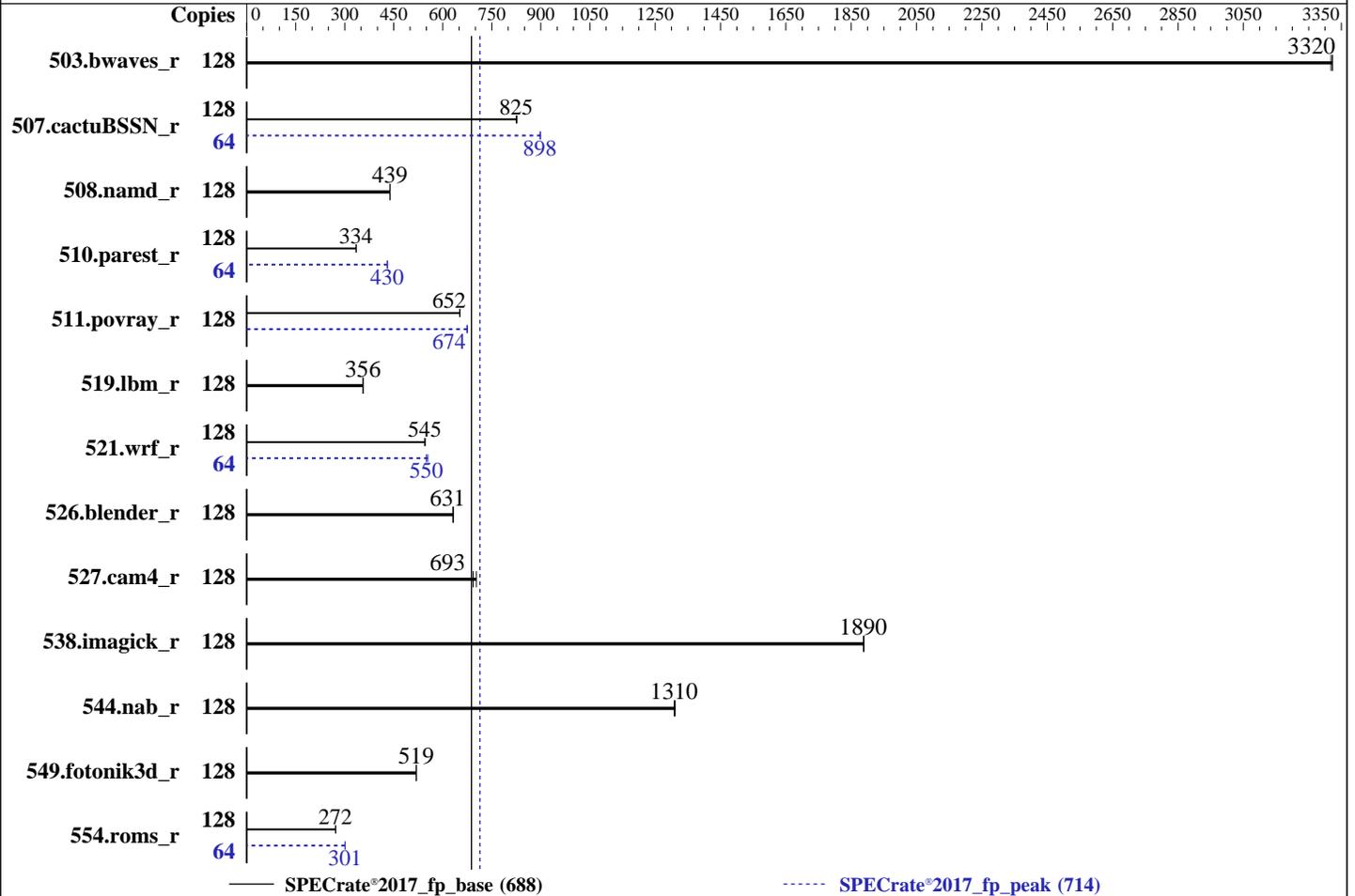$SPECrate®2017\_fp\_peak = 714$

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

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

Copies		
503.bwaves_r	128	3320
507.cactuBSSN_r	128	825
	64	898
508.namd_r	128	439
510.parest_r	128	334
	64	430
511.povray_r	128	652
	128	674
519.lbm_r	128	356
521.wrf_r	128	545
	64	550
526.blender_r	128	631
527.cam4_r	128	693
538.imagick_r	128	1890
544.nab_r	128	1310
549.fotonik3d_r	128	519
554.roms_r	128	272
	64	301

SPECrate®2017_fp_base (688) ------- SPECrate®2017_fp_peak (714)

Hardware

CPU Name: Intel Xeon Gold 6448Y
  Max MHz: 4100
  Nominal: 2100
Enabled: 64 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: 60 MB I+D on chip per chip
  Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-4800B-R)
Storage: 80 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 1.0.1 released Mar-2023
File System: tmpfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 64-bit
Other: jemalloc memory allocator V5.0.1
Power Management: BIOS and OS set to prefer performance
  at the cost of additional power usage.

