SPEC® CINT2006 Result

Lenovo Group Limited

Lenovo ThinkServer SD350
(1.70 GHz, Intel Xeon E5-2609 v4)

SPECint®2006 =   37.4

SPECint_base2006 =   35.8
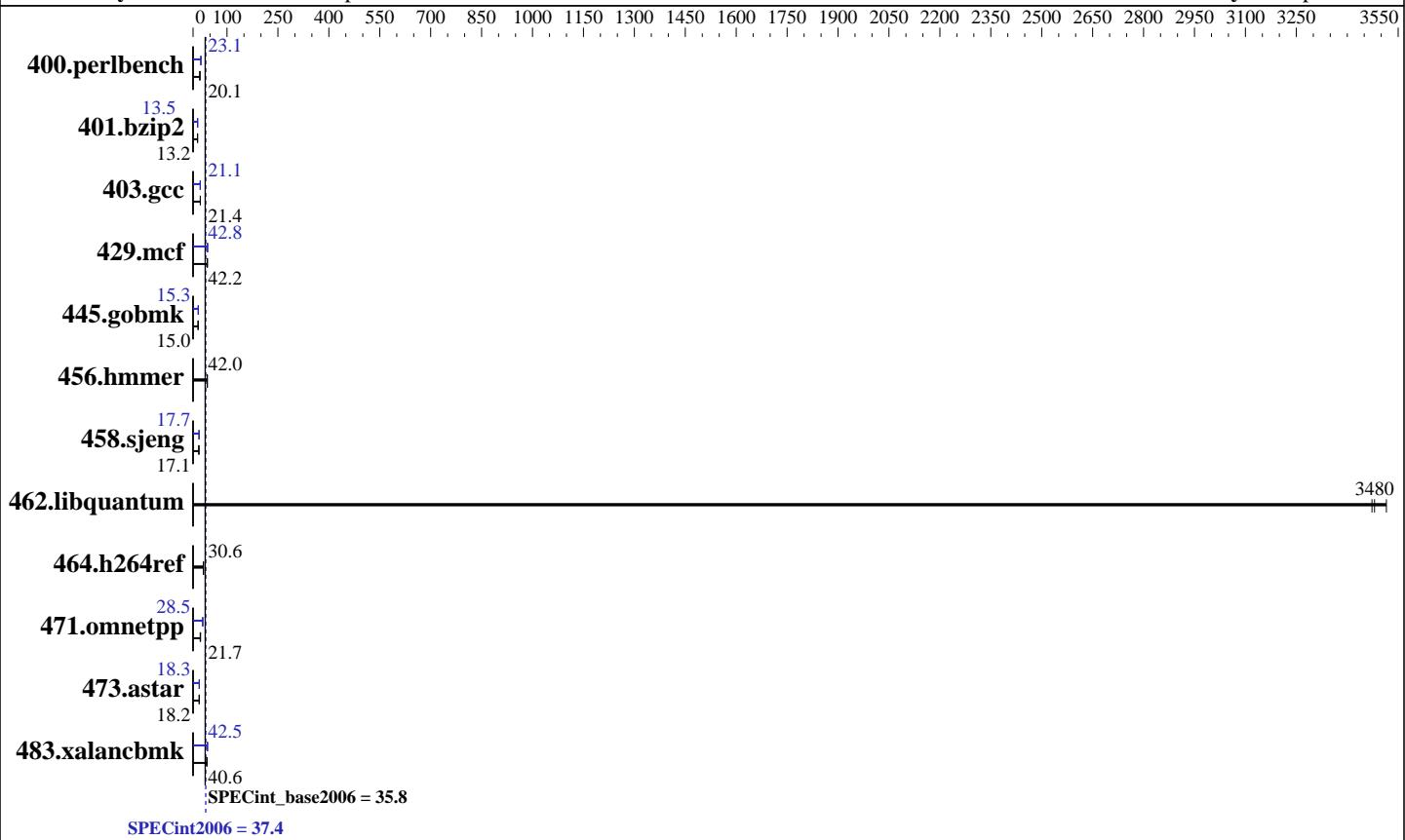
CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Jan-2017
Hardware Availability: Sep-2016
Software Availability: Sep-2016

Benchmark results (base / peak):

- 400.perlbench: 23.1 / 20.1
- 401.bzip2: 13.5 / 13.2
- 403.gcc: 21.1 / 21.4
- 429.mcf: 42.8 / 42.2
- 445.gobmk: 15.3 / 15.0
- 456.hmmer: 42.0
- 458.sjeng: 17.7 / 17.1
- 462.libquantum: 3480
- 464.h264ref: 30.6
- 471.omnetpp: 28.5 / 21.7
- 473.astar: 18.3 / 18.2
- 483.xalancbmk: 42.5 / 40.6

