Hewlett Packard Enterprise
(Test Sponsor: HPE)
Synergy 480 Gen9
(1.70 GHz, Intel Xeon E5-2650L v4)

<table>
<thead>
<tr>
<th>SPECfp®2006</th>
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CPU2006 license: 3
Test sponsor: HPE
Tested by: HPE

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<tr>
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<td>435.gromacs</td>
<td>32.1</td>
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<td>738</td>
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<td>437.leslie3d</td>
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<tr>
<td>481.wrf</td>
<td>92.1</td>
</tr>
<tr>
<td>482.sphinx3</td>
<td>49.9</td>
</tr>
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SPECfp_base2006 = 91.1
SPECfp2006 = 96.1

### Hardware
- **CPU Name:** Intel Xeon E5-2650L v4
- **CPU Characteristics:** Intel Turbo Boost Technology up to 2.50 GHz
- **CPU MHz:** 1700
- **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

### Software
- **Operating System:** SUSE Linux Enterprise Server 12 (x86_64) SP1
  Kernel 3.12.49-11-default
- **Compiler:** C/C++: Version 17.0.0.098 of Intel C++ Studio XE for Linux;
  Fortran: Version 17.0.0.098 of Intel Fortran Studio XE for Linux
- **Auto Parallel:** Yes
- **File System:** xfs
- **System State:** Run level 3 (multi-user)
# SPEC CFP2006 Result

## Test Information

**Test Sponsor:** HPE  
**Hardware Availability:** Dec-2016  
**Software Availability:** Sep-2016  
**Test date:** Nov-2016  
**CPU2006 license:** 3  
**Test sponsor:** HPE  
**Hardware Availability:** Dec-2016  
**Tested by:** HPE  
**Software Availability:** Sep-2016

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## Results Table

| Benchmark | Base | | | | | Peak | | | | |
|-----------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|           | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 24.2 | 563 | 23.8 | 571 | 23.7 | 574 | 24.2 | 563 | 23.8 | 571 | 23.7 | 574 |
| 416.gamess | 718 | 27.3 | 722 | 27.1 | 719 | 27.2 | 630 | 31.1 | 632 | 31.0 | 631 | 31.0 |
| 433.milc | 146 | 63.0 | 145 | 63.2 | 145 | 63.2 | 146 | 63.0 | 145 | 63.2 | 145 | 63.2 |
| 434.zeusmp | 53.4 | 170 | 53.4 | 170 | 53.3 | 171 | 53.4 | 170 | 53.4 | 170 | 53.3 | 171 |
| 435.gromacs | 226 | 31.5 | 221 | 32.3 | 223 | 32.1 | 226 | 31.5 | 221 | 32.3 | 223 | 32.1 |
| 436.cactusADM | 16.3 | 734 | 16.2 | 740 | 16.2 | 738 | 16.3 | 734 | 16.2 | 740 | 16.2 | 738 |
| 437.leslie3d | 32.4 | 290 | 30.1 | 312 | 29.5 | 318 | 32.4 | 290 | 30.1 | 312 | 29.5 | 318 |
| 444.namd | 364 | 22.0 | 364 | 22.1 | 364 | 22.0 | 356 | 22.5 | 356 | 22.5 | 356 | 22.5 |
| 447.dealII | 234 | 49.0 | 234 | 48.8 | 234 | 48.9 | 234 | 49.0 | 234 | 48.8 | 234 | 48.9 |
| 450.soplex | 207 | 40.4 | 207 | 40.2 | 212 | 39.3 | 207 | 40.4 | 207 | 40.2 | 212 | 39.3 |
| 453.povray | 130 | 40.8 | 130 | 40.8 | 129 | 41.3 | 115 | 46.4 | 116 | 45.9 | 114 | 46.8 |
| 454.calculix | 197 | 41.9 | 197 | 41.8 | 197 | 41.8 | 188 | 43.9 | 188 | 43.9 | 188 | 44.0 |
| 459.GemsFDTD | 52.4 | 203 | 50.5 | 210 | 51.6 | 206 | 41.1 | 258 | 41.5 | 256 | 40.9 | 260 |
| 470.lbm | 16.9 | 814 | 16.1 | 853 | 16.4 | 840 | 16.9 | 814 | 16.1 | 853 | 16.4 | 840 |
| 481.wrf | 121 | 92.1 | 122 | 91.2 | 121 | 92.2 | 121 | 92.1 | 122 | 91.2 | 121 | 92.2 |
| 482.sphinx3 | 390 | 49.9 | 390 | 49.9 | 393 | 49.6 | 390 | 49.9 | 390 | 49.9 | 393 | 49.6 |

