



# SPEC® CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant ML150 Gen9  
(2.00 GHz, Intel Xeon E5-2660 v4)

SPECfp®2006 = 116

SPECfp\_base2006 = 110

CPU2006 license: 3

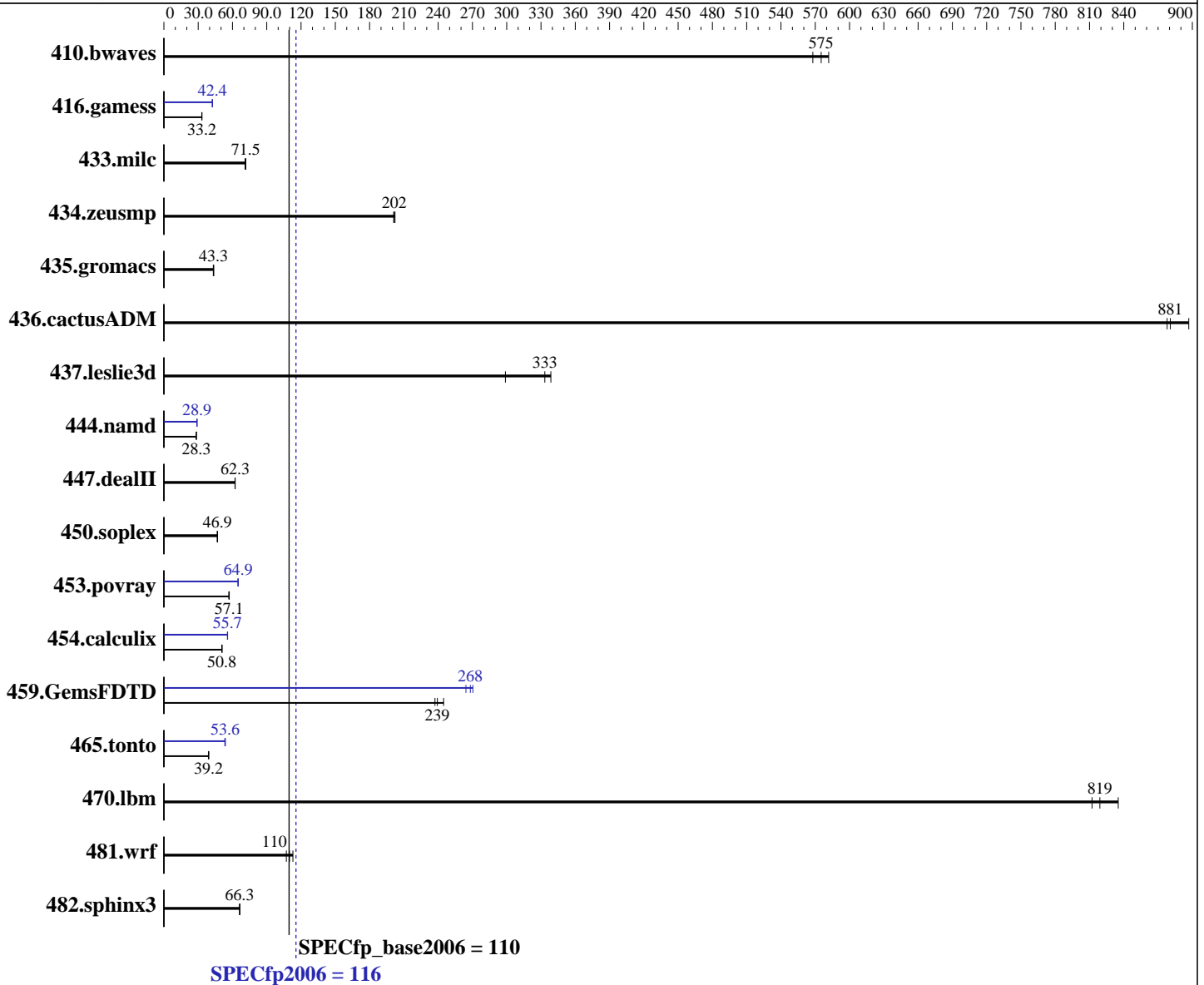
Test sponsor: HPE

Tested by: HPE

Test date: Mar-2016

Hardware Availability: Mar-2016

Software Availability: Nov-2015



## Hardware

CPU Name: Intel Xeon E5-2660 v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz  
 CPU MHz: 2000  
 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

