Hewlett Packard Enterprise
ProLiant XL450 Gen9
(2.20 GHz, Intel Xeon E5-2630 v4)

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

Test date: Apr-2016
Hardware Availability: Mar-2016
Software Availability: Nov-2015

SPECfp®2006 = 112
SPECfp_base2006 = 106

Hardware

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Score</th>
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<tbody>
<tr>
<td>bwaves</td>
<td>41.3</td>
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<tr>
<td>gamess</td>
<td>32.3</td>
</tr>
<tr>
<td>milc</td>
<td>71.9</td>
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<tr>
<td>zeusmp</td>
<td>196</td>
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<tr>
<td>gromacs</td>
<td>44.7</td>
</tr>
<tr>
<td>cactusADM</td>
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<tr>
<td>leslie3d</td>
<td>351</td>
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<tr>
<td>namd</td>
<td>28.1</td>
</tr>
<tr>
<td>dealII</td>
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<td>soplex</td>
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<td>povray</td>
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<td>calculix</td>
<td>56.6</td>
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<td>GemsFDTD</td>
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<td>tonto</td>
<td>53.1</td>
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<tr>
<td>lbm</td>
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<td>wrf</td>
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</tr>
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<td>sphinx3</td>
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Continued on next page
### SPEC CFP2006 Result

**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)  
ProLiant XL450 Gen9  
(2.20 GHz, Intel Xeon E5-2630 v4)  

<table>
<thead>
<tr>
<th>Test sponsor: HPE</th>
<th>Tested by: HPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU2006 license: 3</td>
<td></td>
</tr>
<tr>
<td>L3 Cache: 25 MB I+D on chip per chip</td>
<td>Other Cache: None</td>
</tr>
<tr>
<td>Memory: 256 GB (8 x 32 GB 2Rx4 PC4-2400T-R, running at 2133 MHz)</td>
<td>Disk Subsystem: 2 x 480 GB SATA SSD, RAID 1</td>
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<tr>
<td>Other Hardware: None</td>
<td>System State: Run level 3 (multi-user)</td>
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<tr>
<td>Test date: Apr-2016</td>
<td>Base Pointers: 64-bit</td>
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<tr>
<td>Hardware Availability: Mar-2016</td>
<td>Peak Pointers: 32/64-bit</td>
</tr>
<tr>
<td>Software Availability: Nov-2015</td>
<td>Other Software: None</td>
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### Results Table

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<tr>
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<th>Seconds</th>
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<td>68.7</td>
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<td>68.8</td>
<td>283</td>
<td>69.0</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:  
echo always > /sys/kernel/mm/transparent_hugepage/enabled

### Platform Notes

**BIOS Configuration:**  
- Intel Hyperthreading set to Disabled  
- Power Profile set to Custom  
- Power Regulator to HP Static High Performance Mode  
- Minimum Processor Idle Power Core C-State set to C6 State  
- Minimum Processor Idle Power Package C-State set to No Package State  
- QPI Snoop Configuration set to Home Snoop
Platform Notes (Continued)

Collaborative Power Control set to Disabled
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 XL450-G9-node2 Thu Apr 28 12:49:06 2016

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 E5-2630 v4 @ 2.20GHz
  2 "physical id"s (chips)
  20 "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 : 10
  siblings : 10
  physical 0: cores 0 2 3 4 8 9 10 11 12
  physical 1: cores 0 2 3 4 8 9 10 11 12
  cache size : 25600 KB

From /proc/meminfo
MemTotal: 263712764 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

From /etc/*release* /etc/*version*
os-release:
  NAME="Red Hat Enterprise Linux Server"
  VERSION="7.2 (Maipo)"
  ID="rhel"
  ID_LIKE="fedora"
  VERSION_ID="7.2"
  PRETTY_NAME="Red Hat Enterprise Linux Server 7.2 (Maipo)"
  ANSI_COLOR="0;31"
  CPE_NAME=cpe:/o:redhat:enterprise_linux:7.2:GA:server
redhat-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)
system-release: Red Hat Enterprise Linux Server release 7.2 (Maipo)

uname -a:
Linux XL450-G9-node2 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29 EDT
2015 x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Apr 28 12:33

