

```
1. //  
2. // AppDelegate.h  
3. // Hola1  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates localized nibs.  
10. //  
11.  
12. #import <UIKit/UIKit.h>  
13.  
14. @class ViewController;  
15.  
16. @interface AppDelegate : UIResponder <UIApplicationDelegate>  
17.  
18. @property (strong, nonatomic) UIWindow *window;  
19.  
20. @property (strong, nonatomic) ViewController *viewController;  
21.  
22. @end
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10. //  
11.  
12. #import "AppDelegate.h"  
13. #import "ViewController.h"  
14.  
15. @implementation AppDelegate  
16.  
17. - (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions  
18. {  
19.     self.window = [[UIWindow alloc] initWithFrame:[[UIScreen mainScreen] bounds]];  
20.     self.viewController = [[ViewController alloc] initWithNibName:@"ViewController" bundle:nil];  
21.     self.window.rootViewController = self.viewController;  
22.     [self.window makeKeyAndVisible];  
23.     return YES;  
24. }  
25.  
26. @end
```

```
1. //
2. // main.m
3. // Holal
4. //
5. //
6. // David J. Malan
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11. //
12.
13. #import <UIKit/UIKit.h>
14.
15. #import "AppDelegate.h"
16.
17. int main(int argc, char *argv[])
18. {
19.     @autoreleasepool {
20.         return UIApplicationMain(argc, argv, nil, NSStringFromClass([AppDelegate class]));
21.     }
22. }
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10. //
11.
12. #import "ViewController.h"
13.
14. @implementation ViewController
15. @end
```

```
1. //  
2. // AppDelegate.h  
3. // Hola2  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates localized strings.  
10. //  
11.  
12. #import <UIKit/UIKit.h>  
13.  
14. @class ViewController;  
15.  
16. @interface AppDelegate : UIResponder <UIApplicationDelegate>  
17.  
18. @property (strong, nonatomic) ViewController *viewController;  
19. @property (strong, nonatomic) UIWindow *window;  
20.  
21. @end
```

```
1. //  
2. // AppDelegate.m  
3. // Hola2  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates localized strings.  
10. //  
11.  
12. #import "AppDelegate.h"  
13. #import "ViewController.h"  
14.  
15. @implementation AppDelegate  
16.  
17. - (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions  
18. {  
19.     self.window = [[UIWindow alloc] initWithFrame:[[UIScreen mainScreen] bounds]];  
20.     self.viewController = [[ViewController alloc] initWithNibName:@"ViewController" bundle:nil];  
21.     self.window.rootViewController = self.viewController;  
22.     [self.window makeKeyAndVisible];  
23.     return YES;  
24. }  
25.  
26. @end
```

```
1. //
2. // main.m
3. // Hola2
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6. // Harvard University
7. // malan@harvard.edu
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12.
13. #import <UIKit/UIKit.h>
14.
15. #import "AppDelegate.h"
16.
17. int main(int argc, char *argv[])
18. {
19.     @autoreleasepool {
20.         return UIApplicationMain(argc, argv, nil, NSStringFromClass([AppDelegate class]));
21.     }
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5. // David J. Malan
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8. //
9. // Demonstrates localized strings.
10. //
11.
12. #import "ViewController.h"
13.
14. @interface ViewController : UIViewController
15. @property (nonatomic, readwrite, weak) IBOutlet UILabel *label;
16. @end
17.
18. @implementation ViewController
19.
20. - (void)viewDidLoad
21. {
22.     [super viewDidLoad];
23.
24.     // localize greeting
25.     self.label.text = NSLocalizedString(@"GREETING", nil);
26. }
27.
28. @end
```

```
1. //  
2. // AppDelegate.h  
3. // Paddle  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates Core Graphics with a rectangle.  
10. //  
11.  
12. #import <UIKit/UIKit.h>  
13.  
14. @class ViewController;  
15.  
16. @interface AppDelegate : UIResponder <UIApplicationDelegate>  
17.  
18. @property (strong, nonatomic) ViewController *viewController;  
19. @property (strong, nonatomic) UIWindow *window;  
20.  
21. @end
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12. #import "AppDelegate.h"  
13. #import "ViewController.h"  
14.  
15. @implementation AppDelegate  
16.  
17. - (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions  
18. {  
19.     self.window = [[UIWindow alloc] initWithFrame:[[UIScreen mainScreen] bounds]];  
20.     self.viewController = [[ViewController alloc] initWithNibName:@"ViewController" bundle:nil];  
21.     self.window.rootViewController = self.viewController;  
22.     [self.window makeKeyAndVisible];  
23.     return YES;  
24. }  
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```
1. //
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12. #import <UIKit/UIKit.h>
13.
14. #import "AppDelegate.h"
15.
16. int main(int argc, char *argv[])
17. {
18.     @autoreleasepool {
19.         return UIApplicationMain(argc, argv, nil, NSStringFromClass([AppDelegate class]));
20.     }
21. }
```

```
1. //
2. //  PaddleView.h
3. //  Paddle
4. //
5. //  David J. Malan
6. //  Harvard University
7. //  malan@harvard.edu
8. //
9. //  Demonstrates Core Graphics with a rectangle.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @interface PaddleView : UIView
15. @end
```

```
1. //
2. //  PaddleView.m
3. //  Paddle
4. //
5. //  David J. Malan
6. //  Harvard University
7. //  malan@harvard.edu
8. //
9. //  Demonstrates Core Graphics with a rectangle.
10. //
11.
12. #import "PaddleView.h"
13.
14. @implementation PaddleView
15.
16. - (void)drawRect:(CGRect)rect
17. {
18.     CGRect square = CGRectMake(0.0f, 0.0f, 10.0f, 60.0f);
19.     [[UIColor whiteColor] set];
20.     UIRectFill(square);
21. }
22.
23. @end
```

```
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9. // Demonstrates Core Graphics with a rectangle.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @interface ViewController : UIViewController
15. @end
```

