# SPEC® CFP2006 Result

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## IBM Corporation

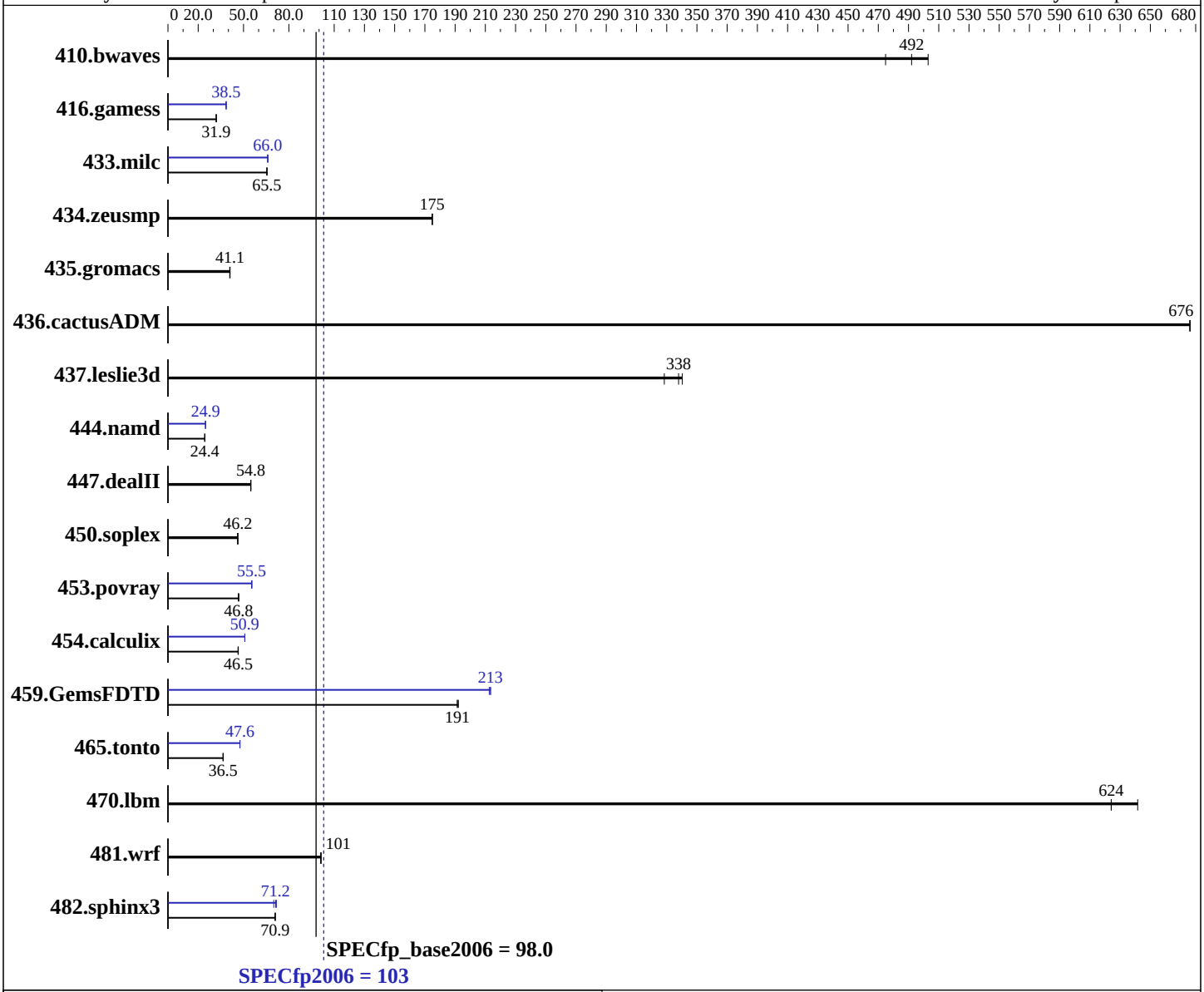
IBM System x3650 M4 HD
(Intel Xeon E5-2697 v2, 2.70 GHz)

