SPEC® CFP2006 Result
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Silver 4110)

SPECfp®2006 = Not Run
SPECfp_base2006 = 107

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>28.9</td>
<td>38.3</td>
<td>72.5</td>
<td>215</td>
<td>42.1</td>
<td>734</td>
<td>329</td>
<td>40.3</td>
<td>59.6</td>
<td>37.9</td>
<td>56.1</td>
<td>58.2</td>
<td>225</td>
<td>46.8</td>
<td>96.8</td>
<td>55.9</td>
<td>SPECf_base2006 = 107</td>
</tr>
</tbody>
</table>

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

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

CPU Name: Intel Xeon Silver 4110
CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz: 2100
FPU: Integrated
CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip
CPU(s) orderable: 1, 2 chip(s)
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 1 MB I+D on chip per core

Operating System: Red Hat Enterprise Linux Server release 7.4 (Maipo)
Compiler: 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
Auto Parallel: Yes
File System: xfs

Continued on next page
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Silver 4110)

SPECfp2006 = Not Run
SPECfp_base2006 = 107

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

L3 Cache: 11 MB I+D on chip per chip
Other Cache: None
Memory: 192 GB (12 x 16 GB 2Rx8 PC4-2666V-R, running at 2400)
Disk Subsystem: 1 x 480 GB SATA SSD, RAID 0

System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: Not Applicable
Other Software: None

Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>22.1</td>
<td>615</td>
<td>21.6</td>
<td>630</td>
<td>21.9</td>
<td>619</td>
<td></td>
</tr>
<tr>
<td>416.gamess</td>
<td>511</td>
<td>38.3</td>
<td>512</td>
<td>38.2</td>
<td>512</td>
<td>38.3</td>
<td></td>
</tr>
<tr>
<td>433.milc</td>
<td>126</td>
<td>73.1</td>
<td>127</td>
<td>72.5</td>
<td>129</td>
<td>71.3</td>
<td></td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>42.3</td>
<td>215</td>
<td>42.2</td>
<td>216</td>
<td>42.3</td>
<td>215</td>
<td></td>
</tr>
<tr>
<td>435.gromacs</td>
<td>169</td>
<td>42.2</td>
<td>170</td>
<td>42.1</td>
<td>170</td>
<td>42.0</td>
<td></td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>16.2</td>
<td>738</td>
<td>17.0</td>
<td>703</td>
<td>16.3</td>
<td>734</td>
<td></td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>28.4</td>
<td>331</td>
<td>28.6</td>
<td>329</td>
<td>28.7</td>
<td>328</td>
<td></td>
</tr>
<tr>
<td>444.namd</td>
<td>278</td>
<td>28.9</td>
<td>278</td>
<td>28.8</td>
<td>278</td>
<td>28.9</td>
<td></td>
</tr>
<tr>
<td>447.dealII</td>
<td>193</td>
<td>59.4</td>
<td>192</td>
<td>59.6</td>
<td>191</td>
<td>59.8</td>
<td></td>
</tr>
<tr>
<td>450.soplex</td>
<td>219</td>
<td>38.0</td>
<td>220</td>
<td>37.9</td>
<td>220</td>
<td>37.8</td>
<td></td>
</tr>
<tr>
<td>453.povray</td>
<td>94.7</td>
<td>56.1</td>
<td>95.5</td>
<td>55.7</td>
<td>94.6</td>
<td>56.3</td>
<td></td>
</tr>
<tr>
<td>454.calculix</td>
<td>141</td>
<td>58.3</td>
<td>142</td>
<td>58.2</td>
<td>143</td>
<td>57.9</td>
<td></td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>47.5</td>
<td>223</td>
<td>47.2</td>
<td>225</td>
<td>46.4</td>
<td>228</td>
<td></td>
</tr>
<tr>
<td>465.tonto</td>
<td>244</td>
<td>40.3</td>
<td>248</td>
<td>39.6</td>
<td>244</td>
<td>40.3</td>
<td></td>
</tr>
<tr>
<td>470.tfbm</td>
<td>18.4</td>
<td>747</td>
<td>17.8</td>
<td>770</td>
<td>17.9</td>
<td>768</td>
<td></td>
</tr>
<tr>
<td>481.wrf</td>
<td>118</td>
<td>94.8</td>
<td>115</td>
<td>96.8</td>
<td>115</td>
<td>97.0</td>
<td></td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>351</td>
<td>55.5</td>
<td>348</td>
<td>55.9</td>
<td>347</td>
<td>56.1</td>
<td></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
irqbalance disabled with "systemctl stop irqbalance"
tuned profile set with "tuned-adm profile throughput-performance"

