Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant DL360 Gen9
(1.70 GHz, Intel Xeon E5-2650L v4)

SPECint®2006 = 52.9
SPECint_base2006 = 51.0

CPU2006 license: 3
Tested by: HPE

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

400.perlbench 32.3
401.bzip2 29.7
403.gcc 29.5
429.mcf 51.7
445.gobmk 60.9
456.hmmer 26.8
458.sjeng 25.3
462.libquantum 51.7
464.h264ref 39.4
471.omnetpp 35.5
473.astar 36.8
483.xalancbmk 57.5

SPECint2006 = 52.9

Hardware
CPU Name: Intel Xeon E5-2650L v4
CPU Characteristics: Intel Turbo Boost Technology up to 2.50 GHz
CPU MHZ: 1700
FPU: Integrated
CPU(s) enabled: 28 cores, 2 chips, 14 cores/chip, 2 threads/core
CPU(s) orderable: 1.2 chip
Primary Cache: 32 KB I + 32 KB D on chip per core
Secondary Cache: 256 KB I+D on chip per core
L3 Cache: 35 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (16 x 32 GB 2Rx4 PC4-2400T-R)
Disk Subsystem: 2 x 400 GB SAS SSD, RAID 1
Other Hardware: None

Software
Operating System: Red Hat Enterprise Linux Server release 7.2 (Maipo)
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
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>
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<td>400.perlbench</td>
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<td>5240</td>
<td>3.92</td>
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<td>464.h264ref</td>
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<tr>
<td>473.astar</td>
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<td>26.7</td>
<td>261</td>
<td>26.9</td>
<td>262</td>
<td>26.8</td>
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<td>26.9</td>
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<tr>
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<td>57.6</td>
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<td>62.6</td>
<td>109</td>
<td>63.1</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:
HP Power Profile set to Custom
HP Power Regulator to HP 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
QPI Snoop Configuration set to Home Snoop
Collaborative Power Control set to Disabled
Thermal Configuration set to Maximum Cooling
Processor Power and Utilization Monitoring set to Disabled
Memory Refresh Rate set to 1x Refresh
Intel Hyperthreading set to Enabled
Sysinfo program /cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 $$ e3fbb8667b5a285932ceab81e28219e1
running on localhost.localdomain Sun Jun 12 18:24:43 2016

This section contains SUT (System Under Test) info as seen by some common utilities. To remove or add to this section, see:

Continued on next page
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CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

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

Platform Notes (Continued)

From /proc/cpuinfo
   model name : Intel(R) Xeon(R) CPU E5-2650L v4@ 1.70GHz
      2 "physical id"s (chips)
      56 "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 : 14
      siblings : 28
      physical 0: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
      physical 1: cores 0 1 2 3 4 5 6 8 9 10 11 12 13 14
      cache size : 35840 KB

From /proc/meminfo
   MemTotal:       528063736 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 localhost.localdomain 3.10.0-327.el7.x86_64 #1 SMP Thu Oct 29 17:29:29
   EDT 2015 x86_64 x86_64 x86_64 GNU/Linux

   run-level 3 Jun 12 18:22

   SPEC is set to: /cpu2006

   Filesystem   Type Size Used Avail Use% Mounted on
   /dev/sda4    xfs  368G 263G 106G  72% /

   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 04/12/2016
   Memory:
## SPEC CINT2006 Result

### Hewlett Packard Enterprise

**Test Sponsor:** HPE  
**ProLiant DL360 Gen9**  
**(1.70 GHz, Intel Xeon E5-2650L v4)**

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**SPECint2006 =** 52.9  
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### Platform Notes (Continued)

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 = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"
- OMP_NUM_THREADS = "28"

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

<table>
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<tr>
<td>483.xalancbmk</td>
<td>-DSPEC_CPU_LP64 -DSPEC_CPU_LINUX</td>
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</table>

### Base Optimization Flags

**C benchmarks:**

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

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Base Optimization Flags (Continued)

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-Wh,-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: -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: -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
                           -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

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

Peak Other Flags

C benchmarks:

Continued on next page
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Peak Other Flags (Continued)

403.gcc: -Dalloca=_alloca

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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