SPEC® CINT2006 Result
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Lenovo Group Limited

SPECint®2006 = 35.3

Lenovo ThinkServer RD450
(1.70 GHz, Intel Xeon E5-2603 v4)

SPECint_base2006 = 34.2

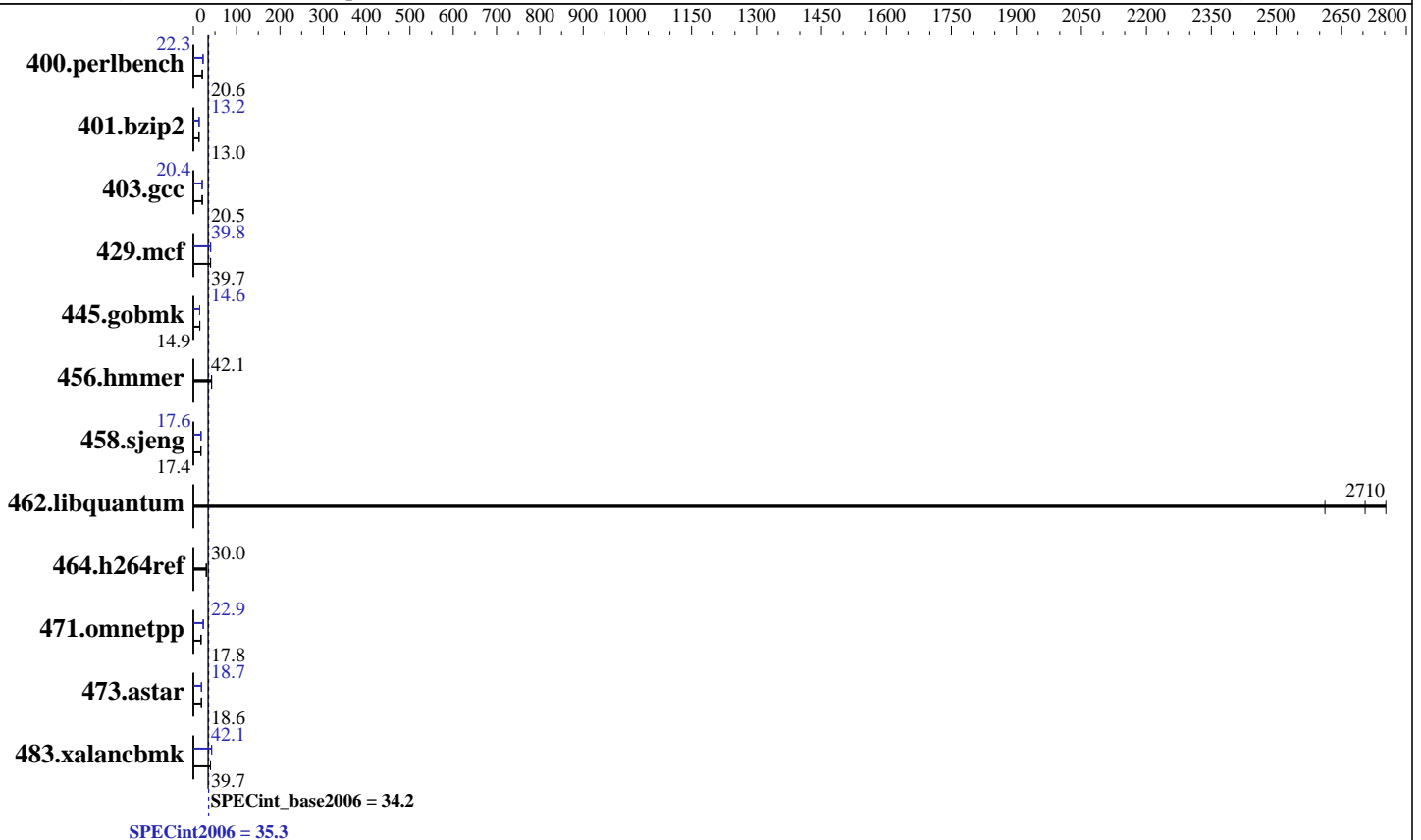|	
CPU2006 license: 9017	**Test date:** Apr-2016
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Mar-2016
Tested by: Lenovo Group Limited	**Software Availability:** Dec-2015

400.perlbench 22.3 / 20.6
401.bzip2 13.2 / 13.0
403.gcc 20.4 / 20.5
429.mcf 39.8 / 39.7
445.gobmk 14.6 / 14.9
456.hmmer 42.1
458.sjeng 17.6 / 17.4
462.libquantum 2710
464.h264ref 30.0
471.omnetpp 22.9 / 17.8
473.astar 18.7 / 18.6
483.xalancbmk 42.1 / 39.7

