# SPEC® CFP2006 Result

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant BL460c Gen10  
(3.60 GHz, Intel Xeon Gold 5122)

| SPECfp®2006 = | 93.3 |
| SPECfp_base2006 = | 90.7 |

## Hardware

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Name</td>
<td>Intel Xeon Gold 5122</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>3600</td>
</tr>
<tr>
<td>FPU</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled</td>
<td>8 cores, 2 chips, 4 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable</td>
<td>1, 2 chip(s)</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>1 MB I+D on chip per core</td>
</tr>
</tbody>
</table>

## Software

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Red Hat Enterprise Linux Server release 7.3 (Maipo)</td>
</tr>
<tr>
<td>Compiler</td>
<td>C/C++: Version 17.0.1.132 of Intel C/C++ Compiler for Linux;</td>
</tr>
<tr>
<td>Auto Parallel</td>
<td>Yes</td>
</tr>
<tr>
<td>File System</td>
<td>xfs</td>
</tr>
<tr>
<td></td>
<td>Continued on next page</td>
</tr>
</tbody>
</table>

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Standard Performance Evaluation Corporation  
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http://www.spec.org/  
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**SPEC CFP2006 Result**

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(Test Sponsor: HPE)  
ProLiant BL460c Gen10  
(3.60 GHz, Intel Xeon Gold 5122)  

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

<table>
<thead>
<tr>
<th>L3 Cache:</th>
<th>16.5 MB I+D on chip per chip</th>
<th>System State:</th>
<th>Run level 3 (multi-user)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Cache:</td>
<td>None</td>
<td>Base Pointers:</td>
<td>64-bit</td>
</tr>
<tr>
<td>Memory:</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2666V-R)</td>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 480 GB SATA SSD, RAID 0</td>
<td>Other Software:</td>
<td>None</td>
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</tbody>
</table>
| Other Hardware: | None | **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>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Base</strong></td>
<td><strong>Peak</strong></td>
<td><strong>Base</strong></td>
<td><strong>Peak</strong></td>
<td><strong>Base</strong></td>
<td><strong>Peak</strong></td>
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<tr>
<td>410.bwaves</td>
<td>41.6</td>
<td>326</td>
<td>41.7</td>
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<td>41.6</td>
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<tr>
<td>416.gamess</td>
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<td>46.7</td>
<td>419</td>
<td>46.7</td>
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<td>46.7</td>
<td><strong>398</strong></td>
<td><strong>49.2</strong></td>
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<td>433.milc</td>
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<td>85.6</td>
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<td>85.2</td>
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<td>84.7</td>
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<td>85.6</td>
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<td>434.zeusmp</td>
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<td><strong>62.3</strong></td>
<td>146</td>
<td>62.3</td>
<td>146</td>
<td>62.1</td>
<td>147</td>
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<tr>
<td>435.gromacs</td>
<td>122</td>
<td>58.5</td>
<td>122</td>
<td>58.7</td>
<td>122</td>
<td>58.7</td>
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<td>58.5</td>
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<tr>
<td>436.cactusADM</td>
<td><strong>27.4</strong></td>
<td><strong>436</strong></td>
<td>27.4</td>
<td>436</td>
<td>27.4</td>
<td>436</td>
<td><strong>27.4</strong></td>
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<td>437.leslie3d</td>
<td>47.4</td>
<td>198</td>
<td>47.9</td>
<td>196</td>
<td><strong>47.5</strong></td>
<td><strong>198</strong></td>
<td>47.4</td>
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<tr>
<td>444.namd</td>
<td>227</td>
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<td>227</td>
<td>35.4</td>
<td><strong>227</strong></td>
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<td>38.4</td>
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<td>447.dealII</td>
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<td>70.5</td>
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<td>70.3</td>
<td><strong>163</strong></td>
<td><strong>70.3</strong></td>
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<td>70.5</td>
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<td>450.soplex</td>
<td><strong>197</strong></td>
<td><strong>42.4</strong></td>
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<td>42.2</td>
<td>194</td>
<td>42.9</td>
<td><strong>197</strong></td>
<td><strong>42.4</strong></td>
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<tr>
<td>453.povray</td>
<td>81.8</td>
<td>65.0</td>
<td><strong>81.8</strong></td>
<td><strong>65.1</strong></td>
<td>81.7</td>
<td>65.1</td>
<td>70.9</td>
<td>75.0</td>
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<td>454.calculix</td>
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<td>68.4</td>
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<td>68.2</td>
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<td>68.2</td>
<td>122</td>
<td>67.8</td>
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<td>459.GemsFDTD</td>
<td>108</td>
<td>98.0</td>
<td><strong>104</strong></td>
<td><strong>102</strong></td>
<td>104</td>
<td>102</td>
<td>90.3</td>
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<tr>
<td>465.tonto</td>
<td>167</td>
<td>58.8</td>
<td>167</td>
<td>59.1</td>
<td><strong>167</strong></td>
<td><strong>58.8</strong></td>
<td>156</td>
<td>62.9</td>
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<tr>
<td>470.lbm</td>
<td><strong>147</strong></td>
<td><strong>93.6</strong></td>
<td>145</td>
<td>94.9</td>
<td>147</td>
<td>93.3</td>
<td><strong>147</strong></td>
<td><strong>93.6</strong></td>
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<tr>
<td>481.wrf</td>
<td>124</td>
<td>89.8</td>
<td>121</td>
<td>92.7</td>
<td><strong>122</strong></td>
<td><strong>91.5</strong></td>
<td>124</td>
<td>89.8</td>
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<tr>
<td>482.sphinx3</td>
<td>234</td>
<td>83.3</td>
<td><strong>234</strong></td>
<td><strong>83.3</strong></td>
<td>234</td>
<td>83.4</td>
<td>234</td>
<td>83.3</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 by default  
Filesystem page cache cleared with:  
shell invocation of 'sync; echo 3 > /proc/sys/vm/drop_caches' prior to run  
IRQ balance service was stop using "service irqbalance stop"  
Tuned-adm profile was set to Throughtput-Performance

