SPEC CPU®2017 Integer Speed Result

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Lenovo Global Technology

$SPECspeed®2017\_int\_base =$ 8.98

ThinkSystem SR630 V4
(1.90 GHz, Intel Xeon 6766E)

$SPECspeed®2017\_int\_peak =$ Not Run

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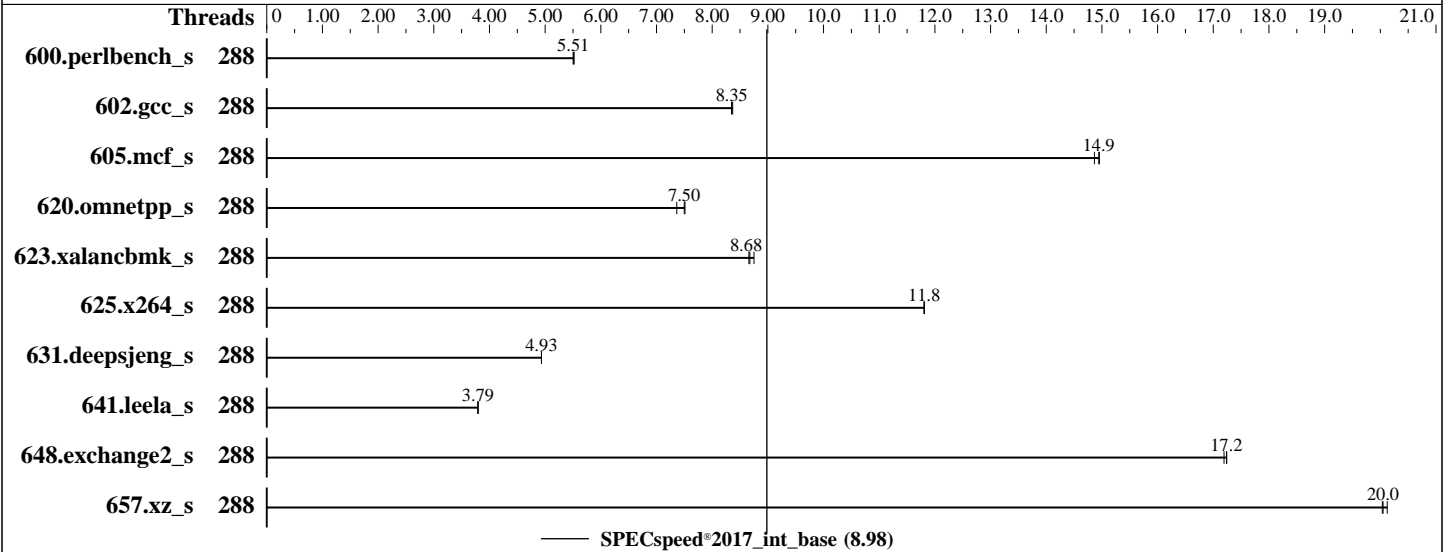**Test Sponsor:** Lenovo Global Technology
Tested by: Lenovo Global Technology

Test Date: Oct-2024
Hardware Availability: Nov-2024
Software Availability: Apr-2024

Benchmark	Threads	Result
600.perlbench_s	288	5.51
602.gcc_s	288	8.35
605.mcf_s	288	14.9
620.omnetpp_s	288	7.50
623.xalancbmk_s	288	8.68
625.x264_s	288	11.8
631.deepsjeng_s	288	4.93
641.leela_s	288	3.79
648.exchange2_s	288	17.2
657.xz_s	288	20.0

SPECspeed®2017_int_base (8.98)

Hardware

CPU Name: Intel Xeon 6766E
 Max MHz: 2700
 Nominal: 1900
Enabled: 288 cores, 2 chips
Orderable: 1,2 chips
Cache L1: 64 KB I + 32 KB D on chip per core
 L2: 4 MB I+D on chip per core
 L3: 108 MB I+D on chip per chip
 Other: None
Memory: 1 TB (16 x 64 GB 2Rx4 PC5-6400B-R)
Storage: 1 x 3.84 TB NVME SSD
Other: CPU Cooling: Air

Software

OS: Red Hat Enterprise Linux 9.4 (Plow)
 Kernel 5.14.0-427.13.1.el9_4.x86_64
Compiler: C/C++: Version 2024.1 of Intel oneAPI DPC++/C++ Compiler for Linux;
 Fortran: Version 2024.1 of Intel Fortran Compiler for Linux;
Parallel: Yes
Firmware: Lenovo BIOS Version IHE107B 1.10 released Sep-2024
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 set to prefer performance at the cost of additional power usage

