SPEC CPU®2017 Integer Speed Result

Copyright 2017-2024 Standard Performance Evaluation Corporation

Lenovo Global Technology

$SPECspeed®2017\_int\_base = 10.3$

ThinkSystem SR630 V4
(2.40 GHz, Intel Xeon 6710E)

$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

Threads — scale 0 to 22.0

Benchmark	Threads	Result
600.perlbench_s	128	6.45
602.gcc_s	128	9.43
605.mcf_s	128	17.0
620.omnetpp_s	128	8.21
623.xalancbmk_s	128	10.2
625.x264_s	128	13.9
631.deepsjeng_s	128	5.70
641.leela_s	128	4.50
648.exchange2_s	128	20.4
657.xz_s	128	21.8

—— SPECspeed®2017_int_base (10.3)

Hardware

CPU Name: Intel Xeon 6710E

Max MHz: 3200

Nominal: 2400

Enabled: 128 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: 96 MB I+D on chip per chip

Other: None

Memory: 1 TB (16 x 64 GB 2Rx4 PC5-6400B-R, running at 5600)

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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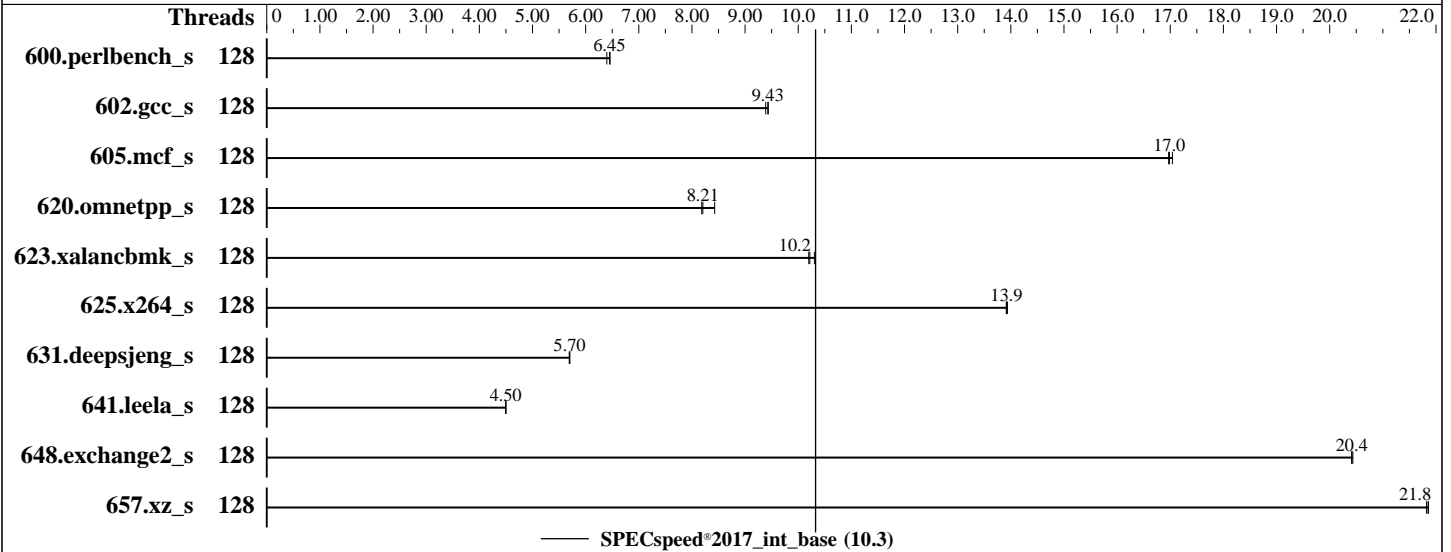SPECspeed®2017_int_peak = Not Run

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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	128	277	6.40	275	6.46	**275**	**6.45**							
602.gcc_s	128	**422**	**9.43**	422	9.44	424	9.39							
605.mcf_s	128	**278**	**17.0**	278	17.0	277	17.0							
620.omnetpp_s	128	194	8.43	**199**	**8.21**	199	8.18							
623.xalancbmk_s	128	139	10.2	**139**	**10.2**	138	10.3							
625.x264_s	128	127	13.9	**127**	**13.9**	127	13.9							
631.deepsjeng_s	128	251	5.70	252	5.69	**251**	**5.70**							
641.leela_s	128	379	4.50	379	4.50	**379**	**4.50**							
648.exchange2_s	128	**144**	**20.4**	144	20.4	144	20.4							
657.xz_s	128	283	21.9	**283**	**21.8**	283	21.8							