SPECfp®2006 = 103

SPECfp_base2006 = 98.0

**CPU2006 license:** 11
**Test sponsor:** IBM Corporation
**Tested by:** IBM Corporation

**Test date:** Aug-2014
**Hardware Availability:** Dec-2013
**Software Availability:** Sep-2013




### Hardware

| | |
|---|---|
| CPU Name: | Intel Xeon E5-2697 v2 |
| CPU Characteristics: | Intel Turbo Boost Technology up to 3.50 GHz |
| CPU MHz: | 2700 |
| FPU: | Integrated |
| CPU(s) enabled: | 24 cores, 2 chips, 12 cores/chip |
| CPU(s) orderable: | 1,2 chips |
| Primary Cache: | 32 KB I + 32 KB D on chip per core |
| Secondary Cache: | 256 KB I+D on chip per core |

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### Software

| | |
|---|---|
| Operating System: | Red Hat Enterprise Linux Server release 6.4 (Santiago)<br>2.6.32-358.el6.x86_64 |
| Compiler: | C/C++: Version 14.0.0.080 of Intel C++ Studio XE for Linux;<br>Fortran: Version 14.0.0.080 of Intel Fortran Studio XE for Linux |
| Auto Parallel: | Yes |
| File System: | ext4 |

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L3 Cache: 30 MB I+D on chip per chip
Other Cache: None
Memory: 256 GB (16 x 16 GB 2Rx4 PC3-14900R-13, ECC)
Disk Subsystem: 1 x 400 GB SSD, RAID 0
Other Hardware: None

System State: Run level 3 (multi-user)
Base Pointers: 64-bit
Peak Pointers: 32/64-bit
Other Software: None

## Results Table

| Benchmark | Base | | | | | | Peak | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | **27.6** | **492** | 27.0 | 503 | 28.6 | 475 | **27.6** | **492** | 27.0 | 503 | 28.6 | 475 |
| 416.gamess | **613** | **31.9** | 613 | 31.9 | 612 | 32.0 | **509** | **38.5** | 508 | 38.5 | 509 | 38.5 |
| 433.milc | **140** | **65.5** | 140 | 65.4 | 140 | 65.6 | 139 | 66.0 | **139** | **66.0** | 139 | 66.1 |
| 434.zeusmp | 52.0 | 175 | **52.0** | **175** | 52.0 | 175 | 52.0 | 175 | **52.0** | **175** | 52.0 | 175 |
| 435.gromacs | 174 | 41.1 | 175 | 40.9 | **174** | **41.1** | 174 | 41.1 | 175 | 40.9 | **174** | **41.1** |
| 436.cactusADM | 17.7 | 676 | **17.7** | **676** | 17.7 | 676 | 17.7 | 676 | **17.7** | **676** | 17.7 | 676 |
| 437.leslie3d | 27.6 | 340 | **27.8** | **338** | 28.6 | 328 | 27.6 | 340 | **27.8** | **338** | 28.6 | 328 |
| 444.namd | **329** | **24.4** | 329 | 24.4 | 329 | 24.3 | **323** | **24.9** | 323 | 24.9 | 322 | 24.9 |
| 447.dealII | 209 | 54.8 | **209** | **54.8** | 209 | 54.8 | 209 | 54.8 | **209** | **54.8** | 209 | 54.8 |
| 450.soplex | **181** | **46.2** | 181 | 46.1 | 180 | 46.3 | **181** | **46.2** | 181 | 46.1 | 180 | 46.3 |
| 453.povray | 114 | 46.6 | **114** | **46.8** | 113 | 46.9 | 96.2 | 55.3 | **95.9** | **55.5** | 95.8 | 55.5 |
| 454.calculix | **177** | **46.5** | 177 | 46.6 | 178 | 46.3 | 162 | 50.9 | **162** | **50.9** | 162 | 50.9 |
| 459.GemsFDTD | 55.4 | 191 | 55.2 | 192 | **55.4** | **191** | **49.7** | **213** | 49.9 | 213 | 49.7 | 213 |
| 465.tonto | 271 | 36.4 | **269** | **36.5** | 269 | 36.6 | 207 | 47.6 | 207 | 47.6 | **207** | **47.6** |
| 470.lbm | **22.0** | **624** | 22.0 | 624 | 21.4 | 642 | **22.0** | **624** | 22.0 | 624 | 21.4 | 642 |
| 481.wrf | **110** | **101** | 110 | 101 | 110 | 101 | **110** | **101** | 110 | 101 | 110 | 101 |
| 482.sphinx3 | 275 | 70.9 | 274 | 71.1 | **275** | **70.9** | 272 | 71.7 | **274** | **71.2** | 278 | 70.0 |

