SPEC CPU®2017 Floating Point Rate Result

Dell Inc.

PowerEdge MX750c (Intel Xeon Gold 6330N, 2.20 GHz)

SPECrate®2017_fp_base = 398

SPECrate®2017_fp_peak = 419

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

Test Date: Jul-2023
Hardware Availability: Apr-2021
Software Availability: Dec-2022

Benchmark	Copies	Base	Peak
503.bwaves_r	112	1940	
507.cactuBSSN_r	112 / 56	460	499
508.namd_r	112	258	
510.parest_r	112 / 56	175	222
511.povray_r	112	395	431
519.lbm_r	112	225	
521.wrf_r	112 / 56	305	314
526.blender_r	112	404	
527.cam4_r	112	407	
538.imagick_r	112	1040	
544.nab_r	112	729	789
549.fotonik3d_r	112	306	
554.roms_r	112 / 56	151	175

SPECrate®2017_fp_base (398)
SPECrate®2017_fp_peak (419)

Hardware

CPU Name: Intel Xeon Gold 6330N
 Max MHz: 3400
 Nominal: 2200
Enabled: 56 cores, 2 chips, 2 threads/core
Orderable: 1,2 chips
Cache L1: 32 KB I + 48 KB D on chip per core
 L2: 1.25 MB I+D on chip per core
 L3: 42 MB I+D on chip per chip
 Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC4-3200AA-R, running at 2666)
Storage: 125 GB on tmpfs
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4
 5.14.21-150400.22-default
Compiler: C/C++: Version 2023.0 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2023.0 of Intel Fortran Compiler for Linux;
Parallel: No
Firmware: Version 1.10.2 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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Dell Inc.

SPECrate®2017_fp_base = 398

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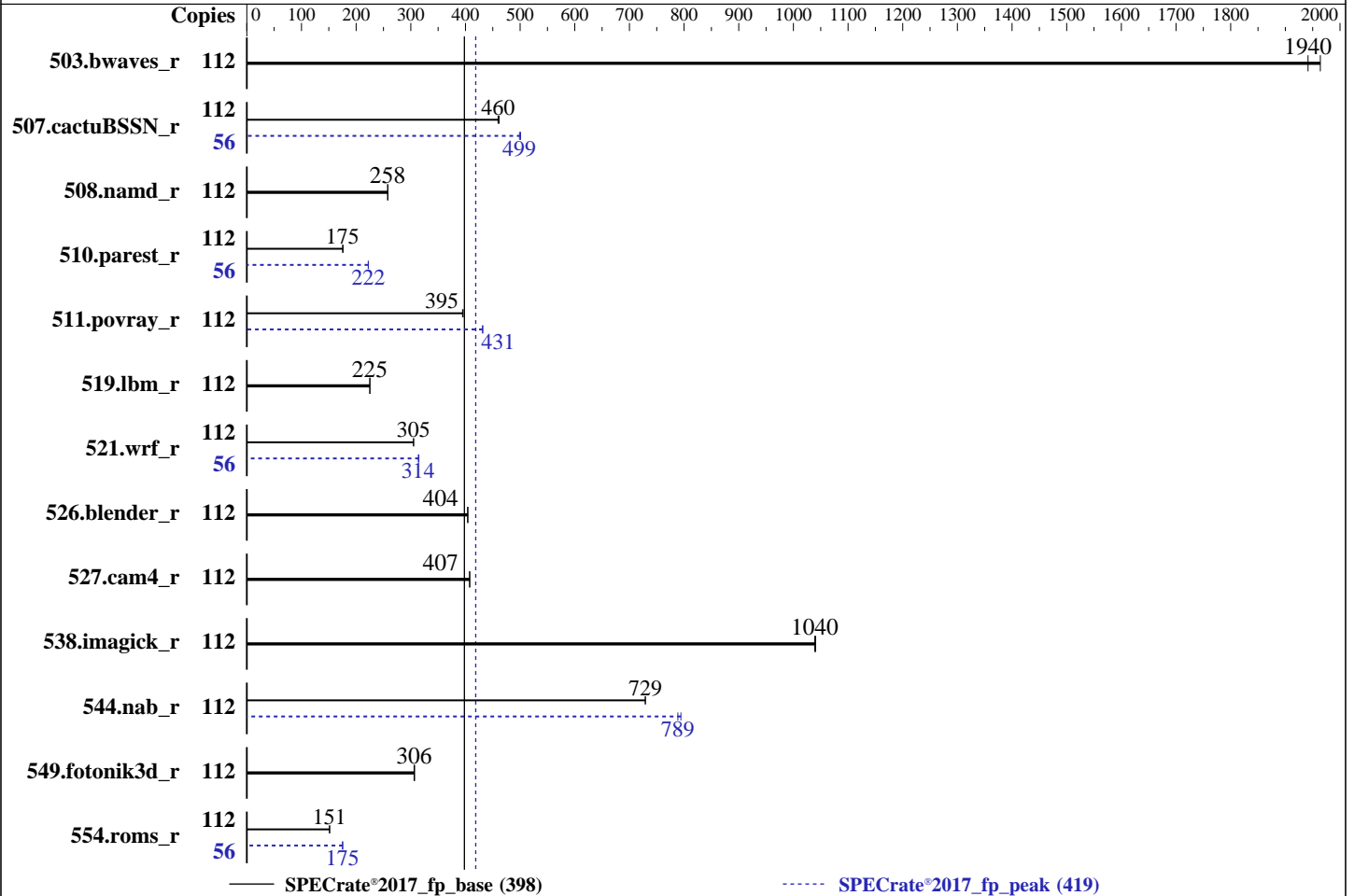
SPECrate®2017_fp_peak = 419

