SPEC® CFP2006 Result

Lenovo Group Limited

$SPECfp^{®}2006 =$ 121

Lenovo System x3950 X6
(Intel Xeon E7-8890 v4, 2.20 GHz)

$SPECfp\_base2006 =$ 111
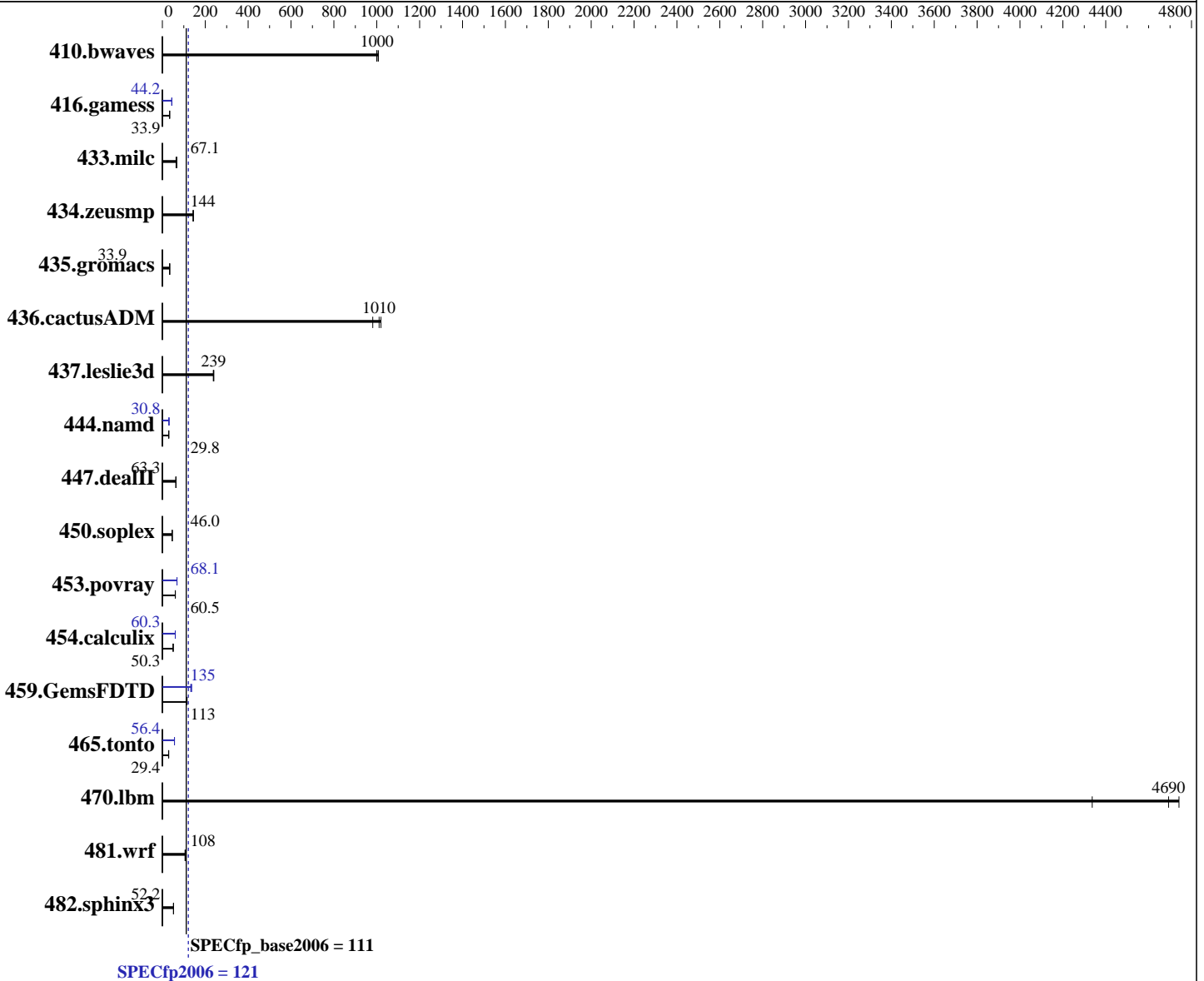
CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Sep-2016
Hardware Availability: Jun-2016
Software Availability: Mar-2016

410.bwaves	1000
416.gamess	44.2 / 33.9
433.milc	67.1
434.zeusmp	144
435.gromacs	33.9
436.cactusADM	1010
437.leslie3d	239
444.namd	30.8 / 29.8
447.dealII	63.3
450.soplex	46.0
453.povray	68.1 / 60.5
454.calculix	60.3 / 50.3
459.GemsFDTD	135 / 113
465.tonto	56.4 / 29.4
470.lbm	4690
481.wrf	108
482.sphinx3	52.2

SPECfp_base2006 = 111
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Hardware

CPU Name: Intel Xeon E7-8890 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.40 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 192 cores, 8 chips, 24 cores/chip
CPU(s) orderable: 4,8 chips
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 256 KB I+D on chip per core

Continued on next page

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;
Fortran: Version 16.0.0.101 of Intel Fortran
Studio XE for Linux
Auto Parallel: Yes
File System: xfs
System State: Run level 3 (multi-user)

