SPEC® CFP2006 Result

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Hewlett-Packard Company

ProLiant BL420c Gen8
(1.90 GHz, Intel Xeon E5-2420)

$SPECfp®\_rate2006 = 294$

$SPECfp\_rate\_base2006 = 286$

CPU2006 license: 3
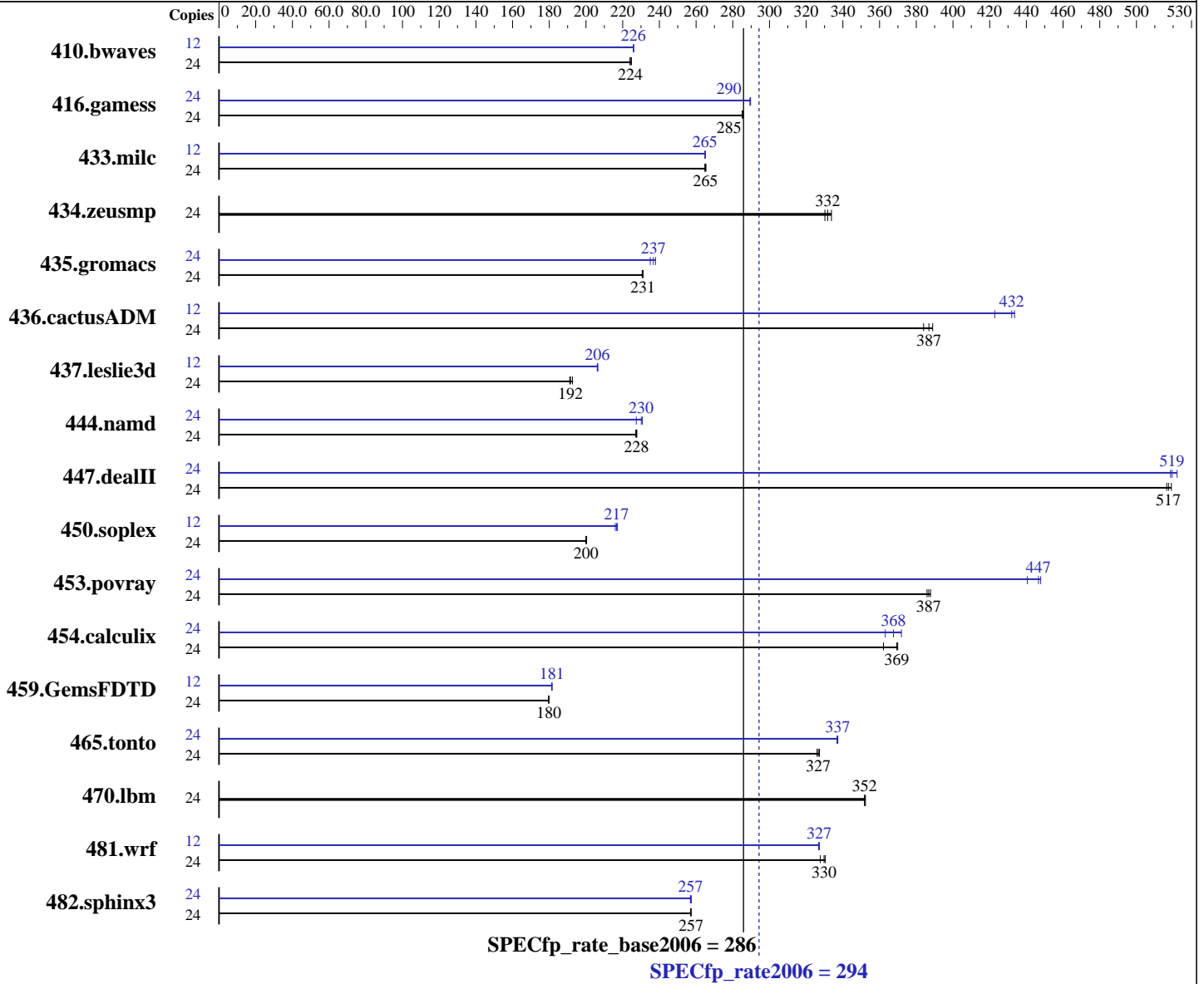**Test sponsor:** Hewlett-Packard Company
Tested by: Hewlett-Packard Company

