# SPEC® CFP2006 Result
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## Hewlett-Packard Company

ProLiant DL160 Gen9
(2.60 GHz, Intel Xeon E5-2660 v3)

$SPECfp^{®}2006 =$  97.9

$SPECfp\_base2006 =$  95.1

**CPU2006 license:** 3

**Test sponsor:** Hewlett-Packard Company

**Tested by:** Hewlett-Packard Company

**Test date:** Aug-2014

**Hardware Availability:** Sep-2014

**Software Availability:** Jun-2014



SPECfp_base2006 = 95.1

SPECfp2006 = 97.9

| Benchmark | Result |
|---|---|
| 410.bwaves | 301 |
| 416.gamess | 40.1 / 35.5 |
| 433.milc | 79.6 / 79.0 |
| 434.zeusmp | 211 |
| 435.gromacs | 43.0 |
| 436.cactusADM | 603 |
| 437.leslie3d | 230 |
| 444.namd | 26.7 / 25.8 |
| 447.dealII | 57.9 |
| 450.soplex | 44.6 |
| 453.povray | 59.0 / 53.0 |
| 454.calculix | 51.1 / 47.2 |
| 459.GemsFDTD | 164 / 158 |
| 465.tonto | 48.4 / 43.4 |
| 470.lbm | 400 |
| 481.wrf | 117 |
| 482.sphinx3 | 74.8 |

## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E5-2660 v3 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.30 GHz |
| CPU MHz: | 2600 |
| FPU: | Integrated |
| CPU(s) enabled: | 10 cores, 1 chip, 10 cores/chip |
| CPU(s) orderable: | 1 chip |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per core |

**Continued on next page**

## Software

| | |
|---|---|
| Operating System: | Red Hat Enterprise Linux Server release 7.0 (Maipo) Kernel 3.10.0-123.el7.x86_64 |
| Compiler: | C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux; Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux |
| Auto Parallel: | Yes |
| File System: | xfs |

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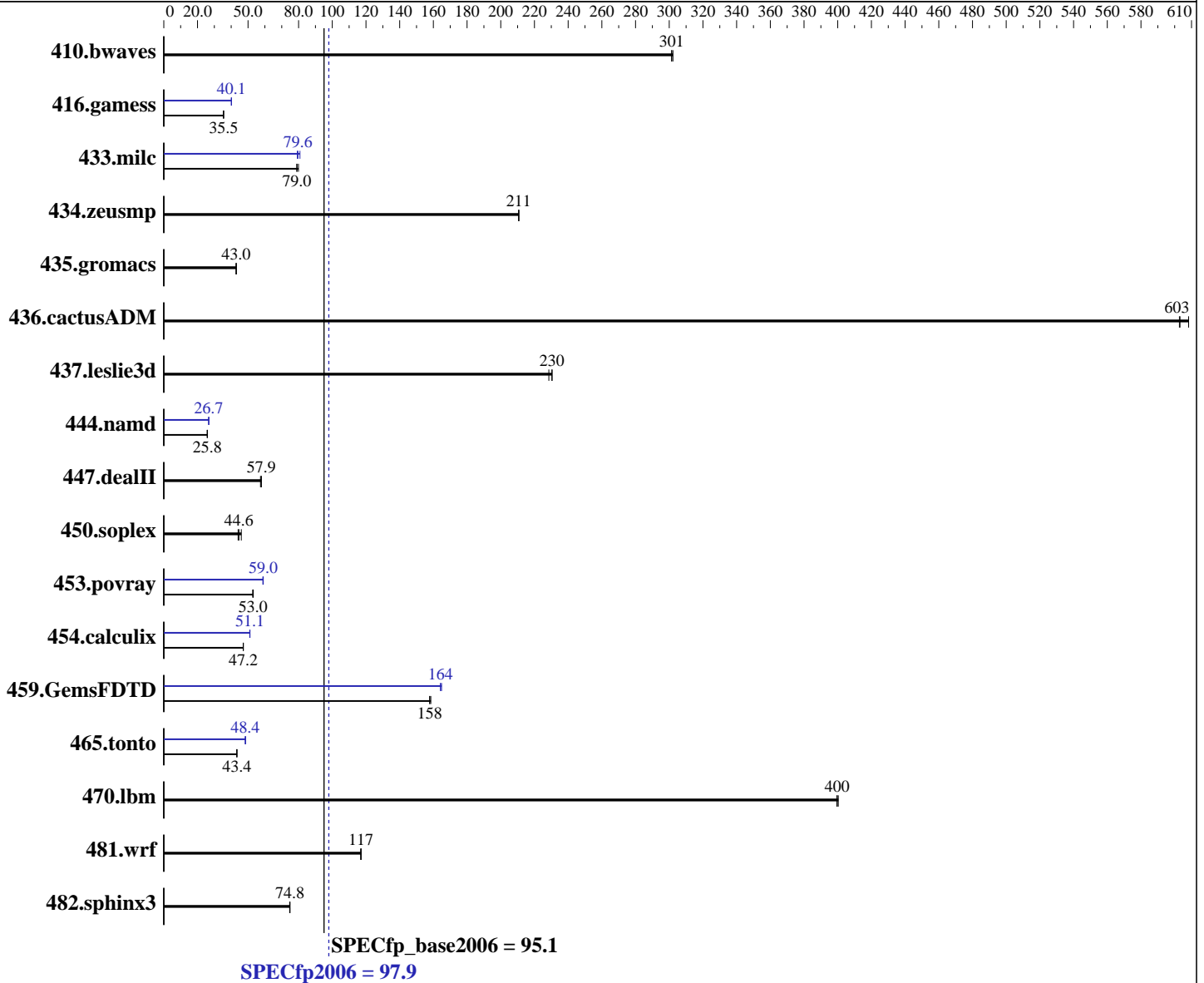| | |
|---|---|
| **CPU2006 license:** 3 | **Test date:** Aug-2014 |
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| | | | |
|---|---|---|---|
| L3 Cache: | 25 MB I+D on chip per chip | System State: | Run level 3 (multi-user) |
| Other Cache: | None | Base Pointers: | 64-bit |
| Memory: | 128 GB (8 x 16 GB 2Rx4 PC4-2133P-R) | Peak Pointers: | 32/64-bit |
| Disk Subsystem: | 1 x 400 GB SAS SSD, RAID 0 | Other Software: | None |
| Other Hardware: | None | | |

