Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant DL380 Gen9  
(2.20 GHz, Intel Xeon E5-2650 v4)  

SPECint\_rate\_base2006 = 1000

| SPECint\_rate2006 | 1050 |

**CPU2006 license:** 3  
**Test sponsor:** HPE  
**Tested by:** HPE  
**Test date:** May-2016  
**Hardware Availability:** Mar-2016  
**Software Availability:** Dec-2015

| SPECint\_rate\_base2006 | 1000 |

**CPU Name:** Intel Xeon E5-2650 v4  
**CPU Characteristics:** Intel Turbo Boost Technology up to 2.90 GHz  
**CPU MHz:** 2200  
**FPU:** Integrated  
**CPU(s) enabled:** 24 cores, 2 chips, 12 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:** 30 MB I+D on chip per chip  
**Other Cache:** None  
**Memory:** 256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)  
**Disk Subsystem:** 2 x 450 GB 15 K SAS, RAID 1  
**Other Hardware:** None  

**Operating System:** SUSE Linux Enterprise Server 12 (x86_64) SP 1 3.12.49-11-default  
**Compiler:** C/C++: Version 16.0.0.101 of Intel C++ Studio XE for Linux  
**Auto Parallel:** No  
**File System:** ext4  
**System State:** Run level 3 (multi-user)  
**Base Pointers:** 32-bit  
**Peak Pointers:** 32/64-bit  
**Other Software:** Microquill SmartHeap V10.2
SPEC CINT2006 Result

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Results Table

<table>
<thead>
<tr>
<th>Benchmark</th>
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<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<tr>
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<td>660</td>
<td>711</td>
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<td>473.astar</td>
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<tr>
<td>483.xalancbmk</td>
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<td>1210</td>
<td>272</td>
<td>1220</td>
<td>48</td>
<td>273</td>
</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.:
umactl --interleave=all runspec <etc>

Platform Notes
BIOS Configuration:
HP Power Profile set to Custom
HP Power Regulator to HP Static High Performance Mode
Minimum Processor Idle Power Core State set to C6 State
Minimum Processor Idle Power Package State set to No Package State
Energy/Performance Bias set to Maximum Performance
QPI Snoop Configuration set to Cluster on Die
Collaborative Power Control set to Disabled
Thermal Configuration set so Maximum Cooling
Processor Power and Utilization Monitoring set to Disabled
Memory Refresh Rate set to 1x Refresh

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Platform Notes (Continued)

Sysinfo program /cpu/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 $ e3fbb8667b5a285932ceab81e28219e1
running on pl34 Sat May 14 19:06:25 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 E5-2650 v4 @ 2.20GHz
  2 "physical id"s (chips)
  48 "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 : 12
siblings : 24
  physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
  physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
  cache size : 15360 KB

From /proc/meminfo
MemTotal: 264550284 kB
HugePages_Total: 0
Hugepagesize: 2048 kB

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:
  Linux pl34 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015 (8d714a0)
x86_64 x86_64 x86_64 GNU/Linux

  run-level 3 May 14 19:04
  SPEC is set to: /cpu
  Filesystem Type Size Used Avail Use% Mounted on

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Platform Notes (Continued)

/dev/sda1      ext4  413G   91G  301G  24% /
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 P89 02/22/2016
Memory:
16x HP 809081-081 16 GB 2 rank 2400 MHz
8x UNKNOWN NOT AVAILABLE

(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:
16x HP 809081-081 16 GB 2 rank 2400 MHz

General Notes

Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/cpu/libs/32:/cpu/libs/64:/cpu/sh"

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 -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

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
462.libquantum: -D_FILE_OFFSET_BITS=64 -DSPEC_CPU_LINUX
464.h264ref: -D_FILE_OFFSET_BITS=64
471.omnetpp: -D_FILE_OFFSET_BITS=64

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Base Portability Flags (Continued)

473.astar: -D\_FILE\_OFFSET\_BITS=64
483.xalancbmk: -D\_FILE\_OFFSET\_BITS=64 -DSPEC\_CPU\_LINUX

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
400.perlbench: icc -m64
401.bzip2: icc -m64
456.hmmer: icc -m64
458.sjeng: icc -m64

C++ benchmarks:
icpc -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
401.bzip2: -D\_FILE\_OFFSET\_BITS=64 -DSPEC\_CPU\_LP64
403.gcc: -D\_FILE\_OFFSET\_BITS=64
429.mcf: -D\_FILE\_OFFSET\_BITS=64

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Peak Portability Flags (Continued)

