## SPEC® CFP2006 Result

Hewlett Packard Enterprise  
(Test Sponsor: HPE)  
ProLiant BL460c Gen9  
(2.40 GHz, Intel Xeon E5-2680 v4)  

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
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<tr>
<td>SPECfp_base2006</td>
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### CPU2006 license: 3  
Test sponsor: HPE  
Tested by: HPE  

<table>
<thead>
<tr>
<th>Test date:</th>
<th>Mar-2016</th>
</tr>
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<tbody>
<tr>
<td>Hardware Availability:</td>
<td>Mar-2016</td>
</tr>
<tr>
<td>Software Availability:</td>
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<table>
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<tr>
<th>Test</th>
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<tr>
<td>410.bwaves</td>
<td>43.8</td>
</tr>
<tr>
<td>444.namd</td>
<td>29.9</td>
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<td>53.2</td>
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<td>119</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>75.1</td>
</tr>
</tbody>
</table>

### Hardware

- **CPU Name:** Intel Xeon E5-2680 v4  
- **CPU Characteristics:** Intel Turbo Boost Technology up to 3.30 GHz  
- **CPU MHz:** 2400  
- **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

### 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;  
  - **Fortran:** Version 16.0.0.101 of Intel Fortran Studio XE for Linux  
- **Auto Parallel:** Yes  
- **File System:** xfs

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Hewlett Packard Enterprise
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L3 Cache: 35 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (8 x 32 GB 2Rx4 PC4-2400T-R)
Disk Subsystem: 1 x 400 GB SAS SSD, RAID 0
Other Hardware: None

System State: Run level 3 (multi-user)
Base Pointers: 32/64-bit
Peak Pointers: 32/64-bit
Other Software: None

Results Table

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<th>Benchmark</th>
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<th>Seconds</th>
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<td>75.1</td>
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</tbody>
</table>

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

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 CLE 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

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Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant BL460c Gen9
(2.40 GHz, Intel Xeon E5-2680 v4)

SPECfp2006 = 121
SPECfp_base2006 = 116

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

Platform Notes (Continued)

Processor Power and Utilization Monitoring set to Disabled
Memory Refresh Rate set to 1x Refresh
Intel Hyperthreading Option set to Enabled
Sysinfo program /home/cpuv1.5/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on BL460c-Gen9-B Fri Apr 29 09:28:42 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 E5-2680 v4@ 2.40GHz
  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
cautions.)
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: 263838544 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 BL460c-Gen9-B 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 Apr 29 09:17
SPEC is set to: /home/cpuv1.5/cpu2006

Filesystem Type Size Used Avail Use% Mounted on
/home/cpu206 xfs 314G 248G 67G 79% /home

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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 I36 02/29/2016
Memory:
8x UNKNOWN NOT AVAILABLE
8x 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 256 GB and the dmidecode description should have one line reading as:
8x 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,compact,1,0"
OMP_NUM_THREADS = "28"
LD_LIBRARY_PATH = "/home/cpuv1.5/cpu2006/libs/32:/home/cpuv1.5/cpu2006/libs/64:/home/cpuv1.5/cpu2006/sh"

Binaries compiled on a system with 1x Intel Xeon E5-2660 v4 CPU + 128GB memory using RedHat EL 7.2

Base Compiler Invocation

C benchmarks:
icc  -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Benchmarks using both Fortran and C:
icc  -m64 ifort -m64

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64

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Base Portability Flags (Continued)

434.zeusmp: -DSPEC_CPU_LP64
435.gromacs: -DSPEC_CPU_LP64 -nofor_main
436.cactusADM: -DSPEC_CPU_LP64 -nofor_main
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
447.dealII: -DSPEC_CPU_LP64
450.soplex: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64 -nofor_main
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LP64 -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LINUX
482.sphinx3: -DSPEC_CPU_LP64

Base Optimization Flags

C benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias -qopt-prefetch-issue-excl-hint

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias

Fortran benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-fp-model fast=2
-qopt-prefetch-issue-excl-hint

Benchmarks using both Fortran and C:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel -opt-prefetch
-ansi-alias -qopt-prefetch-issue-excl-hint
-fp-model fast=2

Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

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Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

```plaintext
  icc  -m64 ifort  -m64
```

Peak Portability Flags

Same as Base Portability Flags

Peak Optimization Flags

C benchmarks:

- `433.milc`: basepeak = yes
- `470.lbm`: basepeak = yes
- `482.sphinx3`: basepeak = yes

C++ benchmarks:

- `444.namd`:
  - `XCORE-AVX2(pass 2)  -prof-genthreadsafe(pass 1)`
  - `ipo(pass 2)  -O3(pass 2)  -no-prec-div(pass 2)`
  - `par-num-threads=1(pass 1)  -prof-use(pass 2)  -fno-alias`
  - `auto-llp32`

- `447.dealII`: basepeak = yes
- `450.soplex`: basepeak = yes
- `453.povray`:
  - `XCORE-AVX2(pass 2)  -prof-genthreadsafe(pass 1)`
  - `ipo(pass 2)  -O3(pass 2)  -no-prec-div(pass 2)`
  - `par-num-threads=1(pass 1)  -prof-use(pass 2)  -unroll14`
  - `ansi-alias`

Fortran benchmarks:

- `410.bwaves`:
  - `XCORE-AVX2  -ipo  -O3  -no-prec-div  -static  -parallel`
  - `opt-prefetch`
  - `fp-model fast=2`
  - `qopt-prefetch-issue-excl-hint  -funroll-all-loops`

- `416.gamess`:
  - `XCORE-AVX2(pass 2)  -prof-genthreadsafe(pass 1)`
  - `ipo(pass 2)  -O3(pass 2)  -no-prec-div(pass 2)`
  - `par-num-threads=1(pass 1)  -prof-use(pass 2)  -unroll12`
  - `inline-level=0  -scalar-rep-`
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Test date: Mar-2016
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Hardware Availability: Mar-2016
Tested by: HPE
Software Availability: Nov-2015

Peak Optimization Flags (Continued)

434.zeusmp: basepeak = yes
437.leslie3d: basepeak = yes

459.GemsFDTD: -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) -unroll2
               -inline-level=0 -opt-prefetch -parallel

465.tonto: -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) -inline-calloc
           -opt-malloc-options=3 -auto -unroll4

Benchmarks using both Fortran and C:

435.gromacs: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -parallel
             -opt-prefetch -ansi-alias
             -fp-model fast=2
             -gopt-prefetch-issue-excl-hint -funroll-all-loops
             -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: -xCORE-AVX2 -ipo -O3 -no-prec-div -auto-ilp32 -ansi-alias

481.wrf: basepeak = yes

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/HP-Compiler-Flags-Intel-V1.2-BDW-revE.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/HP-Compiler-Flags-Intel-V1.2-BDW-revE.xml

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

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