## Results Table

| Benchmark | Base | | | | | | Peak | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | **45.1** | **301** | 45.0 | 302 | 45.1 | 301 | **45.1** | **301** | 45.0 | 302 | 45.1 | 301 |
| 416.gamess | 551 | 35.5 | **552** | **35.5** | 554 | 35.4 | 488 | 40.1 | **488** | **40.1** | 487 | 40.2 |
| 433.milc | 116 | 78.9 | 115 | 79.9 | **116** | **79.0** | 116 | 79.2 | **115** | **79.6** | 114 | 80.8 |
| 434.zeusmp | **43.2** | **211** | 43.2 | 211 | 43.2 | 211 | **43.2** | **211** | 43.2 | 211 | 43.2 | 211 |
| 435.gromacs | 167 | 42.9 | **166** | **43.0** | 166 | 43.1 | 167 | 42.9 | **166** | **43.0** | 166 | 43.1 |
| 436.cactusADM | **19.8** | **603** | 19.8 | 603 | 19.6 | 608 | **19.8** | **603** | 19.8 | 603 | 19.6 | 608 |
| 437.leslie3d | 40.8 | 230 | **40.8** | **230** | 41.1 | 229 | 40.8 | 230 | **40.8** | **230** | 41.1 | 229 |
| 444.namd | 310 | 25.8 | **310** | **25.8** | 311 | 25.8 | **301** | **26.7** | 301 | 26.7 | 301 | 26.7 |
| 447.dealII | **198** | **57.9** | 199 | 57.4 | 198 | 57.9 | **198** | **57.9** | 199 | 57.4 | 198 | 57.9 |
| 450.soplex | 181 | 46.0 | 189 | 44.1 | **187** | **44.6** | 181 | 46.0 | 189 | 44.1 | **187** | **44.6** |
| 453.povray | 100 | 53.1 | 101 | 52.8 | **100** | **53.0** | 90.1 | 59.0 | **90.2** | **59.0** | 90.5 | 58.8 |
| 454.calculix | 175 | 47.2 | 175 | 47.1 | **175** | **47.2** | 162 | 51.0 | 161 | 51.1 | **161** | **51.1** |
| 459.GemsFDTD | 67.2 | 158 | 66.9 | 158 | **67.2** | **158** | **64.6** | **164** | 64.6 | 164 | 64.4 | 165 |
| 465.tonto | **227** | **43.4** | 227 | 43.4 | 227 | 43.4 | 204 | 48.4 | 203 | 48.6 | **203** | **48.4** |
| 470.lbm | 34.3 | 400 | 34.4 | 399 | **34.4** | **400** | 34.3 | 400 | 34.4 | 399 | **34.4** | **400** |
| 481.wrf | **95.4** | **117** | 95.4 | 117 | 95.6 | 117 | **95.4** | **117** | 95.4 | 117 | 95.6 | 117 |
| 482.sphinx3 | 261 | 74.7 | **260** | **74.8** | 260 | 74.9 | 261 | 74.7 | **260** | **74.8** | 260 | 74.9 |