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Results Table

Benchmark	Base							Peak						
	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Threads	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
600.perlbench_s	288	**322**	**5.51**	322	5.52	322	5.50							
602.gcc_s	288	477	8.35	476	8.37	**477**	**8.35**							
605.mcf_s	288	316	15.0	318	14.9	**316**	**14.9**							
620.omnetpp_s	288	**218**	**7.50**	217	7.51	221	7.36							
623.xalancbmk_s	288	162	8.75	164	8.66	**163**	**8.68**							
625.x264_s	288	**149**	**11.8**	149	11.8	149	11.8							
631.deepsjeng_s	288	**290**	**4.93**	290	4.93	290	4.93							
641.leela_s	288	450	3.79	450	3.79	**450**	**3.79**							
648.exchange2_s	288	171	17.2	171	17.2	**171**	**17.2**							
657.xz_s	288	**308**	**20.0**	307	20.1	309	20.0							

SPECspeed®2017_int_base =	**8.98**
SPECspeed®2017_int_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,scatter"
LD_LIBRARY_PATH = "/home/cpu2017-1.1.9-ic2024.1/lib/intel64:/home/cpu2017-1.1.9-ic2024.1/je5.0.1-64"
MALLOC_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.
  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
```

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Platform Notes

```
BIOS configuration:
Workload Profile set to General Computing - Max Performance
Page Policy set to Adaptive

 Sysinfo program /home/cpu2017-1.1.9-ic2024.1/bin/sysinfo
 Rev: r6732 of 2022-11-07 fe91c89b7ed5c36ae2c92cc097bec197
 running on localhost.localdomain Tue Oct 29 21:00:24 2024

 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 252 (252-32.el9_4)
 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
 -----------------------------------------------------------

 -----------------------------------------------------------
 1. uname -a
   Linux localhost.localdomain 5.14.0-427.13.1.el9_4.x86_64 #1 SMP PREEMPT_DYNAMIC Wed Apr 10 10:29:16 EDT
   2024 x86_64 x86_64 x86_64 GNU/Linux

 -----------------------------------------------------------
 2. w
    21:00:24 up 3 min,  0 users,  load average: 0.08, 0.04, 0.01
   USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT

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

 -----------------------------------------------------------
 4. ulimit -a
   real-time non-blocking time  (microseconds, -R) unlimited
   core file size              (blocks, -c) 0
   data seg size               (kbytes, -d) unlimited
   scheduling priority             (-e) 0
   file size                   (blocks, -f) unlimited
   pending signals                 (-i) 4126744
   max locked memory           (kbytes, -l) unlimited
```

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Platform Notes (Continued)

```
   max memory size             (kbytes, -m) unlimited
   open files                       (-n) 102400
   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) 4126744
   virtual memory          (kbytes, -v) unlimited
   file locks                      (-x) unlimited


 -------------------------------------------------------------
5. sysinfo process ancestry
 /usr/lib/systemd/systemd --switched-root --system --deserialize 31
 sshd: /usr/sbin/sshd -D [listener] 0 of 10-100 startups
 sshd: root [priv]
 sshd: root@notty
 /bin/bash ./02.remote_local_SPECcpu_1.01.sh
 sh Run742-compliant-ic2024.1-lin-sierraforest-speedint-base-20240308.sh
 runcpu --nobuild --action validate --define default-platform-flags -c
   ic2024.1-lin-sierraforest-speed-20240308.cfg --define cores=288 --tune base -o all --define
   intspeedaffinity --define smt-on --define drop_caches intspeed
 runcpu --nobuild --action validate --define default-platform-flags --configfile
   ic2024.1-lin-sierraforest-speed-20240308.cfg --define cores=288 --tune base --output_format all --define
   intspeedaffinity --define smt-on --define drop_caches --nopower --runmode speed --tune base --size
   refspeed intspeed --nopreenv --note-preenv --logfile
   $SPEC/tmp/CPU2017.583/templogs/preenv.intspeed.583.0.log --lognum 583.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017-1.1.9-ic2024.1


