SPEC® CFP2006 Result

Lenovo Group Limited

$SPECfp^{®}2006 =$ 91.1

Lenovo System x3500 M5
(Intel Xeon E5-2628L v3, 2.00 GHz)

$SPECfp\_base2006 =$ 87.4
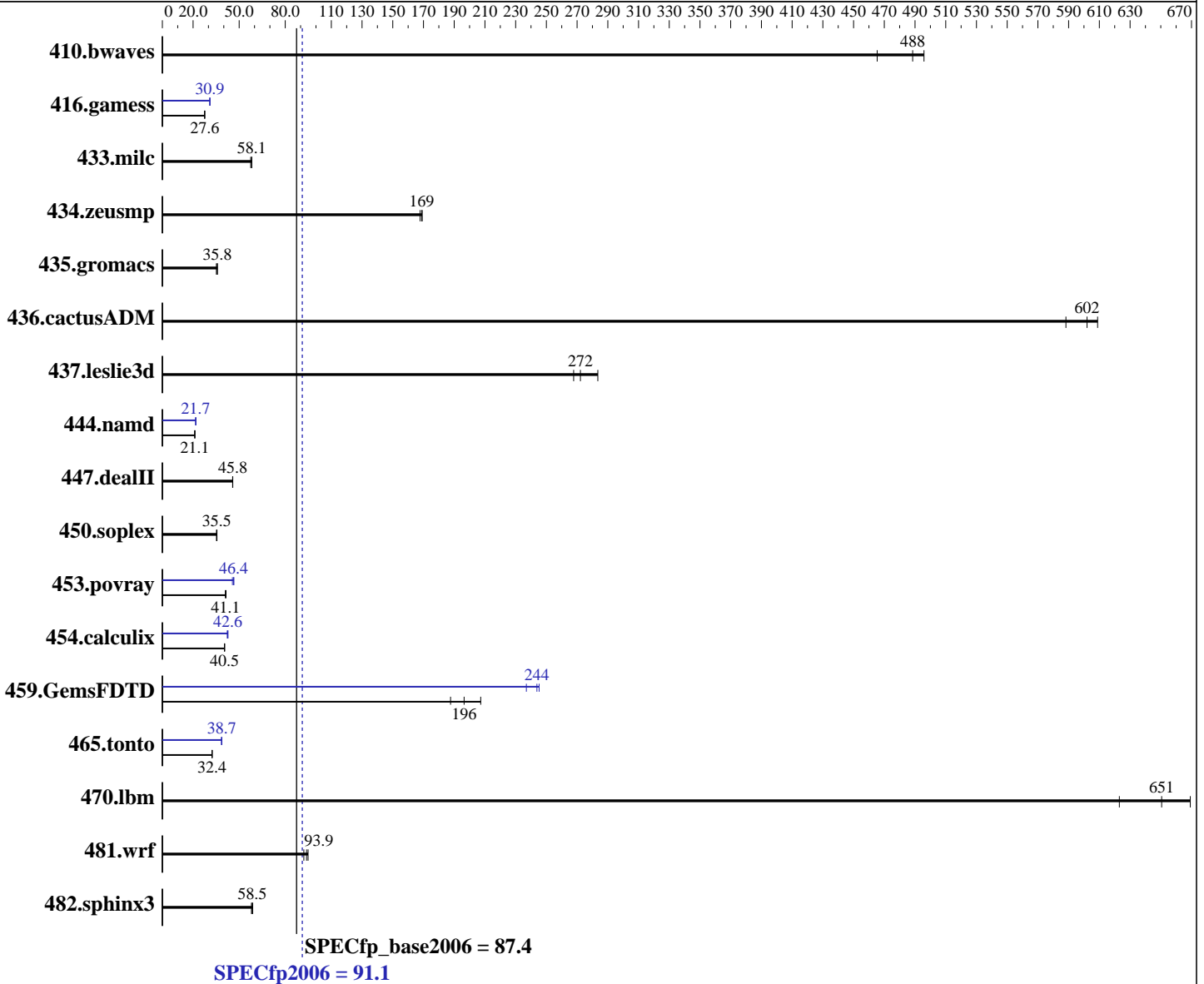
CPU2006 license: 9017
Test sponsor: Lenovo Group Limited
Tested by: Lenovo Group Limited

Test date: Oct-2015
Hardware Availability: Jan-2015
Software Availability: Sep-2014

Benchmark	Result
410.bwaves	488
416.gamess	30.9 / 27.6
433.milc	58.1
434.zeusmp	169
435.gromacs	35.8
436.cactusADM	602
437.leslie3d	272
444.namd	21.7 / 21.1
447.dealII	45.8
450.soplex	35.5
453.povray	46.4 / 41.1
454.calculix	42.6 / 40.5
459.GemsFDTD	244 / 196
465.tonto	38.7 / 32.4
470.lbm	651
481.wrf	93.9
482.sphinx3	58.5

SPECfp_base2006 = 87.4
SPECfp2006 = 91.1

Hardware

CPU Name: Intel Xeon E5-2628L v3
CPU Characteristics: Intel Turbo Boost Technology up to 2.50 GHz
CPU MHz: 2000
FPU: Integrated
CPU(s) enabled: 20 cores, 2 chips, 10 cores/chip, 2 threads/core
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
Continued on next page

