SPEC® CFP2006 Result
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Dell Inc.

PowerEdge R920 (Intel Xeon E7-2880 v2, 2.50 GHz)

$SPECfp^®\_rate2006 =$ 820

$SPECfp\_rate\_base2006 =$ 799

CPU2006 license: 55
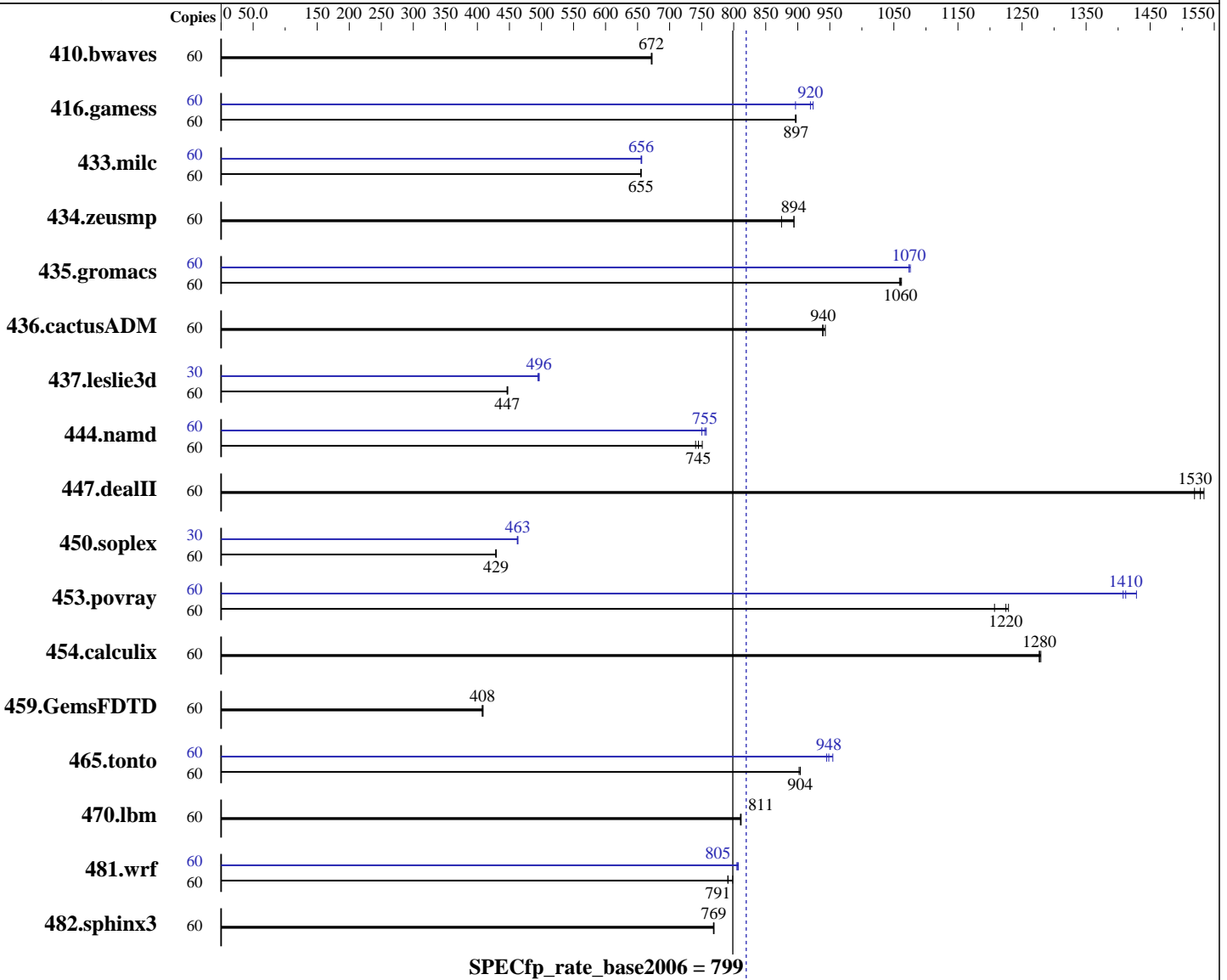**Test sponsor:** Dell Inc.
Tested by: Dell Inc.

Test date: Jan-2014
Hardware Availability: Mar-2014
Software Availability: Nov-2013

Benchmark	Copies	Result (base)	Result (peak)
410.bwaves	60	672	
416.gamess	60 / 60	897	920
433.milc	60 / 60	655	656
434.zeusmp	60	894	
435.gromacs	60 / 60	1060	1070
436.cactusADM	60	940	
437.leslie3d	30 / 60	447	496
444.namd	60 / 60	745	755
447.dealII	60	1530	
450.soplex	30 / 60	429	463
453.povray	60 / 60	1220	1410
454.calculix	60	1280	
459.GemsFDTD	60	408	
465.tonto	60 / 60	904	948
470.lbm	60	811	
481.wrf	60 / 60	791	805
482.sphinx3	60	769	

