SPEC® CFP2006 Result

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IBM Corporation

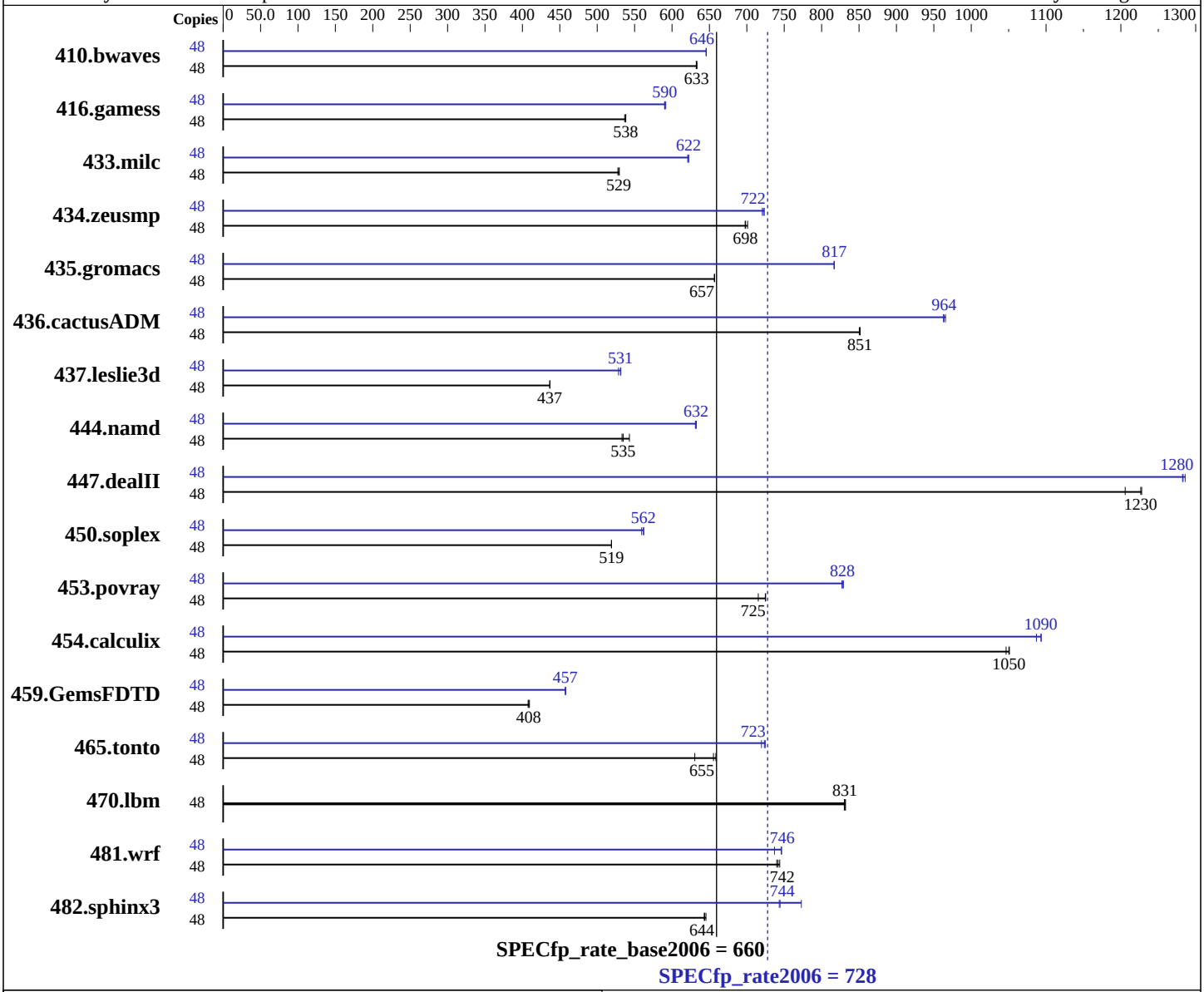
IBM System x3755 M3
(AMD Opteron 6344, 2.60 GHz)

SPECfp®_rate2006 = 728

SPECfp_rate_base2006 = 660

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

Test date: Aug-2014
Hardware Availability: Dec-2013
Software Availability: Aug-2012



Hardware

CPU Name:	AMD Opteron 6344
CPU Characteristics:	AMD Turbo CORE technology up to 3.20 GHz
CPU MHz:	2600
FPU:	Integrated
CPU(s) enabled:	48 cores, 4 chips, 12 cores/chip
CPU(s) orderable:	2,4 chips

