SPEC® CINT2006 Result
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Lenovo Global Technology

ThinkSystem SN850
(2.10 GHz, Intel Xeon Platinum 8176)

SPECint®2006 = 83.0

SPECint_base2006 = 79.8
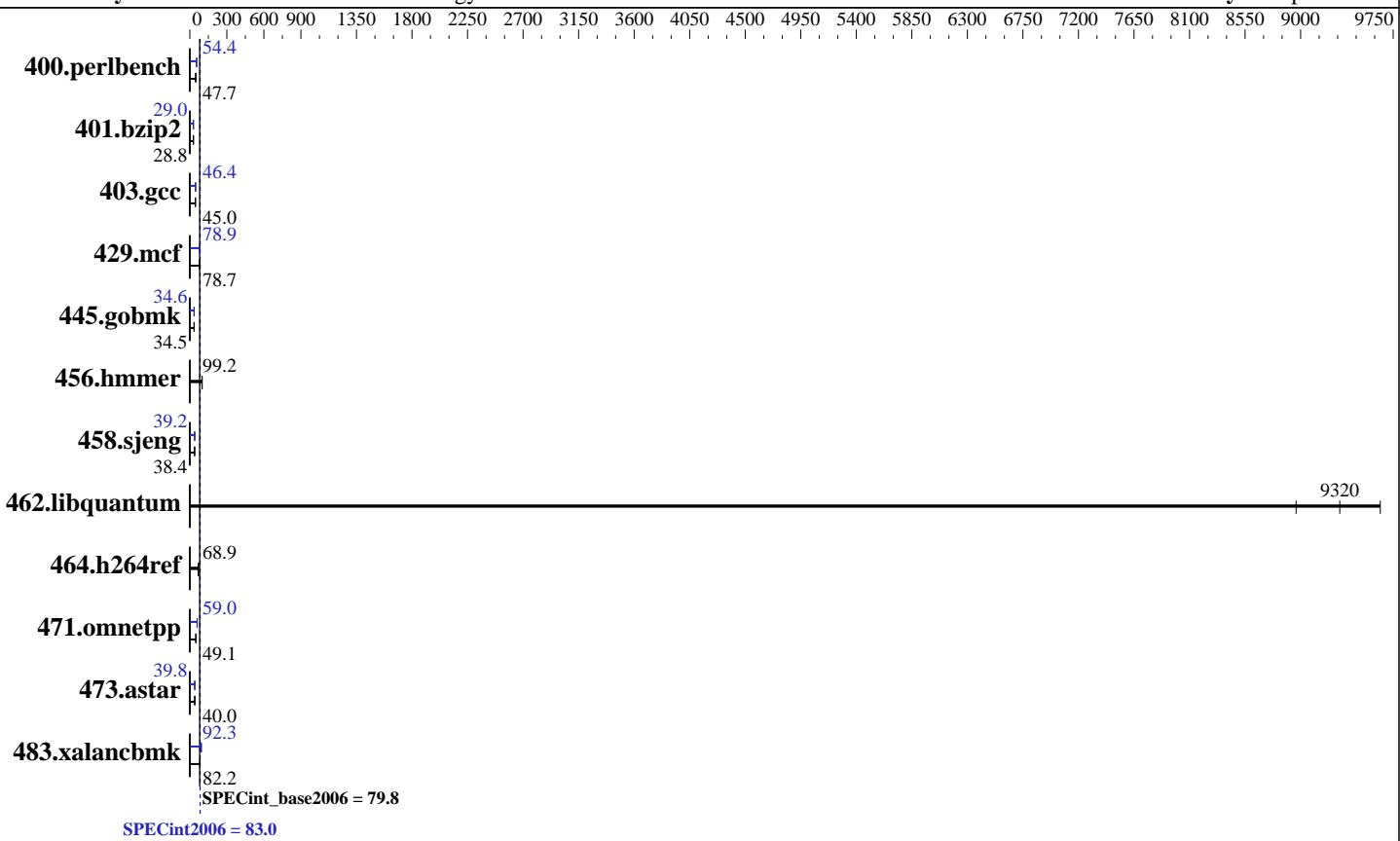
CPU2006 license: 9017
Test sponsor: Lenovo Global Technology
Tested by: Lenovo Global Technology

Test date: Jun-2017
Hardware Availability: Aug-2017
Software Availability: Apr-2017

Scale: 0 300 600 900 1350 1800 2250 2700 3150 3600 4050 4500 4950 5400 5850 6300 6750 7200 7650 8100 8550 9000 9750

