## SPEC® CFP2006 Result

**Hewlett Packard Enterprise**
(Test Sponsor: HPE)

ProLiant BL460c Gen9
(3.50 GHz, Intel Xeon E5-2637 v4)

### Hardware

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name:</td>
<td>Intel Xeon E5-2637 v4</td>
</tr>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.70 GHz</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>3500</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>8 cores, 2 chips, 4 cores/chip, 2 threads/core</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>1.2 chip</td>
</tr>
<tr>
<td>Primary Cache:</td>
<td>32 KB I + 32 KB D on chip per core</td>
</tr>
<tr>
<td>Secondary Cache:</td>
<td>256 KB I+D on chip per core</td>
</tr>
</tbody>
</table>

### Software

<table>
<thead>
<tr>
<th>Component</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System:</td>
<td>SuSE Linux Enterprise 12 (x86_64) SP 1 Kernel 3.12.49-11-default</td>
</tr>
<tr>
<td>Compiler:</td>
<td>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</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>Yes</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 5 (multi-user, w/GUI)</td>
</tr>
</tbody>
</table>

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**SPECfp®2006 = 111**

**SPECfp_base2006 = 107**

### Test Information

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

### Software Availability

- 410.bwaves
- 416.gamess
- 433.milc
- 434.zeusmp
- 435.gromacs
- 436.cactusADM
- 437.leslie3d
- 444.namd
- 447.dealII
- 450.soplex
- 453.povray
- 454.calculix
- 459.GemsFDTD
- 465.tonto
- 470.lbm
- 481.wrf
- 482.sphinx3

---

**SPECfp®2006 = 111**

**SPECfp_base2006 = 107**
### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<tr>
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<td>31.3</td>
<td>434</td>
<td>31.6</td>
<td>430</td>
<td>31.8</td>
<td>427</td>
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<td>434</td>
<td>31.6</td>
<td>430</td>
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<tr>
<td>416.gamess</td>
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<td>44.5</td>
<td>440</td>
<td>44.5</td>
<td>441</td>
<td>44.4</td>
<td>407</td>
<td>48.1</td>
<td>408</td>
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<td>78.0</td>
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<td>78.0</td>
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<td>49.8</td>
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<td>50.4</td>
<td>181</td>
<td>49.7</td>
<td>183</td>
<td>49.8</td>
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<td>435.gromacs</td>
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<td>63.6</td>
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<tr>
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<td>22.7</td>
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<td>527</td>
<td>22.1</td>
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<td>437.leslie3d</td>
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<td>444.namd</td>
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<td>71.1</td>
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<td>46.5</td>
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<td>453.povray</td>
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<td>64.4</td>
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<td>129</td>
<td>63.8</td>
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<td>63.7</td>
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<td>459.GemsFDTD</td>
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<td>178</td>
<td>62.1</td>
<td>171</td>
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<td>173</td>
<td>54.1</td>
<td>196</td>
<td>54.1</td>
<td>196</td>
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<tr>
<td>465.tonto</td>
<td>187</td>
<td>52.5</td>
<td>188</td>
<td>52.5</td>
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<td>52.5</td>
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<td>470.libm</td>
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<td>465</td>
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<td>449</td>
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<td>481.wrf</td>
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<td>94.5</td>
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<td>95.5</td>
<td>118</td>
<td>94.5</td>
<td>117</td>
<td>95.2</td>
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<tr>
<td>482.sphinx3</td>
<td>214</td>
<td>91.0</td>
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<td>91.2</td>
<td>213</td>
<td>91.4</td>
<td>214</td>
<td>91.0</td>
<td>214</td>
<td>91.2</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"  
Transparent Huge Pages enabled with:  
```bash  
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  
Continued on next page
## SPEC CFP2006 Result

### Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**ProLiant BL460c Gen9**  
**(3.50 GHz, Intel Xeon E5-2637 v4)**  
**SPECfp2006 = 111**  
**SPECfp_base2006 = 107**

<table>
<thead>
<tr>
<th>CPU2006 license: 3</th>
<th>Test date: Mar-2016</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Test sponsor: HPE</td>
<td>Hardware Availability: Mar-2016</td>
<td></td>
</tr>
<tr>
<td>Tested by: HPE</td>
<td>Software Availability: Dec-2015</td>
<td></td>
</tr>
</tbody>
</table>

### Platform Notes (Continued)

- Thermal Configuration set to Maximum Cooling
- Processor Power and Utilization Monitoring set to Disabled
- Memory Refresh Rate set to 1x Refresh
- Sysinfo program /home/cpuv1.5/cpu2006/config/sysinfo.rev6914
- $Rev: 6914 $ $Date:: 2014-06-25 $ e3fbb8667b5a285932ceab81e28219e1
- running on bl460c2-gen9-b Tue May 3 09:25:47 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 E5-2637 v4 @ 3.50GHz
- 2 "physical id"s (chips)
- 16 "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 : 8
  - physical 0: cores 0 1 2 3
  - physical 1: cores 0 1 2 3
- cache size : 15360 KB

From `/proc/meminfo`

- MemTotal: 264329876 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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SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen9
(3.50 GHz, Intel Xeon E5-2637 v4)

SPECfp2006 = 111
SPECfp_base2006 = 107

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

Platform Notes (Continued)

run-level 5 May 3 09:23
SPEC is set to: /home/cpuv1.5/cpu2006
Filesystem     Type  Size  Used Avail Use% Mounted on
/dev/sda4      xfs   424G  132G  293G  31% /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)
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"
LD_LIBRARY_PATH = "/home/cpuv1.5/cpu2006/libs/32:/home/cpuv1.5/cpu2006/libs/64:/home/cpuv1.5/cpu2006/sh"
OMP_NUM_THREADS = "8"
Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1

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
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen9
(3.50 GHz, Intel Xeon E5-2637 v4)

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

SPECfp2006 = 111
SPECfp_base2006 = 107

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.games: -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.lesie3d: -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 -parallel -opt-prefetch
-ansi-alias

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch

Benchmarks using both Fortran and C:
-xCORE-AVX2 -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

Continued on next page
Peak Compiler Invocation (Continued)

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-ilkp32`

- `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-`

- `434.zeusmp`: `basepeak = yes`
- `437.leslie3d`: `basepeak = yes`
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen9
(3.50 GHz, Intel Xeon E5-2637 v4)

SPECfp2006 = 111
SPECfp_base2006 = 107

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

Peak Optimization Flags (Continued)

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/Intel-ic16.0-official-linux64.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/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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

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