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

Benchmark	Base Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
503.bwaves_r	112	572	1960	**578**	**1940**			112	572	1960	**578**	**1940**		
507.cactuBSSN_r	112	307	461	**308**	**460**			56	142	501	**142**	**499**		
508.namd_r	112	412	258	**413**	**258**			112	412	258	**413**	**258**		
510.parest_r	112	**1672**	**175**	1664	176			56	**659**	**222**	659	222		
511.povray_r	112	661	396	**663**	**395**			112	606	432	**607**	**431**		
519.lbm_r	112	**525**	**225**	524	225			112	**525**	**225**	524	225		
521.wrf_r	112	822	305	**822**	**305**			56	398	315	**400**	**314**		
526.blender_r	112	422	405	**422**	**404**			112	422	405	**422**	**404**		
527.cam4_r	112	480	408	**481**	**407**			112	480	408	**481**	**407**		
538.imagick_r	112	268	1040	**268**	**1040**			112	268	1040	**268**	**1040**		
544.nab_r	112	**259**	**729**	258	729			112	237	794	**239**	**789**		
549.fotonik3d_r	112	**1426**	**306**	1422	307			112	**1426**	**306**	1422	307		
554.roms_r	112	1174	152	**1177**	**151**			56	507	176	**509**	**175**		
SPECrate®2017_fp_base =			**398**										
SPECrate®2017_fp_peak =			**419**										

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 125 GB ramdisk created with the cmd: "mount -t tmpfs -o size=125G tmpfs /mnt/ramdisk"
```

Platform Notes

```
BIOS settings:
        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 Wed Jul 19 21:46:53 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 (249.11+suse.124.g2bc0b2c447)
12. Services, from systemctl list-unit-files
13. Linux kernel boot-time arguments, from /proc/cmdline
14. cpupower frequency-info
15. sysctl
16. /sys/kernel/mm/transparent_hugepage
```

(Continued on next page)

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Platform Notes (Continued)

```
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
    21:46:53 up  5:39,  1 user,  load average: 80.77, 104.14, 108.03
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                16:08    5:37m  2.25s  0.00s /bin/bash ./dell-run-specrate.sh
   --iterations 2 --output_format csv,html,pdf,txt -define Dell-BIOS-inc=Dell-BIOS_Xeon-3.inc