SPECint_base2006 = 35.8

SPECint2006 = 37.4

Hardware

CPU Name:	Intel Xeon E5-2609 v4
CPU Characteristics:	
CPU MHz:	1700
FPU:	Integrated
CPU(s) enabled:	16 cores, 2 chips, 8 cores/chip
CPU(s) orderable:	1,2 chips
Primary Cache:	32 KB I + 32 KB D on chip per core
Secondary Cache:	256 KB I+D on chip per core
L3 Cache:	20 MB I+D on chip per chip
Other Cache:	None
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2400T-R, running at 1866 MHz)
Disk Subsystem:	1 x 480 GB SATA SSD
Other Hardware:	None

Software

Operating System:	SUSE Linux Enterprise Server 12 SP1 (x86_64) Kernel 3.12.49-11-default
Compiler:	C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux
Auto Parallel:	Yes
File System:	btrfs
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	486	20.1	**486**	**20.1**	486	20.1	**423**	**23.1**	423	23.1	424	23.0
401.bzip2	730	13.2	**729**	**13.2**	728	13.3	**717**	**13.5**	718	13.4	717	13.5
403.gcc	377	21.4	**377**	**21.4**	376	21.4	**381**	**21.1**	379	21.2	381	21.1
429.mcf	215	42.3	**216**	**42.2**	218	41.8	**213**	**42.8**	215	42.4	213	42.8
445.gobmk	**699**	**15.0**	702	15.0	699	15.0	686	15.3	**685**	**15.3**	685	15.3
456.hmmer	**222**	**42.0**	223	41.9	222	42.0	**222**	**42.0**	223	41.9	222	42.0
458.sjeng	**707**	**17.1**	706	17.1	708	17.1	684	17.7	**684**	**17.7**	684	17.7
462.libquantum	**5.95**	**3480**	5.89	3520	5.97	3470	**5.95**	**3480**	5.89	3520	5.97	3470
464.h264ref	723	30.6	725	30.5	**723**	**30.6**	723	30.6	725	30.5	**723**	**30.6**
471.omnetpp	283	22.1	298	21.0	**287**	**21.7**	220	28.4	**219**	**28.5**	219	28.6
473.astar	384	18.3	**386**	**18.2**	388	18.1	386	18.2	384	18.3	**385**	**18.3**
483.xalancbmk	169	40.9	**170**	**40.6**	170	40.5	162	42.5	**162**	**42.5**	162	42.5

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"
Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled

Platform Notes

BIOS configuration:
 Sysinfo program /home/cpu2006-1.2-ic17.0/config/sysinfo.rev6993
 Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
 running on Kent-SUT2 Sun Jan 10 21:45:54 2016

 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) CPU E5-2609 v4 @ 1.70GHz
       2 "physical id"s (chips)
       16 "processors"
    cores, siblings (Caution: counting these is hw and system dependent. The
    following excerpts from /proc/cpuinfo might not be reliable. Use with
    caution.)
       cpu cores : 8

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Platform Notes (Continued)

```
       siblings  : 8
       physical 0: cores 0 1 2 3 4 5 6 7
       physical 1: cores 0 1 2 3 4 5 6 7
    cache size : 20480 KB

From /proc/meminfo
    MemTotal:       264572328 kB
    HugePages_Total:        0
    Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
    SuSE-release:
       SUSE Linux Enterprise Server 12 (x86_64)
       VERSION = 12
       PATCHLEVEL = 1
       # This file is deprecated and will be removed in a future service pack or
       release.
       # Please check /etc/os-release for details about this release.
    os-release:
       NAME="SLES"
       VERSION="12-SP1"
       VERSION_ID="12.1"
       PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
       ID="sles"
       ANSI_COLOR="0;32"
       CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
    Linux Kent-SUT2 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
    (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jan 10 21:45

SPEC is set to: /home/cpu2006-1.2-ic17.0
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sdc2       btrfs  447G   13G  434G   3% /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 American Megatrends Inc. 3.57 08/12/2016
  Memory:
    16x Samsung M393A2G40DB1-CRC 16 GB 2 rank 2400 MHz, configured at 1866 MHz

(End of data from sysinfo program)
```

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Tested by:	Lenovo Group Limited	**Software Availability:**	Sep-2016

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-ic17.0/libs/32:/home/cpu2006-1.2-ic17.0/libs/64:/home/cpu2006-1.2-ic17.0/sh10.2"
OMP_NUM_THREADS = "16"

 Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
 memory using Redhat Enterprise Linux 7.2
```

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.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-BDW-revE.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.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-BDW-revE.xml

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

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