SPEC® CFP2006 Result
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Lenovo Group Limited

$SPECfp®_rate2006 = $ 705

Lenovo ThinkServer RD452X
(Intel Xeon E5-2680 v3, 2.50 GHz)

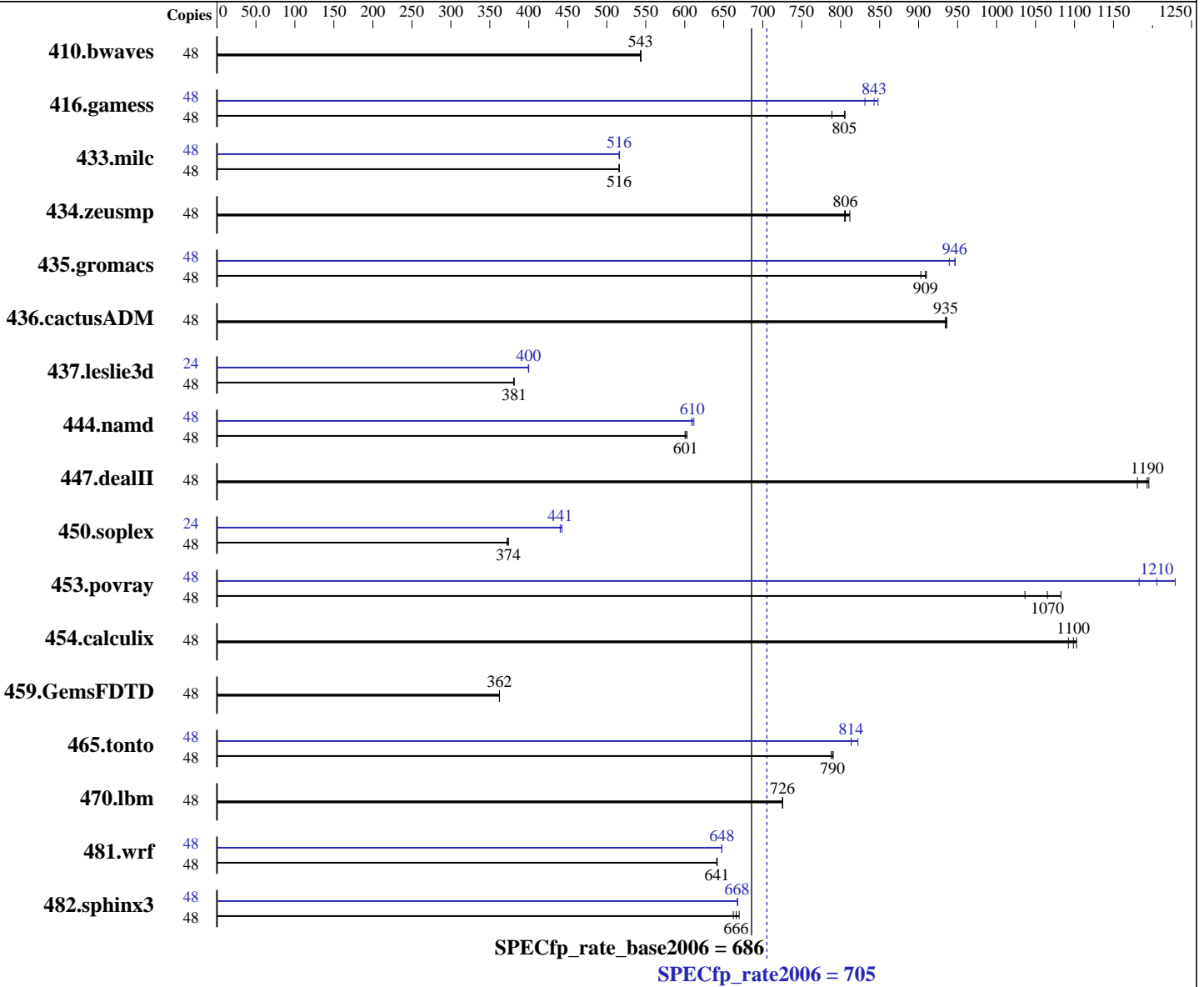$SPECfp_rate_base2006 = $ 686

	Copies		
410.bwaves	48		543
416.gamess	48		843
	48		805
433.milc	48		516
	48		516
434.zeusmp	48		806
435.gromacs	48		946
	48		909
436.cactusADM	48		935
437.leslie3d	24		400
	48		381
444.namd	48		610
	48		601
447.dealII	48		1190
450.soplex	24		441
	48		374
453.povray	48		1210
	48		1070
454.calculix	48		1100
459.GemsFDTD	48		362
465.tonto	48		814
	48		790
470.lbm	48		726
481.wrf	48		648
	48		641
482.sphinx3	48		668
	48		666

SPECfp_rate_base2006 = 686

SPECfp_rate2006 = 705

Hardware

CPU Name: Intel Xeon E5-2680 v3
CPU Characteristics: Intel Turbo Boost Technology up to 3.30 GHz
CPU MHz: 2500
FPU: Integrated
CPU(s) enabled: 24 cores, 2 chips, 12 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
Continued on next page

Software

Operating System: Red Hat Enterprise Linux Server release 6.7 (Santiago)
2.6.32-573.el6.x86_64
Compiler: C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux;
Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux
Auto Parallel: No
File System: ext4
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Lenovo ThinkServer RD452X
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$SPECfp\_rate2006 =$ 705

$SPECfp\_rate\_base2006 =$ 686

CPU2006 license: 9017	**Test date:** Sep-2016
Test sponsor: Lenovo Group Limited	**Hardware Availability:** Nov-2015
Tested by: Lenovo Group Limited	**Software Availability:** Sep-2013

L3 Cache:	30 MB I+D on chip per chip	System State:	Run level 5 (multi-user)
Other Cache:	None	Base Pointers:	32/64-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 480 GB SATA SSD		