Continued on next page

Software

Operating System:	Red Hat Enterprise Linux Server release 6.4 (Santiago) 2.6.32-358.el6.x86_64
Compiler:	C/C++/Fortran: Version 4.5.2 of x86 Open64 Compiler Suite (from AMD)
Auto Parallel:	No
File System:	ext4
System State:	Run level 3 (multi-user)
Base Pointers:	64-bit

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Primary Cache: 384 KB I on chip per chip, 64 KB I shared / 2 cores; 16 KB D on chip per core
Secondary Cache: 12 MB I+D on chip per chip, 2 MB shared / 2 cores
L3 Cache: 16 MB I+D on chip per chip, 8 MB shared / 6 cores
Other Cache: None
Memory: 512 GB (32 x 16 GB 2Rx4 PC3-14900R-13, ECC, running at 1600 MHz)
Disk Subsystem: 1 x 600 GB SAS, 15000 RPM
Other Hardware: None

Peak Pointers: 32/64-bit
Other Software: None

Results Table

Benchmark	Base							Peak						
	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio	Copies	Seconds	Ratio	Seconds	Ratio	Seconds	Ratio
410.bwaves	48	1031	632	1030	633	**1031**	**633**	48	**1010**	**646**	1010	646	1010	646
416.gamess	48	1746	538	**1747**	**538**	1751	537	48	**1592**	**590**	1593	590	1589	592
433.milc	48	832	530	835	528	**833**	**529**	48	**708**	**622**	708	622	710	621
434.zeusmp	48	623	701	**626**	**698**	626	698	48	604	723	**605**	**722**	606	721
435.gromacs	48	522	657	**522**	**657**	522	657	48	420	817	**420**	**817**	419	817
436.cactusADM	48	**674**	**851**	675	850	674	851	48	594	966	596	963	**595**	**964**
437.leslie3d	48	1033	437	**1033**	**437**	1033	437	48	**850**	**531**	849	532	854	528
444.namd	48	722	533	**720**	**535**	709	543	48	610	631	609	632	**609**	**632**
447.dealII	48	**448**	**1230**	455	1210	447	1230	48	427	1290	428	1280	**428**	**1280**
450.soplex	48	771	519	771	519	**771**	**519**	48	**713**	**562**	716	559	712	562
453.povray	48	352	725	357	715	**352**	**725**	48	309	827	**308**	**828**	308	829
454.calculix	48	378	1050	377	1050	**377**	**1050**	48	**362**	**1090**	364	1090	362	1090
459.GemsFDTD	48	**1247**	**408**	1244	409	1249	408	48	1113	457	1112	458	**1113**	**457**
465.tonto	48	717	659	**721**	**655**	749	630	48	656	720	652	725	**653**	**723**
470.lbm	48	**793**	**831**	793	832	794	830	48	**793**	**831**	793	832	794	830
481.wrf	48	721	744	**723**	**742**	725	740	48	**719**	**746**	718	747	728	737
482.sphinx3	48	1450	645	**1454**	**644**	1455	643	48	1210	773	1259	743	**1257**	**744**

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

Submit Notes

```
The config file option 'submit' was used.
'numactl' was used to bind copies to the cores.
See the configuration file for details.
```

Operating System Notes

```
'ulimit -s unlimited' was used to set environment stack size
'ulimit -l 2097152'  was used to set environment locked pages in memory limit
```

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Operating System Notes (Continued)

```
Set transparent_hugepage=never as a boot parameter in /boot/grub/menu.lst

Set vm/nr_hugepages=43008 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

Platform Notes

```
 BIOS setting:
 Operating Mode set to Performance
 Sysinfo program /home/SPECcpu-20120821-amd1206/Docs/sysinfo-rev6818
 $Rev: 6818 $ $Date:: 2012-07-17 #$ 5569a0425e2ad530534e4c79a46e4d28
 running on x3755M3 Thu Aug 14 19:08:09 2014

 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 : AMD Opteron(tm) Processor 6344
       4 "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 : 6
       siblings  : 12
       physical 0: cores 0 1 2 3 4 5
       physical 1: cores 0 1 2 3 4 5
       physical 2: cores 0 1 2 3 4 5
       physical 3: cores 0 1 2 3 4 5
    cache size : 2048 KB

 From /proc/meminfo
    MemTotal:       529379188 kB
    HugePages_Total:   43008
    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 x3755M3 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 12 16:16
```

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Platform Notes (Continued)

```
 SPEC is set to: /home/SPECcpu-20120821-amd1206
    Filesystem     Type    Size  Used Avail Use% Mounted on
    /dev/mapper/VolGroup-lv_root
                   ext4    546G  151G  368G  30% /