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8. //  
9. // Demonstrates Core Graphics with a rectangle.  
10. //  
11.  
12. #import "ViewController.h"  
13. #import "PaddleView.h"  
14.  
15.  
16. @interface ViewController()  
17.  
18. // private property  
19. @property (nonatomic, retain) PaddleView *paddleView;  
20.  
21. @end  
22.  
23.  
24. @implementation ViewController  
25.  
26. - (id)initWithNibName:(NSString *)NibNameOrNil bundle:(NSBundle *)bundleOrNil  
27. {  
28.     if (self = [super initWithNibNameNibNameOrNil bundle:bundleOrNil])  
29.     {  
30.         // add paddle  
31.         self.paddleView = [[PaddleView alloc] initWithFrame:CGRectMake(10.0f, 10.0f, 10.0f, 60.0f)];  
32.         [self.view addSubview:self.paddleView];  
33.     }  
34.     return self;  
35. }  
36.  
37. - (void)touchesMoved:(NSSet *)touches withEvent:(UIEvent *)event  
38. {  
39.     // follow user's finger vertically with paddle  
40.     UITouch *touch = [[event allTouches] anyObject];  
41.     CGPoint location = [touch locationInView:self.view];  
42.     self.paddleView.center = CGPointMake(self.paddleView.center.x, location.y);  
43. }  
44.  
45. @end
```

```
1. //  
2. // AppDelegate.h  
3. // Pong  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates Core Graphics.  
10. // Inspired by iTennis by Brandon Trebitowski.  
11. //  
12.  
13. #import <UIKit/UIKit.h>  
14.  
15. @class ViewController;  
16.  
17. @interface AppDelegate : UIResponder <UIApplicationDelegate>  
18.  
19. @property (strong, nonatomic) ViewController *viewController;  
20. @property (strong, nonatomic) UIWindow *window;  
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13. #import "AppDelegate.h"  
14. #import "ViewController.h"  
15.  
16. @implementation AppDelegate  
17.  
18. - (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions  
19. {  
20.     self.window = [[UIWindow alloc] initWithFrame:[[UIScreen mainScreen] bounds]];  
21.     self.viewController = [[ViewController alloc] initWithNibName:@"ViewController" bundle:nil];  
22.     self.window.rootViewController = self.viewController;  
23.     [self.window makeKeyAndVisible];  
24.     return YES;  
25. }  
26.  
27. - (void)applicationWillResignActive:(UIApplication *)application  
28. {  
29.     [self.viewController kickoff];  
30. }  
31.  
32. @end
```

