



# SPEC<sup>®</sup> CFP2006 Result

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Hewlett Packard Enterprise

(Test Sponsor: HPE)

ProLiant DL380 Gen9

(2.30 GHz, Intel Xeon E5-2697 v4)

SPECfp<sup>®</sup>\_rate2006 = 1040

SPECfp\_rate\_base2006 = 1000

CPU2006 license: 3

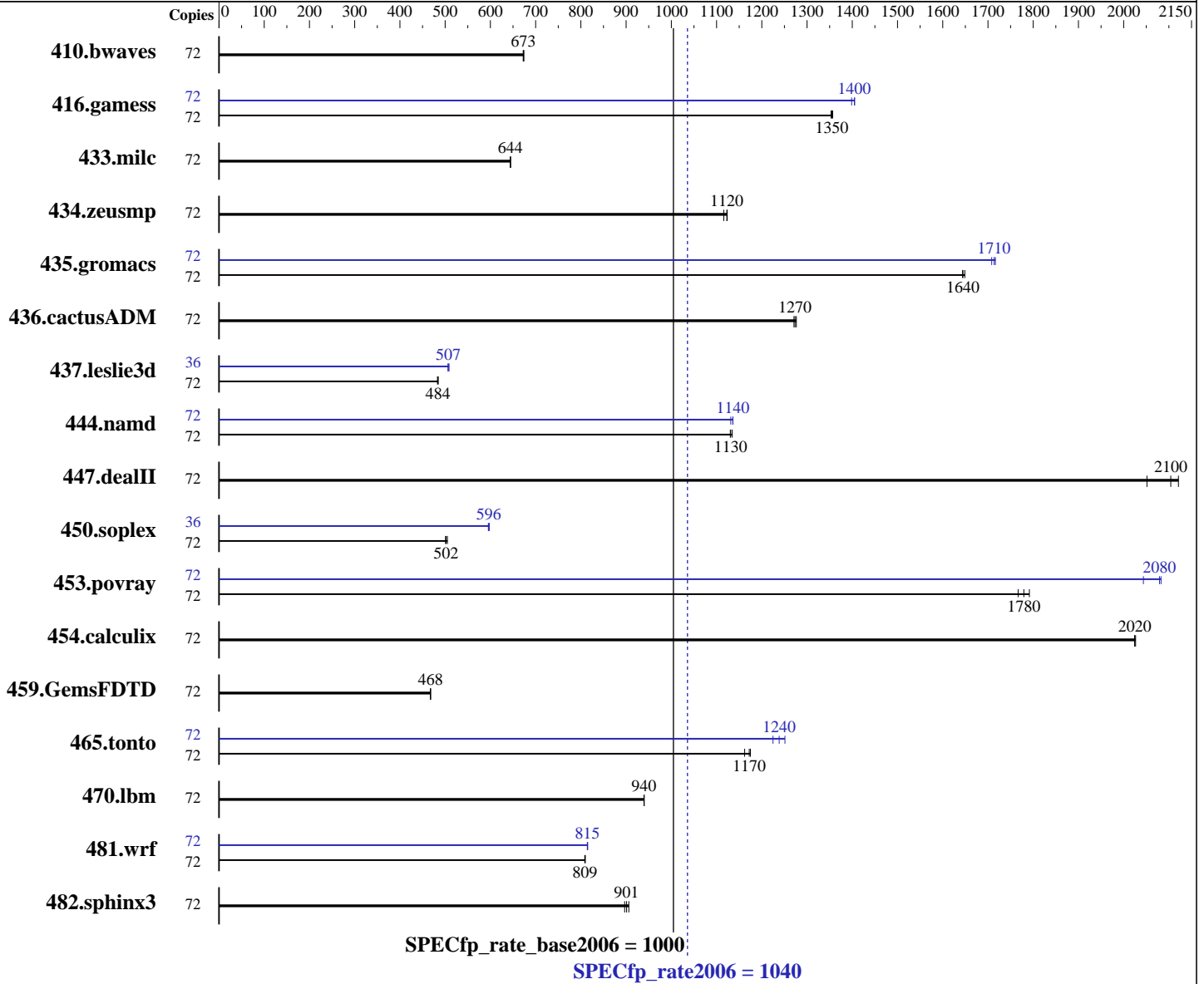
Test sponsor: HPE

Tested by: HPE

Test date: Jun-2016

Hardware Availability: Mar-2016

Software Availability: Nov-2015



## Hardware

CPU Name: Intel Xeon E5-2697 v4  
 CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz  
 CPU MHz: 2300  
 FPU: Integrated  
 CPU(s) enabled: 36 cores, 2 chips, 18 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: No  
 File System: xfs

