Hewlett-Packard Company
ProLiant BL660c Gen9
(2.10 GHz, Intel Xeon E5-4660 v3)

SPECfp®2006 = 102
SPECfp_base2006 = 96.5

Hewlett-Packard Company
Tested by: Hewlett-Packard Company

CPU2006 license: 3
Test date: May-2015
Test sponsor: Hewlett-Packard Company
Hardware Availability: Jun-2015
Tested by: Hewlett-Packard Company
Software Availability: Oct-2014

Operating System: SUSE Linux Enterprise Server 12 (x86_64)
Compiler: C/C++: Version 15.0.0.090 of Intel C++ Studio XE for Linux;
           Fortran: Version 15.0.0.090 of Intel Fortran Studio XE for Linux
Auto Parallel: Yes
File System: xfs
System State: Run level 3 multi-user

Hardware
CPU Name: Intel Xeon E5-4660 v3
CPU Characteristics: Intel Turbo Boost Technology up to 2.90 GHz
CPU MHz: 2100
FPU: Integrated
CPU(s) enabled: 56 cores, 4 chips, 14 cores/chip
CPU(s) orderable: 2,4 chips
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 256 KB I+D on chip per core

Software
Continued on next page
Continued on next page
## SPEC CFP2006 Result

**Hewlett-Packard Company**

ProLiant BL660c Gen9  
(2.10 GHz, Intel Xeon E5-4660 v3)

**SPECfp2006 =** 102

**SPECfp_base2006 =** 96.5

### CPU2006 license: 3

Test sponsor: Hewlett-Packard Company  
Tested by: Hewlett-Packard Company

L3 Cache: 35 MB I+D on chip per chip  
Other Cache: None

Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2133P-R)  
Disk Subsystem: 1 x 400 GB SAS SSD, RAID 0  
Other Hardware: None

Base Pointers: 64-bit  
Peak Pointers: 32/64-bit  
Other Software: None

### Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Ratio</th>
<th>Seconds Peak</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td>16.6</td>
<td>821</td>
<td>16.1</td>
<td>844</td>
</tr>
<tr>
<td>416.gamess</td>
<td>647</td>
<td>30.3</td>
<td>645</td>
<td>30.3</td>
</tr>
<tr>
<td>433.milc</td>
<td>148</td>
<td>62.2</td>
<td>148</td>
<td>62.2</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>58.9</td>
<td>155</td>
<td>58.9</td>
<td>155</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>217</td>
<td>32.9</td>
<td>217</td>
<td>33.0</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>17.6</td>
<td>677</td>
<td>17.6</td>
<td>679</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>39.8</td>
<td>236</td>
<td>40.6</td>
<td>231</td>
</tr>
<tr>
<td>444.namd</td>
<td>327</td>
<td>24.6</td>
<td>408</td>
<td>24.5</td>
</tr>
<tr>
<td>447.dealII</td>
<td>240</td>
<td>47.6</td>
<td>240</td>
<td>47.6</td>
</tr>
<tr>
<td>450.soplex</td>
<td>208</td>
<td>40.1</td>
<td>208</td>
<td>40.1</td>
</tr>
<tr>
<td>453.povray</td>
<td>107</td>
<td>49.9</td>
<td>108</td>
<td>49.5</td>
</tr>
<tr>
<td>454.calculix</td>
<td>191</td>
<td>43.1</td>
<td>191</td>
<td>43.1</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>58.1</td>
<td>183</td>
<td>54.0</td>
<td>197</td>
</tr>
<tr>
<td>465.tonto</td>
<td>311</td>
<td>31.7</td>
<td>310</td>
<td>31.7</td>
</tr>
<tr>
<td>470.ibm</td>
<td>11.8</td>
<td>1100</td>
<td>11.7</td>
<td>1180</td>
</tr>
<tr>
<td>481.wrf</td>
<td>115</td>
<td>97.3</td>
<td>115</td>
<td>97.2</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>325</td>
<td>59.9</td>
<td>324</td>
<td>60.1</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:

### Platform Notes

- **BIOS Configuration**
  - Intel Hyperthreading options set to Disabled
  - Power Profile set to Custom
  - Power Regulator set to Static High Performance Mode
  - Minimum Processor Idle Power Core C-State set to C6 State
  - Minimum Processor Idle Power Package C-State set to Package C6 (retention) State
  - Energy/Performance Bias set to Maximum Performance
  - Collaborative Power Control set to Enabled
  - Thermal Configuration set to Maximum Cooling

Continued on next page
Hewlett-Packard Company
ProLiant BL660c Gen9
(2.10 GHz, Intel Xeon E5-4660 v3)

SPECfp2006 = 102
SPECfp_base2006 = 96.5

CPU2006 license: 3
Test sponsor: Hewlett-Packard Company
Test date: May-2015
Tested by: Hewlett-Packard Company
Hardware Availability: Jun-2015
Software Availability: Oct-2014

