# SPEC® CFP2006 Result

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## Hewlett Packard Enterprise

(Test Sponsor: HPE)

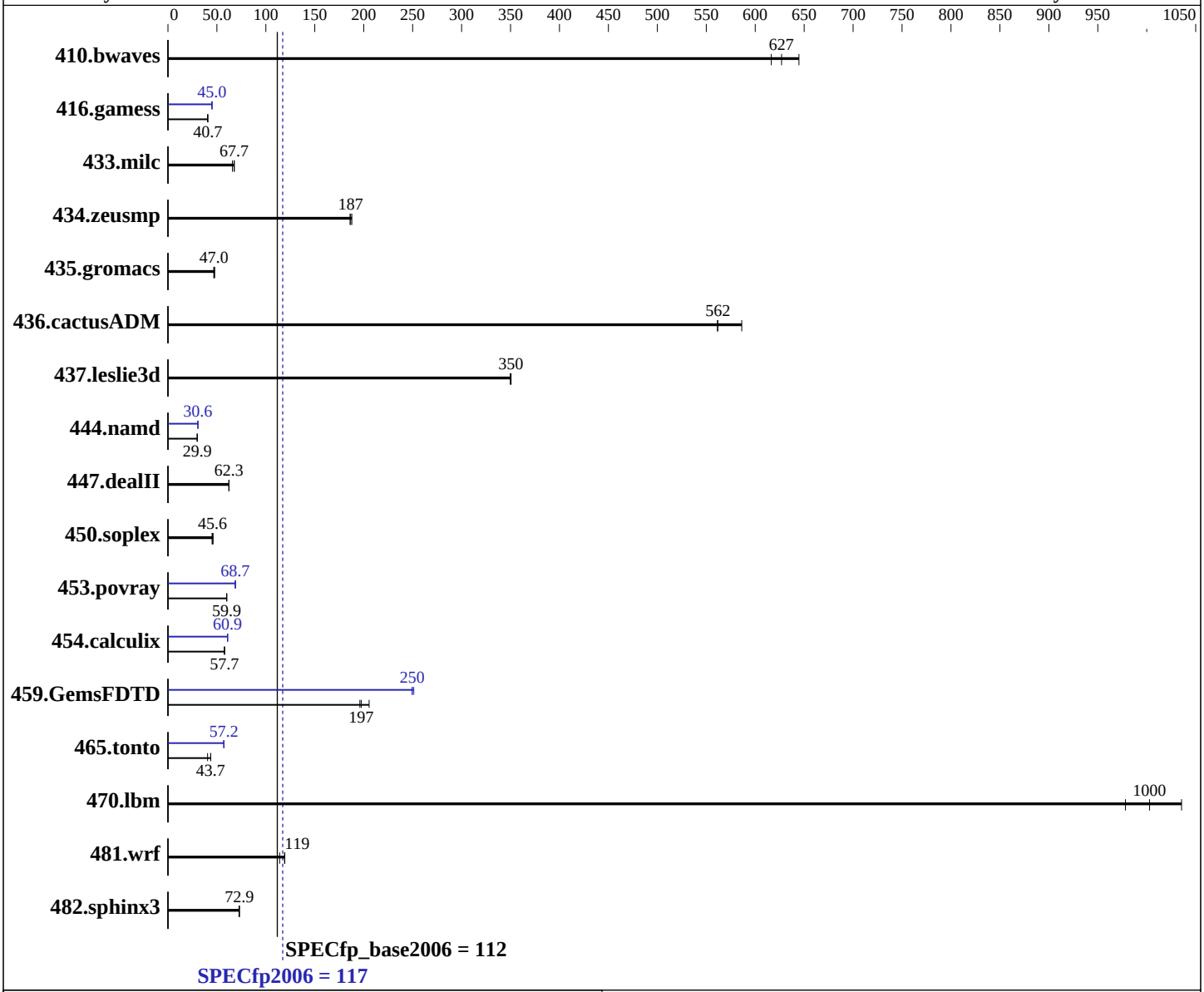
Synergy 620 Gen9
(2.40 GHz, Intel Xeon E7-8894 v4)

