SPEC® CINT2006 Result

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

SPECint®_rate2006 = 734
SPECint_rate_base2006 = 697

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

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

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, 2 threads/core
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

Operating System: SUSE Linux Enterprise Server 12 (x86_64) SP1
Kernel 3.12.49-11-default
Compiler: C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux
Auto Parallel: No
File System: xfs
System State: Run level 3 (multi-user)
Base Pointers: 32-bit
Peak Pointers: 32/64-bit
Other Software: Microquill SmartHeap V10.2
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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Copies</th>
<th>Seconds</th>
<th>Ratio</th>
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<th>Ratio</th>
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<tbody>
<tr>
<td></td>
<td>Base</td>
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<td>Peak</td>
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<tr>
<td>400.perlbench</td>
<td>24</td>
<td>471</td>
<td>498</td>
<td>468</td>
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<td>401.bzip2</td>
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<td>687</td>
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<td>429.mcf</td>
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<td>458.sjeng</td>
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<td>471.omnetpp</td>
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<td>451</td>
<td>332</td>
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<td>333</td>
<td>423</td>
<td>354</td>
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<tr>
<td>473.astar</td>
<td>24</td>
<td>404</td>
<td>417</td>
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<td>419</td>
<td>404</td>
<td>417</td>
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<tr>
<td>483.xalancbmk</td>
<td>24</td>
<td>188</td>
<td>881</td>
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</tr>
</tbody>
</table>

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

Submit Notes
The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

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
Filesystem page cache cleared with:
echo 1 >       /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

Platform Notes
BIOS Configuration:
Intel Hyperthreading Option set to Enabled
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 Cluster On Die
Thermal Configuration set to Maximum Cooling
Processor Power and Utilization Monitoring set to Disabled
Memory Double Refresh Rate set to 1x Refresh
Continued on next page
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**SPECint_rate2006 = 734**  
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**Platform Notes (Continued)**

Energy Performance Bias set to Maximum Performance

Sysinfo program /home/specuser/cpu2006/ic16/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25#$ e3fbb8667b5a285932ceab81e28219el
running on linux-szds Sun Mar 20 13:45:14 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 E5-2643 v4 @ 3.40GHz
2 "physical id"s (chips)
24 "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 : 12
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: 529094632 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 20 13:30

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**Platform Notes (Continued)**

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:

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

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**General Notes**

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "*/home/specuser/cpu2006/ic16/libs32*/home/specuser/cpu2006/ic16/libs64*/home/specuser/cpu2006/ic16/sh"

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 -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

C++ benchmarks:
icpc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

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**Base Portability Flags**

400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX_IA32
401.bzip2: -D_FILE_OFFSET_BITS=64
403.gcc: -D_FILE_OFFSET_BITS=64
429.mcf: -D_FILE_OFFSET_BITS=64
445.gobmk: -D_FILE_OFFSET_BITS=64
456.hmmer: -D_FILE_OFFSET_BITS=64
458.sjeng: -D_FILE_OFFSET_BITS=64

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| SPECint_rate_base2006 | 697 |

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Test sponsor: HPE  
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**Base Portability Flags (Continued)**

<table>
<thead>
<tr>
<th>Baseline Code</th>
<th>Flags</th>
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<tbody>
<tr>
<td>462.libquantum</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX</td>
</tr>
<tr>
<td>464.h264ref</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>471.omnetpp</td>
<td>-D_FILE_OFFSET_BITS=64</td>
</tr>
<tr>
<td>473.astar</td>
<td>-D_FILE_OFFSET_BITS=64</td>
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<tr>
<td>483.xalancbmk</td>
<td>-D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX</td>
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**Base Optimization Flags**

- **C benchmarks:**
  -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch  
  -opt-mem-layout-trans=3

- **C++ benchmarks:**
  -xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch  
  -opt-mem-layout-trans=3 -Wl,-z,muldefs -L/sh -lsmartheap

**Base Other Flags**

- **C benchmarks:**
  403.gcc: -Dalloca=_alloca

**Peak Compiler Invocation**

- **C benchmarks (except as noted below):**
  icc -m32 -L/opt/intel/compilers_and_libraries_2016/linux/compiler/lib/ia32_lin

- **Peak Portability Flags**
  400.perlbench: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LP64 -DSPEC_CPU_LINUX_X64
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<td>483.xalancbmk</td>
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### Peak Optimization Flags

**C benchmarks:**

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<tr>
<td>400.perlbench</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafepass=1 -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -auto-ilp32</td>
</tr>
<tr>
<td>401.bzip2</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafepass=1 -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -opt-prefetch -auto-ilp32 -ansi-alias</td>
</tr>
<tr>
<td>403.gcc</td>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div</td>
</tr>
<tr>
<td>429.mcf</td>
<td>basepeak = yes</td>
</tr>
<tr>
<td>445.gobmk</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafepass=1 -prof-use(pass 2) -par-num-threads=1(pass 1) -ansi-alias -opt-mem-layout-trans=3</td>
</tr>
<tr>
<td>456.hmmer</td>
<td>-xCORE-AVX2 -ipo -O3 -no-prec-div -unroll2 -auto-ilp32</td>
</tr>
<tr>
<td>458.sjeng</td>
<td>-xCORE-AVX2(pass 2) -prof-gen:threadsafepass=1 -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -par-num-threads=1(pass 1) -prof-use(pass 2) -unroll4 -auto-ilp32</td>
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<td>basepeak = yes</td>
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<td>464.h264ref</td>
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</tr>
</tbody>
</table>

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Continued on next page
## Peak Optimization Flags (Continued)

### 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)
- `-ansi-alias`
- `-opt-ra-region-strategy=block`
- `-Wl,-z,muldefs`
- `-L/sh -lsmartheap`

`473.astar`: `basepeak = yes`

`483.xalancbmk`: `basepeak = yes`

## 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:


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/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml)

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

Tested with SPEC CPU2006 v1.2.
Report generated on Tue May 3 18:00:43 2016 by SPEC CPU2006 PS/PDF formatter v6932.
Originally published on 3 May 2016.