Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen9
(2.10 GHz, Intel Xeon E5-2683 v4)

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

0 30.0 60.0 90.0 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570 600 630 660 690 720 750 780 810 840 880

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECfp2006</th>
<th>SPECfp_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>410.bwaves</td>
<td></td>
<td></td>
</tr>
<tr>
<td>416.gamess</td>
<td></td>
<td></td>
</tr>
<tr>
<td>433.milc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>434.zeusmp</td>
<td></td>
<td></td>
</tr>
<tr>
<td>435.gromacs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>436.cactusADM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>437.leslie3d</td>
<td></td>
<td></td>
</tr>
<tr>
<td>444.namd</td>
<td></td>
<td></td>
</tr>
<tr>
<td>447.dealII</td>
<td></td>
<td></td>
</tr>
<tr>
<td>450.soplex</td>
<td></td>
<td></td>
</tr>
<tr>
<td>453.povray</td>
<td></td>
<td></td>
</tr>
<tr>
<td>454.calculix</td>
<td></td>
<td></td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>465.tonto</td>
<td></td>
<td></td>
</tr>
<tr>
<td>470.lbm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>481.wrf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>482.sphinx3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SPECfp2006 = 113
SPECfp_base2006 = 108

Hardware

CPU Name: Intel Xeon E5-2683 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.00 GHz
CPU MHz: 2100
FPU: Integrated
CPU(s) enabled: 32 cores, 2 chips, 16 cores/chip, 2 threads/core
CPU(s) orderable: 1,2 core
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 256 KB I+D on chip per core

Software

Operating System: Red Hat Enterprise Linux Server release 7.2 (Maipo)
Compiler: C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux;
            Fortran: Version 16.0.0.101 of Intel Fortran Studio XE for Linux
Auto Parallel: Yes
File System: xfs
## Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<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>19.3</td>
<td>704</td>
<td>21.1</td>
<td>643</td>
<td>19.5</td>
<td>696</td>
</tr>
<tr>
<td>416.gamess</td>
<td>600</td>
<td>32.6</td>
<td>600</td>
<td>32.6</td>
<td>605</td>
<td>32.4</td>
</tr>
<tr>
<td>433.milc</td>
<td>135</td>
<td>68.2</td>
<td>135</td>
<td>68.2</td>
<td>135</td>
<td>68.1</td>
</tr>
<tr>
<td>434.zeusmp</td>
<td>46.9</td>
<td>194</td>
<td>46.8</td>
<td>194</td>
<td>46.6</td>
<td>195</td>
</tr>
<tr>
<td>435.gromacs</td>
<td>160</td>
<td>44.6</td>
<td>160</td>
<td>44.6</td>
<td>160</td>
<td>44.6</td>
</tr>
<tr>
<td>436.cactusADM</td>
<td>13.9</td>
<td>861</td>
<td>14.2</td>
<td>843</td>
<td>14.0</td>
<td>854</td>
</tr>
<tr>
<td>437.leslie3d</td>
<td>30.4</td>
<td>310</td>
<td>27.3</td>
<td>344</td>
<td>28.8</td>
<td>327</td>
</tr>
<tr>
<td>444.namd</td>
<td>304</td>
<td>26.4</td>
<td>305</td>
<td>26.3</td>
<td>304</td>
<td>26.4</td>
</tr>
<tr>
<td>447.dealII</td>
<td>197</td>
<td>58.0</td>
<td>199</td>
<td>57.6</td>
<td>198</td>
<td>57.9</td>
</tr>
<tr>
<td>450.soplex</td>
<td>188</td>
<td>44.4</td>
<td>189</td>
<td>44.0</td>
<td>186</td>
<td>44.9</td>
</tr>
<tr>
<td>453.povray</td>
<td>99.3</td>
<td>53.6</td>
<td>99.8</td>
<td>53.3</td>
<td>99.4</td>
<td>53.5</td>
</tr>
<tr>
<td>454.calculix</td>
<td>174</td>
<td>47.4</td>
<td>174</td>
<td>47.4</td>
<td>174</td>
<td>47.5</td>
</tr>
<tr>
<td>459.GemsFDTD</td>
<td>46.4</td>
<td>229</td>
<td>46.9</td>
<td>226</td>
<td>45.8</td>
<td>232</td>
</tr>
<tr>
<td>465.tonto</td>
<td>261</td>
<td>37.7</td>
<td>256</td>
<td>38.4</td>
<td>262</td>
<td>37.5</td>
</tr>
<tr>
<td>470.lbm</td>
<td>15.8</td>
<td>869</td>
<td>15.7</td>
<td>874</td>
<td>16.0</td>
<td>859</td>
</tr>
<tr>
<td>481.wrf</td>
<td>102</td>
<td>109</td>
<td>104</td>
<td>107</td>
<td>103</td>
<td>109</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>296</td>
<td>65.9</td>
<td>296</td>
<td>65.9</td>
<td>297</td>
<td>65.7</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:**
HP Power Profile set to Custom
HP Power Regulator to HP Static High Performance Mode
Minimum Processor Idle Power Core C-State set to CLE State
Minimum Processor Idle Power Package C-State set to No Package State
QPI Snoop Configuration set to Home Snoop
Collaborative Power Control set to Disabled
Thermal Configuration set to Maximum Cooling