```
1. //
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3. //  Pong
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12.
13. #import <UIKit/UIKit.h>
14.
15. #import "AppDelegate.h"
16.
17. int main(int argc, char *argv[])
18. {
19.     @autoreleasepool {
20.         return UIApplicationMain(argc, argv, nil, NSStringFromClass([AppDelegate class]));
21.     }
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```

```
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8. //
9. //  Demonstrates Core Graphics.
10. // Inspired by iTennis by Brandon Trebitowski.
11. //
12.
13. #import <UIKit/UIKit.h>
14.
15. @interface PongView : UIView
16. @end
```

```
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9. //  Demonstrates Core Graphics.
10. // Inspired by iTennis by Brandon Trebitowski.
11. //
12.
13. #import "PongView.h"
14.
15. @implementation PongView
16.
17. - (void)drawRect:(CGRect)rect
18. {
19.     // get context
20.     CGContextRef context = UIGraphicsGetCurrentContext();
21.
22.     // draw dashed midfield line
23.     CGFloat dashes[] = {1,1};
24.     CGContextSetLineDash(context, 0.0, dashes, 2);
25.     CGContextSetStrokeColorWithColor(context, [UIColor whiteColor].CGColor);
26.     CGContextSetLineWidth(context, 5.0f);
27.     CGContextMoveToPoint(context, 240.0f, 0.0f);
28.     CGContextAddLineToPoint(context, 240.0f, 320.0f);
29.     CGContextStrokePath(context);
30. }
31.
32. @end
```

