SPEC® CFP2006 Result
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Hewlett-Packard Company

$SPECfp®2006 =$ 64.6

ProLiant BL660c Gen8
(2.70 GHz, Intel Xeon E5-4650)
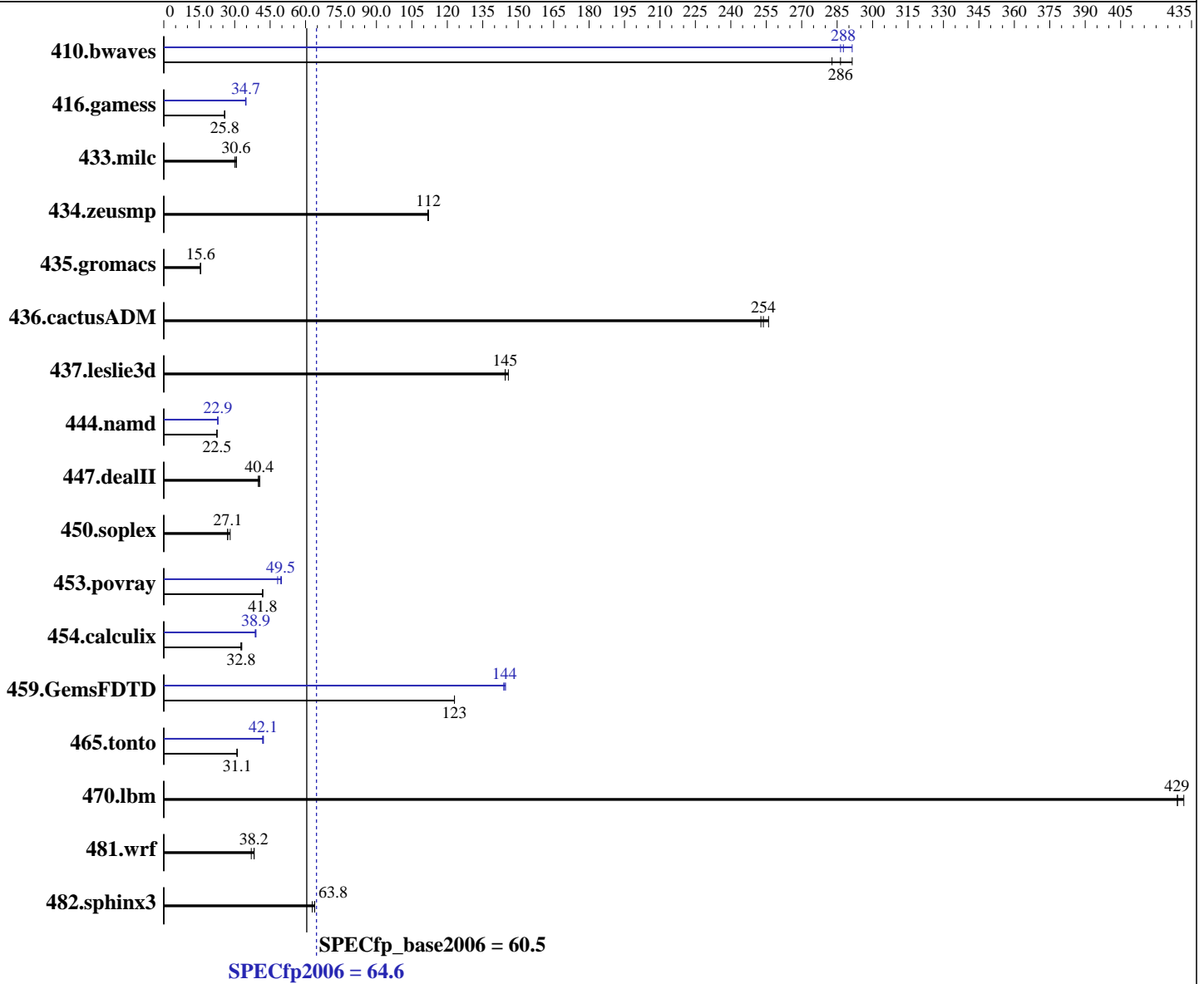
$SPECfp\_base2006 =$ 60.5

