Lenovo Group Limited
Lenovo ThinkServer RD350 (Intel Xeon E5-2640 v3, 2.60 GHz)

SPECint\textsubscript{rate}\textsubscript{2006} = 719
SPECint\textsubscript{rate}_base\textsubscript{2006} = 691

CPU\textsubscript{2006} license: 9017
Test date: Dec-2014
Test sponsor: Lenovo Group Limited
Hardware Availability: Dec-2014
Tested by: Lenovo Group Limited
Software Availability: Sep-2014

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECint\textsubscript{rate}_2006</th>
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<tr>
<td>400.perlbench</td>
<td>32</td>
<td>839</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>32</td>
<td>347</td>
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<tr>
<td>403.gcc</td>
<td>32</td>
<td>537</td>
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<tr>
<td>429.mcf</td>
<td>32</td>
<td>855</td>
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<tr>
<td>445.gobmk</td>
<td>32</td>
<td>470</td>
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<td>456.hmmer</td>
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<td>1110</td>
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<td>458.sjeng</td>
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<td>511</td>
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<tr>
<td>462.libquantum</td>
<td>32</td>
<td>716</td>
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<td>464.h264ref</td>
<td>32</td>
<td>837</td>
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<tr>
<td>471.omnetpp</td>
<td>32</td>
<td>388</td>
</tr>
<tr>
<td>473.astar</td>
<td>32</td>
<td>392</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>32</td>
<td>759</td>
</tr>
</tbody>
</table>

CPU Name: Intel Xeon E5-2640 v3
CPU Characteristics: Intel Turbo Boost Technology up to 3.40 GHz
CPU MHz: 2600
FPU: Integrated
CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip, 2 threads/core
CPU(s) orderable: 1,2 chip
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 PC4-2133P-R, running at 1866 MHz)
Disk Subsystem: 1 x 800 GB SATA SSD
Other Hardware: None

Operating System: Red Hat Enterprise Linux Server release 7.0 (Maipo) 3.10.0-123.el7.x86_64
Compiler: C/C++: Version 15.0.0.090 of Intel C++ Studio XE for Linux
Auto Parallel: No
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 32-bit
Peak Pointers: 32/64-bit
Other Software: Microquill SmartHeap V10.0
Lenovo Group Limited

Lenovo ThinkServer RD350 (Intel Xeon E5-2640 v3, 2.60 GHz)

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

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
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<td>92.6</td>
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<tr>
<td>h264ref</td>
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<td>858</td>
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<td>540</td>
<td>370</td>
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<tr>
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<td>572</td>
<td>393</td>
<td>573</td>
<td>392</td>
<td>572</td>
<td>392</td>
</tr>
<tr>
<td>salancbmk</td>
<td>32</td>
<td>291</td>
<td>759</td>
<td>292</td>
<td>757</td>
<td>292</td>
<td>757</td>
</tr>
</tbody>
</table>

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

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

Platform Notes

BIOS configuration:
- Cluster On Die set to Auto
- Early Snoop set to Auto
- 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 /usr/cpu2006/config/sysinfo.rev6914
$mRev: 6914 $mDate:: 2014-06-25 $m e3fbb8667b5a285932ceab81e28219e1
running on RD350 Tue Dec 23 09:53:12 2014

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

Continued on next page
## Lenovo Group Limited

**Lenovo ThinkServer RD350 (Intel Xeon E5-2640 v3, 2.60 GHz)**

<table>
<thead>
<tr>
<th>SPECint_rate2006</th>
<th>719</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECint_rate_base2006</td>
<td>691</td>
</tr>
</tbody>
</table>

**CPU2006 license:** 9017  
**Test sponsor:** Lenovo Group Limited  
**Tested by:** Lenovo Group Limited  
**Test date:** Dec-2014  
**Hardware Availability:** Dec-2014  
**Software Availability:** Sep-2014

### Platform Notes (Continued)

From `/proc/cpuinfo`

- `model name`: Intel(R) Xeon(R) CPU E5-2640 v3 @ 2.60GHz
- `2 "physical id"s (chips)`
- `32 "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
  - `siblings`: 16
  - `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`: 263858144 kB
- `HugePages_Total`: 0
- `Hugepagesize`: 2048 kB