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12.
13. #import <UIKit/UIKit.h>
14.
15. @interface ViewController : UIViewController
16. - (void)kickoff;
17. @end
```

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8. //  
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10. // Inspired by iTennis by Brandon Trebitowski.  
11. //  
12.  
13. #import "ViewController.h"  
14.  
15.  
16. // default velocity  
17. static const float VELOCITY = 10.0f;  
18.  
19.  
20. @interface ViewController () {  
21. @private  
22. CGPoint _velocity;  
23. }  
24.  
25. // private properties  
26. @property (nonatomic, readwrite, weak) IBOutlet UIImageView *ball;  
27. @property (nonatomic, readwrite, weak) IBOutlet UILabel *labelLeft;  
28. @property (nonatomic, readwrite, weak) IBOutlet UILabel *labelRight;  
29. @property (nonatomic, readwrite, weak) IBOutlet UIImageView *paddleLeft;  
30. @property (nonatomic, readwrite, weak) IBOutlet UIImageView *paddleRight;  
31. @property (assign, nonatomic, readwrite) BOOL paused;  
32. @property (assign, nonatomic, readwrite)NSUInteger scoreLeft;  
33. @property (assign, nonatomic, readwrite) NSUInteger scoreRight;  
34.  
35. @end  
36.  
37.  
38. @implementation ViewController  
39.  
40. - (id)initWithNibName:(NSString *)NibNameOrNil bundle:(NSBundle *)nibBundleOrNil  
41. {  
42.     if (self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil])  
43.     {  
44.         // initialize scores  
45.         self.scoreLeft = 0;  
46.         self.scoreRight = 0;  
47.  
48.         // initialize ball's velocity
```

```
49.     _velocity = CGPointMake(VELOCITY, VELOCITY);
50.
51.     // schedule movement
52.     [NSTimer scheduledTimerWithTimeInterval:0.05 target:self selector:@selector(play) userInfo:nil repeats:YES];
53. }
54. return self;
55. }
56.
57. - (void)kickoff
58. {
59.     // pause
60.     self.paused = YES;
61.
62.     // update scores
63.     self.labelLeft.text = [NSString stringWithFormat:@"%u", self.scoreLeft];
64.     self.labelRight.text = [NSString stringWithFormat:@"%u", self.scoreRight];
65.
66.     // center ball
67.     self.ball.center = CGPointMake(240.0f, 160.0f);
68.
69.     // align paddles
70.     self.paddleLeft.center = CGPointMake(25.0f, 160.0f);
71.     self.paddleRight.center = CGPointMake(455.0f, 160.0f);
72. }
73.
74. - (void)play
75. {
76.     // check whether paused
77.     if (self.paused)
78.         return;
79.
80.     // move ball
81.     self.ball.center = CGPointMake(self.ball.center.x + _velocity.x, self.ball.center.y + _velocity.y);
82.
83.     // detect goals
84.     if (self.ball.center.x < 5) {
85.         self.scoreRight++;
86.         [self kickoff];
87.     }
88.     else if (self.view.bounds.size.width - 5 < self.ball.center.x) {
89.         self.scoreLeft++;
90.         [self kickoff];
91.     }
92.
93.     // bounce off of top and bottom walls
94.     if (self.ball.center.y < 5 || self.view.bounds.size.height - 5 < self.ball.center.y) {
95.         _velocity.y = -_velocity.y;
96.     }
}
```

```
97.
98.    // bounce off of left paddle
99.    if (CGRectIntersectsRect(self.ball.frame, self.paddleLeft.frame)) {
100.        if (self.paddleLeft.center.x < self.ball.center.x) {
101.            _velocity.x = -_velocity.x;
102.        }
103.    }
104.
105.    // bounce off of right paddle
106.    if (CGRectIntersectsRect(self.ball.frame, self.paddleRight.frame)) {
107.        if (self.ball.center.x < self.paddleRight.center.x) {
108.            _velocity.x = -_velocity.x;
109.        }
110.    }
111.
112.    // move opponent as ball approaches
113.    if (_velocity.x < 0) {
114.
115.        // move down
116.        if (self.ball.center.y < self.paddleLeft.center.y) {
117.            self.paddleLeft.center = CGPointMake(self.paddleLeft.center.x, self.paddleLeft.center.y - 10.0f);
118.        }
119.
120.        // move up
121.        else if (self.ball.center.y > self.paddleLeft.center.y) {
122.            self.paddleLeft.center = CGPointMake(self.paddleLeft.center.x, self.paddleLeft.center.y + 10.0f);
123.        }
124.    }
125. }
126.
127. - (void)touchesBegan:(NSSet *)touches withEvent:(UIEvent *)event
128. {
129.     // unpause if paused
130.     if (self.paused)
131.         self.paused = NO;
132. }
133.
134. - (void)touchesMoved:(NSSet *)touches withEvent:(UIEvent *)event
135. {
136.     // follow user's finger vertically with left paddle
137.     UITouch *touch = [[event allTouches] anyObject];
138.     CGPoint location = [touch locationInView:self.view];
139.     self.paddleRight.center = CGPointMake(self.paddleRight.center.x, location.y);
140. }
141.
142. - (void)viewDidAppear:(BOOL)animated
143. {
144.     // play ball!
```

```
145.     [self kickoff];
146. }
147.
148. @end
```

```
1. //
2. // AppDelegate.h
3. // Sqlite
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates SQLite.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @class ViewController;
15.
16. @interface AppDelegate : UIResponder <UIApplicationDelegate>
17.
18. @property (strong, nonatomic) ViewController *viewController;
19. @property (strong, nonatomic) UIWindow *window;
20.
21. @end
```

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3. // Sqlite  
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6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates SQLite.  
10. //  
11.  
12. #import "AppDelegate.h"  
13.  
14. #import "ViewController.h"  
15.  
16. @implementation AppDelegate  
17.  
18. - (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions  
19. {  
20.     self.window = [[UIWindow alloc] initWithFrame:[[UIScreen mainScreen] bounds]];  
21.     self.viewController = [[ViewController alloc] initWithNibName:@"ViewController" bundle:nil];  
22.     self.window.rootViewController = self.viewController;  
23.     [self.window makeKeyAndVisible];  
24.     return YES;  
25. }  
26.  
27. @end
```