     ----------------------------------------------------------
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) 4124490
   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) 4124490
   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-specrate.sh --iterations 2 --output_format csv,html,pdf,txt -define
    Dell-BIOS-inc=Dell-BIOS_Xeon-3.inc
  /bin/bash ./dell-run-specrate.sh --iterations 2 --output_format csv,html,pdf,txt -define
    Dell-BIOS-inc=Dell-BIOS_Xeon-3.inc
  runcpu --nobuild --action validate --define default-platform-flags --define numcopies=112 -c
    ic2023.0-lin-core-avx512-rate-20221201.cfg --define smt-on --define cores=56 --define physicalfirst
    --define invoke_with_interleave --define drop_caches --tune base,peak -o all --iterations 2
    --output_format csv,html,pdf,txt -define Dell-BIOS-inc=Dell-BIOS_Xeon-3.inc fprate
  runcpu --nobuild --action validate --define default-platform-flags --define numcopies=112 --configfile
```

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Platform Notes (Continued)

```
   ic2023.0-lin-core-avx512-rate-20221201.cfg --define smt-on --define cores=56 --define physicalfirst
   --define invoke_with_interleave --define drop_caches --tune base,peak --output_format all --iterations 2
   --output_format csv,html,pdf,txt --define Dell-BIOS-inc=Dell-BIOS_Xeon-3.inc --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 6330N CPU @ 2.20GHz
   vendor_id        : GenuineIntel
   cpu family       : 6
   model            : 106
   stepping         : 6
   microcode        : 0xd000390
   bugs             : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores        : 28
   siblings         : 56
   2 physical ids (chips)
   112 processors (hardware threads)
   physical id 0: core ids 0-27
   physical id 1: core ids 0-27
   physical id 0: apicids 0-55
   physical id 1: apicids 128-183
  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):                  112
  On-line CPU(s) list:     0-111
  Vendor ID:               GenuineIntel
  Model name:              Intel(R) Xeon(R) Gold 6330N CPU @ 2.20GHz
  CPU family:              6
  Model:                   106
  Thread(s) per core:      2
  Core(s) per socket:      28
  Socket(s):               2
  Stepping:                6
  CPU max MHz:             3400.0000
  CPU min MHz:             800.0000
  BogoMIPS:                4400.00
  Flags:                   fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36
                           clflush dts acpi mmx fxsr sse sse2 ss ht tm pbe syscall nx pdpe1gb rdtscp
                           lm constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology
                           nonstop_tsc cpuid aperfmperf pni pclmulqdq dtes64 monitor ds_cpl smx est
                           tm2 ssse3 sdbg fma cx16 xtpr pdcm pcid dca sse4_1 sse4_2 x2apic movbe
                           popcnt tsc_deadline_timer aes xsave avx f16c rdrand lahf_lm abm
                           3dnowprefetch cpuid_fault epb cat_l3 invpcid_single intel_ppin ssbd mba
                           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
```

(Continued on next page)

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Platform Notes (Continued)

```
                              split_lock_detect wbnoinvd dtherm ida arat pln pts avx512vbmi umip pku
                              ospke avx512_vbmi2 gfni vaes vpclmulqdq avx512_vnni avx512_bitalg tme
                              avx512_vpopcntdq la57 rdpid fsrm md_clear pconfig flush_l1d
                              arch_capabilities
  L1d cache:                  2.6 MiB (56 instances)
  L1i cache:                  1.8 MiB (56 instances)
  L2 cache:                   70 MiB (56 instances)
  L3 cache:                   84 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
  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
  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
  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
  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     2.6M   12 Data            1    64        1             64
    L1i       32K     1.8M    8 Instruction    1    64        1             64
    L2       1.3M      70M   20 Unified         2  1024        1             64
    L3        42M      84M   12 Unified         3 57344        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
  node 0 size: 257360 MB
  node 0 free: 240799 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
  node 1 size: 258006 MB
  node 1 free: 237447 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
  node 2 size: 258040 MB
  node 2 free: 246468 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
  node 3 size: 257738 MB
  node 3 free: 246221 MB
  node distances:
  node   0   1   2   3
    0:  10  11  20  20
    1:  11  10  20  20
    2:  20  20  10  11
    3:  20  20  11  10


  --------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1055894196 kB
```

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Platform Notes (Continued)

```
    ----------------------------------------------------------
    10. who -r
      run-level 3 Jul 19 16:08


    ----------------------------------------------------------
    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
                       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 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


    ----------------------------------------------------------
    13. Linux kernel boot-time arguments, from /proc/cmdline
      BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
      root=UUID=acc9cea5-a1c4-496c-8316-c09929b114e8
      linux
      splash=silent
      resume=/dev/disk/by-uuid/fce4dd98-b060-4b64-9ca8-09b03e4c6dce
      mitigations=auto
      quiet
      security=apparmor
      crashkernel=273M,high
      crashkernel=72M,low


