SPEC® CFP2006 Result
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Hewlett-Packard Company

$SPECfp^{®}2006 =$ 83.4

ProLiant DL560 Gen8
(2.20 GHz, Intel Xeon E5-4640 v2)
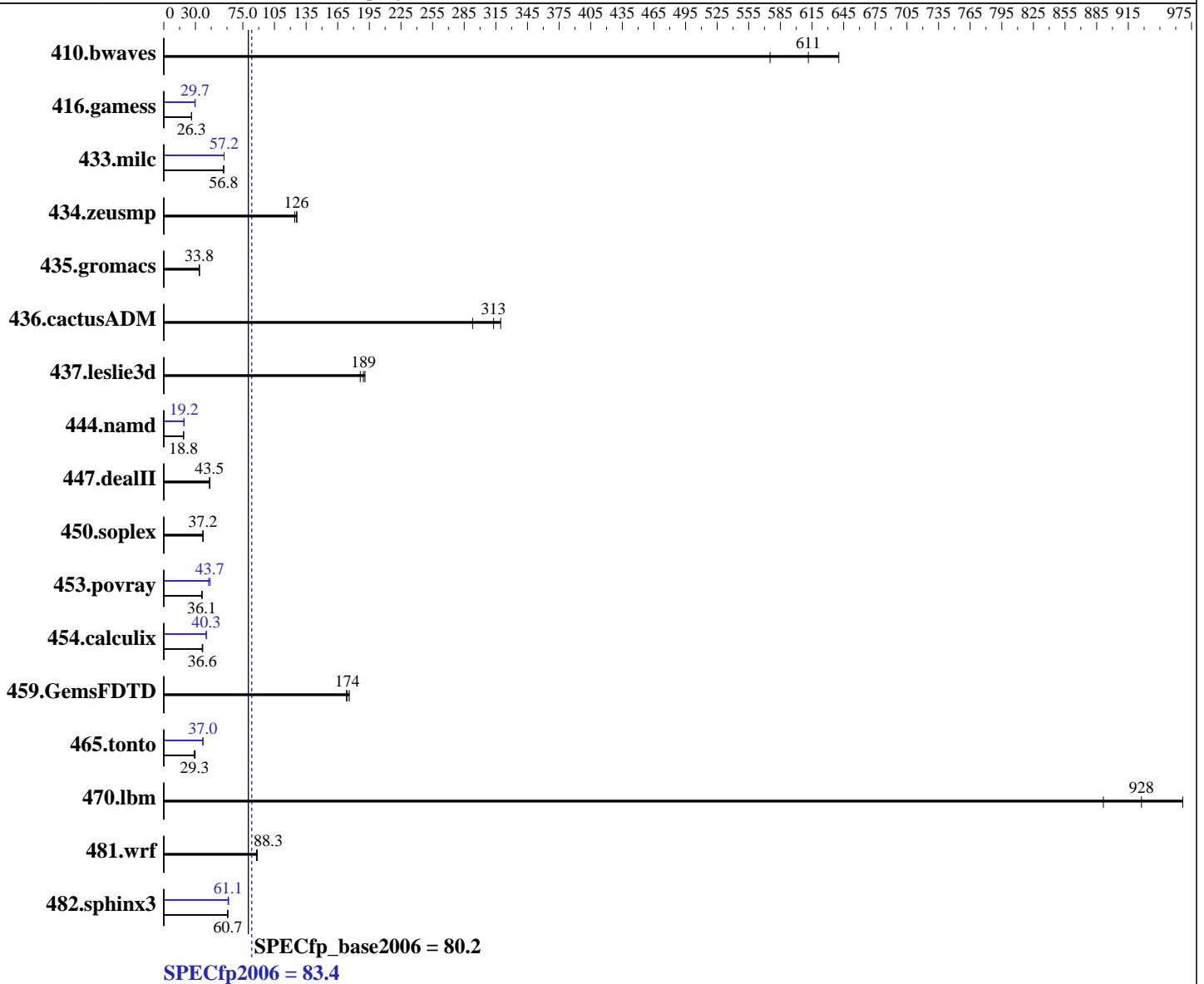
$SPECfp\_base2006 =$ 80.2

CPU2006 license: 3

Test sponsor: Hewlett-Packard Company

Tested by: Hewlett-Packard Company

Test date: Mar-2014

Hardware Availability: Mar-2014

Software Availability: Nov-2013

Benchmark	Value
410.bwaves	611
416.gamess	29.7 / 26.3
433.milc	57.2 / 56.8
434.zeusmp	126
435.gromacs	33.8
436.cactusADM	313
437.leslie3d	189
444.namd	19.2 / 18.8
447.dealII	43.5
450.soplex	37.2
453.povray	43.7 / 36.1
454.calculix	40.3 / 36.6
459.GemsFDTD	174
465.tonto	37.0 / 29.3
470.lbm	928
481.wrf	88.3
482.sphinx3	61.1 / 60.7