```
1. //
2. //  main.m
3. //  Sqlite
4. //
5. //  David J. Malan
6. //  Harvard University
7. //  malan@harvard.edu
8. //
9. //  Demonstrates SQLite.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. #import "AppDelegate.h"
15.
16. int main(int argc, char *argv[])
17. {
18.     @autoreleasepool {
19.         return UIApplicationMain(argc, argv, nil, NSStringFromClass([AppDelegate class]));
20.     }
21. }
```

```
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3. // Sqlite  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates SQLite.  
10. //  
11.  
12. #import <UIKit/UIKit.h>  
13.  
14. @interface ViewController : UIViewController  
15. @end
```

```
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2. // ViewController.m  
3. // Sqlite  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates SQLite.  
10. //  
11.  
12. #import "ViewController.h"  
13. #import "sqlite3.h"  
14.  
15.  
16. @interface ViewController ()  
17.  
18. // private property  
19. @property (nonatomic, readwrite, strong) NSMutableArray *words;  
20.  
21. @end  
22.  
23.  
24. @implementation ViewController  
25.  
26. - (id)initWithNibName:(NSString *)NibNameOrNil bundle:(NSBundle *)bundleOrNil  
27. {  
28.     if (self = [super initWithNibNameNibNameOrNil bundle:bundleOrNil])  
29.     {  
30.         // prepare for words  
31.         self.words = [[NSMutableArray alloc] init];  
32.  
33.         // connect to SQLite database  
34.         sqlite3 *db;  
35.         NSString *path = [[NSBundle mainBundle] pathForResource:@"small" ofType:@"sqlite"];  
36.         sqlite3_open([path UTF8String], &db);  
37.  
38.         // select all words  
39.         NSString *sql = @"SELECT word FROM words";  
40.         sqlite3_stmt *statement;  
41.         sqlite3_prepare_v2(db, [sql UTF8String], -1, &statement, nil);  
42.  
43.         // iterate over results  
44.         while (sqlite3_step(statement) == SQLITE_ROW) {  
45.             char *c = (char *) sqlite3_column_text(statement, 0);  
46.             NSString *s = [[NSString alloc] initWithUTF8String:c];  
47.             [self.words addObject:s];  
48.         }  
}
```

```
49.
50.    // close database
51.    sqlite3_close(db);
52. }
53. return self;
54. }
55.
56. - (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView
57. {
58.     return 1;
59. }
60.
61. - (UITableViewCell *)tableView:(UITableView *)tableView cellForRowAtIndexPath:(NSIndexPath *)indexPath
62. {
63.     // allocate cell, reusing if possible
64.     static NSString *CellIdentifier = @"Cell";
65.     UITableViewCell *cell = [tableView dequeueReusableCellWithIdentifier:CellIdentifier];
66.     if (cell == nil)
67.         cell = [[UITableViewCell alloc] initWithStyle:UITableViewCellStyleDefault reuseIdentifier:CellIdentifier];
68.
69.     // configure cell
70.     cell.selectionStyle = UITableViewCellStyleNone;
71.     cell.textLabel.text = [self.words objectAtIndex:[indexPath row]];
72.
73.     return cell;
74. }
75.
76. - (NSInteger)tableView:(UITableView *)tableView numberOfRowsInSection:(NSInteger)section
77. {
78.     return [self.words count];
79. }
80.
81. @end
```

```
1. //  
2. // AppDelegate.h  
3. // Transformations  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates affine transformations of Rob.  
10. //  
11.  
12. #import <UIKit/UIKit.h>  
13.  
14. @class ViewController;  
15.  
16. @interface AppDelegate : UIResponder <UIApplicationDelegate>  
17.  
18. @property (strong, nonatomic) ViewController *viewController;  
19. @property (strong, nonatomic) UIWindow *window;  
20.  
21. @end
```

```
1. //  
2. // AppDelegate.m  
3. // Transformations  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates affine transformations of Rob.  
10. //  
11.  
12. #import "AppDelegate.h"  
13. #import "ViewController.h"  
14.  
15. @implementation AppDelegate  
16.  
17. - (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions  
18. {  
19.     self.window = [[UIWindow alloc] initWithFrame:[[UIScreen mainScreen] bounds]];  
20.     self.viewController = [[ViewController alloc] initWithNibName:@"ViewController" bundle:nil];  
21.     self.window.rootViewController = self.viewController;  
22.     [self.window makeKeyAndVisible];  
23.     return YES;  
24. }  
25.  
26. @end
```

