**Hewlett Packard Enterprise**  
(Test Sponsor: HPE)

**ProLiant ML350 Gen9**  
(3.40 GHz, Intel Xeon E5-2643 v4)

### CPU2006 license:
3

### Test sponsor:
HPE

### Tested by:
HPE

### Test date:
Mar-2016

### Hardware Availability:
Mar-2016

### Software Availability:
Dec-2015

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>SPECint2006</th>
<th>SPECint_base2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>perlbench</td>
<td>447.4</td>
<td></td>
</tr>
<tr>
<td>bzip2</td>
<td>23.2</td>
<td></td>
</tr>
<tr>
<td>gcc</td>
<td>39.1</td>
<td></td>
</tr>
<tr>
<td>mcf</td>
<td>70.0</td>
<td></td>
</tr>
<tr>
<td>gobmk</td>
<td>11.0</td>
<td></td>
</tr>
<tr>
<td>hmer</td>
<td>36.6</td>
<td></td>
</tr>
<tr>
<td>sjeng</td>
<td>36.2</td>
<td></td>
</tr>
<tr>
<td>libquantum</td>
<td>63.1</td>
<td></td>
</tr>
<tr>
<td>h264ref</td>
<td>43.8</td>
<td></td>
</tr>
<tr>
<td>omnetpp</td>
<td>29.9</td>
<td></td>
</tr>
<tr>
<td>astar</td>
<td>38.8</td>
<td></td>
</tr>
<tr>
<td>xalancbmk</td>
<td>78.0</td>
<td></td>
</tr>
</tbody>
</table>

### SPECint2006 = 71.3

### SPECint_base2006 = 67.7

| Benchmark | 0 | 200 | 400 | 600 | 800 | 1000 | 1200 | 1400 | 1600 | 1800 | 2000 | 2200 | 2400 | 2600 | 2800 | 3000 | 3200 | 3400 | 3600 | 3800 | 4000 | 4200 | 4400 | 4600 | 4800 | 5000 |
|-----------|---|----|-----|-----|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|
| perlbench | 447.4 |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| bzip2     | 23.2   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| gcc       | 39.1   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| mcf       | 70.0   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| gobmk     | 11.0   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| hmer      | 36.6   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| sjeng     | 36.2   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| libquantum| 63.1   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| h264ref   | 43.8   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| omnetpp   | 29.9   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| astar     | 38.8   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |
| xalancbmk | 78.0   |    |     |     |     |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |      |

### Hardware

- **CPU Name:** Intel Xeon E5-2643 v4
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.70 GHz
- **CPU MHz:** 3400
- **FPU:** Integrated
- **CPU(s) enabled:** 12 cores, 2 chips, 6 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:** 20 MB I+D on chip per chip
- **Other Cache:** None
- **Memory:** 512 GB (16 x 32 GB 2Rx4 PC4-2400T-R)
- **Disk Subsystem:** 1 x 800 GB SAS SSD, RAID 0
- **Other Hardware:** None

### Software

- **Operating System:** SUSE Linux Enterprise Server 12 (x86_64) SP1 Kernel 3.12.49-11-default
- **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
Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen9
(3.40 GHz, Intel Xeon E5-2643 v4)