 -------------------------------------------------------------
6. /proc/cpuinfo
   model name       : Intel(R) Xeon(R) 6766E
   vendor_id        : GenuineIntel
   cpu family       : 6
   model            : 175
   stepping         : 3
   microcode        : 0x3000270
   bugs             : spectre_v1 spectre_v2 spec_store_bypass swapgs
   cpu cores        : 144
   siblings         : 144
   2 physical ids (chips)
   288 processors (hardware threads)
   physical id 0: core ids 0-143
   physical id 1: core ids 0-143
   physical id 0: apicids
   0,2,4,6,8,10,12,14,16,18,20,22,24,26,28,30,32,34,36,38,40,42,44,46,48,50,52,54,56,58,60,62,64,66,68,70,72
   ,74,76,78,80,82,84,86,88,90,92,94,96,98,100,102,104,106,108,110,112,114,116,118,120,122,124,126,128,130,1
   32,134,136,138,140,142,144,146,148,150,152,154,156,158,160,162,164,166,168,170,172,174,176,178,180,182,18
   4,186,188,190,192,194,196,198,200,202,204,206,208,210,212,214,216,218,220,222,224,226,228,230,232,234,236
   ,238,240,242,244,246,248,250,252,254,256,258,260,262,264,266,268,270,272,274,276,278,280,282,284,286
   physical id 1: apicids
   512,514,516,518,520,522,524,526,528,530,532,534,536,538,540,542,544,546,548,550,552,554,556,558,560,562,5
   64,566,568,570,572,574,576,578,580,582,584,586,588,590,592,594,596,598,600,602,604,606,608,610,612,614,61
   6,618,620,622,624,626,628,630,632,634,636,638,640,642,644,646,648,650,652,654,656,658,660,662,664,666,668
   ,670,672,674,676,678,680,682,684,686,688,690,692,694,696,698,700,702,704,706,708,710,712,714,716,718,720,
   722,724,726,728,730,732,734,736,738,740,742,744,746,748,750,752,754,756,758,760,762,764,766,768,770,772,7
   74,776,778,780,782,784,786,788,790,792,794,796,798
   Caution: /proc/cpuinfo data regarding chips, cores, and threads is not necessarily reliable, especially for
   virtualized systems.  Use the above data carefully.
```

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Platform Notes (Continued)

```
          ----------------------------------------------------------
          7. lscpu

          From lscpu from util-linux 2.37.4:
            Architecture:               x86_64
            CPU op-mode(s):             32-bit, 64-bit
            Address sizes:              52 bits physical, 48 bits virtual
            Byte Order:                 Little Endian
            CPU(s):                     288
            On-line CPU(s) list:        0-287
            Vendor ID:                  GenuineIntel
            BIOS Vendor ID:             Intel(R) Corporation
            Model name:                 Intel(R) Xeon(R) 6766E
            BIOS Model name:            Intel(R) Xeon(R) 6766E
            CPU family:                 6
            Model:                      175
            Thread(s) per core:         1
            Core(s) per socket:         144
            Socket(s):                  2
            Stepping:                   3
            BogoMIPS:                   3800.00
            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 cdp_l2 ssbd mba ibrs ibpb stibp ibrs_enhanced tpr_shadow
                                        flexpriority ept vpid ept_ad fsgsbase tsc_adjust bmi1 avx2 smep bmi2
                                        erms invpcid cqm rdt_a rdseed adx smap clflushopt clwb intel_pt sha_ni
                                        xsaveopt xsavec xgetbv1 xsaves cqm_llc cqm_occup_llc cqm_mbm_total
                                        cqm_mbm_local split_lock_detect avx_vnni lam wbnoinvd dtherm ida arat
                                        pln pts vnmi umip pku ospke waitpkg gfni vaes vpclmulqdq tme rdpid
                                        bus_lock_detect cldemote movdiri movdir64b enqcmd fsrm md_clear
                                        serialize pconfig arch_lbr ibt flush_l1d arch_capabilities
            Virtualization:             VT-x
            L1d cache:                  9 MiB (288 instances)
            L1i cache:                  18 MiB (288 instances)
            L2 cache:                   288 MiB (72 instances)
            L3 cache:                   216 MiB (2 instances)
            NUMA node(s):               2
            NUMA node0 CPU(s):          0-143
            NUMA node1 CPU(s):          144-287
            Vulnerability Gather data sampling: Not affected
            Vulnerability Itlb multihit:        Not affected
            Vulnerability L1tf:                 Not affected
            Vulnerability Mds:                  Not affected
            Vulnerability Meltdown:             Not affected
            Vulnerability Mmio stale data:      Not affected
            Vulnerability Retbleed:             Not affected
            Vulnerability Spec rstack overflow: Not affected
            Vulnerability Spec store bypass:    Mitigation; Speculative Store Bypass disabled via prctl
            Vulnerability Spectre v1:           Mitigation; usercopy/swapgs barriers and __user pointer sanitization
            Vulnerability Spectre v2:           Mitigation; Enhanced / Automatic IBRS, IBPB conditional, RSB filling,
                                                PBRSB-eIBRS Not affected
            Vulnerability Srbds:                Not affected
            Vulnerability Tsx async abort:      Not affected
```

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Platform Notes (Continued)

