Hewlett-Packard Company
ProLiant BL660c Gen9
(2.90 GHz, Intel Xeon E5-4655 v3)

**SPECfp®2006 = 114**
**SPECfp_base2006 = 108**

<table>
<thead>
<tr>
<th>Test sponsor</th>
<th>Hewlett-Packard Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tested by</td>
<td>Hewlett-Packard Company</td>
</tr>
<tr>
<td>CPU2006 license:</td>
<td>3</td>
</tr>
<tr>
<td>Test date</td>
<td>Apr-2015</td>
</tr>
<tr>
<td>Hardware Availability</td>
<td>Jun-2015</td>
</tr>
<tr>
<td>Software Availability</td>
<td>Oct-2014</td>
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<tr>
<td>SPECfp_base2006 = 108</td>
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</table>

**Hardware**

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-4655 v3</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.20 GHz</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>2900</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>24 cores, 4 chips, 6 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>2,4 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>Operating System:</th>
<th>SUSE Linux Enterprise Server 12 (x86_64)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>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</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 3 (multi-user)</td>
</tr>
</tbody>
</table>
Hewlett-Packard Company
ProLiant BL660c Gen9 (2.90 GHz, Intel Xeon E5-4655 v3)

| Benchmark | Base | | | Peak | | | |
|-----------|------|----------------|----------------|------|----------------|----------------|------|----------------|----------------|------|----------------|----------------|------|----------------|----------------|
|           | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 14.8 | 917 | 14.9 | 913 | 14.4 | 941 | 14.8 | 917 | 14.9 | 913 | 14.4 | 941 |
| 416.gamess | 535 | 36.6 | 533 | 36.7 | 533 | 36.7 | 478 | 41.0 | 478 | 41.0 | 478 | 41.0 |
| 433.milc | 141 | 65.3 | 140 | 65.6 | 132 | 69.4 | 131 | 70.3 | 136 | 67.4 | 131 | 70.3 |
| 434.zeusmp | 54.1 | 168 | 54.1 | 168 | 53.7 | 170 | 54.1 | 168 | 54.1 | 168 | 53.7 | 170 |
| 435.gromacs | 162 | 44.2 | 159 | 44.8 | 160 | 44.7 | 162 | 44.2 | 159 | 44.8 | 160 | 44.7 |
| 436.cactusADM | 17.0 | 702 | 17.0 | 704 | 17.3 | 691 | 17.0 | 702 | 17.0 | 704 | 17.3 | 691 |
| 437.leslie3d | 32.6 | 289 | 33.1 | 284 | 33.3 | 282 | 32.6 | 289 | 33.1 | 284 | 33.3 | 282 |
| 444.namd | 296 | 27.1 | 296 | 27.1 | 296 | 27.1 | 288 | 27.8 | 288 | 27.9 | 288 | 27.8 |
| 447.dealII | 214 | 53.5 | 213 | 53.7 | 214 | 53.3 | 214 | 53.5 | 213 | 53.7 | 214 | 53.3 |
| 450.soplex | 179 | 46.5 | 185 | 45.1 | 180 | 46.3 | 179 | 46.5 | 185 | 45.1 | 180 | 46.3 |
| 453.povray | 97.4 | 54.6 | 97.6 | 54.5 | 95.9 | 55.5 | 84.5 | 63.0 | 87.2 | 61.0 | 87.2 | 61.0 |
| 454.calculix | 159 | 51.8 | 160 | 51.4 | 159 | 51.7 | 145 | 56.9 | 145 | 56.9 | 145 | 56.9 |
| 459.GemsFDTD | 44.2 | 240 | 46.5 | 228 | 48.4 | 219 | 37.5 | 283 | 36.8 | 288 | 37.3 | 285 |
| 465.tonto | 256 | 38.4 | 248 | 39.7 | 248 | 39.7 | 194 | 50.8 | 195 | 50.4 | 194 | 50.8 |
| 470.lbm | 14.9 | 923 | 14.8 | 928 | 14.3 | 959 | 14.9 | 923 | 14.8 | 928 | 14.3 | 959 |
| 481.wrf | 127 | 88.0 | 127 | 88.3 | 128 | 87.5 | 127 | 88.0 | 127 | 88.3 | 128 | 87.5 |
| 482.sphinx3 | 253 | 77.1 | 252 | 77.2 | 254 | 76.8 | 253 | 77.1 | 252 | 77.2 | 254 | 76.8 |

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:
    echo always > /sys/kernel/mm/transparent_hugepage/enabled

Platform Notes
BIOS Configuration:
    Intel Hyperthreading Options set to Disabled
    HP Power Profile set to Custom
    HP Power Regulator to HP Static High Performance Mode
    Minimum Processor Idle Power Core State set to C6 State
    Minimum Processor Idle Power Package State set to Package C6 (retention) State
    Energy/Performance Bias set to Maximum Performance
    Collaborative Power Control set to Disabled
Continued on next page
Hewlett-Packard Company
ProLiant BL660c Gen9
(2.90 GHz, Intel Xeon E5-4655 v3)

SPECfp2006 = 114
SPECfp_base2006 = 108

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/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on bl660cgen9sles12cpu Wed Apr 29 16:06:21 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 E5-4655 v3 @ 2.90GHz
  4 "physical id"s (chips)
  24 "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 : 6
  siblings : 6
  physical 0: cores 1 3 5 9 11 12
  physical 1: cores 1 3 5 9 11 12
  physical 2: cores 1 3 5 9 11 12
  physical 3: cores 1 3 5 9 11 12
  cache size : 30720 KB

From /proc/meminfo
  MemTotal:       529312952 kB
  HugePages_Total:       0
  Hugepagesize:       2048 kB

From /etc/*release* /etc/*version*
SuSE-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 bl660cgen9sles12cpu 3.12.28-4-default #1 SMP Thu Sep 25 17:02:34 UTC
  2014 (9879bd4) x86_64 x86_64 x86_64 GNU/Linux

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**SPEC CFP2006 Result**

Hewlett-Packard Company  
ProLiant BL660c Gen9  
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CPU2006 license: 3  
Test sponsor: Hewlett-Packard Company  
Tested by: Hewlett-Packard Company  

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

---

**Platform Notes (Continued)**

run-level 3 Apr 29 16:00

SPEC is set to: /home/cpu2006

<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>331G</td>
<td>4.1G</td>
<td>327G</td>
<td>2%</td>
<td>/home</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 HP I38 03/05/2015  
Memory:  
4x HP 752369-081 16 GB 2 rank 2133 MHz  
28x UNKNOWN NOT AVAILABLE 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 = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"  
OMP_NUM_THREADS = "24"

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

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Hewlett-Packard Company
ProLiant BL660c Gen9
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Test sponsor: Hewlett-Packard Company
Tested by: Hewlett-Packard Company

Test date: Apr-2015
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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-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
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Test date: Apr-2015
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Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:
433.milc: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
          -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
          -auto-ilp32 -ansi-alias

470.lbm: basepeak = yes
482.sphinx3: basepeak = yes

C++ benchmarks:
444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
           -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
           -fnno-alias -auto-ilp32

447.dealII: basepeak = yes
450.soplex: basepeak = yes
453.povray: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
           -O3(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)
           -O3(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)
              -O3(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)
           -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
           -inline-calloc -opt-malloc-options=3 -auto -unroll4

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Hardware Availability: Jun-2015
Software Availability: Oct-2014

Peak Optimization Flags (Continued)

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-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

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

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