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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: 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: 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	<b><u>23.6</u></b>	<b><u>575</u></b>	23.4	582	23.9	568	<b><u>23.6</u></b>	<b><u>575</u></b>	23.4	582	23.9	568
416.gamess	592	33.1	<b><u>590</u></b>	<b><u>33.2</u></b>	588	33.3	<b><u>462</u></b>	<b><u>42.4</u></b>	462	42.4	461	42.5
433.milc	<b><u>128</u></b>	<b><u>71.5</u></b>	129	71.0	128	71.5	<b><u>128</u></b>	<b><u>71.5</u></b>	129	71.0	128	71.5
434.zeusmp	45.3	201	45.0	202	<b><u>45.1</u></b>	<b><u>202</u></b>	45.3	201	45.0	202	<b><u>45.1</u></b>	<b><u>202</u></b>
435.gromacs	165	43.2	164	43.7	<b><u>165</u></b>	<b><u>43.3</u></b>	165	43.2	164	43.7	<b><u>165</u></b>	<b><u>43.3</u></b>
436.cactusADM	13.6	878	13.3	897	<b><u>13.6</u></b>	<b><u>881</u></b>	13.6	878	13.3	897	<b><u>13.6</u></b>	<b><u>881</u></b>
437.leslie3d	31.5	299	<b><u>28.2</u></b>	<b><u>333</u></b>	27.8	339	31.5	299	<b><u>28.2</u></b>	<b><u>333</u></b>	27.8	339
444.namd	283	28.4	283	28.3	<b><u>283</u></b>	<b><u>28.3</u></b>	277	28.9	277	28.9	<b><u>277</u></b>	<b><u>28.9</u></b>
447.dealII	184	62.3	184	62.2	<b><u>184</u></b>	<b><u>62.3</u></b>	184	62.3	184	62.2	<b><u>184</u></b>	<b><u>62.3</u></b>
450.soplex	179	46.7	<b><u>178</u></b>	<b><u>46.9</u></b>	178	46.9	179	46.7	<b><u>178</u></b>	<b><u>46.9</u></b>	178	46.9
453.povray	93.0	57.2	93.7	56.8	<b><u>93.1</u></b>	<b><u>57.1</u></b>	82.1	64.8	<b><u>81.9</u></b>	<b><u>64.9</u></b>	81.8	65.0
454.calculix	162	50.8	<b><u>162</u></b>	<b><u>50.8</u></b>	163	50.7	148	55.6	148	55.8	<b><u>148</u></b>	<b><u>55.7</u></b>
459.GemsFDTD	43.3	245	44.7	237	<b><u>44.3</u></b>	<b><u>239</u></b>	<b><u>39.6</u></b>	<b><u>268</u></b>	40.1	264	39.2	270
465.tonto	253	38.9	<b><u>251</u></b>	<b><u>39.2</u></b>	251	39.2	<b><u>184</u></b>	<b><u>53.6</u></b>	183	53.8	185	53.3
470.lbm	16.5	835	<b><u>16.8</u></b>	<b><u>819</u></b>	16.9	812	16.5	835	<b><u>16.8</u></b>	<b><u>819</u></b>	16.9	812
481.wrf	98.9	113	104	107	<b><u>102</u></b>	<b><u>110</u></b>	98.9	113	104	107	<b><u>102</u></b>	<b><u>110</u></b>
482.sphinx3	<b><u>294</u></b>	<b><u>66.3</u></b>	293	66.4	294	66.2	<b><u>294</u></b>	<b><u>66.3</u></b>	293	66.4	294	66.2

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 C6 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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**ProLiant ML150 Gen9**  
(2.00 GHz, Intel Xeon E5-2660 v4)

**SPECfp2006 = 116**

**SPECfp\_base2006 = 110**

**CPU2006 license:** 3

**Test sponsor:** HPE

**Tested by:** HPE

**Test date:** Mar-2016

**Hardware Availability:** Mar-2016

**Software Availability:** Nov-2015

## Platform Notes (Continued)

Processor Power and Utilization Monitoring set to Disabled  
Memory Refresh Rate set to 1x Refresh

Sysinfo program /home/cpu2006/config/sysinfo.rev6914  
\$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1  
running on ML150-Gen9-Biswa Tue Mar 1 12:21:55 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 E5-2660 v4@ 2.00GHz
 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:      263708540 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 ML150-Gen9-Biswa 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 Mar 1 12:18

SPEC is set to: /home/cpu2006

```
Filesystem      Type      Size  Used Avail Use% Mounted on
/dev/sda5        xfs       411G   84G  328G  21% /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 P95 02/22/2016

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/cpu2006/libs/32:/home/cpu2006/libs/64:/home/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 -fp-model fast=2
-qopt-prefetch-issue-excl-hint

```

C++ benchmarks:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -ansi-alias
-fp-model fast=2
-qopt-prefetch-issue-excl-hint

```

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 -fp-model fast=2
-qopt-prefetch-issue-excl-hint

```

## Peak Compiler Invocation

C benchmarks:

icc -m64

C++ benchmarks:

icpc -m64

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## Peak Compiler Invocation (Continued)

Fortran benchmarks:

ifort -m64

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.dealIII: 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-

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## 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: basepeak = yes

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-revE.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-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](mailto:webmaster@spec.org).

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