Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Silver 4116)

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

**SPECfp\textsuperscript{\textregistered}\_rate\textsubscript{2006} = Not Run**

**SPECfp\textsubscript{rate\_base}\textsubscript{2006} = 891**

Hardware

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>SPECfp\textsubscript{rate_base}\textsubscript{2006}</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>48</td>
<td>842</td>
</tr>
<tr>
<td>416.gamess</td>
<td>48</td>
<td>776</td>
</tr>
<tr>
<td>433.milc</td>
<td>48</td>
<td>1120</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>48</td>
<td>1000</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>48</td>
<td>1190</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>48</td>
<td>579</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>48</td>
<td>685</td>
</tr>
<tr>
<td>444.namd</td>
<td>48</td>
<td>1390</td>
</tr>
<tr>
<td>447.dealII</td>
<td>48</td>
<td>1210</td>
</tr>
<tr>
<td>450.soplex</td>
<td>48</td>
<td>1290</td>
</tr>
<tr>
<td>453.povray</td>
<td>48</td>
<td>534</td>
</tr>
<tr>
<td>454.calculix</td>
<td>48</td>
<td>904</td>
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<tr>
<td>459.GemsFD</td>
<td>48</td>
<td>955</td>
</tr>
<tr>
<td>465.tonto</td>
<td>48</td>
<td>1050</td>
</tr>
<tr>
<td>470.lbm</td>
<td>48</td>
<td>843</td>
</tr>
<tr>
<td>481.wrf</td>
<td>48</td>
<td></td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>48</td>
<td></td>
</tr>
</tbody>
</table>

Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>SUSE Linux Enterprise Server 12 (x86_64) SP3 Kernel 4.4.73-5-default</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 17.0.3.191 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.3.191 of Intel Fortran Compiler for Linux</td>
</tr>
<tr>
<td>Auto Parallel:</td>
<td>No</td>
</tr>
<tr>
<td>File System:</td>
<td>xfs</td>
</tr>
<tr>
<td>System State:</td>
<td>Run level 3 (multi-user)</td>
</tr>
</tbody>
</table>
# SPEC CFP2006 Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant BL460c Gen10  
(2.10 GHz, Intel Xeon Silver 4116)  

**SPEC CFP2006 Result**  

**SPECfp_rate2006 = Not Run**  
**SPECfp_rate_base2006 = 891**

**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>Base Pointers:</th>
<th>32/64-bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other Cache:</td>
<td>None</td>
<td>Peak Pointers:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Memory:</td>
<td>192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)</td>
<td>Other Software:</td>
<td>None</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 480 GB SATA SSD, RAID 0</td>
<td><strong>Test date:</strong></td>
<td>Dec-2017</td>
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<tr>
<td>Other Hardware:</td>
<td>None</td>
<td><strong>Hardware Availability:</strong></td>
<td>Nov-2017</td>
</tr>
</tbody>
</table>

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>48</td>
<td>834</td>
<td>782</td>
<td>829</td>
<td>787</td>
<td>830</td>
<td>786</td>
<td>416.gamess</td>
<td>48</td>
<td><strong>1117</strong></td>
<td>842</td>
<td>1117</td>
<td>841</td>
<td>1117</td>
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<tr>
<td>433.milc</td>
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<td>569</td>
<td>774</td>
<td><strong>567</strong></td>
<td>776</td>
<td>567</td>
<td>777</td>
<td>434.zeusmp</td>
<td>48</td>
<td>389</td>
<td>1120</td>
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<td>1010</td>
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<td>483</td>
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<td>579</td>
<td><strong>779</strong></td>
<td>579</td>
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<td>48</td>
<td>563</td>
<td>683</td>
<td>559</td>
<td>688</td>
<td><strong>562</strong></td>
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<td>396</td>
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<td>395</td>
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<td>453.povray</td>
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<td><strong>210</strong></td>
<td><strong>1210</strong></td>
<td>213</td>
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<td>459.GemsFDTD</td>
<td>48</td>
<td>954</td>
<td>534</td>
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<td>953</td>
<td>535</td>
<td>465.tonto</td>
<td>48</td>
<td>522</td>
<td>905</td>
<td>524</td>
<td>901</td>
<td><strong>523</strong></td>
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<td>1112</td>
<td>842</td>
<td><strong>1110</strong></td>
<td><strong>843</strong></td>
<td>1110</td>
<td>843</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

## Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

## 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  
runcspec command invoked through numactl i.e.:  
numactl --interleave=all runspec <etc>  
irqbalance disabled with "systemctl stop irqbalance"

Continued on next page
Hewlett Packard Enterprise
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ProLiant BL460c Gen10
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SPECfp_rate2006 = Not Run
SPECfp_rate_base2006 = 891

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

Operating System Notes (Continued)

- tuned profile set with "tuned-adm profile throughput-performance"
- VM Dirty ratio was set to 40 using "echo 40 > /proc/sys/vm/dirty_ratio"
- Numa balancing was disabled using "echo 0 > /proc/sys/kernel/numa_balancing"

Platform Notes

BIOS Configuration:
- Thermal Configuration set to Maximum Cooling
- Memory Patrol Scrubbing set to Disabled
- LLC Prefetch set to Enabled
- LLC Dead Line Allocation set to Disabled
- Workload Profile set to General Throughput Compute
- Minimum Processor Idle Power Core C-State set to C1E State
- Workload Profile set to Custom
- Sub-NUMA Clustering set to Disabled

Sysinfo program /home/cpu2006/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on bl460c107 Sun Dec 10 00:08:30 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) Silver 4116 CPU @ 2.10GHz
- 2 "physical id"s (chips)
- 48 "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 : 12
- siblings : 24
- physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
- physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
- cache size : 16896 KB

From /proc/meminfo
- MemTotal:  197746480 kB
- HugePages_Total: 0
- Hugepagesize:  2048 kB

From /etc/*release* /etc/*version*
- SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 3
  # 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"

Continued on next page
SPEC CFP2006 Result

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SPECfp_rate2006 =  Not Run
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CPU2006 license: 3
Test sponsor:  HPE
Tested by:  HPE

Platform Notes (Continued)

VERSION="12-SP3"
VERSION_ID="12.3"
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP3"
ID="sles"
ANSI_COLOR="0;32"
CPE_NAME="cpe:/o:suse:sles:12:sp3"

uname -a:
 Linux bl460c107 4.4.73-5-default #1 SMP Tue Jul 4 15:33:39 UTC 2017 (b7ce4e4)
x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Dec 10 00:07
SPEC is set to: /home/cpu2006
Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 300G 137G 164G 46% /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 HPE I41 11/14/2017
Memory:
4x UNKNOWN NOT AVAILABLE
12x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2666 MHz, configured at 2400 MHz

(End of data from sysinfo program)

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/cpu2006/lib/ia32:/home/cpu2006/lib/intel64:/home/cpu2006/sh10.2"

Binaries compiled on a system with 1x Intel Core i7-4790 CPU + 32GB RAM
memory using Redhat Enterprise Linux 7.2

No: The test sponsor attests, as of date of publication, that CVE-2017-5754 (Meltdown)
is mitigated in the system as tested and documented.
No: The test sponsor attests, as of date of publication, that CVE-2017-5753 (Spectre variant 1)
is mitigated in the system as tested and documented.
No: The test sponsor attests, as of date of publication, that CVE-2017-5715 (Spectre variant 2)
is mitigated in the system as tested and documented.

This benchmark result is intended to provide perspective on
past performance using the historical hardware and/or
software described on this result page.

The system as described on this result page was formerly
Continued on next page
General Notes (Continued)

generally available. At the time of this publication, it may not be shipping, and/or may not be supported, and/or may fail to meet other tests of General Availability described in the SPEC OSG Policy document, http://www.spec.org/osg/policy.htm.

This measured result may not be representative of the result that would be measured were this benchmark run with hardware and software available as of the publication date.

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
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
SPEC CFP2006 Result

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant BL460c Gen10  
(2.10 GHz, Intel Xeon Silver 4116)

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Test sponsor: HPE  
Tested by: HPE

Test date: Dec-2017  
Hardware Availability: Nov-2017  
Software Availability: Apr-2017

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3

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

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch -auto-p32
-qopt-mem-layout-trans=3

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

Tested with SPEC CPU2006 v1.2.  
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