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


    ----------------------------------------------------------
    15. sysctl
      kernel.numa_balancing           1
      kernel.randomize_va_space        2
      vm.compaction_proactiveness     20
      vm.dirty_background_bytes        0
      vm.dirty_background_ratio       10
      vm.dirty_bytes                   0
      vm.dirty_expire_centisecs     3000
      vm.dirty_ratio                  20
      vm.dirty_writeback_centisecs   500
```

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Platform Notes (Continued)

```
  vm.dirtytime_expire_seconds     43200
  vm.extfrag_threshold              500
  vm.min_unmapped_ratio               1
  vm.nr_hugepages                     0
  vm.nr_hugepages_mempolicy           0
  vm.nr_overcommit_hugepages          0
  vm.swappiness                      60
  vm.watermark_boost_factor       15000
  vm.watermark_scale_factor          10
  vm.zone_reclaim_mode                0


  ----------------------------------------------------------------
16. /sys/kernel/mm/transparent_hugepage
  defrag          always defer defer+madvise [madvise] never
  enabled         [always] madvise never
  hpage_pmd_size  2097152
  shmem_enabled   always within_size advise [never] deny force


  ----------------------------------------------------------------
17. /sys/kernel/mm/transparent_hugepage/khugepaged
  alloc_sleep_millisecs   60000
  defrag                      1
  max_ptes_none             511
  max_ptes_shared           256
  max_ptes_swap              64
  pages_to_scan            4096
  scan_sleep_millisecs    10000


  ----------------------------------------------------------------
18. OS release
  From /etc/*-release /etc/*-version
  os-release SUSE Linux Enterprise Server 15 SP4


  ----------------------------------------------------------------
19. Disk information
SPEC is set to: /mnt/ramdisk/cpu2017-1.1.9-ic2023.0
  Filesystem      Type   Size  Used Avail Use% Mounted on
  tmpfs           tmpfs  125G   49G   77G  40% /mnt/ramdisk


  ----------------------------------------------------------------
20. /sys/devices/virtual/dmi/id
    Vendor:         Dell Inc.
    Product:        PowerEdge MX750c
    Product Family: PowerEdge
    Serial:         S3N2099


  ----------------------------------------------------------------
21. dmidecode
  Additional information from dmidecode 3.2 follows.  WARNING: Use caution when you interpret this section.
  The 'dmidecode' program reads system data which is "intended to allow hardware to be accurately
  determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the
  "DMTF SMBIOS" standard.
  Memory:
    1x 002C00B3002C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200, configured at 2666
    1x 002C069D002C 36ASF8G72PZ-3G2B2 64 GB 2 rank 3200, configured at 2666
    8x 00CE00B300CE M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2666
    6x 00CE063200CE M393A8G40AB2-CWE 64 GB 2 rank 3200, configured at 2666


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

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Dell Inc.

PowerEdge MX750c (Intel Xeon Gold 6330N, 2.20 GHz)

SPECrate®2017_fp_base = 398

SPECrate®2017_fp_peak = 419

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

Test Date: Jul-2023
Hardware Availability: Apr-2021
Software Availability: Dec-2022

Platform Notes (Continued)

```
   22. BIOS
  (This section combines info from /sys/devices and dmidecode.)
     BIOS Vendor:       Dell Inc.
     BIOS Version:      1.10.2
     BIOS Date:         03/03/2023
     BIOS Revision:     1.10
```

