SPEC® CFP2006 Result

Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant XL230a Gen9
(2.20 GHz, Intel Xeon E5-2698 v4)

$SPECfp^{®}2006 =$ 125
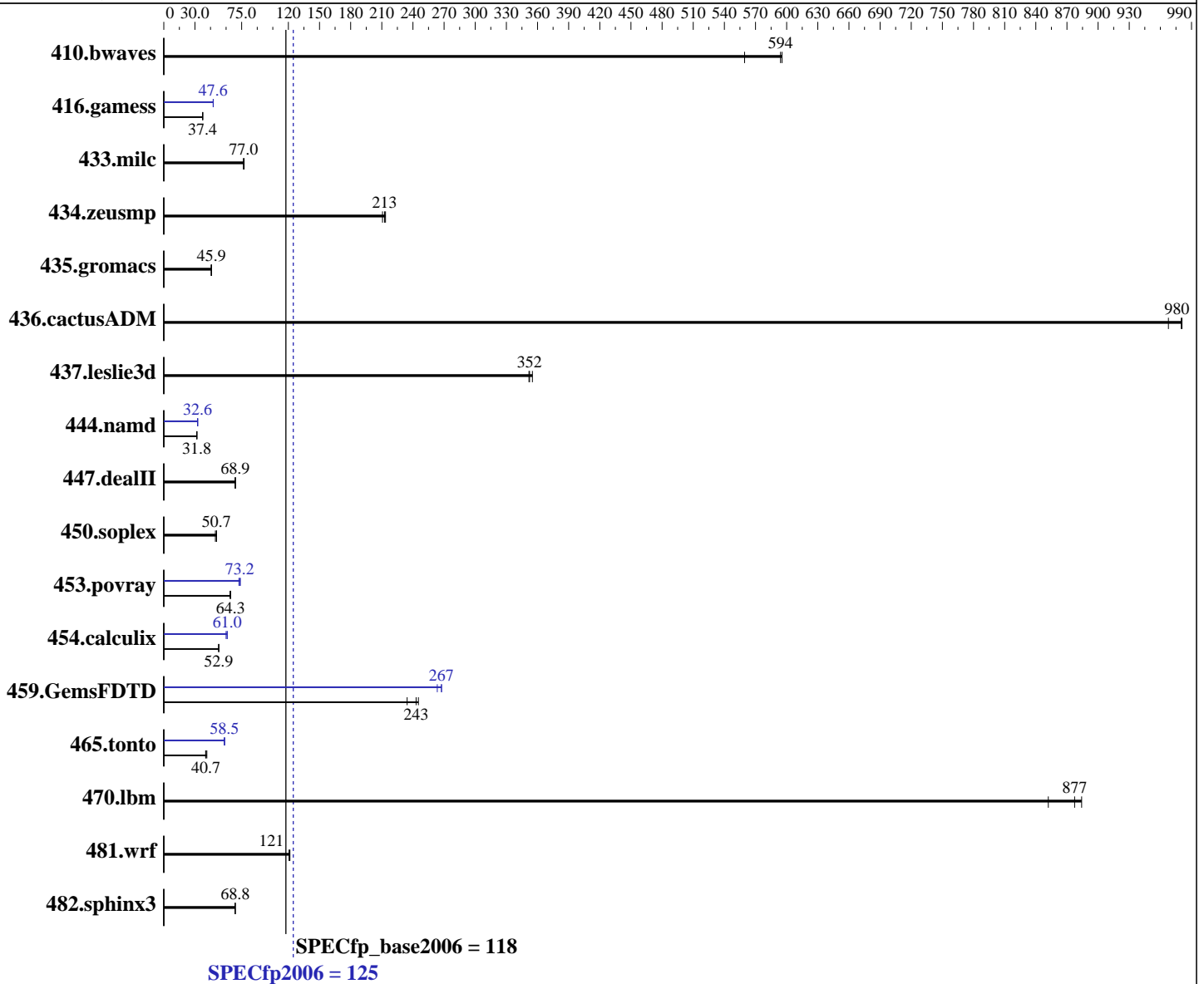
$SPECfp\_base2006 =$ 118

CPU2006 license:	3		**Test date:**	Mar-2016
Test sponsor:	HPE		**Hardware Availability:**	Mar-2016
Tested by:	HPE		**Software Availability:**	Dec-2015

