SPEC® CFP2006 Result
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Dell Inc.

PowerEdge R830 (Intel Xeon E5-4655 v4, 2.50 GHz)

$SPECfp^{®}\_rate2006 =$ 1310

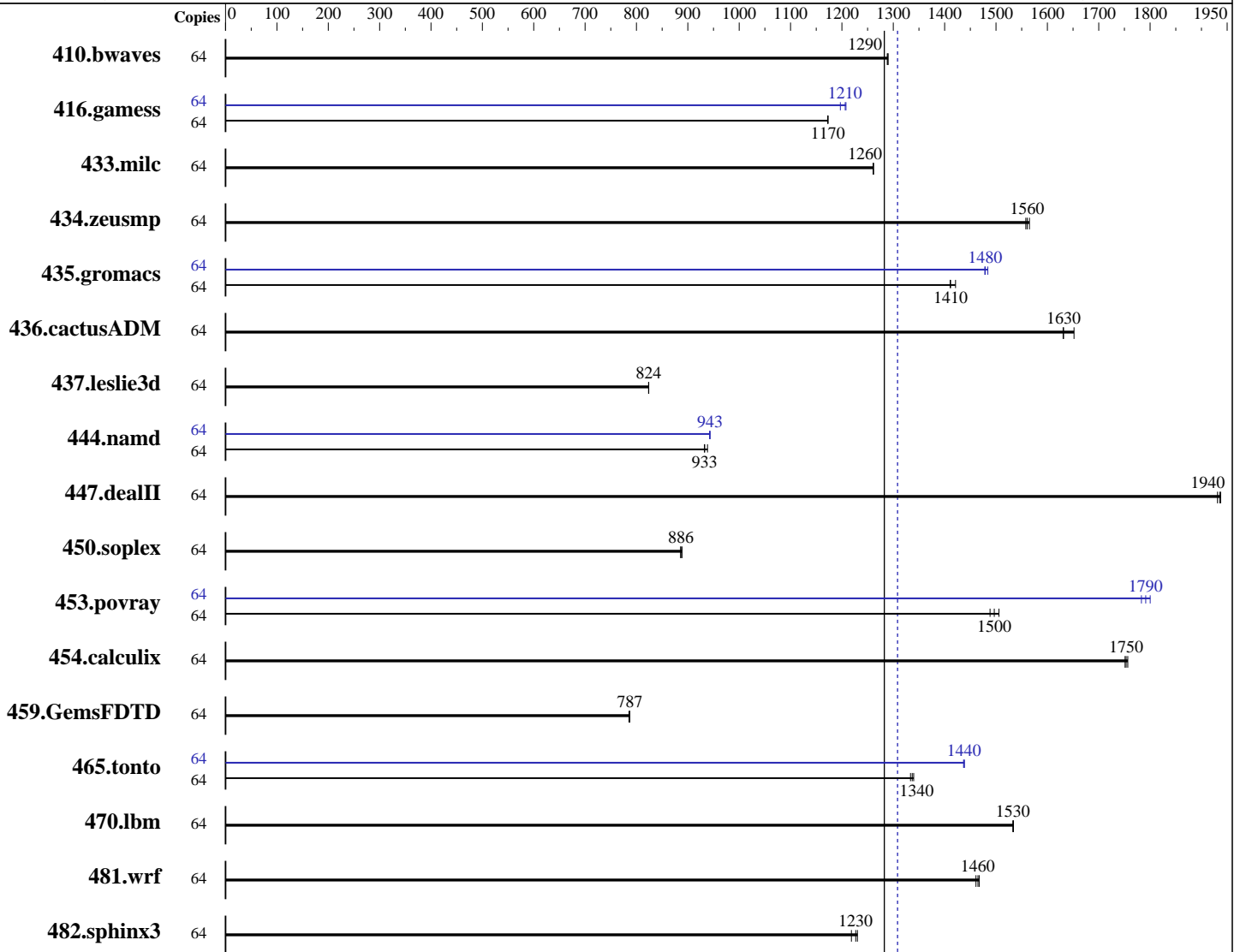$SPECfp\_rate\_base2006 =$ 1280

CPU2006 license: 55
Test sponsor: Dell Inc.
Tested by: Dell Inc.

Test date: Apr-2016
Hardware Availability: Jun-2016
Software Availability: Mar-2016

Benchmark	Copies	Result
410.bwaves	64	1290
416.gamess	64	1210
416.gamess	64	1170
433.milc	64	1260
434.zeusmp	64	1560
435.gromacs	64	1480
435.gromacs	64	1410
436.cactusADM	64	1630
437.leslie3d	64	824
444.namd	64	943
444.namd	64	933
447.dealII	64	1940
450.soplex	64	886
453.povray	64	1790
453.povray	64	1500
454.calculix	64	1750
459.GemsFDTD	64	787
465.tonto	64	1440
465.tonto	64	1340
470.lbm	64	1530
481.wrf	64	1460
482.sphinx3	64	1230

SPECfp_rate_base2006 = 1280

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Hardware

CPU Name: Intel Xeon E5-4655 v4
CPU Characteristics: Intel Turbo Boost Technology up to 3.20 GHz
CPU MHz: 2500
FPU: integrated
CPU(s) enabled: 32 cores, 4 chips, 8 cores/chip, 2 threads/core
CPU(s) orderable: 2,4 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: SUSE Linux Enterprise Server 12 SP1
3.12.49-11-default
Compiler: C/C++: Version 16.0.2.181 of Intel C++ Studio XE for Linux;
Fortran: Version 16.0.2.181 of Intel Fortran Studio XE for Linux
Auto Parallel: No
File System: btrfs
System State: Run level 3 (multi-user)