- 445.gobmk: \(-D\_FILE\_OFFSET\_BITS=64\)
- 456.hmmer: \(-D\_FILE\_OFFSET\_BITS=64\) \(-DSPEC\_CPU\_LP64\)
- 458.sjeng: \(-D\_FILE\_OFFSET\_BITS=64\) \(-DSPEC\_CPU\_LP64\)
- 462.libquantum: \(-D\_FILE\_OFFSET\_BITS=64\) \(-DSPEC\_CPU\_LINUX\)
- 464.h264ref: \(-D\_FILE\_OFFSET\_BITS=64\)
- 471.omnetpp: \(-D\_FILE\_OFFSET\_BITS=64\)
- 473.astar: \(-D\_FILE\_OFFSET\_BITS=64\)
- 483.xalancbmk: \(-D\_FILE\_OFFSET\_BITS=64\) \(-DSPEC\_CPU\_LINUX\)

Peak Optimization Flags

C benchmarks:

- 400.perlbench: \(-xCORE\_AVX2\)\(\)\(pass\ 2\) \(-prof\_gen:threadsafe\)\(\)\(pass\ 1\)
  \(-ipo\)\(\)\(pass\ 2\) \(-O3\)\(\)\(pass\ 2\) \(-no-prec-div\)\(\)\(pass\ 2\)
  \(-par\_num\_threads=1\)\(\)\(pass\ 1\) \(-prof\_use\)\(\)\(pass\ 2\) \(-auto\_ilp32\)
- 401.bzip2: \(-xCORE\_AVX2\)\(\)\(pass\ 2\) \(-prof\_gen:threadsafe\)\(\)\(pass\ 1\)
  \(-ipo\)\(\)\(pass\ 2\) \(-O3\)\(\)\(pass\ 2\) \(-no-prec-div\)\(\)\(pass\ 2\)
  \(-par\_num\_threads=1\)\(\)\(pass\ 1\) \(-prof\_use\)\(\)\(pass\ 2\) \(-opt\_prefetch\)
  \(-auto\_ilp32\) \(-ansi\_alias\)
- 403.gcc: \(-xCORE\_AVX2\) \(-ipo\) \(-O3\) \(-no-prec-div\)
- 429.mcf: basepeak = yes
- 445.gobmk: \(-xCORE\_AVX2\)\(\)\(pass\ 2\) \(-prof\_gen:threadsafe\)\(\)\(pass\ 1\)
  \(-prof\_use\)\(\)\(pass\ 2\) \(-par\_num\_threads=1\)\(\)\(pass\ 1\) \(-ansi\_alias\)
  \(-opt\_mem\_layout\_trans=3\)
- 456.hmmer: \(-xCORE\_AVX2\) \(-ipo\) \(-O3\) \(-no-prec-div\) \(-unroll12\) \(-auto\_ilp32\)
- 458.sjeng: \(-xCORE\_AVX2\)\(\)\(pass\ 2\) \(-prof\_gen:threadsafe\)\(\)\(pass\ 1\)
  \(-ipo\)\(\)\(pass\ 2\) \(-O3\)\(\)\(pass\ 2\) \(-no-prec-div\)\(\)\(pass\ 2\)
  \(-par\_num\_threads=1\)\(\)\(pass\ 1\) \(-prof\_use\)\(\)\(pass\ 2\) \(-unroll4\)
  \(-auto\_ilp32\)
- 462.libquantum: basepeak = yes
- 464.h264ref: \(-xCORE\_AVX2\)\(\)\(pass\ 2\) \(-prof\_gen:threadsafe\)\(\)\(pass\ 1\)
  \(-ipo\)\(\)\(pass\ 2\) \(-O3\)\(\)\(pass\ 2\) \(-no-prec-div\)\(\)\(pass\ 2\)
  \(-par\_num\_threads=1\)\(\)\(pass\ 1\) \(-prof\_use\)\(\)\(pass\ 2\) \(-unroll12\)
  \(-ansi\_alias\)

C++ benchmarks:

- 471.omnetpp: \(-xCORE\_AVX2\)\(\)\(pass\ 2\) \(-prof\_gen:threadsafe\)\(\)\(pass\ 1\)
  \(-ipo\)\(\)\(pass\ 2\) \(-O3\)\(\)\(pass\ 2\) \(-no-prec-div\)\(\)\(pass\ 2\)
  \(-par\_num\_threads=1\)\(\)\(pass\ 1\) \(-prof\_use\)\(\)\(pass\ 2\) \(-ansi\_alias\)

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**Peak Optimization Flags (Continued)**

471.omnetpp (continued):
- 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

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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