Software

Operating System: Red Hat Enterprise Linux Server release 7.0 (Maipo)
3.10.0-123.el7.x86_64
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
Continued on next page

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L3 Cache:	25 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2133P-R, running at 1866 MHz)	Peak Pointers:	32/64-bit
		Other Software:	None
Disk Subsystem:	1 x 960 GB SATA SSD		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	29.2	465	27.4	496	**27.8**	**488**	29.2	465	27.4	496	**27.8**	**488**
416.gamess	713	27.5	710	27.6	**710**	**27.6**	632	31.0	**633**	**30.9**	634	30.9
433.milc	**158**	**58.1**	158	58.2	160	57.5	**158**	**58.1**	158	58.2	160	57.5
434.zeusmp	**53.9**	**169**	53.8	169	54.2	168	**53.9**	**169**	53.8	169	54.2	168
435.gromacs	199	35.8	**199**	**35.8**	203	35.2	199	35.8	**199**	**35.8**	203	35.2
436.cactusADM	**19.9**	**602**	19.6	609	20.3	588	**19.9**	**602**	19.6	609	20.3	588
437.leslie3d	35.1	268	**34.5**	**272**	33.2	284	35.1	268	**34.5**	**272**	33.2	284
444.namd	**379**	**21.1**	380	21.1	379	21.1	368	21.8	**369**	**21.7**	370	21.7
447.dealII	250	45.7	250	45.8	**250**	**45.8**	250	45.7	250	45.8	**250**	**45.8**
450.soplex	**235**	**35.5**	237	35.2	235	35.5	**235**	**35.5**	237	35.2	235	35.5
453.povray	**129**	**41.1**	129	41.1	128	41.5	**115**	**46.4**	117	45.6	114	46.5
454.calculix	204	40.5	204	40.5	**204**	**40.5**	195	42.2	193	42.7	**194**	**42.6**
459.GemsFDTD	51.2	207	56.5	188	**54.0**	**196**	44.8	237	**43.5**	**244**	43.3	245
465.tonto	305	32.3	**304**	**32.4**	303	32.4	256	38.5	254	38.7	**254**	**38.7**
470.lbm	22.1	623	**21.1**	**651**	20.5	669	22.1	623	**21.1**	**651**	20.5	669
481.wrf	118	94.9	121	92.1	**119**	**93.9**	118	94.9	121	92.1	**119**	**93.9**
482.sphinx3	**333**	**58.5**	336	58.0	331	58.8	**333**	**58.5**	336	58.0	331	58.8

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 setting:
Operating Mode set to "Efficiency-Favor Performance"
Hyper-threading set to "Enable"
Snoop mode set to "Early Snoop"
Sysinfo program /home/SPEC_ic16/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on x3500M5 Wed Oct 14 08:25:24 2015

This section contains SUT (System Under Test) info as seen by
```

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Platform Notes (Continued)

```
  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 E5-2628L v3 @ 2.00GHz
        2 "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  : 20
        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
     cache size : 25600 KB

  From /proc/meminfo
     MemTotal:        263454900 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 x3500M5 3.10.0-123.el7.x86_64 #1 SMP Mon May 5 11:16:57 EDT 2014 x86_64
     x86_64 x86_64 GNU/Linux


  SPEC is set to: /home/SPEC_ic16
     Filesystem            Type  Size  Used Avail Use% Mounted on
     /dev/mapper/rhel-root xfs   927G  149G  779G  16% /
  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 -[TAE105J-1.10]- 04/20/2015
     Memory:
```

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CPU2006 license: 9017	**Test date:** Oct-2015
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Jan-2015
Tested by: Lenovo Group Limited	**Software Availability:** Sep-2014

Platform Notes (Continued)

```
    6x Hynix HMA42GR7MFR4N-TF 16 GB 2 rank 2133 MHz, configured at 1866 MHz
    10x Hynix HMA42GR7MFR4N-TFT1 16 GB 2 rank 2133 MHz, configured at 1866 MHz
    8x 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,1,0"
LD_LIBRARY_PATH = "/home/SPEC_ic16/libs/32:/home/SPEC_ic16/libs/64:/home/SPEC_ic16/sh"
OMP_NUM_THREADS = "20"

 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
```

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
   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
```

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Lenovo System x3500 M5
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$\text{SPECfp2006} =$ 91.1

$\text{SPECfp\_base2006} =$ 87.4

Base Portability Flags (Continued)

```
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
```

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

Peak Portability Flags

```
Same as Base Portability Flags
```

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Lenovo Group Limited

Lenovo System x3500 M5
(Intel Xeon E5-2628L v3, 2.00 GHz)

$SPECfp2006 = $ 91.1

$SPECfp_base2006 = $ 87.4

CPU2006 license: 9017	**Test date:** Oct-2015
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Jan-2015
Tested by: Lenovo Group Limited	**Software Availability:** Sep-2014

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-malloc-options=3 -auto -unroll4`

Benchmarks using both Fortran and C:

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Test sponsor: Lenovo Group Limited		**Hardware Availability:**	Jan-2015
Tested by: Lenovo Group Limited		**Software Availability:**	Sep-2014

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-HSW-D.20150923.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-HSW-D.20150923.xml

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