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L3 Cache:	60 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	1 TB (64 x 16 GB 2Rx4 PC4-2133P-R, running at 1600 MHz)	Other Software:	None
Disk Subsystem:	2 x 600 GB 15000 RPM SAS, RAID 1		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	**13.6**	**1000**	13.6	1000	13.5	1010	**13.6**	**1000**	13.6	1000	13.5	1010
416.gamess	576	34.0	580	33.7	**577**	**33.9**	445	44.0	443	44.2	**443**	**44.2**
433.milc	137	67.2	**137**	**67.1**	144	63.8	137	67.2	**137**	**67.1**	144	63.8
434.zeusmp	**63.0**	**144**	62.9	145	63.7	143	**63.0**	**144**	62.9	145	63.7	143
435.gromacs	211	33.9	207	34.4	**210**	**33.9**	211	33.9	207	34.4	**210**	**33.9**
436.cactusADM	12.2	981	11.7	1020	**11.8**	**1010**	12.2	981	11.7	1020	**11.8**	**1010**
437.leslie3d	**39.4**	**239**	39.1	240	39.6	238	**39.4**	**239**	39.1	240	39.6	238
444.namd	270	29.7	268	29.9	**269**	**29.8**	261	30.8	260	30.8	**260**	**30.8**
447.dealII	181	63.3	**181**	**63.3**	181	63.3	181	63.3	**181**	**63.3**	181	63.3
450.soplex	181	46.0	181	46.0	**181**	**46.0**	181	46.0	181	46.0	**181**	**46.0**
453.povray	88.6	60.1	**88.0**	**60.5**	87.9	60.5	78.0	68.2	78.2	68.0	**78.1**	**68.1**
454.calculix	**164**	**50.3**	164	50.2	163	50.6	**137**	**60.3**	137	60.3	137	60.1
459.GemsFDTD	**93.6**	**113**	95.7	111	91.9	115	80.1	132	**78.5**	**135**	77.8	136
465.tonto	**334**	**29.4**	332	29.6	342	28.8	174	56.5	**174**	**56.4**	174	56.4
470.lbm	**2.93**	**4690**	2.90	4740	3.17	4340	**2.93**	**4690**	2.90	4740	3.17	4340
481.wrf	106	106	**103**	**108**	102	109	106	106	**103**	**108**	102	109
482.sphinx3	376	51.8	373	52.3	**374**	**52.2**	376	51.8	373	52.3	**374**	**52.2**

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
    $Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
    running on X3950-01-SLES12SP1 Wed Sep  7 18:31:57 2016

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

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Test date: Sep-2016
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Platform Notes (Continued)

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

 From /proc/cpuinfo
    model name : Intel(R) Xeon(R) CPU E7-8890 v4 @ 2.20GHz
       8 "physical id"s (chips)
       192 "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 : 24
       siblings  : 24
       physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 2: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 3: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 4: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 5: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 6: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
       physical 7: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
       27 28 29
    cache size : 61440 KB

 From /proc/meminfo
    MemTotal:       1058550028 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:
```

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Test sponsor: Lenovo Group Limited	**Hardware Availability:**	Jun-2016
Tested by: Lenovo Group Limited	**Software Availability:**	Mar-2016

Platform Notes (Continued)

```
    Linux X3950-01-SLES12SP1 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 Sep 7 13:29

  SPEC is set to: /home/cpu2006-1.2-ic16.0
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda4       xfs    512G   71G  442G  14% /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 IBM -[A9E135CUS-3.10]- 06/16/2016
    Memory:
    128x NO DIMM Unknown
    64x Samsung M393A2G40DB0-CPB 16 GB 2 rank 2133 MHz, configured at 1600 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 = "192"

 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

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Base Portability Flags

```
  410.bwaves: -DSPEC_CPU_LP64
  416.gamess: -DSPEC_CPU_LP64
     433.milc: -DSPEC_CPU_LP64
   434.zeusmp: -DSPEC_CPU_LP64
  435.gromacs: -DSPEC_CPU_LP64 -nofor_main
 436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
   437.leslie3d: -DSPEC_CPU_LP64
     444.namd: -DSPEC_CPU_LP64
    447.dealII: -DSPEC_CPU_LP64
    450.soplex: -DSPEC_CPU_LP64
    453.povray: -DSPEC_CPU_LP64
   454.calculix: -DSPEC_CPU_LP64 -nofor_main
 459.GemsFDTD: -DSPEC_CPU_LP64
     465.tonto: -DSPEC_CPU_LP64
      470.lbm: -DSPEC_CPU_LP64
      481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
   482.sphinx3: -DSPEC_CPU_LP64
```

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
```

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Test date: Sep-2016
Hardware Availability: Jun-2016
Software Availability: Mar-2016

Peak Compiler Invocation (Continued)

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

Peak Portability Flags

```
Same as Base Portability Flags
```

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
```

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Peak Optimization Flags (Continued)

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-malloc-options=3` `-auto` `-unroll4`

Benchmarks using both Fortran and C:

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-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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