# SPEC® CFP2006 Result

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## ASUSTeK Computer Inc.

(Test Sponsor: Advanced Micro Devices)

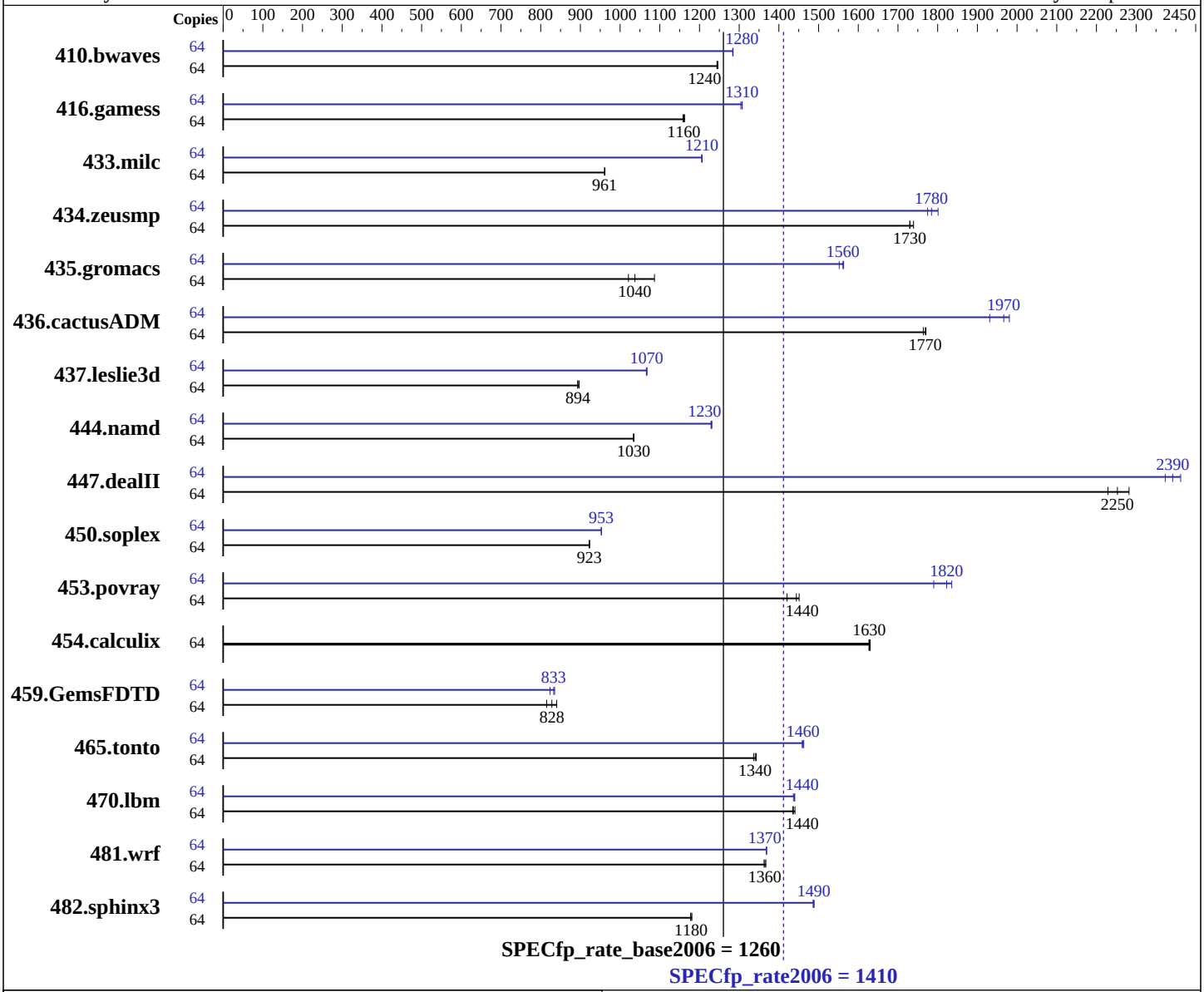
Asus RS700A-E9,
AMD EPYC 7351

**SPECfp®_rate2006 = 1410**

**SPECfp_rate_base2006 = 1260**

**CPU2006 license:** 49
**Test sponsor:** Advanced Micro Devices
**Tested by:** Advanced Micro Devices

**Test date:** Jul-2017
**Hardware Availability:** Sep-2017
**Software Availability:** Apr-2016




## Hardware

| | |
|---|---|
| CPU Name: | AMD EPYC 7351 |
| CPU Characteristics: | AMD Turbo CORE technology up to 2.90 GHz |
| CPU MHz: | 2400 |
| FPU: | Integrated |
| CPU(s) enabled: | 32 cores, 2 chips, 16 cores/chip, 2 threads/core |
| CPU(s) orderable: | 1,2 chips |
| Primary Cache: | 64 KB I + 32 KB D on chip per core |
| Secondary Cache: | 512 KB I+D on chip per core |