```
From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
    L1d       32K       9M    8 Data           1     64        1             64
    L1i       64K      18M    8 Instruction    1    128        1             64
    L2         4M     288M   16 Unified        2   4096        1             64
    L3       108M     216M   12 Unified        3 147456        1             64


-------------------------------------------------------------
8. numactl --hardware
NOTE: a numactl 'node' might or might not correspond to a physical chip.
  available: 2 nodes (0-1)
  node 0 cpus: 0-143
  node 0 size: 515692 MB
  node 0 free: 514019 MB
  node 1 cpus: 144-287
  node 1 size: 516033 MB
  node 1 free: 514834 MB
  node distances:
  node   0   1
    0:  10  21
    1:  21  10


-------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1056486840 kB


-------------------------------------------------------------
10. who -r
   run-level 3 Oct 29 20:57


-------------------------------------------------------------
11. Systemd service manager version: systemd 252 (252-32.el9_4)
   Default Target  Status
   multi-user      running


-------------------------------------------------------------
12. Services, from systemctl list-unit-files
   STATE            UNIT FILES
   enabled          NetworkManager NetworkManager-dispatcher NetworkManager-wait-online auditd chronyd crond
                    dbus-broker firewalld getty@ insights-client-boot irqbalance kdump low-memory-monitor
                    mdmonitor microcode nis-domainname nvmefc-boot-connections rhsmcertd rsyslog rtkit-daemon
                    selinux-autorelabel-mark sshd sssd systemd-boot-update systemd-network-generator udisks2
                    upower
   enabled-runtime  systemd-remount-fs
   disabled         canberra-system-bootup canberra-system-shutdown canberra-system-shutdown-reboot
                    chrony-wait chronyd-restricted console-getty cpupower debug-shell dnf-system-upgrade
                    kvm_stat man-db-restart-cache-update nftables nvmf-autoconnect pesign rdisc rhcd rhsm
                    rhsm-facts rpmdb-rebuild selinux-check-proper-disable serial-getty@ sshd-keygen@
                    systemd-boot-check-no-failures systemd-pstore systemd-sysext
   generated        jexec
   indirect         sssd-autofs sssd-kcm sssd-nss sssd-pac sssd-pam sssd-ssh sssd-sudo systemd-sysupdate
                    systemd-sysupdate-reboot


-------------------------------------------------------------
13. Linux kernel boot-time arguments, from /proc/cmdline
   BOOT_IMAGE=(hd0,gpt2)/boot/vmlinuz-5.14.0-427.13.1.el9_4.x86_64
   root=UUID=218263b5-b938-4bb9-acd2-fdd6e13af967
   ro
   resume=UUID=28b98cc0-6b11-4f02-b151-4d764447b0f5
```

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Platform Notes (Continued)

```
-------------------------------------------------------------
14. cpupower frequency-info
  analyzing CPU 155:
    Unable to determine current policy
    boost state support:
      Supported: yes
      Active: yes


-------------------------------------------------------------
15. sysctl
  kernel.numa_balancing              1
  kernel.randomize_va_space          2
  vm.compaction_proactiveness       20
  vm.dirty_background_bytes          0
  vm.dirty_background_ratio         10
  vm.dirty_bytes                     0
  vm.dirty_expire_centisecs       3000
  vm.dirty_ratio                    20
  vm.dirty_writeback_centisecs     500
  vm.dirtytime_expire_seconds    43200
  vm.extfrag_threshold             500
  vm.min_unmapped_ratio              1
  vm.nr_hugepages                    0
  vm.nr_hugepages_mempolicy          0
  vm.nr_overcommit_hugepages         0
  vm.swappiness                     60
  vm.watermark_boost_factor      15000
  vm.watermark_scale_factor         10
  vm.zone_reclaim_mode               0