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L3 Cache:	30 MB I+D on chip per chip	Base Pointers:	32/64-bit
Other Cache:	None	Peak Pointers:	32/64-bit
Memory:	512 GB (32 x 16 GB 2Rx8 PC4-2400T-R)	Other Software:	None
Disk Subsystem:	1 x 800 GB SATA SSD		
Other Hardware:	None		

Results Table

Benchmark	Base						Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	64	**674**	**1290**	675	1290	674	1290	64	**674**	**1290**	675	1290	674	1290
416.gamess	64	**1069**	**1170**	1068	1170	1069	1170	64	**1039**	**1210**	1047	1200	1037	1210
433.milc	64	466	1260	**466**	**1260**	466	1260	64	466	1260	**466**	**1260**	466	1260
434.zeusmp	64	**373**	**1560**	374	1560	372	1570	64	**373**	**1560**	374	1560	372	1570
435.gromacs	64	322	1420	**324**	**1410**	324	1410	64	308	1480	**309**	**1480**	309	1480
436.cactusADM	64	469	1630	**469**	**1630**	463	1650	64	469	1630	**469**	**1630**	463	1650
437.leslie3d	64	730	824	**730**	**824**	730	824	64	730	824	**730**	**824**	730	824
444.namd	64	547	938	551	932	**550**	**933**	64	**544**	**943**	545	942	544	943
447.dealII	64	379	1930	378	1940	**378**	**1940**	64	379	1930	378	1940	**378**	**1940**
450.soplex	64	**602**	**886**	601	889	602	886	64	**602**	**886**	601	889	602	886
453.povray	64	**227**	**1500**	226	1510	229	1490	64	191	1780	189	1800	**190**	**1790**
454.calculix	64	302	1750	**301**	**1750**	301	1760	64	302	1750	**301**	**1750**	301	1760
459.GemsFDTD	64	863	787	**863**	**787**	865	785	64	863	787	**863**	**787**	865	785
465.tonto	64	**471**	**1340**	470	1340	472	1330	64	**438**	**1440**	438	1440	438	1440
470.lbm	64	**574**	**1530**	574	1530	573	1530	64	**574**	**1530**	574	1530	573	1530
481.wrf	64	**488**	**1460**	489	1460	487	1470	64	**488**	**1460**	489	1460	487	1470
482.sphinx3	64	1014	1230	1024	1220	**1017**	**1230**	64	1014	1230	1024	1220	**1017**	**1230**

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

Submit Notes

The numactl mechanism was used to bind copies to processors. The config file option 'submit' was used to generate numactl commands to bind each copy to a specific processor. For details, please see the config file.

Operating System Notes

Stack size set to unlimited using "ulimit -s unlimited"

Platform Notes

BIOS settings:
Snoop Mode set to Home Snoop
Virtualization Technology disabled

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Platform Notes (Continued)

```
System Profile set to custom
CPU Performance set to Hardware P States
C States set to Autonomous
C1E disabled
Energy Efficient Turbo disabled
Uncore Frequency set to Dynamic
Energy Efficiency Policy set to Balanced Performance
Memory Patrol Scrub disabled
Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on linux-t2sb Wed Apr 20 16:00:36 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 E5-4655 v4 @ 2.50GHz
      4 "physical id"s (chips)
      64 "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 : 8
      siblings  : 16
      physical 0: cores 0 1 3 5 8 10 12 13
      physical 1: cores 0 1 3 5 8 10 12 13
      physical 2: cores 0 1 2 4 9 11 12 13
      physical 3: cores 0 1 3 5 8 10 12 13
   cache size : 30720 KB

From /proc/meminfo
   MemTotal:      529325584 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"
```
Continued on next page

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Platform Notes (Continued)

```
        ID="sles"
        ANSI_COLOR="0;32"
        CPE_NAME="cpe:/o:suse:sles:12:sp1"

  uname -a:
     Linux linux-t2sb 3.12.49-11-default #1 SMP Wed Nov 11 20:52:43 UTC 2015
     (8d714a0) x86_64 x86_64 x86_64 GNU/Linux

  run-level 3 Apr 20 03:48

  SPEC is set to: /root/cpu2006-1.2
     Filesystem      Type   Size  Used Avail Use% Mounted on
     /dev/sda3       btrfs  461G  9.2G  448G   3% /
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 Dell Inc. 0.2.4 03/31/2016
   Memory:
   32x 00AD063200AD HMA82GR7MFR8N-UH 16 GB 2 rank 2400 MHz
   16x Not Specified Not Specified

  (End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"

 Binaries compiled on a system with 1x Intel Core i7-4790K CPU + 32GB
 memory using RedHat EL 7.2 glibc 2.17
 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
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

Base Compiler Invocation

C benchmarks:
     icc   -m64

C++ benchmarks:
     icpc   -m64

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Base Compiler Invocation (Continued)

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 -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -auto-p32
-ansi-alias -opt-mem-layout-trans=3
```

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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

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) -opt-mem-layout-trans=3(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:threadsafe(pass 1)
                -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2)
                -par-num-threads=1(pass 1) -opt-mem-layout-trans=3(pass 2)
                -prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

        410.bwaves: basepeak = yes

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Peak Optimization Flags (Continued)

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-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: basepeak = yes

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) -unroll4 -auto
-inline-calloc -opt-malloc-options=3

Benchmarks using both Fortran and C:

435.gromacs: -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) -opt-mem-layout-trans=3(pass 2)
-prof-use(pass 2) -opt-prefetch -auto-ilp32

436.cactusADM: basepeak = yes

454.calculix: basepeak = yes

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-ic16.0-official-linux64.html
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic16.0-official-linux64.xml
http://www.spec.org/cpu2006/flags/Dell-Platform-Settings-V1.2-revD.20151006.xml

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

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