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

Test date: May-2012
Hardware Availability: Sep-2012
Software Availability: Mar-2012

Graph scale: 0 15.0 30.0 45.0 60.0 75.0 90.0 105 120 135 150 165 180 195 210 225 240 255 270 285 300 315 330 345 360 375 390 405 435

- 410.bwaves: 288 / 286
- 416.gamess: 34.7 / 25.8
- 433.milc: 30.6
- 434.zeusmp: 112
- 435.gromacs: 15.6
- 436.cactusADM: 254
- 437.leslie3d: 145
- 444.namd: 22.9 / 22.5
- 447.dealII: 40.4
- 450.soplex: 27.1
- 453.povray: 49.5 / 41.8
- 454.calculix: 38.9 / 32.8
- 459.GemsFDTD: 144 / 123
- 465.tonto: 42.1 / 31.1
- 470.lbm: 429
- 481.wrf: 38.2
- 482.sphinx3: 63.8

SPECfp_base2006 = 60.5
SPECfp2006 = 64.6

Hardware

CPU Name:	Intel Xeon E5-4650
CPU Characteristics:	Intel Turbo Boost Technology up to 3.30 GHz
CPU MHz:	2700
FPU:	Integrated
CPU(s) enabled:	32 cores, 4 chips, 8 cores/chip
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 6.2, (Santiago) Kernel 2.6.32-220.el6.x86_64
Compiler:	C/C++: Version 12.1.0.225 of Intel C++ Studio XE for Linux; Fortran: Version 12.1.0.225 of Intel Fortran Studio XE for Linux
Auto Parallel:	Yes
File System:	ext4

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L3 Cache:	20 MB I+D on chip per chip
Other Cache:	None
Memory:	256 GB (32 x 8 GB 2Rx4 PC3-12800R-11, ECC)
Disk Subsystem:	2 x 146 GB 15 K SAS, RAID 1
Other Hardware:	None

System State:	Run level 3 (multi-user)
Base Pointers:	64-bit
Peak Pointers:	32/64-bit
Other Software:	HP Array Configuration Utility, CLI version

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	48.0	283	46.6	291	**47.4**	**286**	46.6	291	**47.2**	**288**	47.4	286
416.gamess	**759**	**25.8**	758	25.8	762	25.7	566	34.6	**564**	**34.7**	563	34.8
433.milc	**300**	**30.6**	306	30.0	298	30.8	**300**	**30.6**	306	30.0	298	30.8
434.zeusmp	81.4	112	**81.3**	**112**	81.2	112	81.4	112	**81.3**	**112**	81.2	112
435.gromacs	**459**	**15.6**	460	15.5	458	15.6	**459**	**15.6**	460	15.5	458	15.6
436.cactusADM	47.3	253	46.7	256	**47.1**	**254**	47.3	253	46.7	256	**47.1**	**254**
437.leslie3d	**65.0**	**145**	65.0	145	64.5	146	**65.0**	**145**	65.0	145	64.5	146
444.namd	356	22.5	357	22.5	**356**	**22.5**	351	22.9	351	22.9	**351**	**22.9**
447.dealII	282	40.6	**283**	**40.4**	286	40.0	282	40.6	**283**	**40.4**	286	40.0
450.soplex	297	28.1	**308**	**27.1**	309	27.0	297	28.1	**308**	**27.1**	309	27.0
453.povray	127	41.8	127	41.9	**127**	**41.8**	110	48.2	**107**	**49.5**	107	49.8
454.calculix	250	33.0	**252**	**32.8**	253	32.7	212	39.0	213	38.7	**212**	**38.9**
459.GemsFDTD	86.2	123	**86.2**	**123**	86.2	123	73.7	144	73.3	145	**73.5**	**144**
465.tonto	**316**	**31.1**	316	31.1	318	30.9	233	42.2	**234**	**42.1**	235	41.8
470.lbm	32.0	429	**32.0**	**429**	31.8	432	32.0	429	**32.0**	**429**	31.8	432
481.wrf	292	38.3	302	37.0	**293**	**38.2**	292	38.3	302	37.0	**293**	**38.2**
482.sphinx3	**305**	**63.8**	310	62.8	305	63.9	**305**	**63.8**	310	62.8	305	63.9