Other Hardware:	None		

Results Table

Benchmark	Base Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Peak Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	48	1201	543	**1200**	**543**	1199	544	48	1201	543	**1200**	**543**	1199	544
416.gamess	48	1192	789	1167	806	**1168**	**805**	48	1108	848	1131	831	**1115**	**843**
433.milc	48	**854**	**516**	855	516	854	516	48	**854**	**516**	854	516	854	516
434.zeusmp	48	538	812	**542**	**806**	543	805	48	538	812	**542**	**806**	543	805
435.gromacs	48	380	903	**377**	**909**	377	910	48	365	939	**362**	**946**	362	947
436.cactusADM	48	**614**	**935**	613	936	614	934	48	**614**	**935**	613	936	614	934
437.leslie3d	48	1184	381	**1184**	**381**	1185	381	24	565	399	564	400	**564**	**400**
444.namd	48	639	603	641	600	**641**	**601**	48	632	609	629	612	**631**	**610**
447.dealII	48	459	1200	465	1180	**460**	**1190**	48	459	1200	465	1180	**460**	**1190**
450.soplex	48	1071	374	**1071**	**374**	1076	372	24	452	443	**454**	**441**	455	440
453.povray	48	**240**	**1070**	246	1040	236	1080	48	216	1180	208	1230	**212**	**1210**
454.calculix	48	359	1100	363	1090	**360**	**1100**	48	359	1100	363	1090	**360**	**1100**
459.GemsFDTD	48	1405	362	1406	362	**1405**	**362**	48	1405	362	1406	362	**1405**	**362**
465.tonto	48	600	788	598	790	**598**	**790**	48	581	813	**581**	**814**	574	822
470.lbm	48	**909**	**726**	909	726	909	725	48	**909**	**726**	909	726	909	725
481.wrf	48	836	641	836	642	**836**	**641**	48	828	648	828	648	**828**	**648**
482.sphinx3	48	1397	670	**1405**	**666**	1412	662	48	1402	668	1400	668	**1401**	**668**

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 Enabled
  Early Snoop set to Disabled

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$SPECfp_rate_base2006 = $ 686