SPECfp®2006 = 117

SPECfp_base2006 = 112

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

**Test date:** Feb-2017
**Hardware Availability:** Mar-2017
**Software Availability:** Nov-2016




## Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E7-8894 v4 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.40 GHz |
| CPU MHz: | 2400 |
| FPU: | Integrated |
| CPU(s) enabled: | 48 cores, 2 chips, 24 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: | SUSE Linux Enterprise Server 12 (x86_64) SP2, Kernel 4.4.21-69-default |
| Compiler: | C/C++: Version 17.0.0.098 of Intel C/C++ Compiler for Linux; Fortran: Version 17.0.0.098 of Intel Fortran Compiler for Linux |
| Auto Parallel: | Yes |
| File System: | xfs |
| System State: | Run level 3 (multi-user) |

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L3 Cache: 60 MB I+D on chip per chip
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx4 PC4-2400T-R, running at 1600 MHz)
Disk Subsystem: 1 x 400 GB SAS SSD, RAID 0
Other Hardware: None

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 | 21.1 | 645 | **21.7** | **627** | 22.0 | 616 | 21.1 | 645 | **21.7** | **627** | 22.0 | 616 |
| 416.gamess | 483 | 40.5 | **481** | **40.7** | 481 | 40.7 | 434 | 45.1 | 437 | 44.8 | **435** | **45.0** |
| 433.milc | 139 | 65.9 | **136** | **67.7** | 136 | 67.7 | 139 | 65.9 | **136** | **67.7** | 136 | 67.7 |
| 434.zeusmp | 48.4 | 188 | 48.9 | 186 | **48.7** | **187** | 48.4 | 188 | 48.9 | 186 | **48.7** | **187** |
| 435.gromacs | 152 | 47.0 | **152** | **47.0** | 150 | 47.8 | 152 | 47.0 | **152** | **47.0** | 150 | 47.8 |
| 436.cactusADM | 21.3 | 561 | 20.4 | 586 | **21.3** | **562** | 21.3 | 561 | 20.4 | 586 | **21.3** | **562** |
| 437.leslie3d | 26.9 | 350 | 26.8 | 351 | **26.8** | **350** | 26.9 | 350 | 26.8 | 351 | **26.8** | **350** |
| 444.namd | 268 | 29.9 | **268** | **29.9** | 268 | 29.9 | 262 | 30.6 | 262 | 30.6 | **262** | **30.6** |
| 447.dealII | 183 | 62.4 | **184** | **62.3** | 184 | 62.3 | 183 | 62.4 | **184** | **62.3** | 184 | 62.3 |
| 450.soplex | 185 | 45.1 | 181 | 46.1 | **183** | **45.6** | 185 | 45.1 | 181 | 46.1 | **183** | **45.6** |
| 453.povray | 88.9 | 59.9 | **88.8** | **59.9** | 88.3 | 60.2 | 77.0 | 69.1 | 77.5 | 68.6 | **77.5** | **68.7** |
| 454.calculix | **143** | **57.7** | 143 | 57.7 | 143 | 57.7 | **135** | **60.9** | 136 | 60.8 | 135 | 61.1 |
| 459.GemsFDTD | 54.1 | 196 | **53.7** | **197** | 51.6 | 206 | 42.5 | 249 | **42.5** | **250** | 42.2 | 251 |
| 465.tonto | 243 | 40.5 | 225 | 43.7 | **225** | **43.7** | 173 | 57.0 | 172 | 57.2 | **172** | **57.2** |
| 470.lbm | **13.7** | **1000** | 14.0 | 978 | 13.3 | 1040 | **13.7** | **1000** | 14.0 | 978 | 13.3 | 1040 |
| 481.wrf | **93.8** | **119** | 97.9 | 114 | 93.5 | 119 | **93.8** | **119** | 97.9 | 114 | 93.5 | 119 |
| 482.sphinx3 | **267** | **72.9** | 269 | 72.6 | 267 | 73.1 | **267** | **72.9** | 269 | 72.6 | 267 | 73.1 |

