SPEC CPU®2017 Floating Point Rate Result

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Lenovo Global Technology

SPECrate®2017_fp_base = 833

ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Max 9468)

SPECrate®2017_fp_peak = Not Run
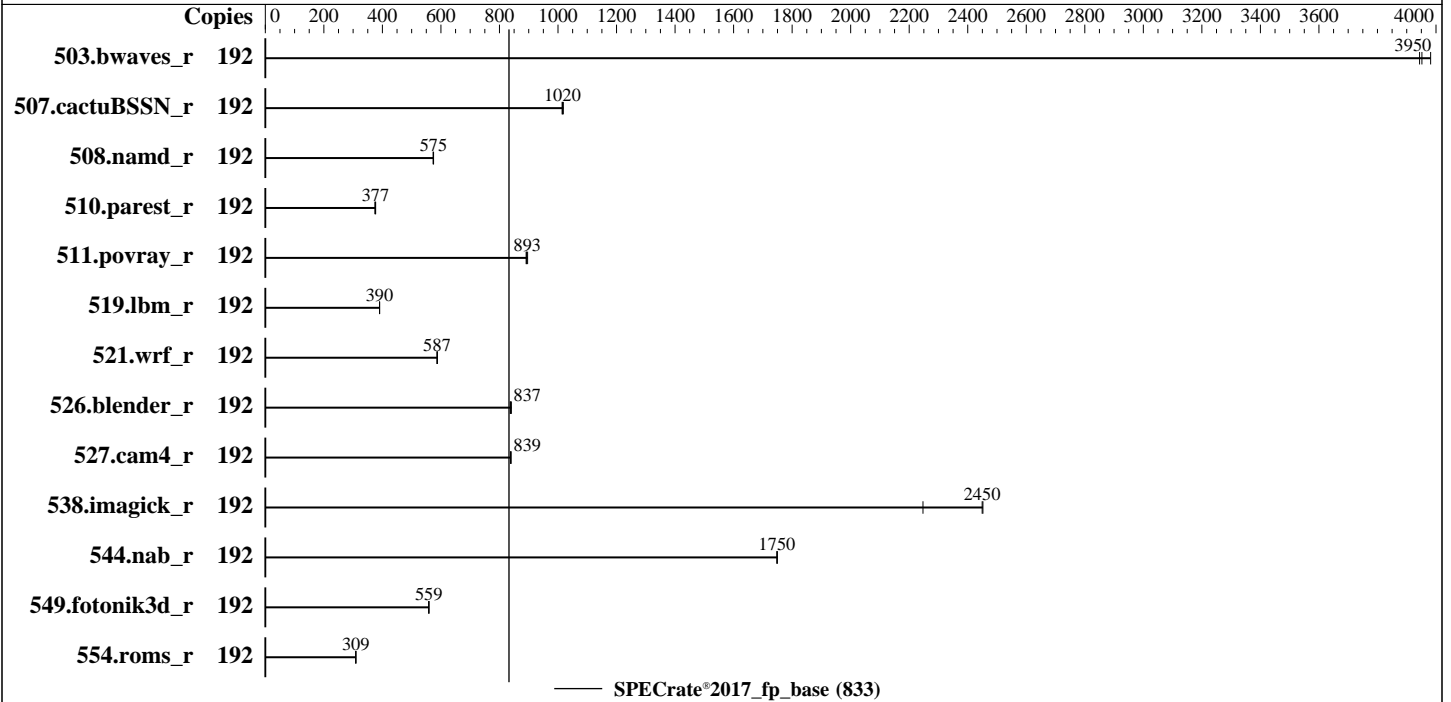
CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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

Benchmark	Copies	Result
503.bwaves_r	192	3950
507.cactuBSSN_r	192	1020
508.namd_r	192	575
510.parest_r	192	377
511.povray_r	192	893
519.lbm_r	192	390
521.wrf_r	192	587
526.blender_r	192	837
527.cam4_r	192	839
538.imagick_r	192	2450
544.nab_r	192	1750
549.fotonik3d_r	192	559
554.roms_r	192	309

SPECrate®2017_fp_base (833)

Hardware

CPU Name: Intel Xeon Max 9468
 Max MHz: 3500
 Nominal: 2100
Enabled: 96 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: 640 GB (16 x 32 GB 2Rx8 PC5-4800B-R +
 2 x 64 GB HBM)
Storage: 1 x 960 GB SATA SSD
Other: None

Software

OS: SUSE Linux Enterprise Server 15 SP4 (x86_64)
 Kernel 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: Lenovo BIOS Version USE117T 3.10 released Apr-2023
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
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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Results Table

Benchmark	Copies	Base Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Peak Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
503.bwaves_r	192	484	3980	488	3940	**487**	**3950**							
507.cactuBSSN_r	192	239	1020	**239**	**1020**	240	1010							
508.namd_r	192	**317**	**575**	317	575	318	573							
510.parest_r	192	**1334**	**377**	1342	374	1333	377							
511.povray_r	192	**502**	**893**	500	896	503	891							
519.lbm_r	192	519	390	518	391	**519**	**390**							
521.wrf_r	192	**733**	**587**	733	587	731	588							
526.blender_r	192	348	841	349	837	**349**	**837**							
527.cam4_r	192	**400**	**839**	401	838	400	839							
538.imagick_r	192	195	2450	**195**	**2450**	212	2250							
544.nab_r	192	**185**	**1750**	185	1750	185	1750							
549.fotonik3d_r	192	1338	559	**1339**	**559**	1340	558							
554.roms_r	192	**987**	**309**	986	309	987	309							

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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 = "/home/cpu2017-1.1.9-ic2023.0/lib/intel64:/home/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>
NA: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.