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## Software

| | |
|---|---|
| Operating System: | Ubuntu 16.04.2 LTS,<br>Kernel 4.4.0-87-generic |
| Compiler: | C/C++/Fortran: Version 4.5.2.1 of x86 Open64 Compiler Suite (from AMD) |
| Auto Parallel: | No |
| File System: | ext4 |
| System State: | Run level 3 (Full multiuser with network) |
| Base Pointers: | 64-bit |
| Peak Pointers: | 32/64-bit |

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**Test date:** Jul-2017
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L3 Cache: 64 MB I+D on chip per chip, 8 MB shared / 2 cores
Other Cache: None
Memory: 512 GB (16 x 32 GB 2Rx4 PC4-2667V-R, running at 2400)
Disk Subsystem: 1 x 1 TB SSD
Other Hardware: None

Other Software: None

## Results Table

| Benchmark | Base | | | | | | | Peak | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio | Copies | Seconds | Ratio | Seconds | Ratio | Seconds | Ratio |
| 410.bwaves | 64 | 698 | 1250 | **699** | **1240** | 699 | 1240 | 64 | **677** | **1280** | 677 | 1280 | 678 | 1280 |
| 416.gamess | 64 | 1078 | 1160 | **1080** | **1160** | 1082 | 1160 | 64 | **959** | **1310** | 961 | 1300 | 958 | 1310 |
| 433.milc | 64 | 611 | 962 | **611** | **961** | 612 | 961 | 64 | 487 | 1210 | **487** | **1210** | 487 | 1210 |
| 434.zeusmp | 64 | 337 | 1730 | 335 | 1740 | **337** | **1730** | 64 | 328 | 1770 | 323 | 1800 | **326** | **1780** |
| 435.gromacs | 64 | 421 | 1090 | **441** | **1040** | 448 | 1020 | 64 | 292 | 1560 | 294 | 1550 | **293** | **1560** |
| 436.cactusADM | 64 | **432** | **1770** | 434 | 1760 | 432 | 1770 | 64 | 386 | 1980 | **389** | **1970** | 396 | 1930 |
| 437.leslie3d | 64 | 671 | 897 | **673** | **894** | 674 | 893 | 64 | 564 | 1070 | 563 | 1070 | **564** | **1070** |
| 444.namd | 64 | 496 | 1030 | **496** | **1030** | 497 | 1030 | 64 | 418 | 1230 | **417** | **1230** | 417 | 1230 |
| 447.dealII | 64 | 328 | 2230 | **325** | **2250** | 321 | 2280 | 64 | 308 | 2370 | **306** | **2390** | 304 | 2410 |
| 450.soplex | 64 | 579 | 922 | 578 | 923 | **579** | **923** | 64 | **560** | **953** | 560 | 953 | 560 | 953 |
| 453.povray | 64 | **236** | **1440** | 240 | 1420 | 235 | 1450 | 64 | 185 | 1840 | 190 | 1790 | **187** | **1820** |
| 454.calculix | 64 | 324 | 1630 | 325 | 1630 | **324** | **1630** | 64 | 324 | 1630 | 325 | 1630 | **324** | **1630** |
| 459.GemsFDTD | 64 | 808 | 840 | 833 | 815 | **820** | **828** | 64 | 813 | 835 | 825 | 823 | **815** | **833** |
| 465.tonto | 64 | **470** | **1340** | 471 | 1340 | 469 | 1340 | 64 | **431** | **1460** | 431 | 1460 | 432 | 1460 |
| 470.lbm | 64 | 610 | 1440 | 613 | 1440 | **612** | **1440** | 64 | **611** | **1440** | 612 | 1440 | 611 | 1440 |
| 481.wrf | 64 | 525 | 1360 | **524** | **1360** | 523 | 1370 | 64 | **522** | **1370** | 522 | 1370 | 522 | 1370 |
| 482.sphinx3 | 64 | 1059 | 1180 | **1058** | **1180** | 1056 | 1180 | 64 | **838** | **1490** | 838 | 1490 | 839 | 1490 |