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

Test date: Sep-2016
Hardware Availability: Nov-2015
Software Availability: Sep-2013

Platform Notes (Continued)

```
Sysinfo program /cpu2006/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on localhost.localdomain Fri Sep 16 02:56:18 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 E5-2680 v3 @ 2.50GHz
      2 "physical id"s (chips)
      48 "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 : 12
      siblings  : 24
      physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
      physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
   cache size : 15360 KB

From /proc/meminfo
   MemTotal:       264500932 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

/usr/bin/lsb_release -d
   Red Hat Enterprise Linux Server release 6.7 (Santiago)

From /etc/*release* /etc/*version*
   redhat-release: Red Hat Enterprise Linux Server release 6.7 (Santiago)
   system-release: Red Hat Enterprise Linux Server release 6.7 (Santiago)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server

uname -a:
   Linux localhost.localdomain 2.6.32-573.el6.x86_64 #1 SMP Wed Jul 1 18:23:37
   EDT 2015 x86_64 x86_64 x86_64 GNU/Linux

run-level 5 Sep 15 14:16

SPEC is set to: /cpu2006
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda2       ext4  193G   57G  126G  32% /

Additional information from dmidecode:
  BIOS American Megatrends Inc. A1.11 04/09/2016
  Memory:
   16x   16 GB
   16x Samsung M393A2G40DB0-CPB 16 GB 1866 MHz 2 rank

(End of data from sysinfo program)
```

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Lenovo ThinkServer RD452X
(Intel Xeon E5-2680 v3, 2.50 GHz)

$SPECfp\_rate2006 =$ 705

$SPECfp\_rate\_base2006 =$ 686

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

Test date: Sep-2016
Hardware Availability: Nov-2015
Software Availability: Sep-2013

General Notes

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

 Binaries compiled on a system with 1x Core i7-860 CPU + 8GB
 memory using RedHat EL 6.4
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/redhat_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
```

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
```

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Lenovo ThinkServer RD452X
(Intel Xeon E5-2680 v3, 2.50 GHz)

SPECfp_rate2006 =   705

SPECfp_rate_base2006 =   686

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

Test date: Sep-2016
Hardware Availability: Nov-2015
Software Availability: Sep-2013

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 (except as noted below):
```
icc    -m64
```

482.sphinx3: `icc -m32`

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

450.soplex: `icpc -m32`

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`
453.povray: `-DSPEC_CPU_LP64`

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Lenovo ThinkServer RD452X
(Intel Xeon E5-2680 v3, 2.50 GHz)

$\text{SPECfp\_rate2006} = \quad 705$

$\text{SPECfp\_rate\_base2006} = \quad 686$

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

Test date: Sep-2016
Hardware Availability: Nov-2015
Software Availability: Sep-2013

Peak Portability Flags (Continued)

```
     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
```

Peak Optimization Flags

C benchmarks:

```
       433.milc: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(pass 2)
                 -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)
                 -auto-ilp32

        470.lbm: basepeak = yes

     482.sphinx3: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-mem-layout-trans=3
                 -unroll2
```

C++ benchmarks:

```
      444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(pass 2)
                 -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2) -fno-alias
                 -auto-ilp32

      447.dealII: basepeak = yes

      450.soplex: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(pass 2)
                 -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)
                 -opt-malloc-options=3

     453.povray: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(pass 2)
                 -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(pass 1) -ipo(pass 2)
                 -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
                 -inline-level=0 -scalar-rep-
```

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Software Availability: Sep-2013

Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes

437.leslie3d: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch

459.GemsFDTD: basepeak = yes

465.tonto: -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 -inline-calloc -opt-malloc-options=3

Benchmarks using both Fortran and C:

435.gromacs: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2)
-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: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.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-ic14.0-official-linux64.20140128.xml
http://www.spec.org/cpu2006/flags/Lenovo-Platform-Settings-V1.2-BDW-revC.xml

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Tested with SPEC CPU2006 v1.2.
Report generated on Tue Oct 4 14:50:16 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 4 October 2016.