Continued on next page.
Hewlett Packard Enterprise

ProLiant DL360 Gen9
(2.10 GHz, Intel Xeon E5-2683 v4)

SPECfp2006 = 113
SPECfp_base2006 = 108

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

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

Platform Notes (Continued)

Processor Power and Utilization Monitoring set to Disabled
Memory Refresh Rate set to 1x Refresh
Intel Hyperthreading set to Enabled
Sysinfo program /cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on localhost.localdomain Thu Jun 23 23:58:42 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 E5-2683 v4 @ 2.10GHz
  2 "physical id"s (chips)
  64 "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 : 16
  siblings : 32
  physical 0: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  physical 1: cores 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15
  cache size : 40960 KB

From /proc/meminfo
MemTotal: 528062744 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 localhost.localdomain 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 Jun 23 18:18

SPEC is set to: /cpu2006

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 368G 117G 251G 32% /

Continued on next page
Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL360 Gen9  
(2.10 GHz, Intel Xeon E5-2683 v4)

SPECfp2006 = 113  
SPECfp_base2006 = 108

CPU2006 license: 3  
Test date: Jun-2016

Test sponsor: HPE  
Hardware Availability: Mar-2016

Tested by: HPE  
Software Availability: Nov-2015

Platform Notes (Continued)

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 P89 04/12/2016  
Memory:  
8x UNKNOWN NOT AVAILABLE  
16x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

(End of data from sysinfo program)

Regarding the sysinfo display about the memory installed, the correct amount of memory is 512 GB and the dmidecode description should have one line reading as:  
16x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz

General Notes

Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"
OMP_NUM_THREADS = "32"

Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB memory using RedHat EL 7.1

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

Continued on next page
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen9
(2.10 GHz, Intel Xeon E5-2683 v4)

SPECfp2006 = 113
SPECfp_base2006 = 108

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

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

Base Portability Flags (Continued)

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
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
SPEC CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen9
(2.10 GHz, Intel Xeon E5-2683 v4)

SPECfp2006 = 113
SPECfp_base2006 = 108

CPU2006 license: 3
Test date: Jun-2016
Test sponsor: HPE
Hardware Availability: Mar-2016
Tested by: HPE
Software Availability: Nov-2015

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: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: basepeak = yes
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-

        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

Continued on next page
Peak Optimization Flags (Continued)

465.tonto (continued):
  -opt-malloc-options=3 -auto -unroll4

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/HP-Platform-Flags-Intel-V1.2-HSW-revE.html
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.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/Intel-ic16.0-official-linux64.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 26 July 2016.