Lenovo Global Technology

ThinkSystem SR650 V3
(3.60 GHz, Intel Xeon Gold 6444Y)

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

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
Classic for Linux;
C/C++: Version 2023.0 of Intel C/C++ Compiler
Classic for Linux
Parallel: Yes
Firmware: Lenovo BIOS Version ESE109L 1.10 released Jan-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

Hardware
CPU Name: Intel Xeon Gold 6444Y
Max MHz: 4000
Nominal: 3600
Enabled: 32 cores, 2 chips
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: 45 MB I+D on chip per core
Other: None
Memory: 512 GB (16 x 32 GB 2Rx8 PC5-4800B-R)
Storage: 1 x 480 GB SATA SSD
Other: None

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>SPECspeed\textsuperscript{2017} _fp_base</th>
<th>SPECspeed\textsuperscript{2017} _fp_peak</th>
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<tbody>
<tr>
<td>603.bwaves_s</td>
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<td>Not Run</td>
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<td>619.lbm_s</td>
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<td>Not Run</td>
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<tr>
<td>627.cam4_s</td>
<td>32</td>
<td>95.6</td>
<td>Not Run</td>
</tr>
<tr>
<td>628.pop2_s</td>
<td>32</td>
<td>501</td>
<td>Not Run</td>
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<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>426</td>
<td>Not Run</td>
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<tr>
<td>644.nab_s</td>
<td>32</td>
<td>159</td>
<td>Not Run</td>
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<tr>
<td>649.fotonik3d_s</td>
<td>32</td>
<td>343</td>
<td>Not Run</td>
</tr>
<tr>
<td>654.roms_s</td>
<td>32</td>
<td></td>
<td>SPECspeed\textsuperscript{2017} _fp_base (272)</td>
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SPECspeed®2017_fp_base = 272
SPECspeed®2017_fp_peak = Not Run

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Threads</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tr>
<td>638.imagick_s</td>
<td>32</td>
<td>28.8</td>
<td>501</td>
<td>28.7</td>
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<td>644.nab_s</td>
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<tr>
<td>649.fotonik3d_s</td>
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<td>57.4</td>
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<td>57.2</td>
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<td>57.7</td>
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<td>45.9</td>
<td>343</td>
<td>46.0</td>
<td>342</td>
</tr>
</tbody>
</table>

SPECspeed®2017_fp_base = 272
SPECspeed®2017_fp_peak = Not Run

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-ic2023.0/lib/intel64:/home/cpu2017-1.1.9-ic2023.0/j
e5.0.1-64"
MALLOCF_CONF = "retain:true"
OMP_STACKSIZE = "192M"

General Notes
Binaries compiled on a system with 2x Intel Xeon Platinum 8280M CPU + 384GB RAM memory using Redhat Enterprise Linux 8.0
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
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.

(Continued on next page)
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SPEC CPU®2017 Floating Point Speed Result
Copyright 2017-2023 Standard Performance Evaluation Corporation

SPECspeed®2017_fp_base = 272
SPECspeed®2017_fp_peak = Not Run

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General Notes (Continued)
jemalloc, a general purpose malloc implementation
built with the RedHat Enterprise 7.5, and the system compiler gcc 4.8.5

Platform Notes

BIOS configuration:
Operating Mode set to Custom Mode
CPU P-State Control set to Legacy
Hyper-Threading set to Disabled
DCU IP Prefetcher set to Disabled

Sysinfo program /home/cpu2017-1.1.9-ic2023.0/bin/sysinfo
Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
running on localhost Wed Feb 15 16:50:58 2023

SUT (System Under Test) info as seen by some common utilities.

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1. uname -a
2. w
3. Username
4. ulimit -a
5. sysinfo process ancestry
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7. lscpu
8. numactl --hardware
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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
17. /sys/kernel/mm/transparent_hugepage/khugepaged
18. OS release
19. Disk information
20. /sys/devices/virtual/dmi/id
21. dmidecode
22. BIOS

(Continued on next page)
Platform Notes (Continued)

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`
   
   16:50:58 up 2 min,  1 user,  load average: 0.04, 0.03, 0.00
   USER     TTY      FROM             LOGIN@   IDLE   JCPU   PCPU WHAT
   root     tty1     -                16:49   10.00s  1.14s  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) 2062693
   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) 2062693
   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
   -bash
   runcpu --nobuild --action validate --define default-platform-flags -c
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=32 --tune base -o all --define drop_caches
   fpspeed
   runcpu --nobuild --action validate --define default-platform-flags --configfile
   ic2023.0-lin-sapphirerapids-speed-20221201.cfg --define cores=32 --tune base --output_format all --define
   drop_caches --nopower --runmode speed --tune base --size refsped fpspeed --nopreenv --note-preenv
   --logfile $SPEC/tmp/CPU2017.092/templogs/preenv.fpspeed.092.0.log --lognum 092.0 --from_runcpu 2

