SPEC® CFP2006 Result

Dell Inc.

PowerEdge R630 (Intel Xeon E5-2650 v4, 2.20 GHz)

$SPECfp^{®}2006 =$ 109

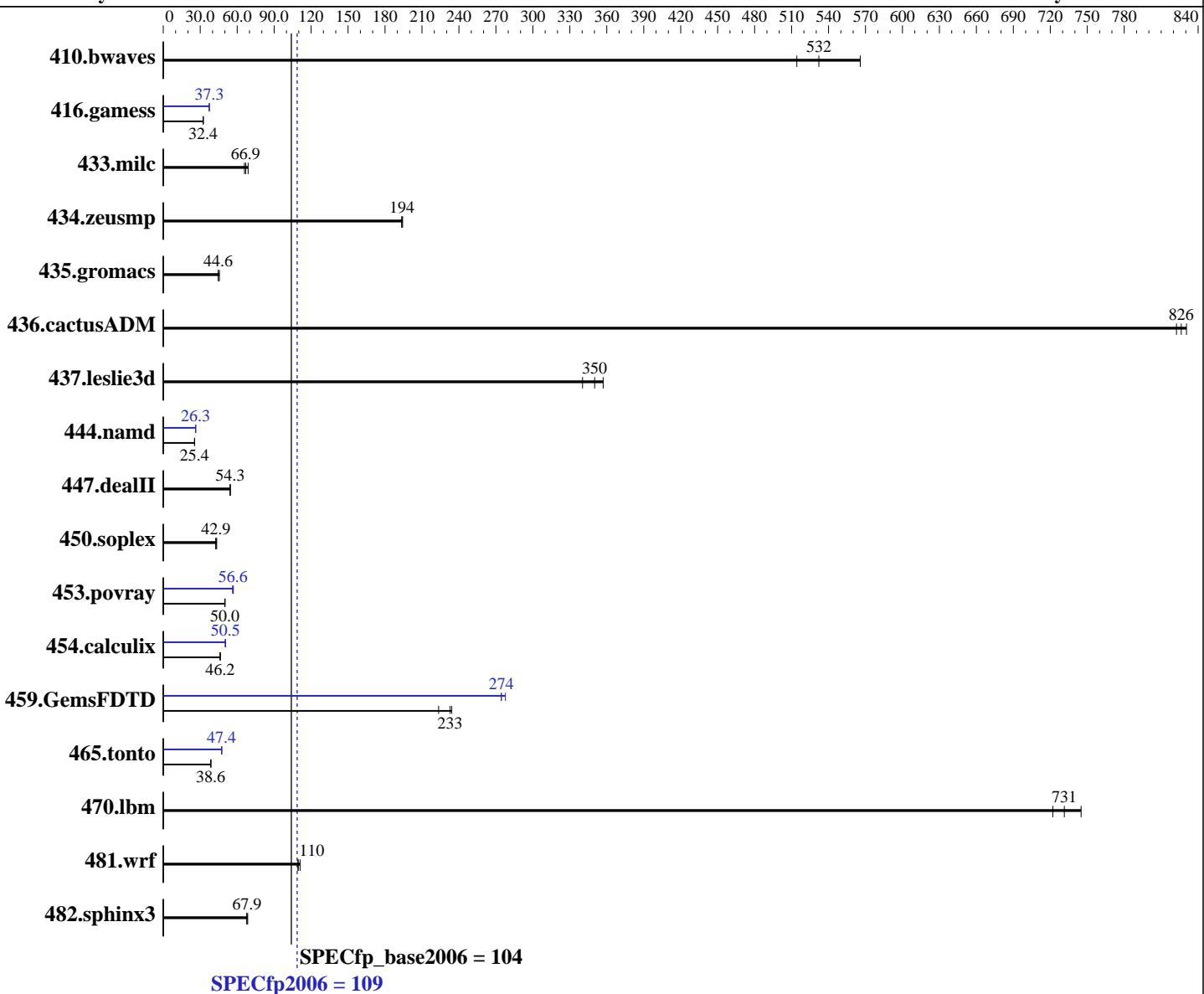$SPECfp\_base2006 =$ 104

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

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

Benchmark	Result
410.bwaves	532
416.gamess	37.3 / 32.4
433.milc	66.9
434.zeusmp	194
435.gromacs	44.6
436.cactusADM	826
437.leslie3d	350
444.namd	26.3 / 25.4
447.dealII	54.3
450.soplex	42.9
453.povray	56.6 / 50.0
454.calculix	50.5 / 46.2
459.GemsFDTD	274 / 233
465.tonto	47.4 / 38.6
470.lbm	731
481.wrf	110
482.sphinx3	67.9

SPECfp_base2006 = 104
SPECfp2006 = 109

Hardware

CPU Name: Intel Xeon E5-2650 v4
CPU Characteristics: Intel Turbo Boost Technology up to 2.90 GHz
CPU MHz: 2200
FPU: Integrated
CPU(s) enabled: 24 cores, 2 chips, 12 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
Continued on next page