SPECint_base2006 = 34.2

SPECint2006 = 35.3

Hardware

CPU Name:	Intel Xeon E5-2603 v4
CPU Characteristics:	
CPU MHz:	1700
FPU:	Integrated
CPU(s) enabled:	12 cores, 2 chips, 6 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:	15 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 800 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 16.0.0.101 of Intel C++ Studio XE 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	474	20.6	**475**	**20.6**	476	20.5	437	22.3	**437**	**22.3**	437	22.4
401.bzip2	**743**	**13.0**	743	13.0	743	13.0	729	13.2	**729**	**13.2**	729	13.2
403.gcc	393	20.5	**393**	**20.5**	394	20.5	395	20.4	**395**	**20.4**	396	20.3
429.mcf	231	39.4	**230**	**39.7**	228	39.9	**229**	**39.8**	229	39.8	227	40.2
445.gobmk	706	14.9	706	14.9	**706**	**14.9**	**716**	**14.6**	717	14.6	715	14.7
456.hmmer	221	42.1	**222**	**42.1**	222	42.0	221	42.1	**222**	**42.1**	222	42.0
458.sjeng	697	17.4	696	17.4	**696**	**17.4**	**689**	**17.6**	689	17.6	689	17.6
462.libquantum	7.53	2750	7.93	2610	**7.66**	**2710**	7.53	2750	7.93	2610	**7.66**	**2710**
464.h264ref	737	30.0	**737**	**30.0**	735	30.1	737	30.0	**737**	**30.0**	735	30.1
471.omnetpp	366	17.1	**351**	**17.8**	351	17.8	273	22.9	274	22.8	**273**	**22.9**
473.astar	374	18.8	377	18.6	**376**	**18.6**	374	18.8	376	18.7	**375**	**18.7**
483.xalancbmk	**174**	**39.7**	174	39.6	174	39.7	163	42.3	**164**	**42.1**	164	42.1

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:
     Cluster On Die set to Disabled
     Early Snoop set to Enabled
     Performance Profile set to Custom
     C1E Support set to Disabled
     Core C3 set to Disabled
     Core C6 set to Disabled
     Thermal Profile set to High Fan Speed
     Memory Power Savings set to Disabled
     Sysinfo program /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914
     $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
     running on RD450-MLK Tue Apr 12 10:46:07 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 E5-2603 v4@ 1.70GHz
```
Continued on next page

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Platform Notes (Continued)

```
     2 "physical id"s (chips)
     12 "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 : 6
     siblings  : 6
     physical 0: cores 0 1 2 3 4 5
     physical 1: cores 0 1 2 3 4 5
  cache size : 15360 KB

From /proc/meminfo
   MemTotal:       264559340 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 RD450-MLK 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 Apr 11 11:47

SPEC is set to: /home/cpu2006-1.2-ic16.0
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda3       xfs   693G  3.9G  690G   1% /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 VB3TS362 03/24/2016
  Memory:
   16x Hynix Semiconductor HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at
```

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Platform Notes (Continued)

```
     1866 MHz

  (End of data from sysinfo program)
```

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-ic16.0/libs/32:/home/cpu2006-1.2-ic16.0/libs/64:/home/cpu2006-1.2-ic16.0/sh"
OMP_NUM_THREADS = "12"

 Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
 memory using RedHat EL 7.1
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
```

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 -opt-prefetch -auto-p32
```

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Base Optimization Flags (Continued)

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-Wl,-z,muldefs -L/sh -lsmartheap64
```

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_2016/linux/compiler/lib/ia32_lin
```

```
445.gobmk: icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
```

C++ benchmarks (except as noted below):
```
icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
```

```
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
```

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Peak Optimization Flags

C benchmarks:

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

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

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

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

445.gobmk: `-xCORE-AVX2`(pass 2) `-prof-gen:threadsafe`(pass 1)
`-prof-use`(pass 2) `-par-num-threads=1`(pass 1) `-ansi-alias`

456.hmmer: basepeak = yes

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

462.libquantum: basepeak = yes

464.h264ref: basepeak = yes

C++ benchmarks:

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

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

483.xalancbmk: `-xCORE-AVX2` `-ipo` `-O3` `-no-prec-div` `-opt-prefetch`
`-ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap`

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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-ic16.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-BDW-revC.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-BDW-revC.xml

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Tested with SPEC CPU2006 v1.2.
Report generated on Tue May 3 18:01:19 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 3 May 2016.