SPEC® CFP2006 Result
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Hewlett-Packard Company

ProLiant BL420c Gen8
(1.80 GHz, Intel Xeon E5-2403)

$SPECfp®\_rate2006 = 175$

$SPECfp\_rate\_base2006 = 170$
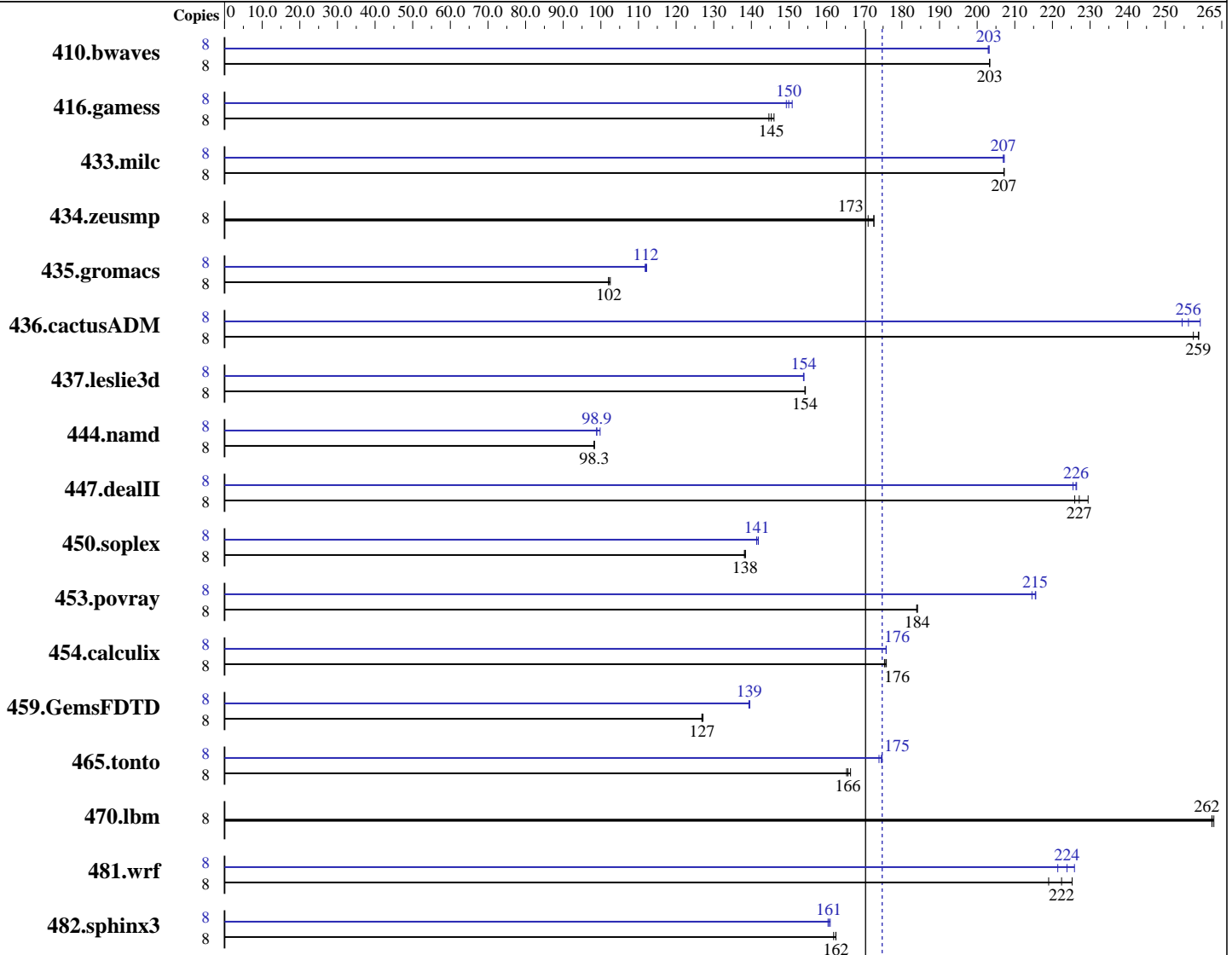
CPU2006 license: 3

