Lenovo Group Limited

Lenovo ThinkServer RD350
(2.10 GHz, Intel Xeon E5-2620 v4)

CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Lenovo Group Limited

SPECint®2006 = 62.4
SPECint_base2006 = 59.5

Test date: May-2016
Hardware Availability: Mar-2016
Software Availability: Dec-2015

Hardware

CPU Name: Intel Xeon E5-2620 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz: 2100
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 2133 MHz)
Disk Subsystem: 1 x 800 GB SATA SSD
Other Hardware: None

Software

Operating System: SUSE Linux Enterprise Server 12 SP1 (x86_64)
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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info@spec.org
http://www.spec.org/
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Peak</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
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<td>471.omnetpp</td>
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<td>473.astar</td>
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<td>34.0</td>
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<td>33.9</td>
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<td>34.0</td>
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<td>34.0</td>
<td>206</td>
</tr>
<tr>
<td>483.xalancbmk</td>
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<td>68.7</td>
<td>101</td>
<td>68.3</td>
<td>100</td>
<td>68.8</td>
<td>90.5</td>
<td>76.2</td>
<td>90.7</td>
<td>76.1</td>
<td>90.6</td>
</tr>
</tbody>
</table>

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

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## Submit Notes

The config file option 'submit' was used.

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## Operating System Notes

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

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## Platform Notes

BIOS Configuration:
- Hyper-Threading set to Disabled
- 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 RD350-MLK Thu May 5 17:52:30 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

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SPECint2006 = 62.4
SPECint_base2006 = 59.5

Platform Notes (Continued)

model name : Intel(R) Xeon(R) CPU E5-2620 v4 @ 2.10GHz
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
cautions.)
cpu cores : 8
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: 264560720 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SUSE-release:
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:
    (8d714a8) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 May 5 17:50

SPEC is set to: /home/cpu2006-1.2-ic16.0
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 689G 4.0G 685G 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:
**SPEC CINT2006 Result**

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**Platform Notes (Continued)**

16x Hynix Semiconductor HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at 2133 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 = "16"

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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For other inquiries, please contact webmaster@spec.org.

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