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
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.
------------------------------------------------------------------------------
```

SPEC CPU®2017 Floating Point Rate Result

Copyright 2017-2023 Standard Performance Evaluation Corporation

Dell Inc.

PowerEdge MX750c (Intel Xeon Gold 6330N, 2.20 GHz)

$SPECrate^®2017\_fp\_base = 398$

$SPECrate^®2017\_fp\_peak = 419$

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

Test Date: Jul-2023
Hardware Availability: Apr-2021
Software Availability: Dec-2022

Base Compiler Invocation

C benchmarks:
`icx`

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

Benchmarks using both Fortran and C:
`ifx icx`

Benchmarks using both C and C++:
`icpx icx`

Benchmarks using Fortran, C, and C++:
`icpx icx ifx`

Base Portability Flags

503.bwaves_r: `-DSPEC_LP64`
507.cactuBSSN_r: `-DSPEC_LP64`
508.namd_r: `-DSPEC_LP64`
510.parest_r: `-DSPEC_LP64`
511.povray_r: `-DSPEC_LP64`
519.lbm_r: `-DSPEC_LP64`
521.wrf_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian`
526.blender_r: `-DSPEC_LP64 -DSPEC_LINUX -funsigned-char`
527.cam4_r: `-DSPEC_LP64 -DSPEC_CASE_FLAG`
538.imagick_r: `-DSPEC_LP64`
544.nab_r: `-DSPEC_LP64`
549.fotonik3d_r: `-DSPEC_LP64`
554.roms_r: `-DSPEC_LP64`

Base Optimization Flags

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

(Continued on next page)

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

Dell Inc.

PowerEdge MX750c (Intel Xeon Gold 6330N, 2.20 GHz)

SPECrate®2017_fp_base = 398

SPECrate®2017_fp_peak = 419

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

Test Date: Jul-2023
Hardware Availability: Apr-2021
Software Availability: Dec-2022

Base Optimization Flags (Continued)

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

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte -auto -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

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

Benchmarks using both C and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -ljemalloc
-L/usr/local/jemalloc64-5.0.1/lib
```

Benchmarks using Fortran, C, and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

Peak Compiler Invocation

C benchmarks:
```
icx
```

C++ benchmarks:
```
icpx
```

Fortran benchmarks:
```
ifx
```

Benchmarks using both Fortran and C:
```
ifx icx
```

(Continued on next page)

Dell Inc.

PowerEdge MX750c (Intel Xeon Gold 6330N, 2.20 GHz)

SPECrate®2017_fp_base = 398

SPECrate®2017_fp_peak = 419

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

Test Date: Jul-2023
Hardware Availability: Apr-2021
Software Availability: Dec-2022

Peak Compiler Invocation (Continued)

Benchmarks using both C and C++:
`icpx icx`

Benchmarks using Fortran, C, and C++:
`icpx icx ifx`

Peak Portability Flags

`Same as Base Portability Flags`

Peak Optimization Flags

C benchmarks:

519.lbm_r: `basepeak = yes`

538.imagick_r: `basepeak = yes`

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

C++ benchmarks:

508.namd_r: `basepeak = yes`

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

Fortran benchmarks:

503.bwaves_r: `basepeak = yes`

549.fotonik3d_r: `basepeak = yes`

554.roms_r: `-w -m64 -Wl,-z,muldefs -xCORE-AVX512 -Ofast -ffast-math -flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -nostandard-realloc-lhs`

Dell Inc.

PowerEdge MX750c (Intel Xeon Gold 6330N, 2.20 GHz)

SPECrate®2017_fp_base = 398

SPECrate®2017_fp_peak = 419

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

Peak Optimization Flags (Continued)

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

Benchmarks using both Fortran and C:

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

527.cam4_r: `basepeak = yes`

Benchmarks using both C and C++:

511.povray_r: `-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs`
`-fprofile-generate`(pass 1)
`-fprofile-use=default.profdata`(pass 2) `-xCORE-AVX2`(pass 1)
`-flto -Ofast -xCORE-AVX512 -ffast-math -mfpmath=sse`
`-funroll-loops -qopt-mem-layout-trans=4 -Wno-implicit-int`
`-ljemalloc -L/usr/local/jemalloc64-5.0.1/lib`

526.blender_r: `basepeak = yes`

Benchmarks using Fortran, C, and C++:
```
-w -std=c++14 -m64 -std=c11 -Wl,-z,muldefs -xCORE-AVX512 -Ofast
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -Wno-implicit-int -nostandard-realloc-lhs
-align array32byte -auto -ljemalloc -L/usr/local/jemalloc64-5.0.1/lib
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64_revB.2023-10-11.html
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.6.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64_revB.2023-10-11.xml
http://www.spec.org/cpu2017/flags/Dell-Platform-Flags-PowerEdge-Intel-Xeon-v1.6.xml

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

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