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Results Table

Benchmark	\<Base> Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	\<Peak> Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	128	386	3320	**387**	**3320**			128	386	3320	**387**	**3320**		
507.cactuBSSN_r	128	196	827	**196**	**825**			64	**90.3**	**898**	90.1	900		
508.namd_r	128	**277**	**439**	277	439			128	**277**	**439**	277	439		
510.parest_r	128	999	335	**1001**	**334**			64	**389**	**430**	388	431		
511.povray_r	128	**459**	**652**	458	653			128	442	675	**443**	**674**		
519.lbm_r	128	**379**	**356**	379	356			128	**379**	**356**	379	356		
521.wrf_r	128	525	546	**526**	**545**			64	**261**	**550**	259	554		
526.blender_r	128	**309**	**631**	308	632			128	**309**	**631**	308	632		
527.cam4_r	128	319	703	**323**	**693**			128	319	703	**323**	**693**		
538.imagick_r	128	**169**	**1890**	169	1890			128	**169**	**1890**	169	1890		
544.nab_r	128	**165**	**1310**	164	1310			128	**165**	**1310**	164	1310		
549.fotonik3d_r	128	**961**	**519**	961	519			128	**961**	**519**	961	519		
554.roms_r	128	747	272	**749**	**272**			64	**338**	**301**	338	301		

SPECrate®2017_fp_base =	**688**
SPECrate®2017_fp_peak =	**714**

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 80 GB ramdisk created with the cmd: "mount -t tmpfs -o size=80G 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 18 02:20:05 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/lp)
    x86_64 x86_64 x86_64 GNU/Linux


  ------------------------------------------------------------
  2. w
    02:20:05 up  5:59,  1 user,  load average: 79.21, 115.63, 122.79
    USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
    root     tty1     -                20:21    5:59m  1.26s  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=2 --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) 4124455
    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) 4124455
    virtual memory          (kbytes, -v) unlimited
    file locks                      (-x) unlimited


  ------------------------------------------------------------
  5. sysinfo process ancestry
   /usr/lib/systemd/systemd --switched-root --system --deserialize 34
   login -- root
   -bash
   /bin/bash ./DELL_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=2 --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=2 --output_format csv,html,pdf,txt
   runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 -c
     ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --define physicalfirst
     --define invoke_with_interleave --define drop_caches --tune base,peak -o all --iterations 2 --define
```

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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=2
    --output_format csv,html,pdf,txt fprate
  runcpu --nobuild --action validate --define default-platform-flags --define numcopies=128 --configfile
    ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=64 --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=2 --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) Gold 6448Y
    vendor_id       : GenuineIntel
    cpu family      : 6
    model           : 143
    stepping        : 8
    microcode       : 0x2b0001b0
    bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
    cpu cores       : 32
    siblings        : 64
    2 physical ids (chips)
    128 processors (hardware threads)
    physical id 0: core ids 0-31
    physical id 1: core ids 0-31
    physical id 0: apicids 0-63
    physical id 1: apicids 128-191
  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):                   128
  On-line CPU(s) list:      0-127
  Vendor ID:                GenuineIntel
  Model name:               Intel(R) Xeon(R) Gold 6448Y
  CPU family:               6
  Model:                    143
  Thread(s) per core:       2
  Core(s) per socket:       32
  Socket(s):                2
  Stepping:                 8
  BogoMIPS:                 4200.00
  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:          3 MiB (64 instances)
  L1i cache:          2 MiB (64 instances)
  L2 cache:           128 MiB (64 instances)
  L3 cache:           120 MiB (2 instances)
  NUMA node(s):       4
  NUMA node0 CPU(s):  0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,10
                      0,104,108,112,116,120,124
  NUMA node1 CPU(s):  2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,1
                      02,106,110,114,118,122,126
  NUMA node2 CPU(s):  1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,10
                      1,105,109,113,117,121,125
  NUMA node3 CPU(s):  3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95,99,1
                      03,107,111,115,119,123,127
  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       3M   12 Data            1     64      1          64
     L1i      32K       2M    8 Instruction     1     64      1          64
     L2        2M     128M   16 Unified         2   2048      1          64
     L3       60M     120M   15 Unified         3  65536      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:
  0,4,8,12,16,20,24,28,32,36,40,44,48,52,56,60,64,68,72,76,80,84,88,92,96,100,104,108,112,116,120,124
  node 0 size: 257420 MB
  node 0 free: 255441 MB
  node 1 cpus:
  2,6,10,14,18,22,26,30,34,38,42,46,50,54,58,62,66,70,74,78,82,86,90,94,98,102,106,110,114,118,122,126
  node 1 size: 258039 MB
  node 1 free: 248190 MB
  node 2 cpus:
  1,5,9,13,17,21,25,29,33,37,41,45,49,53,57,61,65,69,73,77,81,85,89,93,97,101,105,109,113,117,121,125
  node 2 size: 258039 MB
  node 2 free: 257076 MB
  node 3 cpus:
  3,7,11,15,19,23,27,31,35,39,43,47,51,55,59,63,67,71,75,79,83,87,91,95,99,103,107,111,115,119,123,127
  node 3 size: 257638 MB
  node 3 free: 256499 MB
  node distances:
  node   0   1   2   3
    0:  10  12  21  21
```