Test sponsor: Hewlett-Packard Company

Tested by: Hewlett-Packard Company

Test date: Aug-2012

Hardware Availability: Jun-2012

Software Availability: Feb-2012

Benchmark	Copies	Result
410.bwaves	8 / 8	203 / 203
416.gamess	8 / 8	150 / 145
433.milc	8 / 8	207 / 207
434.zeusmp	8	173
435.gromacs	8 / 8	112 / 102
436.cactusADM	8 / 8	256 / 259
437.leslie3d	8 / 8	154 / 154
444.namd	8 / 8	98.9 / 98.3
447.dealII	8 / 8	226 / 227
450.soplex	8 / 8	141 / 138
453.povray	8 / 8	215 / 184
454.calculix	8 / 8	176 / 176
459.GemsFDTD	8 / 8	139 / 127
465.tonto	8 / 8	175 / 166
470.lbm	8	262
481.wrf	8 / 8	224 / 222
482.sphinx3	8 / 8	161 / 162

SPECfp_rate_base2006 = 170

SPECfp_rate2006 = 175

Hardware

CPU Name: Intel Xeon E5-2403

CPU Characteristics:

CPU MHz: 1800

FPU: Integrated

CPU(s) enabled: 8 cores, 2 chips, 4 cores/chip

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:	10 MB I+D on chip per chip
Other Cache:	None
Memory:	96 GB (12 x 8 GB 2Rx4 PC3-12800R-11, ECC, running at 1066 MHz and CL7)
Disk Subsystem:	2 x 146 GB SAS, RAID 0, 15000 RPM
Other Hardware:	None

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

Results Table

Benchmark	Base Copies	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Copies	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
410.bwaves	8	535	203	535	203	**535**	**203**	8	**535**	**203**	535	203	536	203
416.gamess	8	1073	146	**1078**	**145**	1083	145	8	1038	151	1049	149	**1045**	**150**
433.milc	8	**355**	**207**	355	207	354	207	8	**355**	**207**	354	207	355	207
434.zeusmp	8	422	173	426	171	**422**	**173**	8	422	173	426	171	**422**	**173**
435.gromacs	8	557	103	**559**	**102**	560	102	8	**510**	**112**	511	112	509	112
436.cactusADM	8	**369**	**259**	371	257	369	259	8	**373**	**256**	376	254	369	259
437.leslie3d	8	487	154	**487**	**154**	488	154	8	489	154	488	154	**489**	**154**
444.namd	8	653	98.3	653	98.2	**653**	**98.3**	8	**649**	**98.9**	649	98.9	643	99.8
447.dealII	8	399	229	405	226	**403**	**227**	8	**404**	**226**	406	225	404	226
450.soplex	8	482	138	**482**	**138**	483	138	8	**472**	**141**	472	141	470	142
453.povray	8	231	184	**231**	**184**	231	184	8	198	215	**198**	**215**	197	216
454.calculix	8	**376**	**176**	376	175	375	176	8	375	176	375	176	**375**	**176**
459.GemsFDTD	8	669	127	668	127	**669**	**127**	8	**609**	**139**	609	139	608	140
465.tonto	8	473	166	**475**	**166**	476	165	8	453	174	**451**	**175**	450	175
470.lbm	8	**419**	**262**	418	263	419	262	8	**419**	**262**	418	263	419	262
481.wrf	8	397	225	408	219	**402**	**222**	8	**399**	**224**	404	221	396	226
482.sphinx3	8	963	162	**960**	**162**	960	162	8	972	160	**971**	**161**	969	161

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/redhat_transparent_hugepage/enabled

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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 Sat Aug  4 16:55:40 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 E5-2403 0 @ 1.80GHz
      2 "physical id"s (chips)
      8 "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 : 4
      siblings  : 4
      physical 0: cores 0 1 2 3
      physical 1: cores 0 1 2 3
   cache size : 10240 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 Aug 4 00:00

SPEC is set to: /mnt/store/cpu2006
   Filesystem     Type     Size  Used Avail Use% Mounted on
   /dev/sda5      ext4     191G   16G  166G   9% /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 = "/opt/smartheap/"
 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
 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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Hardware Availability: Jun-2012

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Base Optimization Flags

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

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
```

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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: -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
```

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Peak Optimization Flags (Continued)

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`

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/Intel-ic12.1-official-linux64.20120425.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-A.20120829.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic12.1-official-linux64.20120425.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-A.20120829.xml

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