# SPEC® CINT2006 Result

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant ML350 Gen9  
(2.30 GHz, Intel Xeon E5-2697 v4)  

**SPECint®2006 = 73.2**  
**SPECint_base2006 = 71.0**  

<table>
<thead>
<tr>
<th>Test Date:</th>
<th>Apr-2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Mar-2016</td>
</tr>
<tr>
<td>Software Availability:</td>
<td>Nov-2015</td>
</tr>
</tbody>
</table>

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### Hardware

<table>
<thead>
<tr>
<th>CPU Name:</th>
<th>Intel Xeon E5-2697 v4</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Characteristics:</td>
<td>Intel Turbo Boost Technology up to 3.60 GHz</td>
</tr>
<tr>
<td>CPU MHz:</td>
<td>2300</td>
</tr>
<tr>
<td>FPU:</td>
<td>Integrated</td>
</tr>
<tr>
<td>CPU(s) enabled:</td>
<td>36 cores, 2 chips, 18 cores/chip</td>
</tr>
<tr>
<td>CPU(s) orderable:</td>
<td>1, 2 chips</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 L+D on chip per core</td>
</tr>
<tr>
<td>L3 Cache:</td>
<td>45 MB I+D on chip per chip</td>
</tr>
<tr>
<td>Other Cache:</td>
<td>None</td>
</tr>
<tr>
<td>Memory:</td>
<td>512 GB (16 x 32 GB 2Rx4 PC4-2400T-R)</td>
</tr>
<tr>
<td>Disk Subsystem:</td>
<td>1 x 400 GB SAS SSD, RAID 1</td>
</tr>
<tr>
<td>Other Hardware:</td>
<td>None</td>
</tr>
</tbody>
</table>

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### Software

<table>
<thead>
<tr>
<th>Operating System:</th>
<th>Red Hat Enterprise Linux Server release 7.2 (Maipo)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compiler:</td>
<td>C/C++: Version 16.0.0.101 of Intel C++ 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>
<tr>
<td>Base Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Peak Pointers:</td>
<td>32/64-bit</td>
</tr>
<tr>
<td>Other Software:</td>
<td>Microquill SmartHeap V10.2</td>
</tr>
</tbody>
</table>

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info@spec.org  
http://www.spec.org/
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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>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>233</td>
<td>41.9</td>
<td>234</td>
<td>41.8</td>
<td>234</td>
<td>41.7</td>
<td>215</td>
<td>45.4</td>
<td>215</td>
<td>45.5</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>380</td>
<td>25.4</td>
<td>380</td>
<td>25.4</td>
<td>381</td>
<td>25.3</td>
<td>380</td>
<td>25.4</td>
<td>380</td>
<td>25.4</td>
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<tr>
<td>403.gcc</td>
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<td>37.7</td>
<td>214</td>
<td>37.7</td>
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<td>37.7</td>
<td>204</td>
<td>39.4</td>
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<td>39.4</td>
</tr>
<tr>
<td>429.gobmk</td>
<td>345</td>
<td>30.4</td>
<td>344</td>
<td>30.5</td>
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<td>30.5</td>
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<td>30.5</td>
<td>344</td>
<td>30.5</td>
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<tr>
<td>456.hmmer</td>
<td>106</td>
<td>88.3</td>
<td>106</td>
<td>88.1</td>
<td>106</td>
<td>88.1</td>
<td>106</td>
<td>88.3</td>
<td>106</td>
<td>88.1</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>339</td>
<td>35.7</td>
<td>339</td>
<td>35.7</td>
<td>340</td>
<td>35.6</td>
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<td>36.1</td>
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<td>36.1</td>
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<tr>
<td>462.libquantum</td>
<td>2.61</td>
<td>7930</td>
<td>2.61</td>
<td>7950</td>
<td>2.62</td>
<td>7910</td>
<td>2.61</td>
<td>7930</td>
<td>2.61</td>
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<tr>
<td>464.h264ref</td>
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<td>58.5</td>
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<td>58.6</td>
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<td>58.4</td>
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<td>58.6</td>
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<tr>
<td>471.omnetpp</td>
<td>127</td>
<td>49.1</td>
<td>128</td>
<td>48.9</td>
<td>127</td>
<td>49.4</td>
<td>113</td>
<td>55.3</td>
<td>114</td>
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<tr>
<td>473.astar</td>
<td>189</td>
<td>37.2</td>
<td>188</td>
<td>37.4</td>
<td>189</td>
<td>37.5</td>
<td>189</td>
<td>37.2</td>
<td>188</td>
<td>37.4</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>87.3</td>
<td>79.1</td>
<td>87.2</td>
<td>79.1</td>
<td>87.2</td>
<td>79.1</td>
<td>79.1</td>
<td>87.2</td>
<td>79.2</td>
<td>87.1</td>
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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 Option 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 C1E State
Minimum Processor Idle Power Package C-State set to No Package State
Collaborative Power Control set to Disabled
QPI Snoop Configuration set to Home Snoop
Thermal Configuration set to Maximum Cooling
Processor Power and Utilization Monitoring set to Disabled
Memory Double Refresh Rate set to 1x Refresh
Energy Performance Bias set to Maximum Performance
Sysinfo program /home/specuser/specsuite/ic16/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 $$ e3fbb8667b5a285932ceab81e28219e1
running on ml350bdwspec Fri Apr 15 12:22:40 2016

This section contains SUT (System Under Test) info as seen by
Continued on next page
Hewlett Packard Enterprise
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CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

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

Platform Notes (Continued)

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 E5-2697 v4 @ 2.30GHz
- 2 "physical id"s (chips)
- 36 "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: 18
  - siblings: 18
  - physical 0: cores 0 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  - physical 1: cores 0 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
- Cache size: 46080 KB

From /proc/meminfo

- MemTotal: 528066200 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 ml350bdwspec 3.10.0-327.e17.x86_64 #1 SMP Thu Oct 29 17:29:29 EDT 2015
x86_64 x86_64 x86_64 GNU/Linux
```

run-level 3 Apr 15 12:12

SPEC is set to: /home/specuser/specsuite/ic16

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda5 xfs 318G 241G 78G 76% /home

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 P92 02/22/2016

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Platform Notes (Continued)
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,scatter"
LD_LIBRARY_PATH = /home/specuser/specsuite/ic16/1ibs/32:/home/specuser/specsuite/ic16/1ibs/64:/home/specuser/specsuite/ic16/sh*
OMP_NUM_THREADS = "36"

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
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**Base Optimization Flags**

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

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
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: basepeak = yes

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

429.mcf: basepeak = yes

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

473.astar: basepeak = yes

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

Peak Other Flags

C benchmarks:

403.gcc: -Dalloca=_alloca
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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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For other inquiries, please contact webmaster@spec.org.

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