



# SPEC<sup>®</sup> CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant BL460c Gen9

(1.70 GHz, Intel Xeon E5-2609 v4)

SPECfp<sup>®</sup>2006 =

65.0

SPECfp\_base2006 =

63.6

CPU2006 license: 3

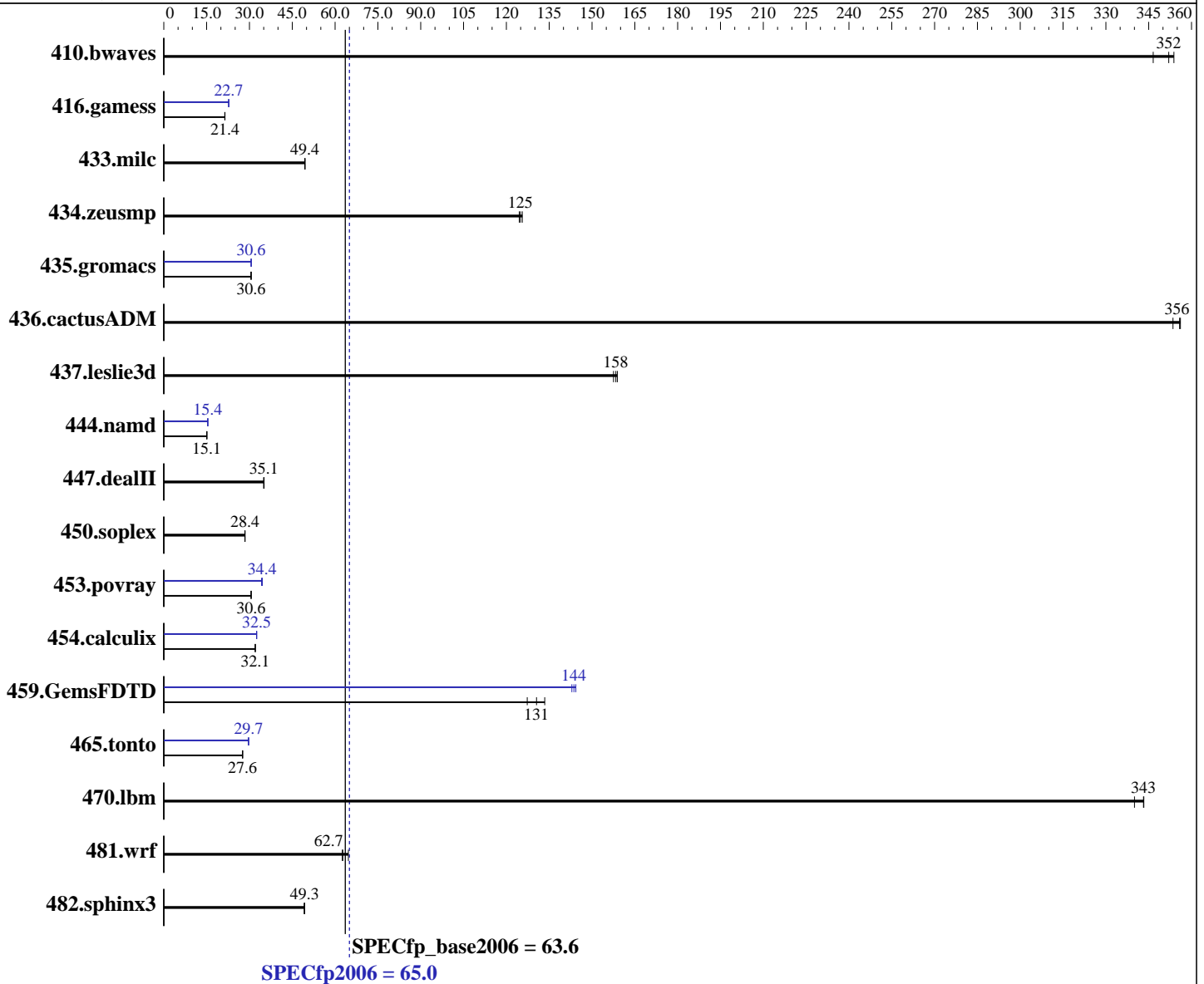
Test sponsor: HPE

Tested by: HPE

Test date: May-2016

Hardware Availability: Mar-2016

Software Availability: Nov-2015



## Hardware

CPU Name: Intel Xeon E5-2609 v4  
 CPU Characteristics:  
 CPU MHz: 1700  
 FPU: Integrated  
 CPU(s) enabled: 16 cores, 2 chips, 8 cores/chip  
 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

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## Software

Operating System: Red Hat Enterprise Linux Server release 7.2, (Maipo)  
 Kernel 3.10.0-327.el7.x86\_64  
 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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L3 Cache: 20 MB I+D on chip per chip  
Other Cache: None  
Memory: 256 GB (8 x 32 GB 2Rx4 PC4-2400T-R, running at 1866 MHz)  
Disk Subsystem: 1 x 400 GB SAS SSD, RAID 0  
Other Hardware: None