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

runspec command invoked through numactl i.e.:
numactl --interleave=all runspec <etc>

Set dirty_ratio=8 to limit dirty cache to 8% of memory
```

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## Operating System Notes (Continued)

```
Set swappiness=1 to swap only if necessary
Set zone_reclaim_mode=1 to free local node memory and avoid remote memory
sync then drop_caches=3 to reset caches before invoking runcpu

Transparent huge pages were enabled for this run (OS default)

Set vm/nr_hugepages=57344 in /etc/sysctl.conf
mount -t hugetlbfs nodev /mnt/hugepages
```

## Platform Notes

```
The Linux run level was 3; sysinfo run-level is incorrect.
The dmidecode memory speed information is incorrect.
```

## General Notes

```
Environment variables set by runspec before the start of the run:
HUGETLB_LIMIT = "896"
LD_LIBRARY_PATH = "/root/work/cpu2006/amd1603-rate-libs-revA/32:/root/work/cpu2006/amd1603-rate-libs-revA/64"

The binaries were built with the AMD supported x86 Open64 Compiler Suite,
which is only available from AMD at
http://developer.amd.com/tools-and-sdks/cpu-development/x86-open64-compiler-suite/
Binaries were compiled on a system with 2x AMD Opteron 6378 chips + 128GB Memory using RHEL 6.3

Submitted_by: "Smith, Van" <Van.Smith@amd.com>
Submitted: Mon Aug  7 23:29:02 EDT 2017
Submission: cpu2006-20170807-48150.sub
```

# 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
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 -mno-fma4 -mno-xop -mno-tbm -WB, -Wl, -z,muldefs

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=bdver2 -mno-fma4 -mno-xop -mno-tbm -WB, -Wl, -z,muldefs

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 -mno-fma4 -mno-xop -mno-tbm -WB, -Wl, -z,muldefs

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 -mno-fma4 -mno-xop -mno-tbm -WB, -Wl, -z,muldefs -LNO:blocking=off -LNO:simd_peel_align=on -OPT:rsqrt=2 -OPT:unroll_size=256

## Peak Compiler Invocation

C benchmarks:
opencc

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## Peak Compiler Invocation (Continued)

C++ benchmarks:
openCC

Fortran benchmarks:
openf95

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 -mno-fma4

470.lbm: -Ofast -CG:cmp_peep=on -OPT:keep_ext=on -HP:bdt=2m:heap=2m
-IPA:plimit=8000 -IPA:small_pu=100 -march=bdver1 -mno-fma4
-mso

482.sphinx3: -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 -WB, -mno-fma4 -mno-tbm -mno-xop

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## Peak Optimization Flags (Continued)

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=bdver2
-mno-fma4 -WB, -mno-xop -mno-tbm

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 -mno-fma4

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 -mno-fma4 -WB, -mno-xop -mno-tbm -Wl,
-z,muldefs

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=bdver2 -mno-fma4

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 -mno-fma4

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=bdver2 -mno-fma4

437.leslie3d: -Ofast -CG:pre_minreg_level=2 -LNO:simd=0 -LNO:fusion=2
-HP:bdt=2m:heap=2m -mso -march=bdver1 -mno-fma4

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## Peak Optimization Flags (Continued)

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 -mno-fma4`

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=bdver2 -WB, -mno-fma4 -mno-tbm -mno-xop`

Benchmarks using both Fortran and C:

435.gromacs: `-Ofast -OPT:rsqrt=2 -HP:bdt=2m:heap=2m -CG:local_sched_alg=2 -CG:load_exe=3 -GRA:unspill=on -march=bdver2 -mno-fma4 -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=bdver2 -mno-fma4`

454.calculix: `basepeak = yes`

481.wrf: `-Ofast -LNO:blocking=off -LANG:copyinout=off -IPA:callee_limit=5000 -GRA:prioritize_by_density=on -HP -WOPT:sib=on -march=bdver1 -mno-fma4`

The flags file that was used to format this result can be browsed at
http://www.spec.org/cpu2006/flags/x86-openflags-rate-revA-I.html

You can also download the XML flags source by saving the following link:
http://www.spec.org/cpu2006/flags/x86-openflags-rate-revA-I.xml


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

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