

```
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
```

```
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13. #import <UIKit/UIKit.h>
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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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10. //
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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
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4. //
5. // David J. Malan
6. // Harvard University
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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. //
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13. #import <UIKit/UIKit.h>
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15. #import "AppDelegate.h"
16.
17. int main(int argc, char *argv[])
18. {
19.     @autoreleasepool {
20.         return UIApplicationMain(argc, argv, nil, NSStringFromClass([AppDelegate class]));
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8. //
9. // Demonstrates localized strings.
10. //
11.
12. #import "ViewController.h"
13.
14. @interface ViewController ()
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
```

```
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3. // Paddle
4. //
5. // David J. Malan
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8. //
9. // Demonstrates Core Graphics with a rectangle.
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12. #import <UIKit/UIKit.h>
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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;
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14. #import "AppDelegate.h"
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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
```

```
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3. // Paddle
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5. // David J. Malan
6. // Harvard University
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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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12. #import <UIKit/UIKit.h>
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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 *)nibBundleOrNil
27. {
28.     if (self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil])
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
```

```
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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.     }
22. }
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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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8. //
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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13. #import <UIKit/UIKit.h>
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15. @interface ViewController : UIViewController
16. - (void)kickoff;
17. @end
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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) NSInteger scoreLeft;
33. @property (assign, nonatomic, readwrite) NSInteger 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;
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12. #import "AppDelegate.h"
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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
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9. // Demonstrates SQLite.
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12. #import <UIKit/UIKit.h>
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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.     }
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14. @interface ViewController : UIViewController
15. @end
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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 *)nibBundleOrNil
27. {
28.     if (self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil])
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 = UITableViewCellSelectionStyleNone;
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:nibNameOrNil 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
* self.scale);
51.     sender.view.transform = CGAffineTransformConcat(scale, translate);
52.
53.     // remember translation once done panning
54.     if (sender.state == UIGestureRecognizerStateEnded)
55.     {
56.         _translation.x += translation.x * self.scale;
57.         _translation.y += translation.y * self.scale;
58.     }
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 == UIGestureRecognizerStateEnded)
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
```