SPEC® CFP2006 Result

Hewlett Packard Enterprise
(Test Sponsor: HPE)
ProLiant ML350 Gen9
(2.20 GHz, Intel Xeon E5-2699 v4)

<table>
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<tr>
<th>SPECfp®2006</th>
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<tr>
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CPU2006 license: 3
Test sponsor: HPE
Test date: Mar-2016

Hardware Availability: Mar-2016
Software Availability: Nov-2015

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Hardware

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

Software

Operating System: Red Hat Enterprise Linux Server release 7.2, (Maipo)
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: xfs

Continued on next page
### Results Table

<table>
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<tr>
<th>Benchmark</th>
<th>Seconds</th>
<th>Ratio</th>
<th>Base</th>
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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

---

### Platform Notes

**BIOS Configuration:**
- Intel Hyperthreading Option set to Enabled
- Power Profile set to Custom
- Power Regulator set to 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
- Collaborative Power Control set to Disabled
- QPI Snoop Configuration set to Home Snoop

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ProLiant ML350 Gen9
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SPECfp_base2006 = 118

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Platform Notes (Continued)

Thermal Configuration set to Maximum Cooling
Processor Power and Utilization Monitoring set to Disabled
Memory Refresh Rate set to 1x Refresh
Energy Performance Bias set to Maximum Performance
 Sysinfo program
/home/specuser/specsuite/HP_build_ic16_suite_corrected_int_bins/cpu2006/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on ml350bdwspec Wed Mar 2 08:26:26 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"
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 : 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: 528059748 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)

uname -a:
Linux ml350bdwspec 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 Mar 2 07:59

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**Platform Notes (Continued)**

SPEC is set to:  
/home/specuser/specsuite/HP_build_ic16_suite_corrected_int_bins/cpu2006

Filesystem     Type  Size  Used Avail Use% Mounted on  
/dev/sda5      xfs   318G   27G  292G   9% /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 P92 02/22/2016  
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:  
KMP_AFFINITY = "granularity=fine,compact,1,0"  
OMP_NUM_THREADS = "44"

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:  
```
icc  -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

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### Base Optimization Flags

#### C benchmarks:

- -xCORE-AVX2  
- -ipo  
- -O3  
- -static  
- -parallel  
- -opt-prefetch  
- -ansi-alias  
- -fp-model fast=2  
- -qopt-prefetch-issue-excl-hint

#### C++ benchmarks:

- -xCORE-AVX2  
- -ipo  
- -O3  
- -static  
- -opt-prefetch  
- -ansi-alias  
- -fp-model fast=2  
- -qopt-prefetch-issue-excl-hint

#### Fortran benchmarks:

- -xCORE-AVX2  
- -ipo  
- -O3  
- -static  
- -parallel  
- -opt-prefetch  
- -fp-model fast=2  
- -qopt-prefetch-issue-excl-hint

#### Benchmarks using both Fortran and C:

- -xCORE-AVX2  
- -ipo  
- -O3  
- -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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Hewlett Packard Enterprise
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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-

Continued on next page
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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 questions about this result, please contact the tester.

For other inquiries, please contact webmaster@spec.org.

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