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
Filesystem page cache cleared with:
 echo 1 > /proc/sys/vm/drop_caches
```

## Platform Notes

```
BIOS Configuration:
 Intel Hyperthreading Options set to Disabled
 HP Power Profile set to Maximum Performance
 Collaborative Power Control set to Disabled
 Thermal Configuration set to Maximum Cooling
 Processor Power and Utilization Monitoring set to Disabled
```

## Hewlett-Packard Company

ProLiant DL160 Gen9
(2.60 GHz, Intel Xeon E5-2660 v3)

$SPECfp2006 = $ 97.9

$SPECfp\_base2006 = $ 95.1

**CPU2006 license:** 3
**Test sponsor:** Hewlett-Packard Company
**Tested by:** Hewlett-Packard Company

**Test date:** Aug-2014
**Hardware Availability:** Sep-2014
**Software Availability:** Jun-2014

## Platform Notes (Continued)

```
 Memory Refresh Rate set to 1x Refresh
 QPI Snoop Configuration set to Home Snoop
Sysinfo program /home/cpu2006/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on Salina Thu Aug 21 23:24:32 2014

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 v3 @ 2.60GHz
      1 "physical id"s (chips)
      10 "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 : 10
      siblings  : 10
      physical 0: cores 0 2 3 4 8 9 10 11 12
   cache size : 25600 KB

From /proc/meminfo
   MemTotal:       131604616 kB
   HugePages_Total:        0
   Hugepagesize:        2048 kB

From /etc/*release* /etc/*version*
   os-release:
      NAME="Red Hat Enterprise Linux Server"
      VERSION="7.0 (Maipo)"
      ID="rhel"
      ID_LIKE="fedora"
      VERSION_ID="7.0"
      PRETTY_NAME="Red Hat Enterprise Linux Server 7.0 (Maipo)"
      ANSI_COLOR="0;31"
      CPE_NAME="cpe:/o:redhat:enterprise_linux:7.0:GA:server"
   redhat-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)
   system-release: Red Hat Enterprise Linux Server release 7.0 (Maipo)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.0:ga:server

uname -a:
   Linux Salina 3.10.0-123.el7.x86_64 #1 SMP Mon May 5 11:16:57 EDT 2014 x86_64
   x86_64 x86_64 GNU/Linux

run-level 3 Aug 21 23:23

SPEC is set to: /home/cpu2006
   Filesystem           Type  Size  Used Avail Use% Mounted on
   /dev/mapper/rhel-home xfs   318G  4.4G  314G   2% /home

Additional information from dmidecode:
```

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## Platform Notes (Continued)

```
    BIOS HP U20 07/11/2014
    Memory:
     8x HP NOT AVAILABLE 16 GB 2133 MHz 2 rank
     8x UNKNOWN NOT AVAILABLE

  (End of data from sysinfo program)
Regarding the sysinfo display about the memory installed, the correct amount of
memory is 128 GB and the dmidecode description should have one line reading as:
     8x HP NOT AVAILABLE 16 GB 2133 MHz 2 rank
```

## General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh"
OMP_NUM_THREADS = "10"

 Binaries compiled on a system with 1x Core i7-860 CPU + 8GB
 memory using RedHat EL 6.4
```

## 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`
     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`

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## Base Portability Flags (Continued)

```
    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 -parallel -opt-prefetch
    -ansi-alias
```

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

Fortran benchmarks:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
```

Benchmarks using both Fortran and C:
```
    -xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
    -ansi-alias
```

## Peak Compiler Invocation

C benchmarks:
```
    icc   -m64
```

C++ benchmarks:
```
    icpc  -m64
```

Fortran benchmarks:
```
    ifort -m64
```

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

## Peak Portability Flags

```
Same as Base Portability Flags
```

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# Peak Optimization Flags

C benchmarks:

433.milc: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-auto-ilp32 -ansi-alias

470.lbm: basepeak = yes

482.sphinx3: basepeak = yes

C++ benchmarks:

444.namd: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2)
-fno-alias -auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll4
-ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
-inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2
-inline-level=0 -opt-prefetch -parallel

465.tonto: -xCORE-AVX2(pass 2) -prof-gen(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -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

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# Peak Optimization Flags (Continued)

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/Intel-ic14.0-official-linux64.20140128.html
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revA.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.xml
http://www.spec.org/cpu2006/flags/HP-Platform-Flags-Intel-V1.2-HSW-revA.xml

For questions about this result, please contact the tester.
For other inquiries, please contact webmaster@spec.org.

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