Test date: Jul-2012
Hardware Availability: Jun-2012
Software Availability: Feb-2012

Copies		
410.bwaves	12	226
	24	224
416.gamess	24	290
	24	285
433.milc	12	265
	24	265
434.zeusmp	24	332
435.gromacs	24	237
	24	231
436.cactusADM	12	432
	24	387
437.leslie3d	12	206
	24	192
444.namd	24	230
	24	228
447.dealII	24	519
	24	517
450.soplex	12	217
	24	200
453.povray	24	447
	24	387
454.calculix	24	368
	24	369
459.GemsFDTD	12	181
	24	180
465.tonto	24	337
	24	327
470.lbm	24	352
481.wrf	12	327
	24	330
482.sphinx3	24	257
	24	257

SPECfp_rate_base2006 = 286

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Hardware

CPU Name: Intel Xeon E5-2420
CPU Characteristics: Intel Turbo Boost Technology up to 2.40 GHz
CPU MHz: 1900
FPU: Integrated
CPU(s) enabled: 12 cores, 2 chips, 6 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 6.2 (Santiago) 2.6.32-220.el6.x86_64
Compiler: C/C++: Version 12.1.2.273 of Intel C++ Studio XE for Linux; Fortran: Version 12.1.2.273 of Intel Fortran Studio XE for Linux
Auto Parallel: No
File System: ext4
Continued on next page

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L3 Cache:	15 MB I+D on chip per chip
Other Cache:	None
Memory:	96 GB (12 x 8 GB 2Rx4 PC3-12800R-11, ECC, running at 1333 MHz)
Disk Subsystem:	2 x 146 GB RAID 0
Other Hardware:	None

System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	24	1456	224	1451	225	**1455**	**224**	12	721	226	**722**	**226**	722	226
416.gamess	24	1644	286	1648	285	**1647**	**285**	24	**1623**	**290**	1622	290	1624	289
433.milc	24	**831**	**265**	830	265	832	265	12	**416**	**265**	416	265	416	265
434.zeusmp	24	661	330	**658**	**332**	654	334	24	661	330	**658**	**332**	654	334
435.gromacs	24	743	231	742	231	**742**	**231**	24	729	235	720	238	**724**	**237**
436.cactusADM	24	737	389	747	384	**741**	**387**	12	331	434	339	423	**332**	**432**
437.leslie3d	24	1180	191	1171	193	**1177**	**192**	12	**547**	**206**	546	206	547	206
444.namd	24	845	228	**846**	**228**	848	227	24	846	227	834	231	**836**	**230**
447.dealII	24	529	519	**531**	**517**	532	516	24	526	522	**529**	**519**	529	519
450.soplex	24	1001	200	**1001**	**200**	999	200	12	463	216	461	217	**462**	**217**
453.povray	24	**330**	**387**	331	386	329	388	24	285	448	**286**	**447**	290	440
454.calculix	24	547	362	535	370	**536**	**369**	24	532	372	**539**	**368**	545	363
459.GemsFDTD	24	1416	180	**1417**	**180**	1418	180	12	701	182	702	181	**702**	**181**
465.tonto	24	722	327	**723**	**327**	725	326	24	700	337	701	337	**700**	**337**
470.lbm	24	936	352	937	352	**937**	**352**	24	936	352	937	352	**937**	**352**
481.wrf	24	**813**	**330**	811	330	818	328	12	410	327	410	327	**410**	**327**
482.sphinx3	24	1818	257	**1818**	**257**	1820	257	24	1821	257	1817	257	**1820**	**257**

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
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