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L3 Cache: 45 MB I+D on chip per chip  
Other Cache: None  
Memory: 512 GB (16 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						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	72	1455	672	1452	674	<b>1453</b>	<b>673</b>	72	1455	672	1452	674	<b>1453</b>	<b>673</b>
416.gamess	72	1039	1360	1042	1350	<b>1041</b>	<b>1350</b>	72	1008	1400	1003	1410	<b>1004</b>	<b>1400</b>
433.milc	72	<b>1026</b>	<b>644</b>	1026	644	1026	644	72	<b>1026</b>	<b>644</b>	1026	644	1026	644
434.zeusmp	72	<b>584</b>	<b>1120</b>	587	1120	583	1120	72	<b>584</b>	<b>1120</b>	587	1120	583	1120
435.gromacs	72	313	1640	312	1650	<b>313</b>	<b>1640</b>	72	300	1720	301	1710	<b>300</b>	<b>1710</b>
436.cactusADM	72	677	1270	674	1280	<b>676</b>	<b>1270</b>	72	677	1270	674	1280	<b>676</b>	<b>1270</b>
437.leslie3d	72	1401	483	1397	484	<b>1398</b>	<b>484</b>	36	665	509	<b>667</b>	<b>507</b>	668	506
444.namd	72	509	1130	511	1130	<b>510</b>	<b>1130</b>	72	508	1140	<b>508</b>	<b>1140</b>	510	1130
447.dealII	72	<b>391</b>	<b>2100</b>	388	2120	402	2050	72	<b>391</b>	<b>2100</b>	388	2120	402	2050
450.soplex	72	1199	501	<b>1196</b>	<b>502</b>	1189	505	36	504	595	<b>503</b>	<b>596</b>	502	598
453.povray	72	214	1790	217	1770	<b>215</b>	<b>1780</b>	72	187	2040	184	2080	<b>184</b>	<b>2080</b>
454.calculix	72	<b>293</b>	<b>2020</b>	293	2030	293	2020	72	<b>293</b>	<b>2020</b>	293	2030	293	2020
459.GemsFDTD	72	<b>1634</b>	<b>468</b>	1635	467	1633	468	72	<b>1634</b>	<b>468</b>	1635	467	1633	468
465.tonto	72	610	1160	603	1170	<b>604</b>	<b>1170</b>	72	<b>572</b>	<b>1240</b>	566	1250	578	1220
470.lbm	72	<b>1053</b>	<b>940</b>	1052	940	1053	940	72	<b>1053</b>	<b>940</b>	1052	940	1053	940
481.wrf	72	995	809	993	810	<b>994</b>	<b>809</b>	72	<b>987</b>	<b>815</b>	987	815	988	814
482.sphinx3	72	1565	897	<b>1557</b>	<b>901</b>	1549	906	72	1565	897	<b>1557</b>	<b>901</b>	1549	906

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
Filesystem page cache cleared with:
echo 1 > /proc/sys/vm/drop_caches
runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>
```



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## 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

Sysinfo program /home/new\_fp/cpu2006/config/sysinfo.rev6914  
 \$Rev: 6914 \$ \$Date:: 2014-06-25 #\$ e3fbb8667b5a285932ceab81e28219e1  
 running on DL380-Gen9-B Thu Jun 23 23:12:04 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 E5-2697 v4 @ 2.30GHz
 2 "physical id"s (chips)
 72 "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 : 18
  siblings  : 36
  physical 0: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
  physical 1: cores 0 1 2 3 4 8 9 10 11 16 17 18 19 20 24 25 26 27
cache size : 23040 KB
```

### From /proc/meminfo

```
MemTotal:      528061232 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:

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## Platform Notes (Continued)

```
Linux DL380-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 Jun 23 21:30
```

```
SPEC is set to: /home/new_fp/cpu2006
```

```
Filesystem      Type  Size  Used Avail Use% Mounted on
/dev/sda5        xfs   318G  16G  302G   6% /home
```

```
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 05/05/2016
```

```
Memory:
```

```
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:

```
LD_LIBRARY_PATH = "/home/new_fp/cpu2006/libs/32:/home/new_fp/cpu2006/libs/64:/home/new_fp/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
```



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## Base Portability Flags

```

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
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 -opt-prefetch -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -qopt-prefetch-issue-excl-hint

```

C++ benchmarks:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-fp-model fast=2 -auto-ilp32 -ansi-alias

```

Fortran benchmarks:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch
-qopt-prefetch-issue-excl-hint

```

Benchmarks using both Fortran and C:

```

-xCORE-AVX2 -ipo -O3 -no-prec-div -static -opt-prefetch -auto-ilp32
-ansi-alias -opt-mem-layout-trans=3 -qopt-prefetch-issue-excl-hint

```

## Peak Compiler Invocation

C benchmarks:

icc -m64

C++ benchmarks (except as noted below):

icpc -m64

450.soplex: icpc -m32 -L/opt/intel/compilers\_and\_libraries\_2016/linux/lib/ia32\_lin

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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

410.bwaves: -DSPEC\_CPU\_LP64  
 416.gamess: -DSPEC\_CPU\_LP64  
 433.milc: -DSPEC\_CPU\_LP64  
 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: -D\_FILE\_OFFSET\_BITS=64  
 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

## 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) -static(pass 2)  
 -opt-mem-layout-trans=3(pass 2) -prof-use(pass 2) -fno-alias  
 -auto-ilp32

447.dealII: basepeak = yes

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## Peak Optimization Flags (Continued)

450.soplex: -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) -static(pass 2)  
-opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)  
-opt-malloc-options=3

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) -static(pass 2)  
-opt-mem-layout-trans=3(pass 2) -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) -static(pass 2) -prof-use(pass 2)  
-unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: -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) -static(pass 2) -prof-use(pass 2)  
-opt-malloc-options=3 -opt-prefetch

459.GemsFDTD: basepeak = yes

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) -static(pass 2) -prof-use(pass 2)  
-unroll4 -auto -inline-calloc -opt-malloc-options=3

### Benchmarks using both Fortran and C:

435.gromacs: -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) -static(pass 2)  
-opt-mem-layout-trans=3(pass 2) -prof-use(pass 2)  
-opt-prefetch -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

481.wrf: -xCORE-AVX2 -ipo -O3 -no-prec-div -static -auto-ilp32



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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-HSW-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-HSW-revF.xml>

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

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