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>
Drive Write Cache set to Enabled in HP Array Configuration Utility, CLI version
Accelerator Ratio for Reads/Writes set to = 100% Read / 0% Write in HP Array Configuration Utility, CLI version
```

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

Test date: May-2012
Hardware Availability: Sep-2012
Software Availability: Mar-2012

Platform Notes

```
BIOS Configuration:
 HP Power Profile set to Custom
 Energy/Performance Bias is set to Maximum Performance
 Thermal Configuration set to Maximum Cooling
 Collaborative Power Control set to Disabled
 Processor Power and Utilization Monitoring set to Disabled
Sysinfo program /cpu2006/config/sysinfo.rev6800
$Rev: 6800 $ $Date:: 2011-10-11 #$ 6f2ebdff5032aaa42e583f96b07f99d3
running on BL660G8 Sun May 20 15:43:52 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 E5-4650 0 @ 2.70GHz
      4 "physical id"s (chips)
      32 "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 : 8
      siblings  : 8
      physical 0: cores 0 1 2 3 4 5 6 7
      physical 1: cores 0 1 2 3 4 5 6 7
      physical 2: cores 0 1 2 3 4 5 6 7
      physical 3: cores 0 1 2 3 4 5 6 7
   cache size : 20480 KB

From /proc/meminfo
   MemTotal:       264634472 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 BL660G8 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 May 20 15:42

SPEC is set to: /cpu2006
   Filesystem      Type     Size  Used Avail Use% Mounted on
   /dev/sda3       ext4     133G  8.7G  118G   7% /
```

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Platform Notes (Continued)

```
  Additional information from dmidecode:
    BIOS HP I32 04/11/2012
    Memory:
      32x HP Not Specified 8 GB 1600 MHz 2 rank

  (End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,scatter"
LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64"
OMP_NUM_THREADS = "32"

 Binaries compiled on a system with 2x Xeon E5-2667 CPU + 256GB
 memory using SLES11 SP2,RC3
```

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
```

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Software Availability: Mar-2012

Base 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
```

Base Optimization Flags

C benchmarks:
```
    -xAVX -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
    -ansi-alias
```

C++ benchmarks:
```
    -xAVX -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias
```

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

Benchmarks using both Fortran and C:
```
    -xAVX -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
    -ansi-alias
```

Peak Compiler Invocation

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

C++ benchmarks:
```
    icpc   -m64
```

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

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

Peak Portability Flags

```
Same as Base Portability Flags
```

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CPU2006 license: 3
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Tested by: Hewlett-Packard Company

Test date: May-2012
Hardware Availability: Sep-2012
Software Availability: Mar-2012

Peak Optimization Flags

C benchmarks:

      433.milc: `basepeak = yes`

      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) `-prof-use`(pass 2) `-fno-alias`
        `-auto-ilp32`

    447.dealII: `basepeak = yes`

    450.soplex: `basepeak = yes`

    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 -ipo -O3 -no-prec-div -opt-prefetch -parallel`
        `-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: `basepeak = yes`

  459.GemsFDTD: `-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 -opt-prefetch -parallel`

    465.tonto: `-xAVX`(pass 2) `-prof-gen`(pass 1) `-ipo`(pass 2) `-O3`(pass 2)
        `-no-prec-div`(pass 2) `-prof-use`(pass 2) `-inline-calloc`
        `-opt-malloc-options=3 -auto -unroll4`

Benchmarks using both Fortran and C:

    435.gromacs: `basepeak = yes`

  436.cactusADM: `basepeak = yes`

    454.calculix: `-xAVX -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias`

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Test sponsor:	Hewlett-Packard Company	**Hardware Availability:**	Sep-2012
Tested by:	Hewlett-Packard Company	**Software Availability:**	Mar-2012

Peak Optimization Flags (Continued)

481.wrf: basepeak = yes

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.20120605.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.20120605.xml

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For other inquiries, please contact webmaster@spec.org.

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