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Platform Notes

```
BIOS configuration:
 HP Power Profile set to Maximum Performance
Sysinfo program /mnt/store/cpu2006/Docs/sysinfo
$Rev: 6775 $ $Date:: 2011-08-16 #$ 8787f7622badcf24e01c368b1db4377c
running on bl420c-cpu Thu Jul 12 23:18:02 2012

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 E5-2420 0 @ 1.90GHz
      2 "physical id"s (chips)
      24 "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 : 6
      siblings  : 12
      physical 0: cores 0 1 2 3 4 5
      physical 1: cores 0 1 2 3 4 5
   cache size : 15360 KB

From /proc/meminfo
   MemTotal:        99026400 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

/usr/bin/lsb_release -d
   Red Hat Enterprise Linux Server release 6.2 (Santiago)

From /etc/*release* /etc/*version*
   redhat-release: Red Hat Enterprise Linux Server release 6.2 (Santiago)
   system-release: Red Hat Enterprise Linux Server release 6.2 (Santiago)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server

uname -a:
   Linux bl420c-cpu 2.6.32-220.el6.x86_64 #1 SMP Wed Nov 9 08:03:13 EST 2011
   x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Jul 11 23:26

SPEC is set to: /mnt/store/cpu2006
   Filesystem    Type    Size    Used  Avail Use% Mounted on
   /dev/sda5     ext4    191G   14G   168G   8% /mnt/store

(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 = "/mnt/store/cpu2006/libs2/32:/mnt/store/cpu2006/libs2/64"
 Binaries compiled on a system with 2x E5-2470 CPU + 192 GB
 memory using RHEL 6.2
 glibc-static-2.12-1.47.el6.x86_64.rpm and glibc-static-2.12-1.47.el6.i686.rpm
 are added to enable static linking
```

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

Base Optimization Flags

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

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Base Optimization Flags (Continued)

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

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

Benchmarks using both Fortran and C:
```
-xAVX -ipo -O3 -no-prec-div -static -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
  454.calculix: -DSPEC_CPU_LP64 -nofor_main
 459.GemsFDTD: -DSPEC_CPU_LP64
     465.tonto: -DSPEC_CPU_LP64
      470.lbm: -DSPEC_CPU_LP64
```

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Peak Portability Flags (Continued)

481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX

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) -prof-use(pass 2) -static -auto-ilp32
              -opt-mem-layout-trans=3

    470.lbm: basepeak = yes

    482.sphinx3: -xSSE4.2 -ipo -O3 -no-prec-div -opt-mem-layout-trans=3
                 -unroll2

C++ benchmarks:

    444.namd: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
              -no-prec-div(pass 2) -prof-use(pass 2) -fno-alias
              -auto-ilp32

    447.dealII: -xAVX -ipo -O3 -no-prec-div -static -opt-prefetch
                -auto-p32 -ansi-alias -opt-mem-layout-trans=3

    450.soplex: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
                -no-prec-div(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) -prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

    410.bwaves: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
                -no-prec-div(pass 2) -prof-use(pass 2) -static

    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- -static

    434.zeusmp: basepeak = yes

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

    459.GemsFDTD: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2)
                  -no-prec-div(pass 2) -prof-use(pass 2) -opt-malloc-options=3

    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

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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

      435.gromacs: `-xSSE4.2 -ipo -O3 -no-prec-div -opt-prefetch -static`
                `-auto-p32 -ansi-alias -opt-mem-layout-trans=3`

   436.cactusADM: `-xAVX -ipo -O3 -no-prec-div -static -opt-prefetch`
                `-auto-p32 -ansi-alias -opt-mem-layout-trans=3`

      454.calculix: `-xAVX -ipo -O3 -no-prec-div -static -auto-ilp32`
                `-opt-mem-layout-trans=3`

         481.wrf: `Same as 454.calculix`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-A.20120605.html
http://www.spec.org/cpu2006/flags/Intel-ic12.1-official-linux64.20120425.html

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You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-A.20120605.xml
http://www.spec.org/cpu2006/flags/Intel-ic12.1-official-linux64.20120425.xml

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