 Additional information from dmidecode:
   BIOS American Megatrends Inc. -[AYE167AUS-1.14]- 10/14/2013
   Memory:
    32x   16 GB
    32x Samsung M393B2G70BH0- 16 GB 1866 MHz 2 rank

 (End of data from sysinfo program)
The sysinfo-rev6818 used in this submission has an issue parsing the dmidecode
output with "Memory Device Mapped Address" lines. The additional "32x 16 GB"
in the sysinfo section above are not actual memory DIMMs and can be ignored.
```

General Notes

```
Environment variables set by runspec before the start of the run:
LD_LIBRARY_PATH = "/home/SPECcpu-20120821-amd1206/amd1206-rate-libs-revA/32:/home/SPECcpu-20120821-amd1206/amd1206-rate-libs-revA/64"

The x86 Open64 Compiler Suite is only available from (and supported by) AMD at
http://developer.amd.com/cpu/open64

Binaries were compiled on a system with 2x AMD Opteron 6386SE chips + 128GB Memory using RHEL 6.3
```

Base Compiler Invocation

C benchmarks:
opencc

C++ benchmarks:
openCC

Fortran benchmarks:
openf95

Benchmarks using both Fortran and C:
opencc openf95

Base Portability Flags

410.bwaves: -DSPEC_CPU_LP64
416.gamess: -DSPEC_CPU_LP64
433.milc: -DSPEC_CPU_LP64
434.zeusmp: -DSPEC_CPU_LP64

Continued on next page

Base Portability Flags (Continued)

435.gromacs: -DSPEC_CPU_LP64
436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore
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
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LP64
-fno-second-underscore
482.sphinx3: -DSPEC_CPU_LP64

Base Optimization Flags

C benchmarks:
-Ofast -OPT:malloc_alg=1 -HP:bd=2m:heap=2m -IPA:plimit=8000
-IPA:small_pu=100 -mso -march=bdver1

C++ benchmarks:
-Ofast -static -CG:load_exe=0 -OPT:malloc_alg=1 -INLINE:aggressive=on
-HP:bd=2m:heap=2m -D__OPEN64_FAST_SET -march=bdver1

Fortran benchmarks:
-Ofast -LNO:blocking=off -LNO:simd_peel_align=on -OPT:rsqrt=2
-OPT:unroll_size=256 -HP:bd=2m:heap=2m -mso -march=bdver1

Benchmarks using both Fortran and C:
-Ofast -OPT:malloc_alg=1 -HP:bd=2m:heap=2m -IPA:plimit=8000
-IPA:small_pu=100 -mso -march=bdver1 -LNO:blocking=off
-LNO:simd_peel_align=on -OPT:rsqrt=2 -OPT:unroll_size=256

Peak Compiler Invocation

C benchmarks:
opencc

C++ benchmarks:
openCC

Fortran benchmarks:
openf95

Continued on next page

Peak Compiler Invocation (Continued)

Benchmarks using both Fortran and C:
opencc openf95

Peak 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
436.cactusADM: -DSPEC_CPU_LP64 -fno-second-underscore
437.leslie3d: -DSPEC_CPU_LP64
444.namd: -DSPEC_CPU_LP64
453.povray: -DSPEC_CPU_LP64
454.calculix: -DSPEC_CPU_LP64
459.GemsFDTD: -DSPEC_CPU_LP64
465.tonto: -DSPEC_CPU_LP64
470.lbm: -DSPEC_CPU_LP64
481.wrf: -DSPEC_CPU_LINUX -DSPEC_CPU_CASE_FLAG -DSPEC_CPU_LP64
-fno-second-underscore

Peak Optimization Flags

C benchmarks:

433.milc: -Ofast -CG:movnti=1 -CG:locs_best=on -HP:bdt=2m:heap=2m
-IPA:plimit=7000 -IPA:callee_limit=1200
-OPT:struct_array_copy=2 -OPT:alias=field_sensitive -mso
-march=bdver1

470.lbm: basepeak = yes

482.sphinx3: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
-m32 -IPA:plimit=1000 -OPT:malloc_alg=2 -CG:cmp_peep=on
-CG:p2align=0 -CG:load_exe=1 -CG:dsched=on
-INLINE:aggressive=on -LNO:prefetch=2 -LNO:prefetch_ahead=4
-mso -march=bdver2

C++ benchmarks:

444.namd: -Ofast -IPA:plimit=3000 -LNO:ignore_feedback=off
