Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant BL460c Gen9  
(2.30 GHz, Intel Xeon E5-2697 v4)  

<table>
<thead>
<tr>
<th>SPECfp&lt;sup&gt;®&lt;/sup&gt;2006 = 126</th>
<th>SPECfp&lt;sub&gt;base2006&lt;/sub&gt; = 119</th>
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<tr>
<td>CPU2006 license: 3</td>
<td>Test date: Mar-2016</td>
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<td>Test sponsor: HPE</td>
<td>Hardware Availability: Mar-2016</td>
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<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Dec-2015</td>
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<th>SPECfp&lt;sub&gt;base2006&lt;/sub&gt; = 119</th>
</tr>
</thead>
</table>
| OS: SuSE Linux Enterprise 12 (x86_64) SP1  
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: xfs |
| System State: Run level 5 (multi-user, w/GUI) |

### Hardware

<table>
<thead>
<tr>
<th>Spec</th>
<th>Name</th>
<th>Characteristics</th>
<th>MHz</th>
<th>FPU</th>
<th>CPU(s) enabled</th>
<th>Primary Cache</th>
<th>Secondary Cache</th>
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<tbody>
<tr>
<td>410</td>
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</table>

### Software

<table>
<thead>
<tr>
<th>Spec</th>
<th>Operating System</th>
<th>Compiler</th>
<th>Auto Parallel</th>
<th>File System</th>
<th>System State</th>
</tr>
</thead>
</table>
|      | SuSE Linux Enterprise 12 (x86_64) SP1  
Kernel 3.12.49-11-default |
|      | 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 |
|      | Yes              |
|      | xfs              |
|      | Run level 5 (multi-user, w/GUI) |

Continued on next page
Hewlett Packard Enterprise  
ProLiant BL460c Gen9  
(2.30 GHz, Intel Xeon E5-2697 v4)  

**SPEC CFP2006 Result**  
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<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Base</th>
<th>Peak</th>
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<tbody>
<tr>
<td>Seconds</td>
<td>Ratio</td>
<td>Seconds</td>
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<tr>
<td>410.bwaves</td>
<td>21.4</td>
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<td>436.cactusADM</td>
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<td><strong>43.5</strong></td>
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<tr>
<td>482.sphinx3</td>
<td>277</td>
<td>70.4</td>
</tr>
</tbody>
</table>

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"  
echo always > /sys/kernel/mm/transparent_hugepage/enabled

**Platform Notes**

BIOS Configuration:  
Intel Hyperthreading Option set to Enabled  
Power Profile set to Custom  
Power Regulator set to Static High Performance Mode  
Minimum Processor Idle Power Core C-State set to C1E State  
Minimum Processor Idle Power Package C-State set to No Package State  
Collaborative Power Control set to Disabled  
QPI Snoop Configuration set to Home Snoop  
Thermal Configuration set to Maximum Cooling

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Hewlett Packard Enterprise

SPECfp2006 = 126
SPECfp_base2006 = 119

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

Platform Notes (Continued)

Processor Power and Utilization Monitoring set to Disabled
Memory Refresh Rate set to 1x Refresh
Sysinfo program /home/cpuv1.3/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on bl460c2-gen9-b Tue Apr 5 14:13:31 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 E5-2697 v4 @ 2.30GHz
  2 "physical id"s (chips)
  72 "processors"
 cores, siblings (Caution: counting these is hw and system dependent. The
 following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
  cpu cores : 18
  siblings : 36
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
 cache size : 46080 KB

From /proc/meminfo
MemTotal: 264323024 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:
(8d714a0) x86_64 x86_64 x86_64 GNU/Linux
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Software Availability: Dec-2015

Platform Notes (Continued)

run-level 5 Apr 5 14:06

SPEC is set to: /home/cpuv1.3/cpu2006
   Filesystem  Type  Size  Used  Avail  Use%  Mounted on
   /dev/sda4    xfs   424G  218G  206G  52%  /home

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 I36 02/22/2016
Memory:
  8x UNKNOWN NOT AVAILABLE
  8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = ""/home/cpuv1.3/cpu2006/libs/32:/home/cpuv1.3/cpu2006/libs/64:/home/cpuv1.3/cpu2006/sh"
OMP_NUM_THREADS = "36"

Binaries compiled on a system with 1x Intel Xeon E5-2660 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

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64

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Base Portability Flags (Continued)

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 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
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

C++ benchmarks:
icpc  -m64

Continued on next page
Peak Compiler Invocation (Continued)

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.sooplex: 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-Platform-Flags-Intel-V1.2-HSW-revE.html
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-BDW-revE.html

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-HSW-revE.xml
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-BDW-revE.xml

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

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