(Continued on next page)

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General Notes (Continued)

```
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.
 jemalloc, a general purpose malloc implementation
 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
```

Platform Notes

```
BIOS configuration:
Choose Operating Mode set to Maximum Performance and then set it to Custom Mode
SNC set to SNC4
MONITOR/MWAIT set to Enabled
XPT Prefetcher set to Disabled
LLC Prefetch set to Disabled

 Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on Perf-Seoul2-L Mon May 15 02:21:09 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. tuned-adm active
 16. sysctl
 17. /sys/kernel/mm/transparent_hugepage
 18. /sys/kernel/mm/transparent_hugepage/khugepaged
 19. OS release
 20. Disk information
 21. /sys/devices/virtual/dmi/id
 22. dmidecode
 23. BIOS
 ------------------------------------------------------------


 ------------------------------------------------------------
 1. uname -a
   Linux Perf-Seoul2-L 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
    02:21:09 up 2 min,  1 user,  load average: 9.26, 7.98, 3.29
```

(Continued on next page)

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Platform Notes (Continued)

```
   USER      TTY      FROM            LOGIN@   IDLE   JCPU   PCPU WHAT
   root      tty1     -               02:20    4.00s  1.26s  0.01s -bash


   ------------------------------------------------------------
   3. Username
     From environment variable $USER:  root


   ------------------------------------------------------------
   4. ulimit -a
     core file size          (blocks, -c) unlimited
     data seg size           (kbytes, -d) unlimited
     scheduling priority             (-e) 0
     file size               (blocks, -f) unlimited
     pending signals                 (-i) 2062415
     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) 2062415
     virtual memory          (kbytes, -v) unlimited
     file locks                      (-x) unlimited


   ------------------------------------------------------------
   5. sysinfo process ancestry
    /usr/lib/systemd/systemd --switched-root --system --deserialize 30
    login -- root
    -bash
    -bash
    -bash
    runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 -c
      ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=96 --define physicalfirst
      --define invoke_with_interleave --define drop_caches --tune base -o all fprate
    runcpu --nobuild --action validate --define default-platform-flags --define numcopies=192 --configfile
      ic2023.0-lin-sapphirerapids-rate-20221201.cfg --define smt-on --define cores=96 --define physicalfirst
      --define invoke_with_interleave --define drop_caches --tune base --output_format all --nopower --runmode
      rate --tune base --size refrate fprate --nopreenv --note-preenv --logfile
      $SPEC/tmp/CPU2017.107/templogs/preenv.fprate.107.0.log --lognum 107.0 --from_runcpu 2
    specperl $SPEC/bin/sysinfo
   $SPEC = /home/cpu2017-1.1.9-ic2023.0


   ------------------------------------------------------------
   6. /proc/cpuinfo
     model name      : Intel (R) Xeon (R) CPU Max 9468
     vendor_id       : GenuineIntel
     cpu family      : 6
     model           : 143
     stepping        : 8
     microcode       : 0x2c0001d1
     bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
     cpu cores       : 48
     siblings        : 96
     2 physical ids (chips)
     192 processors (hardware threads)
     physical id 0: core ids 0-47
     physical id 1: core ids 0-47
     physical id 0: apicids 0-95
```

(Continued on next page)

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Platform Notes (Continued)

```
     physical id 1: apicids 128-223
  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):                         192
    On-line CPU(s) list:            0-191
    Vendor ID:                      GenuineIntel
    Model name:                     Intel (R) Xeon (R) CPU Max 9468
    CPU family:                     6
    Model:                          143
    Thread(s) per core:             2
    Core(s) per socket:             48
    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 vmx 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 intel_ppin cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced
                                    tpr_shadow vnmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 hle
                                    avx2 smep bmi2 erms invpcid rtm cqm rdt_a avx512f avx512dq rdseed adx smap
                                    avx512ifma clflushopt clwb intel_pt avx512cd sha_ni avx512bw avx512vl
                                    xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
                                    cqm_mbm_local split_lock_detect 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
    Virtualization:                 VT-x
    L1d cache:                      4.5 MiB (96 instances)
    L1i cache:                      3 MiB (96 instances)
    L2 cache:                       192 MiB (96 instances)
    L3 cache:                       210 MiB (2 instances)
    NUMA node(s):                   8
    NUMA node0 CPU(s):              0-11,96-107
    NUMA node1 CPU(s):              12-23,108-119
    NUMA node2 CPU(s):              24-35,120-131
    NUMA node3 CPU(s):              36-47,132-143
    NUMA node4 CPU(s):              48-59,144-155
    NUMA node5 CPU(s):              60-71,156-167
    NUMA node6 CPU(s):              72-83,168-179
    NUMA node7 CPU(s):              84-95,180-191
    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
```