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Platform Notes (Continued)

```
      1:  12  10  21  21
      2:  21  21  10  12
      3:  21  21  12  10


    ------------------------------------------------------------
 9. /proc/meminfo
    MemTotal:       1055885796 kB


    ------------------------------------------------------------
10. who -r
    run-level 3 May 17 20:21


    ------------------------------------------------------------
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 bluetooth cron display-manager
                    firewalld getty@ haveged irqbalance iscsi issue-generator kbdsettings kdump kdump-early
                    klog libvirtd lvm2-monitor nscd nvmefc-boot-connections oracle postfix purge-kernels
                    rollback rsyslog smartd sshd wicked wickedd-auto4 wickedd-dhcp4 wickedd-dhcp6
                    wickedd-nanny xencommons
    enabled-runtime systemd-remount-fs
    disabled        accounts-daemon amavis apache2 apache2@ appstream-sync-cache autofs autoyast-initscripts
                    bgpd blk-availability bluetooth-mesh boot-sysctl ca-certificates chrony-wait chronyd
                    clamav-milter clamd console-getty cups cups-browsed ddclient debug-shell dhcpd dhcpd6
                    dhcrelay dhcrelay6 dirsrv@ dnsmasq ebtables exchange-bmc-os-info fetchmail freshclam gpm
                    grub2-once haveged-switch-root hwloc-dump-hwdata instsvcdrv ipmi ipmievd iscsi-init iscsid
                    iscsiuio isisd issue-add-ssh-keys kexec-load ksm kvm_stat libvirt-guests lunmask
                    man-db-create mariadb mariadb@ multipathd named nfs nfs-blkmap nfs-server nfsserver nmb
                    nvmf-autoconnect ospf6d ospfd ostree-remount racoon racoon-setkey radvd rarpd@ rdisc ripd
                    ripngd rpcbind rpmconfigcheck rsyncd rtkit-daemon sapconf serial-getty@
                    smartd_generate_opts smb snmpd snmptrapd spamd spampd speech-dispatcherd squid srp_daemon
                    srp_daemon_port@ strongswan strongswan-starter svnserve sysstat
                    systemd-boot-check-no-failures systemd-network-generator systemd-nspawn@ systemd-sysext
                    systemd-time-wait-sync systemd-timesyncd tcsd udisks2 upower virtinterfaced virtnetworkd
                    virtnodedevd virtnwfilterd virtproxyd virtqemud virtsecretd virtstoraged virtxend vsftpd
                    winbind xen-dom0-modules xen-init-dom0 xen-qemu-dom0-disk-backend xen-watchdog xenconsoled
                    xendomains xenstored zebra
    indirect        pcscd uuidd virtlockd virtlogd wickedd


    ------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=35458c4c-5e83-48b0-808c-9f9263c843b9
    splash=silent
    mitigations=auto
    quiet
    security=apparmor
    crashkernel=320M,high
    crashkernel=72M,low


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

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Platform Notes (Continued)

```
       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                    20
  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  80G   4.3G  76G   6% /mnt/ramdisk


       ------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge XR7620
    Product Family: PowerEdge
    Serial:         DULAC01
```

(Continued on next page)

Dell Inc.

PowerEdge XR7620 (Intel Xeon Gold 6448Y)

SPECrate®2017_fp_base = 688

SPECrate®2017_fp_peak = 714

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

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

Platform Notes (Continued)

```
     ---------------------------------------------------------------
  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:
      14x 00CE00B300CE M321R8GA0BB0-CQKEG 64 GB 2 rank 4800
      2x 00CE069D00CE M321R8GA0BB0-CQKVE 64 GB 2 rank 4800


     ---------------------------------------------------------------
  22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:       Dell Inc.
    BIOS Version:      1.0.1
    BIOS Date:         03/09/2023
    BIOS Revision:     1.0
```

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.
------------------------------------------------------------------------------


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

(Continued on next page)

SPEC CPU®2017 Floating Point Rate Result

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Dell Inc.

PowerEdge XR7620 (Intel Xeon Gold 6448Y)

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

Compiler Version Notes (Continued)

```
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`

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`

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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
```

SPEC CPU®2017 Floating Point Rate Result

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

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

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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Software Availability: Dec-2022

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-ic2023-official-linux64.html
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.4.html

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

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You can also download the XML flags sources by saving the following links:

http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.4.xml

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