SPECint2006 = 71.3
SPECint_base2006 = 67.7

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>
</tr>
</thead>
<tbody>
<tr>
<td>400.perlbench</td>
<td>225</td>
<td>43.4</td>
<td>225</td>
<td>43.5</td>
<td>225</td>
<td>43.3</td>
<td>206</td>
<td>47.4</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>361</td>
<td>26.7</td>
<td>361</td>
<td>26.7</td>
<td>360</td>
<td>26.8</td>
<td>355</td>
<td>27.2</td>
</tr>
<tr>
<td>403.gcc</td>
<td>206</td>
<td>39.1</td>
<td>206</td>
<td>39.1</td>
<td>207</td>
<td>39.0</td>
<td>206</td>
<td>39.1</td>
</tr>
<tr>
<td>429.mcf</td>
<td>133</td>
<td>68.8</td>
<td>132</td>
<td>69.3</td>
<td>130</td>
<td>70.3</td>
<td>130</td>
<td>70.0</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>332</td>
<td>31.6</td>
<td>331</td>
<td>31.7</td>
<td>331</td>
<td>31.7</td>
<td>332</td>
<td>31.6</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>103</td>
<td>91.0</td>
<td>103</td>
<td>91.0</td>
<td>102</td>
<td>91.0</td>
<td>103</td>
<td>91.0</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>335</td>
<td>36.2</td>
<td>334</td>
<td>36.2</td>
<td>335</td>
<td>36.1</td>
<td>331</td>
<td>36.6</td>
</tr>
<tr>
<td>462.libquantum</td>
<td>4.17</td>
<td>4960</td>
<td>4.23</td>
<td>4900</td>
<td>4.18</td>
<td>4950</td>
<td>4.17</td>
<td>4960</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>351</td>
<td>63.1</td>
<td>351</td>
<td>63.0</td>
<td>350</td>
<td>63.2</td>
<td>351</td>
<td>63.1</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>204</td>
<td>30.7</td>
<td>209</td>
<td>29.9</td>
<td>209</td>
<td>29.9</td>
<td>143</td>
<td>43.8</td>
</tr>
<tr>
<td>473.astar</td>
<td>181</td>
<td>38.8</td>
<td>181</td>
<td>38.8</td>
<td>181</td>
<td>38.8</td>
<td>181</td>
<td>38.8</td>
</tr>
<tr>
<td>483.xalancbmk</td>
<td>88.4</td>
<td>78.0</td>
<td>87.8</td>
<td>78.6</td>
<td>89.2</td>
<td>77.4</td>
<td>78.7</td>
<td>87.6</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 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/cpu2006/ic16/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab8e28219e1
running on linux-szds Fri Mar 18 13:56:40 2016

This section contains SUT (System Under Test) info as seen by
Continued on next page
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 E5-2643 v4 @ 3.40GHz
   2 "physical id"s (chips)
   12 "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 0 1 2 3 6 7
   physical 1: cores 0 1 2 3 6 7
   cache size : 20480 KB

From /proc/meminfo
   MemTotal:       529095880 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
   SUSE Linux Enterprise Server 12 SP1

From /etc/*release* /etc/*version*
   SuSE-release:
   SUSE Linux Enterprise Server 12 (x86_64)
   VERSION = 12
   PATCHLEVEL = 1
   # This file is deprecated and will be removed in a future service pack or
   release.
   # Please check /etc/os-release for details about this release.
   os-release:
   NAME="SLES"
   VERSION="12-SP1"
   VERSION_ID="12.1"
   PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"
   ID="sles"
   ANSI_COLOR="0;32"
   CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:
   (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Mar 18 13:55

SPEC is set to: /home/specuser/cpu2006/ic16
   Filesystem Type Size Used Avail Use% Mounted on
   /dev/sda4 xfs 703G 279G 425G 40% /home
Additional information from dmidecode:

Continued on next page
SPEC CINT2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen9
(3.40 GHz, Intel Xeon E5-2643 v4)

SPECint2006 = 71.3
SPECint_base2006 = 67.7

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

Platform Notes (Continued)

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
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/cpu2006/ic16/libs/32:/home/specuser/cpu2006/ic16/libs/64:/home/specuser/cpu2006/ic16/sh"
OMP_NUM_THREADS = "12"

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.perlkbench: -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

Continued on next page
Hewlett Packard Enterprise
ProLiant ML350 Gen9
(3.40 GHz, Intel Xeon E5-2643 v4)

SPECint2006 = 71.3
SPECint_base2006 = 67.7

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

Test date: Mar-2016
Hardware Availability: Mar-2016
Software Availability: Dec-2015

Base Portability Flags (Continued)
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
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
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: -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: -D_FILE_OFFSET_BITS=64

Continued on next page
Peak Portability Flags (Continued)

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: -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: basepeak = yes

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

445.gobmk: basepeak = yes

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: basepeak = yes

483.xalancbmk: -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias -Wl,-z,muldefs -L/sh -lsmartheap
<table>
<thead>
<tr>
<th>Peak Other Flags</th>
</tr>
</thead>
<tbody>
<tr>
<td>C benchmarks:</td>
</tr>
<tr>
<td>403.gcc: -Dalloca=_alloca</td>
</tr>
</tbody>
</table>

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 SPECint 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.
Report generated on Tue May  3 18:00:58 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on  3 May 2016.