SPEC® CFP2006 Result

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Lenovo Group Limited

Lenovo ThinkServer RD650
(1.70 GHz, Intel Xeon E5-2650L v4)

$SPECfp^{®}\_rate2006 = 755$

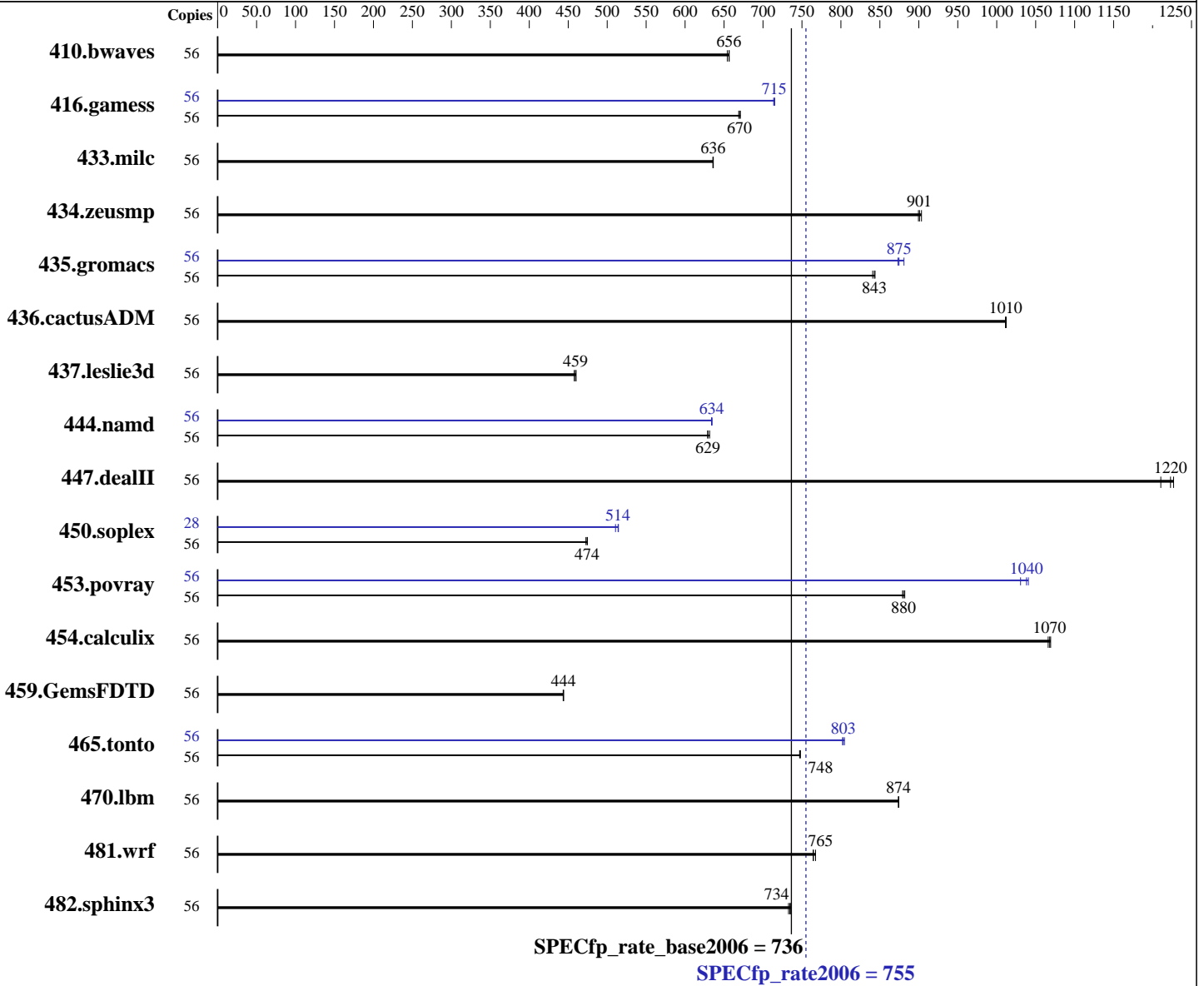$SPECfp\_rate\_base2006 = 736$

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

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

Benchmark	Copies	Result
410.bwaves	56	656
416.gamess	56	715
416.gamess	56	670
433.milc	56	636
434.zeusmp	56	901
435.gromacs	56	875
435.gromacs	56	843
436.cactusADM	56	1010
437.leslie3d	56	459
444.namd	56	634
444.namd	56	629
447.dealII	56	1220
450.soplex	28	514
450.soplex	56	474
453.povray	56	1040
453.povray	56	880
454.calculix	56	1070
459.GemsFDTD	56	444
465.tonto	56	803
465.tonto	56	748
470.lbm	56	874
481.wrf	56	765
482.sphinx3	56	734

SPECfp_rate_base2006 = 736

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Hardware

CPU Name: Intel Xeon E5-2650L v4
CPU Characteristics: Intel Turbo Boost Technology up to 2.50 GHz
CPU MHz: 1700
FPU: Integrated
CPU(s) enabled: 28 cores, 2 chips, 14 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: 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: No
File System: xfs
System State: Run level 3 (multi-user)

