SPEC® CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant XL170r Gen9
(2.20 GHz, Intel Xeon E5-2699 v4)

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

SPECFp®2006 = 123
SPECFp_base2006 = 116

CPU Name: Intel Xeon E5-2699 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.60 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 44 cores, 2 chips, 22 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

Operating System: SUSE Linux Enterprise Server 12 (x86_64)
Kernel 3.12.43-52.6-default
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: ReiserFS
System State: Run level 3 (multi-user)

Test date: Feb-2016
Hardware Availability: Mar-2016
Software Availability: Aug-2015

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Benchmark Name</th>
<th>Result</th>
</tr>
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<tbody>
<tr>
<td>410</td>
<td>bwaves</td>
<td>116.3</td>
</tr>
<tr>
<td>416</td>
<td>gamess</td>
<td>45.6</td>
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<tr>
<td>433</td>
<td>milc</td>
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<tr>
<td>434</td>
<td>zeusmp</td>
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<tr>
<td>435</td>
<td>gromacs</td>
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<tr>
<td>436</td>
<td>cactusADM</td>
<td>267</td>
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<tr>
<td>437</td>
<td>leslie3d</td>
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<td>444</td>
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<td>447</td>
<td>dealII</td>
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<td>450</td>
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<td>459</td>
<td>GemsFDTD</td>
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<td>470</td>
<td>lbm</td>
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<td>482</td>
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Standard Performance Evaluation Corporation
info@spec.org
http://www.spec.org/
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**SPECfp_base2006** = 116

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</tbody>
</table>

| L3 Cache: 55 MB I+D on chip per chip | Base Pointers: 64-bit |
| Other Cache: None | Peak Pointers: 32/64-bit |
| Memory: 256 GB (8 x 32 GB 2Rx4 PC4-2400T-R) | Other Software: None |
| Disk Subsystem: 2 x 400 GB SAS SSD, RAID 1 |

**Results Table**

<table>
<thead>
<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Seconds</th>
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<td>459.GemsFDTD</td>
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<td>285</td>
<td>68.4</td>
<td>285</td>
<td>68.4</td>
</tr>
</tbody>
</table>

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

**Operating System Notes**

Transparent Huge Pages enabled with:

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

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Platform Notes (Continued)

Intel Hyperthreading set to Enabled
Sysinfo program /cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-qjw8 Mon Feb 29 15:10:32 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 E5-2699 v4 @ 2.20GHz
  2 "physical id"s (chips)
  88 "processors"
core, siblings (Caution: counting these is hw and system dependent. The
following excerpts from /proc/cpuinfo might not be reliable. Use with
cautions.)
cpu cores : 22
siblings  : 44
physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
28
physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 16 17 18 19 20 21 24 25 26 27
28
cache size : 56320 KB

From /proc/meminfo
MemTotal:       264256548 kB
HugePages_Total:       0
Hugepagesize:       2048 kB

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

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

uname --a:
  Linux linux-qjw8 3.12.43-52.6-default #1 SMP Wed May 20 12:44:39 UTC 2015
  (fc0ceac) x86_64 x86_64 x86_64 GNU/Linux

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Platform Notes (Continued)

run-level 5 Feb 29 10:27

SPEC is set to: /cpu2006
   Filesystem   Type  Size  Used  Avail  Use% Mounted on
   /dev/sda3    btrfs  369G  13G  355G   4%  /

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 U14 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 = "44"
LD_LIBRARY_PATH = "/cpu2006/libs/32:/cpu2006/libs/64:/cpu2006/sh"

Binaries compiled on a system with 1x Intel Xeon E5-2260 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
**SPEC CFP2006 Result**

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**Base Portability Flags**

410.bwaves: -DSPEC_CPU_LP64
416.game5: -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 -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

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Peak Compiler Invocation (Continued)

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

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.dealII: 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.

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