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Hardware

CPU Name: Intel Xeon E5-4640 v2
CPU Characteristics: Intel Turbo Boost Technology up to 2.70 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 40 cores, 4 chips, 10 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 6.5 (Santiago)
Kernel 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: Yes
File System: ext4
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L3 Cache:	20 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	64-bit
Memory:	512 GB (32 x 16 GB 2Rx4 PC3-14900R-13, ECC)	Peak Pointers:	32/64-bit
Disk Subsystem:	1 x 400 GB SAS SSD, RAID 0	Other Software:	None
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	**22.2**	**611**	23.6	575	21.2	640	**22.2**	**611**	23.6	575	21.2	640
416.gamess	**744**	**26.3**	743	26.3	744	26.3	659	29.7	**659**	**29.7**	661	29.6
433.milc	162	56.8	**162**	**56.8**	162	56.8	160	57.2	**160**	**57.2**	160	57.2
434.zeusmp	**72.3**	**126**	73.3	124	72.1	126	**72.3**	**126**	73.3	124	72.1	126
435.gromacs	**212**	**33.8**	211	33.8	212	33.7	**212**	**33.8**	211	33.8	212	33.7
436.cactusADM	**38.2**	**313**	37.4	320	40.8	293	**38.2**	**313**	37.4	320	40.8	293
437.leslie3d	**49.6**	**189**	49.2	191	50.4	186	**49.6**	**189**	49.2	191	50.4	186
444.namd	**428**	**18.8**	428	18.7	427	18.8	419	19.1	**419**	**19.2**	419	19.2
447.dealII	263	43.5	**263**	**43.5**	263	43.5	263	43.5	**263**	**43.5**	263	43.5
450.soplex	**224**	**37.2**	224	37.2	225	37.1	**224**	**37.2**	224	37.2	225	37.1
453.povray	148	36.1	**147**	**36.1**	146	36.4	125	42.4	121	43.9	**122**	**43.7**
454.calculix	223	36.9	**226**	**36.6**	226	36.5	205	40.3	205	40.3	**205**	**40.3**
459.GemsFDTD	60.3	176	**60.9**	**174**	61.3	173	60.3	176	**60.9**	**174**	61.3	173
465.tonto	331	29.8	**336**	**29.3**	340	28.9	265	37.1	266	37.0	**266**	**37.0**
470.lbm	15.4	891	**14.8**	**928**	14.2	967	15.4	891	**14.8**	**928**	14.2	967
481.wrf	126	88.6	**126**	**88.3**	127	87.9	126	88.6	**126**	**88.3**	127	87.9
482.sphinx3	**321**	**60.7**	323	60.4	321	60.8	317	61.5	**319**	**61.1**	320	61.0

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/redhat_transparent_hugepage/enabled
Filesystem page cache cleared with:
 echo 1 > /proc/sys/vm/drop_caches
Reclaim mode enabled with:
 echo 1 > /proc/sys/vm/zone_reclaim_mode
runspec command invoked through numactl i.e.:
 numactl --localalloc runspec <etc>
```

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Platform Notes

```
BIOS Configuration:
 Intel Hyperthreading Options set to Disabled
 HP Power Profile set to Maximum Performance
 Minimum Processor Idle Power Core State set to C1E state
 Minimum Processor Idle Power Package State set to Package C6 (retention) State
 Memory Power Savings Mode set to Maximum Performance
 Thermal Configuration set to Maximum Cooling
 Collaborative Power Control set to Disabled
 Dynamic Power Capping Functionality set to Disabled
 Processor Power and Utilization Monitoring set to Disabled
 Memory Refresh Rate set to 1x

Sysinfo program /cpu2006/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on DL560p-Gen8-1K4 Tue Mar  4 12:46:12 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 E5-4640 v2 @ 2.20GHz
      4 "physical id"s (chips)
      40 "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 : 10
      siblings  : 10
      physical 0: cores 0 1 2 3 4 8 9 10 11 12
      physical 1: cores 0 1 2 3 4 8 9 10 11 12
      physical 2: cores 0 1 2 3 4 8 9 10 11 12
      physical 3: cores 0 1 2 3 4 8 9 10 11 12
   cache size : 20480 KB

From /proc/meminfo
   MemTotal:       529267592 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 DL560p-Gen8-1K4 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
```

Continued on next page

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Platform Notes (Continued)

```
  run-level 3 Mar 3 15:59

  SPEC is set to: /cpu2006
     Filesystem      Type  Size  Used Avail Use% Mounted on
     /dev/sda3       ext4  365G   14G  333G   4% /

  Additional information from dmidecode:
    BIOS HP P77 11/14/2013
    Memory:
     32x HP 712383-081 16 GB 1866 MHz 2 rank
     16x UNKNOWN NOT AVAILABLE

  (End of data from sysinfo program)
  Regarding the sysinfo display about the memory installed, the correct amount of
  memory is 512 GB and the dmidecode description should have one line reading as:
     32x HP 712383-081 16 GB 1866 MHz 2 rank
```

General Notes

```
  Environment variables set by runspec before the start of the run:
  KMP_AFFINITY = "granularity=fine,compact"
  LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"
  OMP_NUM_THREADS = "40"

   Binaries compiled on a system with 1x Core i7-860 CPU + 8GB
   memory using RedHat EL 6.4
```

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
```

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Base Portability Flags (Continued)

```
     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 -parallel -opt-prefetch -ansi-alias
```

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

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

Benchmarks using both Fortran and C:
```
-xAVX -ipo -O3 -no-prec-div -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
```

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Software Availability: Nov-2013

Peak Portability Flags

Same as Base Portability Flags

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) -auto-ilp32
                -ansi-alias

        470.lbm: basepeak = yes

    482.sphinx3: -xAVX -ipo -O3 -no-prec-div -unroll2 -ansi-alias
                -parallel

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: 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: basepeak = yes

    459.GemsFDTD: basepeak = yes

        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:

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Peak Optimization Flags (Continued)

435.gromacs: basepeak = yes

436.cactusADM: basepeak = yes

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

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-ic14.0-official-linux64.20140128.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-revD.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/HP-Platform-Flags-Intel-V1.2-revD.xml

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Tested with SPEC CPU2006 v1.2.
Report generated on Thu Jul 24 23:56:14 2014 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 2 April 2014.