```
1. //
2. // main.m
3. // Transformations
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates affine transformations of Rob.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. #import "AppDelegate.h"
15.
16. int main(int argc, char *argv[])
17. {
18.     @autoreleasepool {
19.         return UIApplicationMain(argc, argv, nil, NSStringFromClass([AppDelegate class]));
20.     }
21. }
```

```
1. //
2. // ViewController.h
3. // Transformations
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates affine transformations of Rob.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @interface ViewController : UIViewController
15. @end
```

```
1. //  
2. // ViewController.m  
3. // Transformations  
4. //  
5. // David J. Malan  
6. // Harvard University  
7. // malan@harvard.edu  
8. //  
9. // Demonstrates affine transformations of Rob.  
10. //  
11.  
12. #import "ViewController.h"  
13.  
14.  
15. @interface ViewController () {  
16. @private  
17.     CGPoint _translation;  
18. }  
19.  
20. // private properties  
21. @property (nonatomic, readwrite, weak) IBOutlet UIImageView *imageView;  
22. @property (assign, nonatomic, readwrite) float scale;  
23.  
24. // private methods  
25. - (void)handlePan:(UIPanGestureRecognizer *)sender;  
26. - (void)handlePinch:(UIPinchGestureRecognizer *)sender;  
27.  
28. @end  
29.  
30.  
31. @implementation ViewController  
32.  
33. - (id)initWithNibName:(NSString *)NibNameOrNil bundle:(NSBundle *)nibBundleOrNil  
34. {  
35.     if (self = [super initWithNibName:nibNameOrNilOrNil bundle:nibBundleOrNil])  
36.     {  
37.         // prepare Rob  
38.         self.scale = 1.0;  
39.         _translation.x = 0.0;  
40.         _translation.y = 0.0;  
41.     }  
42.     return self;  
43. }  
44.  
45. - (void)handlePan:(UIPanGestureRecognizer *)sender  
46. {  
47.     // translate Rob  
48.     CGPoint translation = [sender translationInView:self.imageView];
```

```
49.     CGAffineTransform scale = CGAffineTransformMakeScale(self.scale, self.scale);
50.     CGAffineTransform translate = CGAffineTransformMakeTranslation(_translation.x + translation.x * self.scale, _translation.y + translation.y
51.         * self.scale);
52.     sender.view.transform = CGAffineTransformConcat(scale, translate);
53. 
54.     // remember translation once done panning
55.     if (sender.state == UIGestureRecognizerStateChanged)
56.     {
57.         _translation.x += translation.x * self.scale;
58.         _translation.y += translation.y * self.scale;
59.     }
60. }
61. - (void)handlePinch:(UIPinchGestureRecognizer *)sender
62. {
63.     // scale Rob
64.     CGFloat factor = [sender scale];
65.     CGAffineTransform scale = CGAffineTransformMakeScale(self.scale * factor, self.scale * factor);
66.     CGAffineTransform translate = CGAffineTransformMakeTranslation(_translation.x, _translation.y);
67.     sender.view.transform = CGAffineTransformConcat(scale, translate);
68. 
69.     // remember scale once done pinching
70.     if (sender.state == UIGestureRecognizerStateChanged)
71.         self.scale *= factor;
72. }
73.
74. - (void)viewDidLoad
75. {
76.     [super viewDidLoad];
77. 
78.     // listen for pan
79.     UIPanGestureRecognizer *panGesture = [[UIPanGestureRecognizer alloc] initWithTarget:self action:@selector(handlePan:)];
80.     [self.imageView addGestureRecognizer:panGesture];
81. 
82.     // listen for pinch
83.     UIPinchGestureRecognizer *pinchGesture = [[UIPinchGestureRecognizer alloc] initWithTarget:self action:@selector(handlePinch:)];
84.     [self.imageView addGestureRecognizer:pinchGesture];
85. }
86.
87. @end
```