SPEC is set to: /home/cpu2006

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SPEC CFP2006 Result

Hewlett Packard Enterprise
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ProLiant XL450 Gen9
(2.20 GHz, Intel Xeon E5-2630 v4)

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SPECfp_base2006 = 106

CPU2006 license: 3
Test sponsor: HPE
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Test date: Apr-2016
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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>
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</thead>
<tbody>
<tr>
<td>/dev/sda4</td>
<td>xfs</td>
<td>438G</td>
<td>20G</td>
<td>419G</td>
<td>5%</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 HP U21 03/10/2016
Memory:
  8x UNKNOWN NOT AVAILABLE
  8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz, configured at 2133 MHz

(End of data from sysinfo program)

Regarding the sysinfo display about the memory installed, the correct amount of memory is 128 GB and the dmidecode description should have one line reading as:
  8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz, configured at 2133 MHz

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
OMP_NUM_THREADS = "20"
LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"

Binaries compiled on a system with 1x Intel Xeon E5-2660 v4 CPU + 128GB memory using RedHat EL 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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CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

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.lele3id: -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 -static -parallel -opt-prefetch
-ansi-alias -qopt-prefetch-issue-excl-hint

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-fp-model fast=2
-qopt-prefetch-issue-excl-hint

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias -qopt-prefetch-issue-excl-hint
-fp-model fast=2

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Continued on next page
Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

```plaintext
icc  -m64  ifort  -m64
```

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

433.milc: basepeak = yes
470.lbm: basepeak = yes
482.sphinx3: -xCORE-AVX2  -ipo  -O3  -no-prec-div  -static  -parallel
            -opt-prefetch  -ansi-alias
            -fp-model fast=2
            -qopt-prefetch-issue-excl-hint  -funroll-all-loops

C++ benchmarks:

444.namd: -xCORE-AVX2(pass 2)  -prof-gen:threadsafe(pass 1)
            -ipo(pass 2)  -O3(pass 2)  -no-prec-div(pass 2)
            -par-num-threads=1(pass 1)  -prof-use(pass 2)  -fno-alias
            -auto-ilp32
447.dealII: basepeak = yes
450.soplex: basepeak = yes
453.povray: -xCORE-AVX2(pass 2)  -prof-gen:threadsafe(pass 1)
            -ipo(pass 2)  -O3(pass 2)  -no-prec-div(pass 2)
            -par-num-threads=1(pass 1)  -prof-use(pass 2)  -unroll4
            -ansi-alias

Fortran benchmarks:

410.bwaves: -xCORE-AVX2  -ipo  -O3  -no-prec-div  -static  -parallel
            -opt-prefetch
            -fp-model fast=2
            -qopt-prefetch-issue-excl-hint  -funroll-all-loops

416.gamess: -xCORE-AVX2(pass 2)  -prof-gen:threadsafe(pass 1)
            -ipo(pass 2)  -O3(pass 2)  -no-prec-div(pass 2)
            -par-num-threads=1(pass 1)  -prof-use(pass 2)  -unroll2
            -inline-level=0  -scalar-rep-

Continued on next page
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant XL450 Gen9
(2.20 GHz, Intel Xeon E5-2630 v4)

SPECfp2006 = 112
SPECfp_base2006 = 106

Peak Optimization Flags (Continued)

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

459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
                   -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                   -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll2
                   -inline-level=0 -opt-prefetch -parallel

465.tonto: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
           -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
           -par-num-threads=1(pass 1) -prof-use(pass 2) -inline-cALLOC
           -opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel
              -opt-prefetch -ansi-alias
              -fp-model fast=2
              -qopt-prefetch-issue-excl-hint -funroll-all-loops
              -auto-ilp32

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/HP-Platform-Flags-Intel-V1.2-HSW-revE.html
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-BDW-revE.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml
http://www.spec.org/cpu2006/flags/HP-Compiler-Flags-Intel-V1.2-BDW-revE.xml

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

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