Platform Notes

BIOS Configuration:
Intel Hyper-Threading set to Disabled
Thermal Configuration set to Maximum Cooling
LLC Prefetch set to Enabled
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Silver 4110)

SPECfp2006 = Not Run
SPECfp_base2006 = 107

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

Platform Notes (Continued)

LLC Dead Line Allocation set to Disabled
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
  Uncore Frequency Scaling set to Auto
Sysinfo program /home/cpu2006/config/sysinfo.rev6993
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
running on BL460c_RHEL7.4BL460c_RHEL7.4BL460c_RHEL7.4BL460c_RHEL7.4BL460c_R Fri
Dec 15 02:38:10 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 4110 CPU @ 2.10GHz
    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
cautions.)
    cpu cores : 8
    siblings : 8
  physical 0: cores 0 1 2 3 4 5 6 7
  physical 1: cores 0 1 2 3 4 5 6 7
  cache size : 11264 KB

From /proc/meminfo
  MemTotal:       197752440 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

From /etc/*release*/etc/*version*
  os-release:
    NAME="Red Hat Enterprise Linux Server"
    VERSION="7.4 (Maipo)"
    ID="rhel"
    ID_LIKE="fedora"
    VARIANT="Server"
    VARIANT_ID="server"
    VERSION_ID="7.4"
    PRETTY_NAME="Red Hat Enterprise Linux Server 7.4 (Maipo)"
  redhat-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
  system-release: Red Hat Enterprise Linux Server release 7.4 (Maipo)
  system-release-cpe: cpe:/o:redhat:enterprise_linux:7.4:ga:server

uname -a:
  Linux BL460c_RHEL7.4BL460c_RHEL7.4BL460c_RHEL7.4BL460c_RHEL7.4BL460c_R 3.10.0-693.el7.x86_64 #1 SMP Thu Jul 6 19:56:57 EDT 2017 x86_64 x86_64 x86_64
  GNU/Linux

Continued on next page
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Silver 4110)

SPECfp2006 = Not Run
SPECfp_base2006 = 107

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

Platform Notes (Continued)

run-level 3 Dec 14 23:48

SPEC is set to: /home/cpu2006
SPEC Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb4 xfs 442G 62G 381G 14% /

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

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=core,compact"
LD_LIBRARY_PATH = "/home/cpu2006/lib/ia32:/home/cpu2006/lib/intel64:/home/cpu2006/sh10.2"
OMP_NUM_THREADS = "16"

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 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.
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen10
(2.10 GHz, Intel Xeon Silver 4110)

SPECfp2006 = Not Run
SPECfp_base2006 = 107

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

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

Base Compiler Invocation

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

C++ benchmarks:
```shell
icpc -m64
```

Fortran benchmarks:
```shell
ifort -m64
```

Benchmarks using both Fortran and C:
```shell
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

Base Optimization Flags

C benchmarks:
```shell
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
```

C++ benchmarks:
```shell
-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch
```

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

Benchmarks using both Fortran and C:
```shell
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch
```
**SPEC CFP2006 Result**

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant BL460c Gen10  
(2.10 GHz, Intel Xeon Silver 4110)  

<table>
<thead>
<tr>
<th>SPECfp2006</th>
<th>Not Run</th>
</tr>
</thead>
<tbody>
<tr>
<td>SPECfp_base2006</td>
<td>107</td>
</tr>
</tbody>
</table>

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

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

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

---

SPEC and SPECfp are registered trademarks of the Standard Performance Evaluation Corporation. All other brand and product names appearing in this result are trademarks or registered trademarks of their respective holders.

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

Tested with SPEC CPU2006 v1.2.  
Originally published on 13 June 2018.