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


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


-------------------------------------------------------------
18. OS release
  From /etc/*-release /etc/*-version
  os-release     Red Hat Enterprise Linux 9.4 (Plow)
  redhat-release Red Hat Enterprise Linux release 9.4 (Plow)
  system-release Red Hat Enterprise Linux release 9.4 (Plow)


-------------------------------------------------------------
19. Disk information
SPEC is set to: /home/cpu2017-1.1.9-ic2024.1
  Filesystem     Type  Size  Used Avail Use% Mounted on
  /dev/nvme0n1p4 xfs   3.5T   42G  3.4T   2% /home
```

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Platform Notes (Continued)

```
    -------------------------------------------------------------
 20. /sys/devices/virtual/dmi/id
     Vendor:         Lenovo
     Product:        ThinkSystem SR630 V4
     Product Family: ThinkSystem
     Serial:         0987654321


    -------------------------------------------------------------
 21. dmidecode
   Additional information from dmidecode 3.5 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:
     12x SK Hynix HMCG94AHBRA275N 64 GB 2 rank 6400
     4x SK Hynix HMCG94AHBRA281N 64 GB 2 rank 6400


    -------------------------------------------------------------
 22. BIOS
 (This section combines info from /sys/devices and dmidecode.)
    BIOS Vendor:
    BIOS Version:     IHE107B-1.10
    BIOS Date:        09/11/2024
    BIOS Revision:    1.10
    Firmware Revision: 1.0
```

Compiler Version Notes

```
==============================================================================================
C        | 600.perlbench_s(base) 602.gcc_s(base) 605.mcf_s(base) 625.x264_s(base) 657.xz_s(base)
----------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
----------------------------------------------------------------------------------------------


==============================================================================================
C++      | 620.omnetpp_s(base) 623.xalancbmk_s(base) 631.deepsjeng_s(base) 641.leela_s(base)
----------------------------------------------------------------------------------------------
Intel(R) oneAPI DPC++/C++ Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
----------------------------------------------------------------------------------------------


==============================================================================================
Fortran | 648.exchange2_s(base)
----------------------------------------------------------------------------------------------
Intel(R) Fortran Compiler for applications running on Intel(R) 64, Version 2024.1.0 Build 20240308
Copyright (C) 1985-2024 Intel Corporation. All rights reserved.
----------------------------------------------------------------------------------------------
```

Base Compiler Invocation

C benchmarks:

icx

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Base Compiler Invocation (Continued)

C++ benchmarks:
`icpx`

Fortran benchmarks:
`ifx`

Base Portability Flags

600.perlbench_s: `-DSPEC_LP64 -DSPEC_LINUX_X64`
602.gcc_s: `-DSPEC_LP64`
605.mcf_s: `-DSPEC_LP64`
620.omnetpp_s: `-DSPEC_LP64`
623.xalancbmk_s: `-DSPEC_LP64 -DSPEC_LINUX`
625.x264_s: `-DSPEC_LP64`
631.deepsjeng_s: `-DSPEC_LP64`
641.leela_s: `-DSPEC_LP64`
648.exchange2_s: `-DSPEC_LP64`
657.xz_s: `-DSPEC_LP64`

Base Optimization Flags

C benchmarks:
```
-w -std=c11 -m64 -Wl,-z,muldefs -xsierraforest -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4 -fiopenmp
-DSPEC_OPENMP -L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

C++ benchmarks:
```
-w -std=c++14 -m64 -Wl,-z,muldefs -xsierraforest -O3 -ffast-math
-flto -mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-L/usr/local/jemalloc64-5.0.1/lib -ljemalloc
```

Fortran benchmarks:
```
-w -m64 -Wl,-z,muldefs -xsierraforest -O3 -ffast-math -flto
-mfpmath=sse -funroll-loops -qopt-mem-layout-trans=4
-nostandard-realloc-lhs -align array32byte
-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-Birchstream-B.html
http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.html

SPEC CPU®2017 Integer Speed Result

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Lenovo Global Technology

ThinkSystem SR630 V4
(1.90 GHz, Intel Xeon 6766E)

SPECspeed®2017_int_base =   8.98

SPECspeed®2017_int_peak = Not Run

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-Birchstream-B.xml
http://www.spec.org/cpu2017/flags/Intel-ic2024-official-linux64.xml

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

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