From `/etc/*release* /etc/*version*`

- `os-release`:
  - `NAME="Red Hat Enterprise Linux Server"`
  - `VERSION="7.0 (Maipo)"
  - `ID="rhel"
  - `ID_LIKE="fedora"
  - `VERSION_ID="7.0"
  - `PRETTY_NAME="Red Hat Enterprise Linux Server 7.0 (Maipo)"
  - `ANSI_COLOR="0;31"
  - `CPE_NAME=cpe:/o:redhat:enterprise_linux:7.0:GA:server`
  - `redhat-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)`
  - `system-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)`
  - `system-release-cpe: cpe:/o:redhat:enterprise_linux:7.0:ga:server`

- `uname -a`:
  - `Linux RD350 3.10.0-123.el7.x86_64 #1 SMP Mon May 5 11:16:57 EDT 2014 x86_64 x86_64 GNU/Linux`
- `run-level 3 Dec 23 09:52`

**SPEC is set to:** `/usr/cpu2006`

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used Avail Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda2</td>
<td>xfs</td>
<td>741G</td>
<td>158G 584G 22%</td>
<td>/</td>
</tr>
</tbody>
</table>

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 VB3TS110 10/05/2014`
- `Memory:`
  - `16x Micron 36ASF2G72PZ-2G1A2 16 GB 2 rank 2133 MHz, configured at 1866 MHz`

Continued on next page
Lenovo Group Limited

Lenovo ThinkServer RD350 (Intel Xeon E5-2640 v3, 2.60 GHz)

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Platform Notes (Continued)

(End of data from sysinfo program)
RD350 support 4 channels and 8 DIMMs per processor, total 8 channels and
16 DIMMs. All 16 DIMM slots installed with 16 GB DIMM for this run.

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/usr/cpu2006/libs/32:/usr/cpu2006/libs/64:/usr/cpu2006/sh"

Binaries compiled on a system with 1x Core i5-4670K CPU + 16GB
memory using RedHat EL 7.0
Transparent Huge Pages enabled with:
echo always > /sys/kernel/mm/transparent_hugepage/enabled
Filesystem page cache cleared with:
echo 1>       /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
umactl --interleave=all runspec <etc>

Base Compiler Invocation

C benchmarks:
  icc -m32 -L/opt/intel/composer_xe_2015/lib/ia32
C++ benchmarks:
  icpc -m32 -L/opt/intel/composer_xe_2015/lib/ia32

Base Portability Flags

  400.perlbench: -DSPEC_CPU_LINUX_IA32
  462.libquantum: -DSPEC_CPU_LINUX
  483.xalancbmk: -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
  -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
C++ benchmarks:
  -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -Wl,-z,muldefs
  -L/sh -lsmartheap
Lenovo Group Limited
Lenovo ThinkServer RD350 (Intel Xeon E5-2640 v3, 2.60 GHz)

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Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Base Other Flags

C benchmarks:
403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m32 -L/opt/intel/composer_xe_2015/lib/ia32
400.perlbench: icc -m64
401.bzip2: icc -m64
456.hmmer: icc -m64
458.sjeng: icc -m64

C++ benchmarks:
icpc -m32 -L/opt/intel/composer_xe_2015/lib/ia32

Peak Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LINUX
483.xalancbmk: -DSPEC_CPU_LINUX

Peak Optimization Flags

C benchmarks:
400.perlbench: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-auto-ilp32
401.bzip2: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-opt-prefetch -auto-ilp32 -ansi-alias
403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div
Lenovo Group Limited

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Peak Optimization Flags (Continued)

429.mcf: basepeak = yes
445.gobmk: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -prof-use(pass 2)
-ansi-alias
456.hmmer: -xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32
458.sjeng: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-unroll4 -auto-ilp32
462.libquantum: basepeak = yes
464.h264ref: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-unroll2 -ansi-alias

C++ benchmarks:
471.omnetpp: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-ansi-alias -opt-ra-region-strategy=block -Wl,-z,-muldefs
-L/sh -lsamartheap
473.astar: basepeak = yes
483.xalancbmk: basepeak = yes

C benchmarks:
403.gcc: -Dalloca=_alloca

Peak Other Flags

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-HSW-revC.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic15.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-HSW-revC.xml
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For other inquiries, please contact webmaster@spec.org.

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