   (Continued on next page)
Platform Notes (Continued)

specperl $SPEC/bin/sysinfo
$SPEC = /home/cpu2017-1.1.9-ic2023.0

6. /proc/cpuinfo

   model name    : Intel(R) Xeon(R) Gold 6444Y
   vendor_id     : GenuineIntel
   cpu family    : 6
   model         : 143
   stepping      : 8
   microcode     : 0x2b000161
   bugs          : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores     : 16
   siblings      : 16

   2 physical ids (chips)
   32 processors (hardware threads)
   physical id 0: core ids 0-15
   physical id 1: core ids 0-15
   physical id 0: apicids 0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30
   physical id 1: apicids 128,130,132,134,136,138,140,142,144,146,148,150,152,154,156,158

   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):                32
   On-line CPU(s) list:   0-31
   Vendor ID:             GenuineIntel
   Model name:            Intel(R) Xeon(R) Gold 6444Y
   CPU family:            6
   Model:                 143
   Thread(s) per core:    1
   Core(s) per socket:    16
   Socket(s):             2
   Stepping:              8
   Frequency boost:       enabled
   CPU max MHz:           3601.0000
   CPU min MHz:           800.0000
   BogoMIPS:              7200.00

   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
                         (Continued on next page)
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**ThinkSystem SR650 V3**  
(3.60 GHz, Intel Xeon Gold 6144Y)

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<th>CPU2017 License:</th>
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<th>Test Date:</th>
<th>Feb-2023</th>
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</thead>
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<tr>
<td>Test Sponsor:</td>
<td>Lenovo Global Technology</td>
<td>Hardware Availability:</td>
<td>Feb-2023</td>
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<tr>
<td>Tested by:</td>
<td>Lenovo Global Technology</td>
<td>Software Availability:</td>
<td>Dec-2022</td>
</tr>
</tbody>
</table>

### SPECspeed®2017_fp_base = 272
### SPECspeed®2017_fp_peak = Not Run

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### Platform Notes (Continued)

- 1m constant_tsc art arch_perfmon pebs bts rep_good nopl xtopology nonstop_tsc cpuid aperf perf tsc_known_freq pni pclmulqdq dtes64 monitor ds_cpl vmx smx est tm2 ssse3 sdbg fma cx16 xtrr pdcm pclid dca ssse4_1 ssse4_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_pni cdp_l2 sbbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow vmmi flexpriority ept vpid ept_ad fsgsbase tsc_adjust bm11 hle avx2 smep bmi2 ems invpcid rtm rdt_a avx512f avx512dq rdseed adx smap avx512ifma clflushopt clwb intel_pt avx512cd sha ni avx512bw avx512vl xsaveopt xsavec xgetbv xsavevm avx512f16b f16c rdrand lsts getopt arch_perfmon pconfig arch_lbr avx512_fp16 amx_tile flush_lld arch_capabilities

---

### Virtualization:
- VT-x

### L1d cache:
- 1.5 MiB (32 instances)

### L1i cache:
- 1 MiB (32 instances)

### L2 cache:
- 64 MiB (32 instances)

### L3 cache:
- 90 MiB (2 instances)

### NUMA node(s):
- 2

### NUMA node0 CPU(s):
- 0-15

### NUMA node1 CPU(s):
- 16-31

### 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/swaps barriers and __user pointer sanitization

### Vulnerability Spectre v2:
- Mitigation; Enhanced IBRS, IBFP conditional, RSB filling

### Vulnerability Srbsd:
- Not affected

### Vulnerability Tsx async abort:
- Not affected

### From lscpu --cache:

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<tr>
<th>NAME</th>
<th>ONE-SIZE</th>
<th>ALL-SIZE</th>
<th>WAYS</th>
<th>TYPE</th>
<th>LEVEL</th>
<th>SETS</th>
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<th>COHERENCY-SIZE</th>
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<td>49152</td>
<td>1</td>
<td>64</td>
</tr>
</tbody>
</table>

---

8. numactl --hardware

**NOTE:** a numactl 'node' might or might not correspond to a physical chip.

- available: 2 nodes (0-1)
- node 0 cpus: 0-15
- node 0 size: 257673 MB
- node 0 free: 256743 MB

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Platform Notes (Continued)

node 1 cpus: 16-31
node 1 size: 258023 MB
node 1 free: 257542 MB
node distances:
node 0 1
 0: 10 21
 1: 21 10