Platform Notes (Continued)

Processor Power and Utilization Monitoring set to Disabled
Memory Refresh Rate set to 1x Refresh

Sysinfo program /root/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-wzg5 Sun May 17 08:09:05 2015

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 E5-4660 v3 @ 2.10GHz
  4 "physical id"s (chips)
  56 "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 : 14
  siblings : 14
  physical 0: cores 0 2 4 5 6 8 9 10 11 12 13 14
  physical 1: cores 0 2 4 5 6 8 9 10 11 12 13 14
  physical 2: cores 0 2 4 5 6 8 9 10 11 12 13 14
  physical 3: cores 0 2 4 5 6 8 9 10 11 12 13 14
  cache size : 35840 KB

From /proc/meminfo
MemTotal: 529177784 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
SuSE-release:
  SUSE Linux Enterprise Server 12 (x86_64)
  VERSION = 12
  PATCHLEVEL = 0
  # This file is deprecated and will be removed in a future service pack or
  # Please check /etc/os-release for details about this release.
  os-release:
    NAME="SLES"
    VERSION="12"
    VERSION_ID="12"
    PRETTY_NAME="SUSE Linux Enterprise Server 12"
    ID="sles"
    ANSI_COLOR="0;32"
    CPE_NAME="cpe:/o:suse:sles:12"

  uname -a:
  Linux linux-wzg5 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC 2014
  (9879bd4) x86_64 x86_64 x86_64 GNU/Linux

Continued on next page
SPEC CFP2006 Result

Hewlett-Packard Company
ProLiant BL660c Gen9
(2.10 GHz, Intel Xeon E5-4660 v3)

SPECfp2006 = 102
SPECfp_base2006 = 96.5

CPU2006 license: 3
Test sponsor: Hewlett-Packard Company
Test date: May-2015
Tested by: Hewlett-Packard Company
Hardware Availability: Jun-2015
Software Availability: Oct-2014

Platform Notes (Continued)

run-level 3 May 17 08:06

SPEC is set to: /root/cpu2006
Filesystem Type Size Used Avail Use% Mounted on
/dev/sdb4 xfs 300G 8.7G 292G 3% /

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 I38 03/05/2015
Memory:
32x HP 752369-081 16 GB 2 rank 2133 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"
LD_LIBRARY_PATH = "/root/cpu2006/libs/32:/root/cpu2006/libs/64:/root/cpu2006/sh"
OMP_NUM_THREADS = "56"

Binaries compiled on a system with 1x Core i5-4670K CPU + 16GB memory using RedHat EL 7.0

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

Continued on next page
SPEC CFP2006 Result

Hewlett-Packard Company
ProLiant BL660c Gen9
(2.10 GHz, Intel Xeon E5-4660 v3)

SPECfp2006 = 102
SPECfp_base2006 = 96.5

CPU2006 license: 3
Test sponsor: Hewlett-Packard Company
Tested by: Hewlett-Packard Company

Test date: May-2015
Hardware Availability: Jun-2015
Software Availability: Oct-2014

Base Portability Flags (Continued)

433.milc: -DSPEC_CPU_LP64
434.zesump: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
437.leslie3d: -DSPEC_CPU_LP64 -nofor_main
444.namd: -DSPEC_CPU_LP64 -nofor_main
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64 -nofor_main
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
481.wrf: -DSPEC_CPU_LP64
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

Benchmarks using both Fortran and C:
icc -m64 ifort -m64
Hewlett-Packard Company

ProLiant BL660c Gen9
(2.10 GHz, Intel Xeon E5-4660 v3)

| SPECfp2006 = | 102 |
| SPECfp_base2006 = | 96.5 |

CPU2006 license: 3
Test sponsor: Hewlett-Packard Company
Tested by: Hewlett-Packard Company

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(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-fno-alias -auto-ilp32

447.dealII: basepeak = yes
450.soplex: basepeak = yes
453.povray: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll4
-ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes
416.gamess: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
-inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes
459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
-inline-level=0 -opt-prefetch -parallel

465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-03(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-inline-calloc -opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

Continued on next page
SPEC CFP2006 Result

Hewlett-Packard Company

ProLiant BL660c Gen9
(2.10 GHz, Intel Xeon E5-4660 v3)

SPECfp2006 = 102
SPECfp_base2006 = 96.5

CPU2006 license: 3
Test sponsor: Hewlett-Packard Company
Tested by: Hewlett-Packard Company

Test date: May-2015
Hardware Availability: Jun-2015
Software Availability: Oct-2014

Peak Optimization Flags (Continued)

435.gromacs: basepeak = yes
436.cactusADM: basepeak = yes
454.calculix: -xCORE-AVX2  -ipo -O3  -no-prec-div  -auto-llp32  -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-ic15.0-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-ic15.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.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 2 June 2015.