SPECfp_rate_base2006 = 799

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Hardware

CPU Name: Intel Xeon E7-2880 v2
CPU Characteristics: Intel Turbo Boost Technology up to 3.10 GHz
CPU MHz: 2500
FPU: Integrated
CPU(s) enabled: 30 cores, 2 chips, 15 cores/chip, 2 threads/core
CPU(s) orderable: 2,4 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 6.5 (Santiago)
2.6.32-431.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
Continued on next page

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L3 Cache:	37.5 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	32/64-bit
Memory:	512 GB (32 x 16 GB 2Rx4 PC3L-12800R-11, ECC)	Peak Pointers:	32/64-bit
Disk Subsystem:	1 x 300 GB 15000 RPM SAS	Other Software:	None
Other Hardware:	None		

Results Table

Benchmark	Base						Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	60	**1214**	**672**	1212	673	1214	672	60	**1214**	**672**	1212	673	1214	672
416.gamess	60	1311	896	**1309**	**897**	1309	897	60	1310	896	**1277**	**920**	1271	924
433.milc	60	840	656	**841**	**655**	841	655	60	840	656	**840**	**656**	839	656
434.zeusmp	60	624	875	611	894	**611**	**894**	60	624	875	611	894	**611**	**894**
435.gromacs	60	405	1060	403	1060	**404**	**1060**	60	398	1080	**399**	**1070**	399	1070
436.cactusADM	60	764	939	**763**	**940**	760	943	60	764	939	**763**	**940**	760	943
437.leslie3d	60	1261	447	**1262**	**447**	1264	446	30	568	496	570	495	**568**	**496**
444.namd	60	641	751	650	741	**646**	**745**	60	635	757	**637**	**755**	641	750
447.dealII	60	452	1520	447	1530	**449**	**1530**	60	452	1520	447	1530	**449**	**1530**
450.soplex	60	**1166**	**429**	1168	429	1165	430	30	541	462	**540**	**463**	540	463
453.povray	60	**261**	**1220**	264	1210	260	1230	60	223	1430	**226**	**1410**	227	1410
454.calculix	60	388	1280	**387**	**1280**	387	1280	60	388	1280	**387**	**1280**	387	1280
459.GemsFDTD	60	1562	408	**1561**	**408**	1557	409	60	1562	408	**1561**	**408**	1557	409
465.tonto	60	653	904	655	902	**653**	**904**	60	**623**	**948**	625	945	618	955
470.lbm	60	**1016**	**811**	1017	810	1016	812	60	**1016**	**811**	1017	810	1016	812
481.wrf	60	**847**	**791**	839	798	847	791	60	830	807	832	805	**832**	**805**
482.sphinx3	60	1520	769	1522	768	**1521**	**769**	60	1520	769	1522	768	**1521**	**769**

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 settings:
   Virtualization Technology disabled
   Execute Disable disabled

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Platform Notes (Continued)

```
 System Profile set to Performance
  Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6818
  $Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
  running on localhost.localdomain Tue Jan 21 01:07:09 2014

  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 E7-2880 v2 @ 2.50GHz
        2 "physical id"s (chips)
        60 "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 : 15
        siblings  : 30
        physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
        physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14
     cache size : 38400 KB

  From /proc/meminfo
     MemTotal:        529354152 kB
     HugePages_Total:         0
     Hugepagesize:         2048 kB

  /usr/bin/lsb_release -d
     Red Hat Enterprise Linux Server release 6.5 (Santiago)

  From /etc/*release* /etc/*version*
     redhat-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
     system-release: Red Hat Enterprise Linux Server release 6.5 (Santiago)
     system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server

  uname -a:
     Linux localhost.localdomain 2.6.32-431.el6.x86_64 #1 SMP Sun Nov 10 22:19:54
     EST 2013 x86_64 x86_64 x86_64 GNU/Linux

  run-level 3 Jan 20 12:02

  SPEC is set to: /root/cpu2006-1.2
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda2       ext4  271G   60G  198G  24% /

  Additional information from dmidecode:
    BIOS Dell Inc. 1.0.1 01/13/2014
    Memory:
    32x 00AD04B300AD HMT42GR7AFR4A-PB 16 GB 1333 MHz 2 rank

  (End of data from sysinfo program)
```

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General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/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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Base Optimization Flags

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

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

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

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

Peak Compiler Invocation

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

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
   454.calculix: -DSPEC_CPU_LP64 -nofor_main
  459.GemsFDTD: -DSPEC_CPU_LP64
```

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Peak Portability Flags (Continued)

```
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: -xAVX(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: basepeak = yes
```

C++ benchmarks:

```
444.namd: -xAVX(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: -xAVX(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: -xAVX(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: -xAVX(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-

434.zeusmp: basepeak = yes

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

459.GemsFDTD: basepeak = yes
```

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Peak Optimization Flags (Continued)

465.tonto: `-xAVX(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: `-xAVX(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: `-xAVX -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/Dell-Platform-Settings-V1.2-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/Dell-Platform-Settings-V1.2-revC.xml

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

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