9. /proc/meminfo
   MemTotal: 528073980 kB

10. who -r
    run-level 3 Feb 15 16:48

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 getty@ haveged irqbalance iscsi
    issue-generator kbssettings klog lvm2-monitor nscd postfix purge-kernels rollback rsyslog
    smartd sshd wicked wickedd-auto4 wickedd-dhcpc4 wickedd-dhcpc6 wickedd-nanny
    enabled-runtime systemd-remount-fs
    disabled autos autostart-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 ipmiudev iscsi-init iscsid iscslui0
    issue-add-ssh-keys kexec-load lunmask man-db-create multipathd nfs nfs-blkmap nmb rdisc
    rpcbind rpmconfigcheck rsyncd serial-getty@ smartd_generate_opts smb snmpd snmptrapd
    systemd-boot-check-no-failures systemd-network-generator systemd-sysxext
    systemd-time-wait-sync systemd-timesyncd udisks2
    indirect wickedd

13. Linux kernel boot-time arguments, from /proc/cmdline
    BOOT_IMAGE=/boot/vmlinuz-5.14.21-150400.22-default
    root=UUID=cf0c8526-2665-4565-b656-0513c168d1bb
    splash=silent
    mitigations=auto
    quiet
    security=apparmor

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**SPECs**

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<th>Value</th>
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<td>SPECspeed®2017_fp_base =</td>
<td>272</td>
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<td>SPECspeed®2017_fp_peak =</td>
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**Platform Notes (Continued)**

14. `cpupower frequency-info`
   analyzing CPU 0:
   - **current policy:** frequency should be within 800 MHz and 3.60 GHz.
     The governor "ondemand" 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
   - `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

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*(Continued on next page)*
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SPE Cs speed\textsuperscript{2017}\textsubscript{fp_base} = 272
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Platform Notes (Continued)

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

19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2023.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda3 xfs 446G 53G 393G 12% /

20. /sys/devices/virtual/dmi/id
Vendor: Lenovo
Product: ThinkSystem SR650 V3 MB,EGS,DDR5,SH,2U
Product Family: ThinkSystem
Serial: 1234567890

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:
9x Samsung M321R4GA3BB0-CQKEG 32 GB 2 rank 4800
7x Samsung M321R4GA3BB0-CQKVG 32 GB 2 rank 4800

22. BIOS
(This section combines info from /sys/devices and dmidecode.)
BIOS Vendor: Lenovo
BIOS Version: ESE109L-1.10
BIOS Date: 01/07/2023
BIOS Revision: 1.10
Firmware Revision: 1.0

Compiler Version Notes
==============================================================================
C | 619.lbm_s(base) 638.imagick_s(base) 644.nab_s(base)
==============================================================================
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64,
Version 2023.0.0 Build 20221201

(Continued on next page)
## Lenovo Global Technology

ThinkSystem SR650 V3
(3.60 GHz, Intel Xeon Gold 6444Y)

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<th>Test Date: Feb-2023</th>
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<td>Hardware Availability: Feb-2023</td>
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<td>Software Availability: Dec-2022</td>
</tr>
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</table>

### SPECspeed®2017_fp_base = 272

**SPECspeed®2017_fp_peak = Not Run**

---

### Compiler Version Notes (Continued)

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```
C++, C, Fortran  | 607.cactuBSSN_s(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.
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2023.0.0 Build 20221201
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```

```
Fortran | 603.bwaves_s(base) 649.fotonik3d_s(base) 654.roms_s(base)
-------------------
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 | 621.wrf_s(base) 627.cam4_s(base) 628.pop2_s(base)
-------------------
Intel(R) Fortran 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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```

### Base Compiler Invocation

**C benchmarks:**
- icx

**Fortran benchmarks:**
- ifx

**Benchmarks using both Fortran and C:**
- ifx icx

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|----------------------------|
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Base Compiler Invocation (Continued)

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

Base Portability Flags

603.bwaves_s: -DSPEC_LP64
607.cactuBSSN_s: -DSPEC_LP64
619.lbm_s: -DSPEC_LP64
621.wrf_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
627.cam4_s: -DSPEC_LP64 -DSPEC_CASE_FLAG
628.pop2_s: -DSPEC_LP64 -DSPEC_CASE_FLAG -convert big_endian
-assume byterecl
638.imagick_s: -DSPEC_LP64
644.nab_s: -DSPEC_LP64
649.fotonik3d_s: -DSPEC_LP64
654.roms_s: -DSPEC_LP64

Base Optimization Flags

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

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

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

Benchmarks using Fortran, C, and C++:
-m64 -std=c++14 -std=c11 -Wl,-z muldefs -xsapphirerapids -Ofast

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

Base Optimization Flags (Continued)

Benchmarks using Fortran, C, and C++ (continued):
-ffast-math -flto -mfpmath=sse -funroll-loops
-qopt-mem-layout-trans=4 -fiopenmp -DSPEC_OPENMP -Wno-implicit-int
-mprefer-vector-width=512 -nostandard-realloc-lhs -align array32byte
-auto -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc

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-O.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-O.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.