Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant XL450 Gen9
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECint®2006 = 65.6
SPECint_base2006 = 62.9

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

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

CPU Name: Intel Xeon E5-2660 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz
CPU MHz: 2000
FPU: Integrated
CPU(s) enabled: 28 cores, 2 chips, 14 cores/chip
CPU(s) orderable: 1.2 chips
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 256 KB I+D on chip per core
L3 Cache: 35 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (8 x 32 GB 2Rx4 PC4-2400T-R)
Disk Subsystem: 2 x 480 GB SATA SSD, RAID 1
Other Hardware: None

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
Auto Parallel: Yes
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 32/64-bit
Peak Pointers: 32/64-bit
Other Software: Microquill SmartHeap V10.2

0 200 400 600 800 1100 1400 1700 2000 2300 2600 2900 3200 3500 3800 4100 4400 4700 5000 5300 5600 5900 6200

Software

37.4 40.9
23.3 22.9
35.2 60.5
60.2
27.4
78.6
32.2 31.8
62.4
51.9
52.2
40.7 13.6
33.6 78.8
70.2
6240
SPEC CINT2006 Result

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Base</th>
<th>Ratio Base</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
<th>Seconds Peak</th>
<th>Ratio Peak</th>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>261</td>
<td>37.4</td>
<td>261</td>
<td>37.4</td>
<td>261</td>
<td>37.4</td>
<td>239</td>
<td>40.9</td>
<td>40.9</td>
<td>40.9</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>421</td>
<td>22.9</td>
<td>420</td>
<td>23.0</td>
<td>421</td>
<td>22.9</td>
<td>415</td>
<td>23.3</td>
<td>415</td>
<td>23.3</td>
</tr>
<tr>
<td>403.gcc</td>
<td>229</td>
<td>35.2</td>
<td>229</td>
<td>35.2</td>
<td>228</td>
<td>35.2</td>
<td>227</td>
<td>35.5</td>
<td>226</td>
<td>35.6</td>
</tr>
<tr>
<td>429.mcf</td>
<td>152</td>
<td>60.2</td>
<td>150</td>
<td>60.6</td>
<td>152</td>
<td>60.0</td>
<td>151</td>
<td>60.5</td>
<td>151</td>
<td>60.5</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>385</td>
<td>27.3</td>
<td>385</td>
<td>27.3</td>
<td>384</td>
<td>27.3</td>
<td>384</td>
<td>27.4</td>
<td>383</td>
<td>27.4</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>119</td>
<td>78.6</td>
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<td>78.6</td>
<td>119</td>
<td>78.6</td>
<td>119</td>
<td>78.6</td>
<td>119</td>
<td>78.6</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>380</td>
<td>31.8</td>
<td>380</td>
<td>31.8</td>
<td>380</td>
<td>31.8</td>
<td>376</td>
<td>32.2</td>
<td>375</td>
<td>32.2</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>3.33</td>
<td>6220</td>
<td>3.32</td>
<td>6240</td>
<td>3.32</td>
<td>6240</td>
<td>3.33</td>
<td>6220</td>
<td>3.32</td>
<td>6240</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>427</td>
<td>51.8</td>
<td>426</td>
<td>51.9</td>
<td>425</td>
<td>52.1</td>
<td>427</td>
<td>51.8</td>
<td>426</td>
<td>51.9</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>153</td>
<td>40.7</td>
<td>153</td>
<td>40.8</td>
<td>154</td>
<td>40.5</td>
<td>152</td>
<td>52.2</td>
<td>119</td>
<td>52.4</td>
</tr>
<tr>
<td>473.astar</td>
<td>209</td>
<td>33.6</td>
<td>209</td>
<td>33.5</td>
<td>208</td>
<td>33.7</td>
<td>209</td>
<td>33.6</td>
<td>209</td>
<td>33.6</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>98.4</td>
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<td>98.3</td>
<td>70.2</td>
<td>98.3</td>
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<td>87.7</td>
<td>78.7</td>
<td>87.3</td>
<td>79.0</td>
</tr>
</tbody>
</table>

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

Submit Notes

The config file option 'submit' was used.