Software

Operating System: Red Hat Enterprise Linux Server release 7.2 (Maipo)
3.10.0-327.el7.x86_64
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
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L3 Cache:	30 MB I+D on chip per chip	System State:	Run level 3 (multi-user)
Other Cache:	None	Base Pointers:	64-bit
Memory:	256 GB (16 x 16 GB 2Rx4 PC4-2400T-R)	Peak Pointers:	32/64-bit
Disk Subsystem:	1 x 500 GB 7200 RPM SATA	Other Software:	None
Other Hardware:	None		

Results Table

Benchmark	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Base Seconds	Base Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio	Peak Seconds	Peak Ratio
410.bwaves	26.4	514	**25.5**	**532**	24.0	566	26.4	514	**25.5**	**532**	24.0	566
416.gamess	605	32.4	**604**	**32.4**	603	32.4	524	37.4	**525**	**37.3**	525	37.3
433.milc	**137**	**66.9**	133	68.9	139	65.9	**137**	**66.9**	133	68.9	139	65.9
434.zeusmp	**47.0**	**194**	46.8	194	47.0	194	**47.0**	**194**	46.8	194	47.0	194
435.gromacs	**160**	**44.6**	160	44.5	157	45.6	**160**	**44.6**	160	44.5	157	45.6
436.cactusADM	**14.5**	**826**	14.4	831	14.5	822	**14.5**	**826**	14.4	831	14.5	822
437.leslie3d	27.6	340	**26.8**	**350**	26.3	357	27.6	340	**26.8**	**350**	26.3	357
444.namd	**315**	**25.4**	315	25.4	316	25.4	305	26.3	**305**	**26.3**	305	26.3
447.dealII	211	54.2	**211**	**54.3**	210	54.4	211	54.2	**211**	**54.3**	210	54.4
450.soplex	192	43.4	**194**	**42.9**	196	42.5	192	43.4	**194**	**42.9**	196	42.5
453.povray	106	50.2	107	49.9	**106**	**50.0**	94.6	56.2	**94.0**	**56.6**	93.5	56.9
454.calculix	178	46.3	179	46.2	**179**	**46.2**	163	50.6	**163**	**50.5**	164	50.2
459.GemsFDTD	45.3	234	**45.6**	**233**	47.5	224	38.2	278	**38.7**	**274**	38.7	274
465.tonto	255	38.6	**255**	**38.6**	255	38.6	**208**	**47.4**	208	47.4	207	47.5
470.lbm	18.4	745	19.0	722	**18.8**	**731**	18.4	745	19.0	722	**18.8**	**731**
481.wrf	102	109	**102**	**110**	101	111	102	109	**102**	**110**	101	111
482.sphinx3	284	68.5	**287**	**67.9**	287	67.8	284	68.5	**287**	**67.9**	287	67.8

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"

Platform Notes

    BIOS settings:
    Snoop Mode set to Opportunistic Snoop Broadcast
    Virtualization Technology disabled
    System Profile set to Custom
    CPU Power Management set to Maximum Performance
    Energy Efficient Turbo disabled
    Memory Patrol Scrub disabled
    Cstates autonomous/C1E enabled
    Energy Efficient Policy set to Performance
    Sysinfo program /root/cpu2006-1.2/config/sysinfo.rev6914

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Platform Notes (Continued)

```
$Rev: 6914 $ $Date:: 2014-06-25 #$ e3fbb8667b5a285932ceab81e28219e1
running on localhost.localdomain Wed Mar 16 09:05:10 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 E5-2650 v4@ 2.20GHz
      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 : 12
      siblings  : 24
      physical 0: cores 0 1 2 3 4 5 8 9 10 11 12 13
      physical 1: cores 0 1 2 3 4 5 8 9 10 11 12 13
   cache size : 30720 KB

From /proc/meminfo
   MemTotal:       264040556 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)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:7.2:ga:server

uname -a:
   Linux localhost.localdomain 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 16 03:21

SPEC is set to: /root/cpu2006-1.2
   Filesystem      Type  Size  Used Avail Use% Mounted on
   /dev/sda2       xfs   256G   12G  245G   5% /
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
```
Continued on next page

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Platform Notes (Continued)

```
   determined", but the intent may not be met, as there are frequent changes to
   hardware, firmware, and the "DMTF SMBIOS" standard.

   BIOS Dell Inc. 2.0.1 02/12/2016
   Memory:
   16x 002C0632002C 18ASF2G72PDZ-2G3B1 16 GB 2 rank 2400 MHz
   8x Not Specified Not Specified

 (End of data from sysinfo program)
```

General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,1,0"
LD_LIBRARY_PATH = "/root/cpu2006-1.2/libs/32:/root/cpu2006-1.2/libs/64:/root/cpu2006-1.2/sh"
OMP_NUM_THREADS = "24"

 Binaries compiled on a system with 1x Intel Core i5-4670K CPU + 32GB
 memory using RedHat EL 7.1
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/transparent_hugepage/enabled
```

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
```

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Base Portability Flags (Continued)

```
   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 -opt-prefetch
-ansi-alias
```

C++ benchmarks:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -opt-prefetch -ansi-alias
```

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

Benchmarks using both Fortran and C:
```
-xCORE-AVX2 -ipo -O3 -no-prec-div -parallel -opt-prefetch
-ansi-alias
```

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
```

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Software Availability: Mar-2016

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-`

  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:

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Peak Optimization Flags (Continued)

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/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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