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 by default.
```

## 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
```

Continued on next page

## Platform Notes (Continued)

```
      Processor Power and Utilization Monitoring set to Disabled
      Intel Hyper Threading set to Disabled
      Memory Refresh Rate set to 1x Refresh

    Sysinfo program /home/cpu2006_copy/config/sysinfo.rev6993
    Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)
    running on synergy620_manju Thu Feb 16 17:41:37 2017

    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 E7-8894 v4 @ 2.40GHz
          2 "physical id"s (chips)
          48 "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 : 24
          siblings  : 24
          physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
          27 28 29
          physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13 16 17 18 19 20 21 24 25 26
          27 28 29
       cache size : 61440 KB

    From /proc/meminfo
       MemTotal:       528268940 kB
       HugePages_Total:       0
       Hugepagesize:       2048 kB

    From /etc/*release* /etc/*version*
       SuSE-release:
          SUSE Linux Enterprise Server 12 (x86_64)
          VERSION = 12
          PATCHLEVEL = 2
          # This file is deprecated and will be removed in a future service pack or
          release.
          # Please check /etc/os-release for details about this release.
       os-release:
          NAME="SLES"
          VERSION="12-SP2"
          VERSION_ID="12.2"
          PRETTY_NAME="SUSE Linux Enterprise Server 12 SP2"
          ID="sles"
          ANSI_COLOR="0;32"
          CPE_NAME="cpe:/o:suse:sles:12:sp2"

    uname -a:
       Linux synergy620_manju 4.4.21-69-default #1 SMP Tue Oct 25 10:58:20 UTC 2016
       (9464f67) x86_64 x86_64 x86_64 GNU/Linux
```

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## Platform Notes (Continued)

```
 run-level 3 Feb 16 17:36

 SPEC is set to: /home/cpu2006_copy
    Filesystem     Type  Size  Used Avail Use% Mounted on
    /dev/sda4      xfs   331G   41G  290G  13% /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 I40 12/08/2016
   Memory:
    16x UNKNOWN NOT AVAILABLE
    32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1600 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:
 32x UNKNOWN NOT AVAILABLE 16 GB 2 rank 2400 MHz, configured at 1600 MHz
```

## General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact"
LD_LIBRARY_PATH = "/home/cpu2006_copy/libs/32:/home/cpu2006_copy/libs/64:/home/cpu2006_copy/sh10.2"
OMP_NUM_THREADS = "48"

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB RAM
 memory using Redhat Enterprise Linux 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
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
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 -qopt-prefetch
-ansi-alias -fp-model fast=2

C++ benchmarks:
-xCORE-AVX2 -ipo -O3 -no-prec-div -static -qopt-prefetch
-ansi-alias -fp-model fast=2

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

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

## Peak Compiler Invocation

C benchmarks:
icc -m64

C++ benchmarks:
icpc -m64

Fortran benchmarks:
ifort -m64

Continued on next page

## 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: -prof-gen=threadsafe(pass 1) -prof-use(pass 2)
-xCORE-AVX2(pass 2) -par-num-threads=1(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -fno-alias -auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

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

Fortran benchmarks:

410.bwaves: basepeak = yes

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

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -prof-gen=threadsafe(pass 1) -prof-use(pass 2)
-xCORE-AVX2(pass 2) -par-num-threads=1(pass 1) -ipo(pass 2)
-O3(pass 2) -no-prec-div(pass 2) -unroll2 -inline-level=0

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## Peak Optimization Flags (Continued)

459.GemsFDTD (continued):
-qopt-prefetch -parallel

465.tonto: -prof-gen=threadsafe(pass 1) -prof-use(pass 2) -xCORE-AVX2(pass 2) -par-num-threads=1(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -inline-calloc -qopt-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-Platform-Flags-Intel-V1.2-HSW-revE.html
http://www.spec.org/cpu2006/flags/HPE-Compiler-Flags-Intel-V1.2-HSW-revH.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/HPE-Compiler-Flags-Intel-V1.2-HSW-revH.xml


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