-CG:local_sched_alg=0 -CG:load_exe=0 -OPT:unroll_size=256
-fno-exceptions -HP:bdt=2m:heap=2m -LNO:if_select_conv=1
-OPT:alias=disjoint -LNO:psimd_iso_unroll=ON -march=bdver1

Continued on next page

Peak Optimization Flags (Continued)

447.dealII: -Ofast -D__OPEN64_FAST_SET -static -INLINE:aggressive=on
-LNO:opt=1 -LNO:simd=2 -fno-emit-exceptions -m32
-OPT:unroll_times_max=8 -OPT:unroll_size=256
-OPT:unroll_level=2 -HP:bdt=2m:heap=2m -GRA:unspill=on
-CG:cmp_peep=on -CG:movext_icmp=off -TENV:frame_pointer=off
-march=bdver1

450.soplex: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -O3
-LNO:ignore_feedback=off -INLINE:aggressive=on -OPT:RO=1
-OPT:IEEE_arith=3 -OPT:IEEE_NaN_Inf=off
-OPT:fold_unsigned_relops=on -fno-exceptions -CG:p2align=0
-m32 -mno-fma4 -HP:bdt=2m:heap=2m -WOPT:sib=on
-march=bdver1

453.povray: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
-CG:pre_local_sched=off -CG:p2align=0 -CG:p2align_split=on
-CG:dsched=on -INLINE:aggressive=on -HP:bd=2m:heap=2m
-OPT:transform=2 -OPT:alias=disjoint -WOPT:aggcm=0
-march=bdver2

Fortran benchmarks:

410.bwaves: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
-OPT:Ofast -OPT:treeheight=on -LNO:blocking=off
-LNO:ignore_feedback=off -LNO:fu=4 -LNO:loop_model_simd=on
-LNO:simd_rm_unity_remainder=on -WOPT:aggstr=0
-HP:bdt=2m:heap=2m -CG:cmp_peep=on -march=bdver1

416.gamess: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
-LNO:fu=6 -LNO:blocking=0 -LNO:simd=2 -OPT:ro=3
-OPT:recip=on -CG:local_sched_alg=1 -HP:bdt=2m:heap=2m
-WOPT:sib=on -march=bdver1

434.zeusmp: -fb_create fbdata(pass 1) -fb_opt fbdata(pass 2) -Ofast
-LNO:blocking=off -LNO:interchange=off -IPA:plimit=1500
-HP:bdt=2m:heap=2m -march=bdver1

437.leslie3d: -Ofast -CG:pre_minreg_level=2 -LNO:simd=0 -LNO:fusion=2
-HP:bdt=2m:heap=2m -mso -march=bdver1

459.GemsFDTD: -Ofast -IPA:plimit=1500 -OPT:unroll_size=1024
-OPT:unroll_times_max=16 -LNO:fission=2
-CG:local_sched_alg=2 -HP -march=bdver1

465.tonto: -Ofast -OPT:alias=no_f90_pointer_alias -LNO:blocking=off
-CG:load_exe=1 -CG:local_sched_alg=3 -IPA:plimit=525
-HP:bdt=2m:heap=2m -march=bdver1

Benchmarks using both Fortran and C:

Continued on next page

Peak Optimization Flags (Continued)

435.gromacs: `-Ofast -OPT:rsqrt=2 -HP:bdt=2m:heap=2m -CG:local_sched_alg=2 -CG:load_exe=3 -GRA:unspill=on -march=bdver1 -LNO:simd=3`

436.cactusADM: `-fb_create fbdata`(pass 1) `-fb_opt fbdata`(pass 2) `-Ofast -LNO:blocking=off -LNO:prefetch=2 -LNO:pf2=0 -LNO:prefetch_ahead=4 -HP -CG:locs_shallow_depth=1 -CG:load_exe=0 -CG:dsched=on -WOPT:sib=on -march=bdver1`

454.calculix: `-Ofast -OPT:unroll_size=256 -OPT:alias=disjoint -GRA:optimize_boundary=on -CG:dsched=on -HP:bdt=2m:heap=2m -march=bdver1`

481.wrf: `-Ofast -LNO:blocking=off -LANG:copyinout=off -IPA:callee_limit=5000 -GRA:prioritize_by_density=on -HP -WOPT:sib=on -march=bdver1`

The flags files that were used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/x86-open64-452-flags-rate-revA-III.html
http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-AMD-A.html

You can also download the XML flags sources by saving the following links:
http://www.spec.org/cpu2006/flags/x86-open64-452-flags-rate-revA-III.xml
http://www.spec.org/cpu2006/flags/IBM-Platform-Flags-V1.2-AMD-A.xml

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