Benchmark	Peak	Base
400.perlbench	54.4	47.7
401.bzip2	29.0	28.8
403.gcc	46.4	45.0
429.mcf	78.9	78.7
445.gobmk	34.6	34.5
456.hmmer		99.2
458.sjeng	39.2	38.4
462.libquantum		9320
464.h264ref		68.9
471.omnetpp	59.0	49.1
473.astar	39.8	40.0
483.xalancbmk	92.3	82.2

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Hardware

CPU Name: Intel Xeon Platinum 8176
CPU Characteristics: Intel Turbo Boost Technology up to 3.80 GHz
CPU MHz: 2100
FPU: Integrated
CPU(s) enabled: 112 cores, 4 chips, 28 cores/chip
CPU(s) orderable: 1,2 chips
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 1 MB I+D on chip per core
L3 Cache: 38.5 MB I+D on chip per chip
Other Cache: None
Memory: 1536 GB (48 x 32 GB 2Rx4 PC4-2666V-R)
Disk Subsystem: 1 x 960 GB SATA SSD
Other Hardware: None

Software

Operating System: Red Hat Enterprise Linux Server release 7.3 (Maipo)
Kernel 3.10.0-514.el7.x86_64
Compiler: C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux
Auto Parallel: Yes
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 32/64-bit
Peak Pointers: 32/64-bit
Other Software: Microquill SmartHeap V10.2

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Results Table

Benchmark	Base						Peak					
	Seconds	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**	**Seconds**	**Ratio**
400.perlbench	**205**	**47.7**	205	47.6	204	47.8	180	54.4	180	54.3	**180**	**54.4**
401.bzip2	335	28.8	**335**	**28.8**	335	28.8	**333**	**29.0**	333	29.0	334	28.9
403.gcc	**179**	**45.0**	179	45.0	179	45.0	173	46.4	174	46.3	**174**	**46.4**
429.mcf	116	78.9	117	78.0	**116**	**78.7**	116	78.9	**116**	**78.9**	117	78.1
445.gobmk	**304**	**34.5**	304	34.5	304	34.5	303	34.6	303	34.6	**303**	**34.6**
456.hmmer	94.1	99.2	**94.0**	**99.2**	93.9	99.3	94.1	99.2	**94.0**	**99.2**	93.9	99.3
458.sjeng	315	38.4	315	38.5	**315**	**38.4**	309	39.1	309	39.2	**309**	**39.2**
462.libquantum	2.15	9650	**2.22**	**9320**	2.31	8960	2.15	9650	**2.22**	**9320**	2.31	8960
464.h264ref	**321**	**68.9**	320	69.1	321	68.9	**321**	**68.9**	320	69.1	321	68.9
471.omnetpp	127	49.1	128	48.7	**127**	**49.1**	105	59.5	**106**	**59.0**	107	58.3
473.astar	176	39.8	**176**	**40.0**	176	40.0	177	39.6	**177**	**39.8**	176	39.8
483.xalancbmk	84.1	82.0	**84.0**	**82.2**	84.0	82.2	74.8	92.3	**74.7**	**92.3**	74.4	92.8

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

Submit Notes

    The config file option 'submit' was used.

Operating System Notes

     Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

    BIOS Configuration:
     Choose Operating Mode set to Maximum Performance
     Hyper-Threading set to Disable
     LLC dead line alloc set to Disable
     Sysinfo program /home/cpu2006-1.2-ic17.0u3/config/sysinfo.rev6993
     Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
     running on SN850-01 Thu Jun 15 22:42:07 2017

     This section contains SUT (System Under Test) info as seen by
     some common utilities. To remove or add to this section, see:
       http://www.spec.org/cpu2006/Docs/config.html#sysinfo

     From /proc/cpuinfo
        model name : Intel(R) Xeon(R) Platinum 8176 CPU @ 2.10GHz
           4 "physical id"s (chips)
           112 "processors"
        cores, siblings (Caution: counting these is hw and system dependent. The
        following excerpts from /proc/cpuinfo might not be reliable. Use with
        caution.)