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

## Results Table

Benchmark	Base						Peak					
	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	39.2	347	38.4	354	<b><u>38.6</u></b>	<b><u>352</u></b>	39.2	347	38.4	354	<b><u>38.6</u></b>	<b><u>352</u></b>
416.gamess	917	21.3	<b><u>915</u></b>	<b><u>21.4</u></b>	913	21.4	<b><u>861</u></b>	<b><u>22.7</u></b>	861	22.7	861	22.7
433.milc	<b><u>186</u></b>	<b><u>49.4</u></b>	186	49.5	186	49.4	<b><u>186</u></b>	<b><u>49.4</u></b>	186	49.5	186	49.4
434.zeusmp	73.1	125	<b><u>72.8</u></b>	<b><u>125</u></b>	72.5	126	73.1	125	<b><u>72.8</u></b>	<b><u>125</u></b>	72.5	126
435.gromacs	234	30.5	233	30.6	<b><u>233</u></b>	<b><u>30.6</u></b>	233	30.6	<b><u>233</u></b>	<b><u>30.6</u></b>	233	30.6
436.cactusADM	33.8	354	33.6	356	<b><u>33.6</u></b>	<b><u>356</u></b>	33.8	354	33.6	356	<b><u>33.6</u></b>	<b><u>356</u></b>
437.leslie3d	<b><u>59.4</u></b>	<b><u>158</u></b>	59.7	158	59.2	159	<b><u>59.4</u></b>	<b><u>158</u></b>	59.7	158	59.2	159
444.namd	532	15.1	532	15.1	<b><u>532</u></b>	<b><u>15.1</u></b>	520	15.4	521	15.4	<b><u>520</u></b>	<b><u>15.4</u></b>
447.dealII	<b><u>326</u></b>	<b><u>35.1</u></b>	326	35.1	327	35.0	<b><u>326</u></b>	<b><u>35.1</u></b>	326	35.1	327	35.0
450.soplex	294	28.4	293	28.5	<b><u>294</u></b>	<b><u>28.4</u></b>	294	28.4	293	28.5	<b><u>294</u></b>	<b><u>28.4</u></b>
453.povray	<b><u>174</u></b>	<b><u>30.6</u></b>	174	30.6	174	30.5	154	34.5	<b><u>154</u></b>	<b><u>34.4</u></b>	155	34.3
454.calculix	<b><u>257</u></b>	<b><u>32.1</u></b>	257	32.1	258	32.0	254	32.5	<b><u>254</u></b>	<b><u>32.5</u></b>	254	32.5
459.GemsFDTD	79.5	133	83.3	127	<b><u>81.3</u></b>	<b><u>131</u></b>	<b><u>73.8</u></b>	<b><u>144</u></b>	74.2	143	73.5	144
465.tonto	356	27.6	<b><u>357</u></b>	<b><u>27.6</u></b>	357	27.6	332	29.7	<b><u>332</u></b>	<b><u>29.7</u></b>	331	29.7
470.lbm	<b><u>40.0</u></b>	<b><u>343</u></b>	40.0	343	40.4	340	<b><u>40.0</u></b>	<b><u>343</u></b>	40.0	343	40.4	340
481.wrf	<b><u>178</u></b>	<b><u>62.7</u></b>	173	64.7	179	62.5	<b><u>178</u></b>	<b><u>62.7</u></b>	173	64.7	179	62.5
482.sphinx3	395	49.3	397	49.2	<b><u>395</u></b>	<b><u>49.3</u></b>	395	49.3	397	49.2	<b><u>395</u></b>	<b><u>49.3</u></b>

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 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

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**ProLiant BL460c Gen9**  
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**SPECfp2006 = 65.0**

**SPECfp\_base2006 = 63.6**

**CPU2006 license:** 3

**Test sponsor:** HPE

**Tested by:** HPE

**Test date:** May-2016

**Hardware Availability:** Mar-2016

**Software Availability:** Nov-2015

## Platform Notes (Continued)

Thermal Configuration set to Maximum Cooling  
Processor Power and Utilization Monitoring set to Disabled  
Memory Refresh Rate set to 1x Refresh  
Sysinfo program /home/cpuv1.5/cpu2006/config/sysinfo.rev6914  
\$Rev: 6914 \$ \$Date:: 2014-06-25 # \$ e3fbb8667b5a285932ceab81e28219e1  
running on BL460c-Gen9-B Fri May 27 11:13:40 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 E5-2609 v4 @ 1.70GHz
 2 "physical id"s (chips)
 16 "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      : 8
  siblings       : 8
  physical 0:    : cores 0 1 2 3 4 5 6 7
  physical 1:    : cores 0 1 2 3 4 5 6 7
cache size      : 20480 KB
```

From /proc/meminfo

```
MemTotal:      263843508 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)
system-release-cpe: cpe:/o:redhat:enterprise_linux:7.2:ga:server
```

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 May 27 11:01

SPEC is set to: /home/cpuv1.5/cpu2006

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda5        xfs   314G  226G   88G  72% /home
```

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## Platform Notes (Continued)

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 I36 02/29/2016

Memory:

8x UNKNOWN NOT AVAILABLE

8x UNKNOWN NOT AVAILABLE 32 GB 2 rank 2400 MHz, configured at 1866 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, configured at 1866 MHz

## General Notes

Environment variables set by runspec before the start of the run:

KMP\_AFFINITY = "granularity=fine,compact,1,0"

OMP\_NUM\_THREADS = "8"

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.deallI: -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
470.lbm: -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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**63.6**

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**Test sponsor:** HPE

**Tested by:** HPE

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**Software Availability:** Nov-2015

## Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:

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-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) -fno-alias  
-auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -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  
-ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -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 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

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## Peak Optimization Flags (Continued)

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  
-qopt-prefetch-issue-excl-hint -funroll-all-loops  
-auto-ilp32

-nofor-main

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-Compiler-Flags-Intel-V1.2-BDW-revF.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/HP-Compiler-Flags-Intel-V1.2-BDW-revF.xml>

<http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revE.xml>

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Tested with SPEC CPU2006 v1.2.

Report generated on Thu Jun 30 14:06:27 2016 by SPEC CPU2006 PS/PDF formatter v6932.

Originally published on 14 June 2016.