Results appear in the order in which they were run. Bold underlined text indicates a median measurement.

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## 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
```

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## Platform Notes

**BIOS Configuration:**  
- Power Profile set to Custom  
- Power Regulator to 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  
- Energy/Performance Bias set to Maximum Performance  
- Collaborative Power Control set to Disabled  
- QPI Snoop Configuration set to Home Snoop

Continued on next page
**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/cpu2006/config/sysinfo.rev6993  
Revision 6993 of 2015-11-06 (b5e8d4b4eb51ed28d7f98696cbe290c1)  
running on linux-xxgs Thu Nov 3 09:19:03 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 E5-2650L v4@ 1.70GHz  
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  
care.)  
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: 264544752 kB  
HugePages_Total: 0  
Hugepagesize: 2048 kB

/usr/bin/lsb_release -d  
SUSE Linux Enterprise Server 12 SP1

From /etc/*release* /etc/*version*  
SuSE-release:  
SUSE Linux Enterprise Server 12 (x86_64)  
VERSION = 12  
PATCHLEVEL = 1  
# 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-SP1"  
VERSION_ID="12.1"  
PRETTY_NAME="SUSE Linux Enterprise Server 12 SP1"  
ID=sles  
ANSI_COLOR="0;32"  
CPE_NAME="cpe:/o:suse:sles:12:sp1"

uname -a:  
Continued on next page
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SPEC CFP2006 Result
Copyright 2006-2016 Standard Performance Evaluation Corporation

SPECfp2006 = 96.1
SPECfp_base2006 = 91.1

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

Test date: Nov-2016
Hardware Availability: Dec-2016
Software Availability: Sep-2016

Platform Notes (Continued)

(8d714a0) x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Nov 3 09:12

SPEC is set to: /home/cpu2006

Filesystem Type Size Used Avail Use% Mounted on
/dev/sda4 xfs 424G 3.9G 420G 1% /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 I37 09/14/2016
Memory:
8x UNKNOWN NOT AVAILABLE
16x UNKNOWN NOT AVAILABLE 16 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:
16x UNKNOWN NOT AVAILABLE 16 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"
LD_LIBRARY_PATH = "/home/cpu2006/libs/32:/home/cpu2006/libs/64:/home/cpu2006/sh10.2"
OMP_NUM_THREADS = "28"

Binaries compiled on a system with 1x Intel Core i7-4790 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
**SPEC CFP2006 Result**

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**SPECfp2006 = 96.1**

**SPECfp_base2006 = 91.1**

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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.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 -parallel -qopt-prefetch`

**C++ benchmarks:**

- `-xCORE-AVX2 -ipo -O3 -no-prec-div -qopt-prefetch`

**Fortran benchmarks:**

- `-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch`

**Benchmarks using both Fortran and C:**

- `-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -qopt-prefetch`

---

**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`
Hewlett Packard Enterprise
(Test Sponsor: HPE)
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SPECfp2006 = 96.1
SPECfp_base2006 = 91.1

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

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(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(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(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(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 -qopt-prefetch -parallel

465.tonto: -prof-gen(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

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'HPE'

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Peak Optimization Flags (Continued)

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
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-ic17.0-official-linux64-revD.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/Intel-ic17.0-official-linux64-revD.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.

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