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L3 Cache:	35 MB I+D on chip per chip
Other Cache:	None
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)
Disk Subsystem:	1 x 800 GB SATA SSD
Other Hardware:	None

Base Pointers:	32/64-bit
Peak Pointers:	32/64-bit
Other Software:	None

Results Table

Benchmark	Base Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Peak Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	56	1159	657	1163	654	**1160**	**656**	56	1159	657	1163	654	**1160**	**656**
416.gamess	56	1639	669	1634	671	**1637**	**670**	56	1536	714	**1535**	**715**	1533	715
433.milc	56	**808**	**636**	809	636	808	636	56	**808**	**636**	809	636	808	636
434.zeusmp	56	564	903	567	900	**566**	**901**	56	564	903	567	900	**566**	**901**
435.gromacs	56	**474**	**843**	474	844	476	841	56	454	881	**457**	**875**	458	873
436.cactusADM	56	**662**	**1010**	661	1010	662	1010	56	**662**	**1010**	661	1010	662	1010
437.leslie3d	56	1150	458	**1146**	**459**	1144	460	56	1150	458	**1146**	**459**	1144	460
444.namd	56	711	632	**714**	**629**	714	629	56	708	635	**708**	**634**	708	634
447.dealII	56	529	1210	522	1230	**524**	**1220**	56	529	1210	522	1230	**524**	**1220**
450.soplex	56	**985**	**474**	984	475	988	473	28	454	514	**454**	**514**	457	511
453.povray	56	338	882	**338**	**880**	339	879	56	286	1040	**287**	**1040**	289	1030
454.calculix	56	433	1070	**433**	**1070**	432	1070	56	433	1070	**433**	**1070**	432	1070
459.GemsFDTD	56	1340	444	1338	444	**1338**	**444**	56	1340	444	1338	444	**1338**	**444**
465.tonto	56	738	747	**737**	**748**	737	748	56	**686**	**803**	687	802	685	805
470.lbm	56	**880**	**874**	880	874	880	874	56	**880**	**874**	880	874	880	874
481.wrf	56	818	765	815	767	**818**	**765**	56	818	765	815	767	**818**	**765**
482.sphinx3	56	**1486**	**734**	1490	733	1484	736	56	**1486**	**734**	1490	733	1484	736

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"
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

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Test date: Aug-2016
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Platform Notes

```
 BIOS Configuration:
  Cluster On Die set to Enabled
  Early Snoop set to Disabled
  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 RD650-MLK Sun Aug 21 13:44:54 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
     model name : Intel(R) Xeon(R) CPU E5-2650L v4@ 1.70GHz
        2 "physical id"s (chips)
        56 "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 : 14
        siblings  : 28
        physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
        physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
     cache size : 17920 KB

  From /proc/meminfo
     MemTotal:       264553052 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"
```

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CPU2006 license: 9017
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Platform Notes (Continued)

```
uname -a:
   Linux RD650-MLK 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 Aug 21 13:43

SPEC is set to: /home/cpu2006-1.2-ic16.0
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda3       xfs   691G  8.0G  683G   2% /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 PB1TS362 03/24/2016
  Memory:
   16x Hynix Semiconductor HMA42GR7AFR4N-UH 16 GB 2 rank 2400 MHz
   8x NO DIMM NO DIMM

(End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
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"

 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
 Filesystem page cache cleared with:
 echo 1>        /proc/sys/vm/drop_caches
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

Base Compiler Invocation

C benchmarks:
    icc   -m64

C++ benchmarks:
    icpc -m64

Fortran benchmarks:
    ifort -m64

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$SPECfp\_rate2006 =$ 755

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CPU2006 license: 9017		**Test date:**	Aug-2016
Test sponsor: Lenovo Group Limited		**Hardware Availability:**	Mar-2016
Tested by: Lenovo Group Limited		**Software Availability:**	Dec-2015

Base Compiler Invocation (Continued)

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
 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 -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

Peak Compiler Invocation

C benchmarks:
```
icc   -m64
```

Lenovo Group Limited

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SPECfp_rate2006 =   755

SPECfp_rate_base2006 =   736

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

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

Peak Compiler Invocation (Continued)

C++ benchmarks (except as noted below):
```
icpc -m64
```

450.soplex: `icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin`

Fortran benchmarks:
```
ifort -m64
```

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

Peak 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: -D_FILE_OFFSET_BITS=64
    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
```

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) -opt-mem-layout-trans=3(pass 2)
              -prof-use(pass 2) -fno-alias -auto-ilp32
```

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Peak Optimization Flags (Continued)

```
       447.dealII: basepeak = yes

       450.soplex: -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) -opt-mem-layout-trans=3(pass 2)
                   -prof-use(pass 2) -opt-malloc-options=3

       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) -opt-mem-layout-trans=3(pass 2)
                   -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: basepeak = yes

        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) -unroll4 -auto
                   -inline-calloc -opt-malloc-options=3
```

Benchmarks using both Fortran and C:

```
     435.gromacs: -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) -opt-mem-layout-trans=3(pass 2)
                  -prof-use(pass 2) -opt-prefetch -auto-ilp32

    436.cactusADM: basepeak = yes

     454.calculix: basepeak = yes

         481.wrf: basepeak = yes
```

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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

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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