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

**ProLiant ML350 Gen9**
(3.50 GHz, Intel Xeon E5-2637 v4)

**SPECint®2006 = 68.1**
**SPECint_base2006 = 64.7**

**CPU2006 license:** 3
**Test sponsor:** HPE
**Test date:** Apr-2016
**Hardware Availability:** Mar-2016

**Tested by:** HPE
**Software Availability:** Dec-2015

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**CPU Name:** Intel Xeon E5-2637 v4
**CPU Characteristics:** Intel Turbo Boost Technology up to 3.70 GHz
**CPU MHz:** 3500
**FPU:** Integrated
**CPU(s) enabled:** 8 cores, 2 chips, 4 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:** 15 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

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**Operating System:** SUSE Linux Enterprise Server 12 SP1 (x86_64)
**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
**SPEC CINT2006 Result**

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**CPU2006 license:** 3  
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**SPECint2006 = 68.1**  
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**Results Table**

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<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
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<td>473.astar</td>
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<td>85.2</td>
<td>81.1</td>
<td>85.1</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 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 $$ e3fbb8667b5a285932ceab81e28219e1  
running on linux-szds Thu Apr 28 12:16:04 2016

This section contains SUT (System Under Test) info as seen by
## 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 E5-2637 v4 @ 3.50GHz  
  - 2 "physical id"s (chips)  
  - 8 "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: 4  
  - siblings: 4  
  - physical 0: cores 0 1 2 3  
  - physical 1: cores 0 1 2 3  
- cache size: 15360 KB

From `/proc/meminfo`  
- MemTotal: 529096296 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 Apr 28 12:06
```

SPEC is set to: `/home/specuser/cpu2006/ic16`  
- Filesystem Type Size Used Avail Use% Mounted on  
  - /dev/sda4 xfs 703G 279G 424G 40% /home  
- Additional information from dmidecode:

Continued on next page
**SPEC CINT2006 Result**

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

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

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### 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 03/23/2016  
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 = "8"

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

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### 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

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SPEC CINT2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen9
(3.50 GHz, Intel Xeon E5-2637 v4)

| SPECint2006 = | 68.1 |
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| CPU2006 license: 3 | Test date: | Apr-2016 |
| Test sponsor: | HPE | Hardware Availability: Mar-2016 |
| Tested by: | HPE | 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`
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`

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SPECint_base2006 = 64.7  

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

Peak Portability Flags (Continued)

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: -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: -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

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Peak Optimization Flags (Continued)

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

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

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml

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For other inquiries, please contact webmaster@spec.org.

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