**Platform Notes**

BIOS Configuration:  
Intel Hyperthreading set to Disabled  
Thermal Configuration set to Maximum Cooling  
LLC Prefetch set to Enabled  
LLC Dead Line Allocation set to Disabled

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Hewlett Packard Enterprise
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SPECfp2006 = 93.3
SPECfp_base2006 = 90.7

CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE
Test date: Dec-2017
Hardware Availability: Oct-2017
Software Availability: Nov-2016

Platform Notes (Continued)

Memory Patrol Scrubbing set to Disabled
Workload Profile set to General Peak Frequency Compute
Energy/Performance Bias set to Maximum Performance
Workload Profile set to Custom
NUMA Group Size Optimization set to Flat
Sysinfo program /root/cpu2006/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on localhost.localdomain Thu Dec 7 20:02:07 2017

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) Gold 5122 CPU @ 3.60GHz
   2 "physical id"s (chips)
   8 "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 : 4
physical 0: cores 1 5 9 13
physical 1: cores 1 2 5 11
cache size : 16896 KB

From /proc/meminfo
MemTotal: 197446384 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.3 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.3"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.3 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME=cpe:/o:redhat:enterprise_linux:7.3:ga:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.3 (Maipo)

uname -a:
   Linux localhost.localdomain 3.10.0-514.el7.x86_64 #1 SMP Wed Oct 19 11:24:13 EDT 2016 x86_64 x86_64 x86_64 GNU/Linux
run-level 3 Dec 7 15:13

SPEC is set to: /root/cpu2006

Continued on next page
### Platform Notes (Continued)

<table>
<thead>
<tr>
<th>Filesystem</th>
<th>Type</th>
<th>Size</th>
<th>Used</th>
<th>Avail</th>
<th>Use%</th>
<th>Mounted on</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>442G</td>
<td>29G</td>
<td>414G</td>
<td>7%</td>
<td>/</td>
</tr>
</tbody>
</table>

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 HPE I41 09/29/2017  
Memory:  
4x UNKNOWN NOT AVAILABLE  
12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666 MHz  

(End of data from sysinfo program)

Regarding the sysinfo display about the memory installed, the correct amount of memory is 192 GB and the dmidecode description should have one line reading as:  
12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666 MHz

### General Notes

Environment variables set by runspec before the start of the run:  
KMP_AFFINITY = "granularity=fine,compact,1,0"  
LD_LIBRARY_PATH = "/root/cpu2006/lib/ia32:/root/cpu2006/lib/intel64:/root/cpu2006/sh10.2"  
OMP_NUM_THREADS = "4"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM memory using Redhat Enterprise Linux 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
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-AVX512 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

C++ benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -qopt-prefetch

Fortran benchmarks:
-xCORE-AVX512 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

Benchmarks using both Fortran and C:
-xCORE-AVX512 -ipo -O3 -no-prec-div -parallel -qopt-prefetch

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
Hewlett Packard Enterprise  
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Tested by: HPE  

Test date: Dec-2017  
Hardware Availability: Oct-2017  
Software Availability: Nov-2016  

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: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2) 
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -fno-alias -auto-ii32

447.dealII: basepeak = yes
450.soplex: basepeak = yes

453.povray: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)  
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes
416.gamess: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)  
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes

459.GemsFDTD: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2) 
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -unroll2 -inline-level=0  
-qopt-prefetch -parallel

465.tonto: -prof-gen(pass 1) -prof-use(pass 2) -xCORE-AVX512(pass 2)  
-par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2)  
-no-prec-div(pass 2) -inline-calloc -qopt-malloc-options=3 
-auto -unroll4

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SPECfp2006 = 93.3
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Peak Optimization Flags (Continued)

Benchmarks using both Fortran and C:

435.gromacs: basepeak = yes
436.cactusADM: basepeak = yes
454.calculix: -xCORE-AVX512 -ipo -O3 -no-prec-div -auto-ilp32
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-ic17.0-official-linux64-revF.html
http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic17.0-official-linux64-revF.xml
http://www.spec.org/cpu2006/flags/HPE-Platform-Flags-Intel-V1.2-SKX-revH.xml

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

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