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"
Zone reclaim mode enabled with:
echo 1 > /proc/sys/vm/zone_reclaim_mode
Intel Idle Driver disabled with the following Linux kernel parameter in /etc/grub.conf:
intel_idle.max_cstate=0
```

## Platform Notes

```
BIOS setting:
Operating Mode set to Maximum Performance
Hyper-Threading set to Disable
Sysinfo program /home/SPECcpu-20140116-ic14.0/config/sysinfo.rev6818
$Rev: 6818 $ $Date:: 2012-07-17 #$ e86d102572650a6e4d596a3cee98f191
running on x3650M4HD Sun Aug 31 10:52:33 2014
```

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## Platform Notes (Continued)

```
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 E5-2697 v2 @ 2.70GHz
      2 "physical id"s (chips)
      24 "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  : 12
      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:       264653964 kB
   HugePages_Total:       0
   Hugepagesize:       2048 kB

/usr/bin/lsb_release -d
   Red Hat Enterprise Linux Server release 6.4 (Santiago)

From /etc/*release* /etc/*version*
   redhat-release: Red Hat Enterprise Linux Server release 6.4 (Santiago)
   system-release: Red Hat Enterprise Linux Server release 6.4 (Santiago)
   system-release-cpe: cpe:/o:redhat:enterprise_linux:6server:ga:server

uname -a:
   Linux x3650M4HD 2.6.32-358.el6.x86_64 #1 SMP Tue Jan 29 11:47:41 EST 2013
   x86_64 x86_64 x86_64 GNU/Linux

run-level 3 Aug 29 10:32

SPEC is set to: /home/SPECcpu-20140116-ic14.0
   Filesystem     Type    Size  Used Avail Use% Mounted on
   /dev/mapper/vg_x3650m4plus-lv_home
                  ext4    309G  222G   71G  76% /home

Additional information from dmidecode:
  BIOS IBM -[VVE141DUS-1.73]- 07/31/2014
  Memory:
   8x Not Specified Not Specified
   16x Samsung M393B2G70QH0-CMA 16 GB 1867 MHz 2 rank

(End of data from sysinfo program)
```

## General Notes

```
Environment variables set by runspec before the start of the run:
KMP_AFFINITY = "granularity=fine,compact,0,1"
LD_LIBRARY_PATH = "/home/SPECcpu-20140116-ic14.0/libs/32:/home/SPECcpu-20140116-ic14.0/libs/64:/home/SPECcpu-20140116-ic14.0/sh"
OMP_NUM_THREADS = "24"

 Binaries compiled on a system with 1x Core i7-860 CPU + 8GB
 memory using RedHat EL 6.4
 Transparent Huge Pages enabled with:
 echo always > /sys/kernel/mm/redhat_transparent_hugepage/enabled
 runspec command invoked through numactl i.e.:
 numactl --interleave=all runspec <etc>
```

## 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
    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:
`-xAVX -ipo -O3 -no-prec-div -parallel -opt-prefetch -ansi-alias`

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

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

Benchmarks using both Fortran and C:
`-xAVX -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

## Peak Optimization Flags

C benchmarks:

433.milc: `-xAVX`(pass 2) `-prof-gen`(pass 1) `-ipo`(pass 2) `-O3`(pass 2) `-no-prec-div`(pass 2) `-prof-use`(pass 2) `-auto-ilp32` `-ansi-alias`

470.lbm: `basepeak = yes`

482.sphinx3: `-xAVX -ipo -O3 -no-prec-div -unroll2 -ansi-alias -parallel`

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# Peak Optimization Flags (Continued)

C++ benchmarks:

444.namd: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -fno-alias -auto-ilp32

447.dealII: basepeak = yes

450.soplex: basepeak = yes

453.povray: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll4 -ansi-alias

Fortran benchmarks:

410.bwaves: basepeak = yes

416.gamess: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2 -inline-level=0 -scalar-rep-

434.zeusmp: basepeak = yes

437.leslie3d: basepeak = yes

459.GemsFDTD: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -prof-use(pass 2) -unroll2 -inline-level=0 -opt-prefetch -parallel

465.tonto: -xAVX(pass 2) -prof-gen(pass 1) -ipo(pass 2) -O3(pass 2) -no-prec-div(pass 2) -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: -xAVX -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-ic14.0-official-linux64.20140128.html
http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-IVB-B.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/Intel-ic14.0-official-linux64.20140128.xml
http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-IVB-B.xml

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