# SPEC® CFP2006 Result

**Lenovo Group Limited**

**Lenovo System x3850 X6**  
(Intel Xeon E7-4820 v4, 2.00 GHz)

**SPECfp®2006 = 90.8**  
**SPECfp_base2006 = 87.3**

<table>
<thead>
<tr>
<th>Hardware</th>
<th>Software</th>
</tr>
</thead>
</table>
| **CPU Name:** Intel Xeon E7-4820 v4 | **Operating System:** SUSE Linux Enterprise Server 12 SP1 (x86_64)  
Kernel 3.12.49-11-default |
| **CPU Characteristics:** | **Compiler:** C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;  
Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux |
| **CPU MHz:** 2000 | **Auto Parallel:** Yes |
| **FPU:** Integrated | **File System:** xfs |
| **CPU(s) enabled:** 40 cores, 4 chips, 10 cores/chip | **System State:** Run level 3 (multi-user) |
| **CPU(s) orderable:** 2.4 chips | |
| **Primary Cache:** 32 KB I + 32 KB D on chip per core | |
| **Secondary Cache:** 256 KB I+D on chip per core | |

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## Lenovo Group Limited

**CPU2006 license:** 9017  
**Test sponsor:** Lenovo Group Limited  
**Tested by:** Lenovo Group Limited  
**L3 Cache:** 25 MB I+D on chip per chip  
**Other Cache:** None  
**Memory:** 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R, running at 1333 MHz)  
**Disk Subsystem:** 1 x 800 GB SATA SSD  
**Other Hardware:** None  

### SPEC CFP2006 Result

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>16.3</td>
<td>834</td>
<td>15.4</td>
<td>885</td>
<td>15.4</td>
<td>883</td>
<td>15.4</td>
<td>883</td>
<td>15.4</td>
<td>883</td>
<td>15.4</td>
<td>883</td>
</tr>
<tr>
<td>Peak</td>
<td>749</td>
<td>26.1</td>
<td>751</td>
<td>26.1</td>
<td>749</td>
<td>26.1</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

### Results Table

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

### Operating System Notes

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

### Platform Notes

- **BIOS Configuration:** Operating Mode set to "Maximum Performance"  
- **Hyper-Threading set to Disable**  
- **Sysinfo program** /home/cpu2006-1.2-ic16.0/config/sysinfo.rev6914  
  $Revision: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1 running on Draco-01 Tue Jul 26 00:56:05 2016

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:

Continued on next page

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*Standard Performance Evaluation Corporation*

info@spec.org  
http://www.spec.org/
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CPU2006 license: 9017  Test date: Jul-2016
Test sponsor: Lenovo Group Limited  Hardware Availability: Jun-2016
Tested by: Lenovo Group Limited  Software Availability: Dec-2015

Platform Notes (Continued)

http://www.spec.org/cpu2006/Docs/config.html#sysinfo

From `/proc/cpuinfo`
- model name : Intel(R) Xeon(R) CPU E7-4820 v4 @ 2.00GHz
- 4 "physical id"s (chips)
- 40 "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 : 10
  - siblings : 10
  - physical 0: cores 0 1 2 3 4 8 9 10 11 12
  - physical 1: cores 0 1 2 3 4 8 9 10 11 12
  - physical 2: cores 0 1 2 3 4 8 9 10 11 12
  - physical 3: cores 0 1 2 3 4 8 9 10 11 12
- cache size : 25600 KB

From `/proc/meminfo`
- MemTotal: 529165796 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`:
  (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

`run-level` 3 Jul 25 16:52

`SPEC` is set to: `/home/cpu2006-1.2-ic16.0`

`Filesystem`  `Type`  `Size`  `Used`  `Avail`  `Mounted on`

  - /dev/sda4  `xfs`  688G  4.5G  684G  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..."
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Platform Notes (Continued)

determined", but the intent may not be met, as there are frequent changes to hardware, firmware, and the "DMTF SMBIOS" standard.

BIOS LENOVO-[A9E135CUS-3.10]- 06/16/2016
Memory: 32x Hynix HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz, configured at 1333 MHz
64x NO DIMM Unknown

(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 = "40"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1
Transparent Huge Pages disabled with:
echo never > /sys/kernel/mm/transparent_hugepage/enabled

Base Compiler Invocation

C benchmarks:
  icc  -m64

C++ benchmarks:
  icpc  -m64

Fortran benchmarks:
  ifort  -m64

Benchmarks using both Fortran and C:
  icc  -m64 ifort  -m64

Base Portability Flags

410.bwaves:  -DSPEC_CPU_LP64
416.gamess:  -DSPEC_CPU_LP64
  433.milc:  -DSPEC_CPU_LP64
  434.zeusmp:  -DSPEC_CPU_LP64
  -nofor_main
435.gromacs:  -DSPEC_CPU_LP64
  -nofor_main
436.cactusADM:  -DSPEC_CPU_LP64
  -nofor_main
437.leslie3d:  -DSPEC_CPU_LP64
444.namd:  -DSPEC_CPU_LP64

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#### Base Portability Flags (Continued)

<table>
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<tr>
<td>447.dealII</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>450.soplex</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>453.povray</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>454.calculix</td>
<td>-DSPEC_CPU_LP64, -nofor_main</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>465.tonto</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>470.lbm</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
<tr>
<td>481.wrf</td>
<td>-DSPEC_CPU_LP64, -DSPEC_CPU_CASE_FLAG, -DSPEC_CPU_LINUX</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>-DSPEC_CPU_LP64</td>
</tr>
</tbody>
</table>

#### Base Optimization Flags

**C benchmarks:**
- -xCORE-AVX2  
- -ipo  
- -O3  
- -no-prec-div  
- -parallel  
- -opt-prefetch  
- -ansi-alias

**C++ benchmarks:**
- -xCORE-AVX2  
- -ipo  
- -O3  
- -no-prec-div  
- -opt-prefetch  
- -ansi-alias

**Fortran benchmarks:**
- -xCORE-AVX2  
- -ipo  
- -O3  
- -no-prec-div  
- -parallel  
- -opt-prefetch

**Benchmarks using both Fortran and C:**
- -xCORE-AVX2  
- -ipo  
- -O3  
- -no-prec-div  
- -parallel  
- -opt-prefetch  
- -ansi-alias

#### Peak Compiler Invocation

**C benchmarks:**
- icc -m64

**C++ benchmarks:**
- icpc -m64

**Fortran benchmarks:**
- ifort -m64

**Benchmarks using both Fortran and C:**
- icc -m64 ifort -m64

#### Peak Portability Flags

Same as Base Portability Flags
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Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes
470.lbm: basepeak = yes
482.sphinx3: basepeak = yes

C++ benchmarks:

444.namd: -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) -fno-alias
           -auto-ilp32

447.dealII: basepeak = yes
450.soplex: basepeak = yes
453.povray: -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
            -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes
416.gamess: -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) -unroll2
            -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes
459.GemsFDTD: -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) -unroll2
               -inline-level=0 -opt-prefetch -parallel

465.tonto: -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) -inline-cALLOC
           -opt-mmalloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

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Peak Optimization Flags (Continued)

435.gromacs: basepeak = yes
436.cactusADM: basepeak = yes
454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias
481.wrf: basepeak = yes

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-Flags-V1.2-BDW-B.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-Flags-V1.2-BDW-B.xml

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

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