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 Maximum Performance
  QPI Snoop Configuration set to Home Snoop
  Collaborative Power Control set to Disabled
  Thermal Configuration set to Maximum Cooling
  Processor Power and Utilization Monitoring set to Disabled
  Memory Double Refresh Rate set to 1x Refresh
  Memory Patrol Scrubbing set to Disabled

Sysinfo program /cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on No1-xl450-g9 Sat Apr 30 19:02:48 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
Continued on next page
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**Test date:** Apr-2016
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**Platform Notes (Continued)**

From /proc/cpuinfo

```
model name : Intel(R) Xeon(R) CPU E5-2660 v4@ 2.00GHz
  2 "physical id"s (chips)
  28 "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
```  

cache size : 35840 KB

From /proc/meminfo

```
MemTotal:        263711164 kB
HugePages_Total:       0
Hugepagesize:        2048 kB
```

From /etc/*release* /etc/*version*

```
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 No1-xl450-g9 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
```

```
runevel 3 Apr 30 18:27
```

SPEC is set to: /cpu2006

```
Filesystem  Type  Size  Used Avail Use% Mounted on
/dev/sda4    xfs  439G 20G  419G  5% /
```

---

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
```
SPEC CINT2006 Result

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Platform Notes (Continued)

8x 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 256 GB and the dmidecode description should have one line reading as:
8x 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,scatter"
LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"
OMP_NUM_THREADS = "28"

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

Base Portability Flags

400.perlbench: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -DSPEC_CPU_LP64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
471.omnetpp: -DSPEC_CPU_LP64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX

Base Optimization Flags

C benchmarks:
   -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch -auto-p32

Continued on next page
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Base Optimization Flags (Continued)

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-Wl,-z,muldefs -L/sh -lsmartheap64

Base Other Flags

C benchmarks:
403.gcc: -Dalloca=_alloca

Peak Compiler Invocation

C benchmarks (except as noted below):
icc -m64
400.perlbench: icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
445.gobmk: icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

C++ benchmarks (except as noted below):
icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin
473.astar: icpc -m64

Peak Portability Flags

400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
401.bzip2: -DSPEC_CPU_LP64
403.gcc: -DSPEC_CPU_LP64
429.mcf: -DSPEC_CPU_LP64
445.gobmk: -D_FILE_OFFSET_BITS=64
456.hmmer: -DSPEC_CPU_LP64
458.sjeng: -DSPEC_CPU_LP64
462.libquantum: -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX
464.h264ref: -DSPEC_CPU_LP64
471.omnetpp: -D_FILE_OFFSET_BITS=64
473.astar: -DSPEC_CPU_LP64
483.xalancbmk: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
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Peak Optimization Flags

C benchmarks:

400.perlbench: -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) -opt-prefetch
    -ansi-alias

401.bzip2: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
    -ipo(pass 2) -O3(pass 2) -no-prec-div
    -par-num-threads=1(pass 1) -prof-use(pass 2) -auto-ilp32
    -opt-prefetch -ansi-alias

403.gcc: -xCORE-AVX2 -ipo -O3 -no-prec-div -inline-calloc
    -opt-malloc-options=3 -auto-ilp32

429.mcf: -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel
    -opt-prefetch -auto-p32

445.gobmk: -xCORE-AVX2(pass 2) -prof-gen:threadsafe(pass 1)
    -prof-use(pass 2) -par-num-threads=1(pass 1) -ansi-alias

456.hmmer: basepeak = yes

458.sjeng: -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

462.libquantum: basepeak = yes

464.h264ref: basepeak = yes

C++ benchmarks:

471.omnetpp: -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)
    -opt-ra-region-strategy=block
    -ansi-alias
    -Wl,-z,muldefs -L/sh -lsmartheap

473.astar: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
    -auto-p32 -Wl,-z,muldefs -L/sh -lsmartheap64

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch
    -ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap
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Peak Other Flags

C benchmarks:

403.gcc -Dalloca=_alloca

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

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