0 30.0 75.0 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570 600 630 660 690 720 750 780 810 840 870 900 930 990

- **410.bwaves** 594
- **416.gamess** 47.6 / 37.4
- **433.milc** 77.0
- **434.zeusmp** 213
- **435.gromacs** 45.9
- **436.cactusADM** 980
- **437.leslie3d** 352
- **444.namd** 32.6 / 31.8
- **447.dealII** 68.9
- **450.soplex** 50.7
- **453.povray** 73.2 / 64.3
- **454.calculix** 61.0 / 52.9
- **459.GemsFDTD** 267 / 243
- **465.tonto** 58.5 / 40.7
- **470.lbm** 877
- **481.wrf** 121
- **482.sphinx3** 68.8

SPECfp_base2006 = 118
SPECfp2006 = 125

Hardware

CPU Name:	Intel Xeon E5-2698 v4
CPU Characteristics:	Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz:	2200
FPU:	Integrated
CPU(s) enabled:	40 cores, 2 chips, 20 cores/chip, 2 threads/core
CPU(s) orderable:	1,2 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:	SUSE Linux Enterprise Server 12 SP1 (x86_64) Kernel 3.12.49-11-default
Compiler:	C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux; Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux
Auto Parallel:	Yes
File System:	ReiserFS
System State:	Run level 3 (multi-user)

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L3 Cache:	50 MB I+D on chip per chip	Base Pointers:	64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	256 GB (8 x 32 GB 2Rx4 PC4-2400T-R)	Other Software:	None
Disk Subsystem:	2 x 400 GB SAS SSD, RAID 1		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	**22.9**	**594**	24.3	559	22.8	596	**22.9**	**594**	24.3	559	22.8	596
416.gamess	523	37.4	522	37.5	**523**	**37.4**	**411**	**47.6**	412	47.6	411	47.7
433.milc	**119**	**77.0**	119	77.4	120	76.8	**119**	**77.0**	119	77.4	120	76.8
434.zeusmp	42.6	214	**42.8**	**213**	43.2	211	42.6	214	**42.8**	**213**	43.2	211
435.gromacs	157	45.5	155	46.0	**155**	**45.9**	157	45.5	155	46.0	**155**	**45.9**
436.cactusADM	**12.2**	**980**	12.2	981	12.3	968	**12.2**	**980**	12.2	981	12.3	968
437.leslie3d	**26.7**	**352**	26.5	355	26.7	352	**26.7**	**352**	26.5	355	26.7	352
444.namd	252	31.9	252	31.8	**252**	**31.8**	**246**	**32.6**	246	32.6	246	32.6
447.dealII	166	69.0	**166**	**68.9**	167	68.7	166	69.0	**166**	**68.9**	167	68.7
450.soplex	164	50.8	168	49.7	**165**	**50.7**	164	50.8	168	49.7	**165**	**50.7**
453.povray	82.6	64.4	83.4	63.8	**82.8**	**64.3**	73.6	72.3	**72.7**	**73.2**	72.1	73.7
454.calculix	**156**	**52.9**	156	52.9	156	53.0	**135**	**61.0**	135	61.0	138	60.0
459.GemsFDTD	45.3	234	**43.7**	**243**	43.3	245	39.7	268	40.3	263	**39.7**	**267**
465.tonto	**242**	**40.7**	237	41.5	244	40.3	168	58.6	169	58.3	**168**	**58.5**
470.lbm	**15.7**	**877**	16.1	852	15.5	884	**15.7**	**877**	16.1	852	15.5	884
481.wrf	91.9	121	92.6	121	**92.3**	**121**	91.9	121	92.6	121	**92.3**	**121**
482.sphinx3	283	68.7	**283**	**68.8**	283	68.8	283	68.7	**283**	**68.8**	283	68.8

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
```

Platform Notes

```
BIOS Configuration:
  HP Power Profile set to Custom
  HP Power Regulator to HP Static High Performance Mode
  Minimum Processor Idle Power Core C-State set to C6 State
  Minimum Processor Idle Power Package C-State set to No Package State
  QPI Snoop Configuration set to Home Snoop
  Collaborative Power Control set to Disabled
  Thermal Configuration set to Maximum Cooling
```

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Hardware Availability: Mar-2016
Software Availability: Dec-2015

Platform Notes (Continued)