(Continued on next page)

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Platform Notes (Continued)

```
    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     4.5M   12 Data             1      64        1             64
      L1i       32K       3M    8 Instruction      1      64        1             64
      L2         2M     192M   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: 0-11,96-107
    node 0 size: 64169 MB
    node 0 free: 63353 MB
    node 1 cpus: 12-23,108-119
    node 1 size: 64471 MB
    node 1 free: 63988 MB
    node 2 cpus: 24-35,120-131
    node 2 size: 64505 MB
    node 2 free: 63968 MB
    node 3 cpus: 36-47,132-143
    node 3 size: 64505 MB
    node 3 free: 64012 MB
    node 4 cpus: 48-59,144-155
    node 4 size: 64505 MB
    node 4 free: 63898 MB
    node 5 cpus: 60-71,156-167
    node 5 size: 64505 MB
    node 5 free: 63980 MB
    node 6 cpus: 72-83,168-179
    node 6 size: 64505 MB
    node 6 free: 63448 MB
    node 7 cpus: 84-95,180-191
    node 7 size: 64457 MB
    node 7 free: 63925 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:      528002976 kB

  ------------------------------------------------------------
  10. who -r
    run-level 3 May 15 02:20

  ------------------------------------------------------------
  11. Systemd service manager version: systemd 249 (249.11+suse.124.g2bc0b2c447)
```

(Continued on next page)

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Platform Notes (Continued)

```
  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 getty@ haveged
                    irqbalance issue-generator kbdsettings 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
                    firewalld 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 tuned
   indirect         wickedd

   ------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
   root=UUID=5f8bfd2f-a83f-41d5-8917-33e974e2f5bd
   splash=silent
   mitigations=auto
   quiet
   security=apparmor

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


   ------------------------------------------------------------
15. tuned-adm active
   It seems that tuned daemon is not running, preset profile is not activated.
   Preset profile: powersave


   ------------------------------------------------------------
16. 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
```

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Platform Notes (Continued)

```
  vm.watermark_scale_factor        10
  vm.zone_reclaim_mode             0


  ----------------------------------------------------------
17. /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


  ----------------------------------------------------------
18. /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


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

  ----------------------------------------------------------
20. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
  Filesystem      Type  Size  Used Avail Use% Mounted on
  /dev/sda3       xfs   889G   42G  848G   5% /

  ----------------------------------------------------------
21. /sys/devices/virtual/dmi/id
    Vendor:         Lenovo
    Product:        ThinkSystem SD650 V3
    Product Family: ThinkSystem
    Serial:         9999999999


  ----------------------------------------------------------
22. 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:
    8x Intel  16 GB 1 rank 3200
    16x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800


  ----------------------------------------------------------
23. BIOS
(This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:      Lenovo
    BIOS Version:     USE117T-3.10
    BIOS Date:        04/17/2023
    BIOS Revision:    3.10
    Firmware Revision: 2.10
Each Intel Xeon CPU Max processor is configured with 64 GB of High Bandwidth Memory (HBM)
in-package.  dmidecode is additionally reporting the capacity of the CPU in-package
HBM stack as: '8x Intel 16 GB 1 rank 3200'
```

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Compiler Version Notes

```
==============================================================================
C              | 519.lbm_r(base) 538.imagick_r(base) 544.nab_r(base)
------------------------------------------------------------------------------
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) 510.parest_r(base)
------------------------------------------------------------------------------
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) 526.blender_r(base)
------------------------------------------------------------------------------
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)
------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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------------------------------------------------------------------------------


==============================================================================
Fortran        | 503.bwaves_r(base) 549.fotonik3d_r(base) 554.roms_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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------------------------------------------------------------------------------


==============================================================================
Fortran, C     | 521.wrf_r(base) 527.cam4_r(base)
------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:
icx

Lenovo Global Technology

ThinkSystem SD650 V3
(2.10 GHz, Intel Xeon Max 9468)

SPECrate®2017_fp_base = 833

SPECrate®2017_fp_peak = Not Run

CPU2017 License: 9017
Test Sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

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

Base Compiler Invocation (Continued)

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 -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`

(Continued on next page)

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ThinkSystem SD650 V3
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SPECrate®2017_fp_base = 833

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CPU2017 License: 9017		**Test Date:**	May-2023
Test Sponsor:	Lenovo Global Technology	**Hardware Availability:**	May-2023
Tested by:	Lenovo Global Technology	**Software Availability:**	Dec-2022

Base Optimization Flags (Continued)

C++ benchmarks (continued):
```
-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
```

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-P.html
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2017/flags/Lenovo-Platform-SPECcpu2017-Flags-V1.2-Eaglestream-P.xml
http://www.spec.org/cpu2017/flags/Intel-ic2023-official-linux64.xml

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

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