SPECspeed®2017_int_base =	**10.3**
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

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

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Platform Notes

```
BIOS configuration:
Workload Profile set to General Computing - Max Performance and then set it to Custom
C-States set to Legacy
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 Wed Oct 16 18:10:26 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
    18:10:26 up 3 min,  0 users,  load average: 0.41, 1.03, 0.52
   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) 4127250
```

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Platform Notes (Continued)

```
     max locked memory           (kbytes, -l) unlimited
     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) 4127250
     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=128 --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=128 --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/CPU2017.491/templogs/preenv.intspeed.491.0.log --lognum 491.0 --from_runcpu 2
 specperl $SPEC/bin/sysinfo
 $SPEC = /home/cpu2017-1.1.9-ic2024.1


    ----------------------------------------------------------
 6. /proc/cpuinfo
     model name      : Intel(R) Xeon(R) 6710E
     vendor_id       : GenuineIntel
     cpu family      : 6
     model           : 175
     stepping        : 3
     microcode       : 0x3000270
     bugs            : spectre_v1 spectre_v2 spec_store_bypass swapgs
     cpu cores       : 64
     siblings        : 64
     2 physical ids (chips)
     128 processors (hardware threads)
     physical id 0: core ids 0-63
     physical id 1: core ids 0-63
     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
     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
 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 2.37.4:
```

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Platform Notes (Continued)

```
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):                           128
On-line CPU(s) list:              0-127
Vendor ID:                        GenuineIntel
BIOS Vendor ID:                   Intel(R) Corporation
Model name:                       Intel(R) Xeon(R) 6710E
BIOS Model name:                  Intel(R) Xeon(R) 6710E
CPU family:                       6
Model:                            175
Thread(s) per core:               1
Core(s) per socket:               64
Socket(s):                        2
Stepping:                         3
BogoMIPS:                         4800.00
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:                        4 MiB (128 instances)
L1i cache:                        8 MiB (128 instances)
L2 cache:                         128 MiB (32 instances)
L3 cache:                         192 MiB (2 instances)
NUMA node(s):                     2
NUMA node0 CPU(s):                0-63
NUMA node1 CPU(s):                64-127
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

From lscpu --cache:
    NAME ONE-SIZE ALL-SIZE WAYS TYPE        LEVEL   SETS PHY-LINE COHERENCY-SIZE
    L1d       32K       4M    8 Data            1     64       1             64
    L1i       64K       8M    8 Instruction     1    128       1             64
    L2         4M     128M   16 Unified         2   4096       1             64
```

(Continued on next page)

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Platform Notes (Continued)

```
     L3        96M    192M   12 Unified        3 131072      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: 0-63
  node 0 size: 515779 MB
  node 0 free: 514750 MB
  node 1 cpus: 64-127
  node 1 size: 516072 MB
  node 1 free: 514621 MB
  node distances:
  node   0   1
    0:  10  21
    1:  21  10


  ------------------------------------------------------------
9. /proc/meminfo
   MemTotal:       1056616452 kB


  ------------------------------------------------------------
10. who -r
  run-level 3 Oct 16 18:07


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


  ------------------------------------------------------------
14. cpupower frequency-info
  analyzing CPU 80:
    Unable to determine current policy
    boost state support:
```

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Platform Notes (Continued)

```
        Supported: yes
        Active: yes


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


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

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Platform Notes (Continued)

```
     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, configured at 5600
       4x SK Hynix HMCG94AHBRA281N 64 GB 2 rank 6400, configured at 5600


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

C++ benchmarks:
icpx

(Continued on next page)

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Base Compiler Invocation (Continued)

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

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SPEC CPU®2017 Integer Speed Result

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Lenovo Global Technology

ThinkSystem SR630 V4
(2.40 GHz, Intel Xeon 6710E)

SPECspeed®2017_int_base = 10.3

SPECspeed®2017_int_peak = Not Run

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

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