```
   Processor Power and Utilization Monitoring set to Disabled
   Memory Refresh Rate set to 1x Refresh
   Intel Hyperthreading set to Enabled
Sysinfo program /cpu2006-HP/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-gy1c Thu Mar  3 13:40:39 2016

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 E5-2698 v4 @ 2.20GHz
      2 "physical id"s (chips)
      80 "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 : 20
      siblings  : 40
      physical 0: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
      physical 1: cores 0 1 2 3 4 8 9 10 11 12 16 17 18 19 20 24 25 26 27 28
   cache size : 51200 KB

From /proc/meminfo
   MemTotal:       264389436 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12 SP1

From /etc/*release* /etc/*version*
   SuSE-release:
      SUSE Linux Enterprise Server 12 (x86_64)
      VERSION = 12
      PATCHLEVEL = 1
      # This file is deprecated and will be removed in a future service pack or
      release.
      # Please check /etc/os-release for details about this release.
   os-release:
      NAME="SLES"
      VERSION="12-SP1"
      VERSION_ID="12.1"
      PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
      ID="sles"
      ANSI_COLOR="0;32"
      CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
   Linux linux-gy1c 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
   (8d714a0) x86_64 x86_64 x86_64 GNU/Linux
```

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Platform Notes (Continued)

```
  run-level 5 Mar 3 16:00

  SPEC is set to: /cpu2006-HP
    Filesystem      Type   Size  Used Avail Use% Mounted on
    /dev/sda3       btrfs  369G  230G  139G  63% /
  Additional information from dmidecode:

    Warning: Use caution when you interpret this section. The 'dmidecode' program
    reads system data which is "intended to allow hardware to be accurately
    determined", but the intent may not be met, as there are frequent changes to
    hardware, firmware, and the "DMTF SMBIOS" standard.

    BIOS HP U13 02/22/2016
    Memory:
    8x UNKNOWN NOT AVAILABLE
    8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

  (End of data from sysinfo program)
  Regarding the sysinfo display about the memory installed, the correct amount of
  memory is 256 GB and the dmidecode description should have one line reading as:
  8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz
```

General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
OMP_NUM_THREADS = "40"
LD_LIBRARY_PATH = "/cpu2006-HP/libs/32:/cpu2006-HP/libs/64:/cpu2006-HP/sh"

 Binaries compiled on a system with 1x Intel Xeon E5-2260 v4 CPU + 128GB
 memory using RedHat EL 7.2
```

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

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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:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias -fp-model fast=2
-qopt-prefetch-issue-excl-hint
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias
-fp-model fast=2
-qopt-prefetch-issue-excl-hint
```

Fortran benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-fp-model fast=2
-qopt-prefetch-issue-excl-hint
```

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias -fp-model fast=2
-qopt-prefetch-issue-excl-hint
```

Peak Compiler Invocation

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

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CPU2006 license: 3
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Test date: Mar-2016
Hardware Availability: Mar-2016
Software Availability: Dec-2015

Peak Compiler Invocation (Continued)

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
```

Peak Optimization Flags

C benchmarks:

> 433.milc: basepeak = yes

> 470.lbm: basepeak = yes

> 482.sphinx3: basepeak = yes

C++ benchmarks:

> 444.namd: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
> -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
> -par-num-threads=1(pass 1) -prof-use(pass 2) -fno-alias
> -auto-ilp32

> 447.dealII: basepeak = yes

> 450.soplex: basepeak = yes

> 453.povray: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
> -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
> -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4
> -ansi-alias

Fortran benchmarks:

> 410.bwaves: basepeak = yes

> 416.gamess: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
> -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
> -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2
> -inline-level=0 -scalar-rep-

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Peak Optimization Flags (Continued)

```
       434.zeusmp: basepeak = yes

       437.leslie3d: basepeak = yes

    459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                  -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                  -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2
                  -inline-level=0 -opt-prefetch -parallel

        465.tonto: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                   -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                   -par-num-threads=1(pass 1) -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: -xCORE-AVX2 -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/HP-Compiler-Flags-Intel-V1.2-BDW-revE.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-BDW-revE.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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

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