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Platform Notes (Continued)

```
        cpu cores : 28
        siblings  : 28
        physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
        25 26 27 28 29 30
        physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
        25 26 27 28 29 30
        physical 2: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
        25 26 27 28 29 30
        physical 3: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14 16 17 18 19 20 21 22 24
        25 26 27 28 29 30
    cache size : 39424 KB

From /proc/meminfo
    MemTotal:       1584968800 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
    os-release:
        NAME="Red Hat Enterprise Linux Server"
        VERSION="7.3 (Maipo)"
        ID="rhel"
        ID_LIKE="fedora"
        VERSION_ID="7.3"
        PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
        ANSI_COLOR="0;31"
        CPE_NAME="cpe:/o:redhat:enterprise_linux:7.3:GA:server"
    redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
    system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
    system-release-cpe: cpe:/o:redhat:enterprise_linux:7.3:ga:server

uname -a:
    Linux SN850-01 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT 2016
    x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jun 15 18:28

SPEC is set to: /home/cpu2006-1.2-ic17.0u3
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda4       xfs    836G   13G  824G   2% /home
Additional information from dmidecode:

    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.

    BIOS Lenovo -[IVE109A-1.00]- 04/27/2017
    Memory:
    48x Samsung M393A4K40BB2-CTD 32 GB 2 rank 2666 MHz

(End of data from sysinfo program)
```

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General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2006-1.2-ic17.0u3/lib/ia32:/home/cpu2006-1.2-ic17.0u3/lib/intel64:/home/cpu2006-1.2-ic17.0u3/sh10.2"
OMP_NUM_THREADS = "112"

 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
 Transparent Huge Pages enabled by default.
 Filesystem page cache cleared with:
 shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run
```

Base Compiler Invocation

C benchmarks:
    icc -m64

C++ benchmarks:
    icpc -m64

Base Portability Flags

```
     400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
        401.bzip2: -DSPEC_CPU_LP64
          403.gcc: -DSPEC_CPU_LP64
          429.mcf: -DSPEC_CPU_LP64
       445.gobmk: -DSPEC_CPU_LP64
       456.hmmer: -DSPEC_CPU_LP64
        458.sjeng: -DSPEC_CPU_LP64
    462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
      464.h264ref: -DSPEC_CPU_LP64
      471.omnetpp: -DSPEC_CPU_LP64
        473.astar: -DSPEC_CPU_LP64
    483.xalancbmk: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
```

Base Optimization Flags

C benchmarks:
    -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
    -auto-p32

C++ benchmarks:
    -xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
    -Wl,-z,muldefs -L/sh10.2 -lsmartheap64

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Base Other Flags

C benchmarks:

> 403.gcc: `-Dalloca=_alloca`

Peak Compiler Invocation

C benchmarks (except as noted below):
   `icc -m64`

   400.perlbench: `icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32`

   445.gobmk: `icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32`

C++ benchmarks (except as noted below):
   `icc -m32 -L/opt/intel/compilers_and_libraries_2017/linux/lib/ia32`

   473.astar: `icpc -m64`

Peak Portability Flags

   400.perlbench: `-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32`
   401.bzip2: `-DSPEC_CPU_LP64`
   403.gcc: `-DSPEC_CPU_LP64`
   429.mcf: `-DSPEC_CPU_LP64`
   445.gobmk: `-D_FILE_OFFSET_BITS=64`
   456.hmmer: `-DSPEC_CPU_LP64`
   458.sjeng: `-DSPEC_CPU_LP64`
   462.libquantum: `-DSPEC_CPU_LP64 -DSPEC_CPU_LINUX`
   464.h264ref: `-DSPEC_CPU_LP64`
   471.omnetpp: `-D_FILE_OFFSET_BITS=64`
   473.astar: `-DSPEC_CPU_LP64`
   483.xalancbmk: `-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX`

Peak Optimization Flags

C benchmarks:

   400.perlbench: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
            `-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)`
            `-no-prec-div(pass 2) -qopt-prefetch`

   401.bzip2: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
            `-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)`
            `-no-prec-div -auto-ilp32 -qopt-prefetch`

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Peak Optimization Flags (Continued)

403.gcc: `-xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc`
`-qopt-malloc-options=3 -auto-ilp32`

429.mcf: `-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel`
`-qopt-prefetch -auto-p32`

445.gobmk: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
`-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)`
`-no-prec-div(pass 2)`

456.hmmer: `basepeak = yes`

458.sjeng: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
`-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)`
`-no-prec-div(pass 2) -unroll4`

462.libquantum: `basepeak = yes`

464.h264ref: `basepeak = yes`

C++ benchmarks:

471.omnetpp: `-prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2)`
`-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)`
`-no-prec-div(pass 2) -qopt-ra-region-strategy=block`
`-Wl,-z,muldefs -L/sh10.2 -lsmartheap`

473.astar: `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch`
`-auto-p32 -Wl,-z,muldefs -L/sh10.2 -lsmartheap64`

483.xalancbmk: `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch`
`-Wl,-z,muldefs -L/sh10.2 -lsmartheap`

Peak Other Flags

C benchmarks:

403.gcc: `-Dalloca=_alloca`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Flags-V1.2-SKL-C.xml

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