

```
1. //
2. // Account.h
3. // ATM
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Simulates an ATM (that only accepts deposits).
10. //
11.
12. #import <Foundation/Foundation.h>
13.
14. @interface Account : NSObject {
15. }
16.
17. @property (assign, nonatomic) unsigned long long balance;
18.
19. @end
```

```
1. //
2. // Account.m
3. // ATM
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Simulates an ATM (that only accepts deposits).
10. //
11.
12. #import "Account.h"
13.
14. @implementation Account
15.
16. - (id)init
17. {
18.     if (self = [super init]) {
19.         self.balance = 0;
20.     }
21.     return self;
22. }
23.
24. @end
```

```
1. //
2. // AppDelegate.h
3. // ATM
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Simulates an ATM (that only accepts deposits).
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. // ATM
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Simulates an ATM (that only accepts deposits).
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. // ViewController.h
3. // ATM
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Simulates an ATM (that only accepts deposits).
10. //
11.
12. #import <UIKit/UIKit.h>
13. #import "Account.h"
14.
15. @interface ViewController : UIViewController {
16. }
17.
18. @property (nonatomic, strong) Account *account;
19. @property (assign, nonatomic) unsigned long long amount;
20. @property (nonatomic, weak) IBOutlet UILabel *balanceLabel;
21. @property (nonatomic, weak) IBOutlet UILabel *depositLabel;
22.
23. - (IBAction)clear:(id)sender;
24. - (IBAction)deposit:(id)sender;
25. - (IBAction)digit:(id)sender;
26. - (void)show;
27.
28. @end
```

```
1. //
2. // ViewController.m
3. // ATM
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Simulates an ATM (that only accepts deposits).
10. //
11.
12. #import "ViewController.h"
13.
14. @implementation ViewController
15.
16. - (IBAction)clear:(id)sender
17. {
18.     // clear input
19.     self.amount = 0;
20.     [self show];
21. }
22.
23. - (IBAction)deposit:(id)sender
24. {
25.     // deposit amount
26.     self.account.balance += self.amount;
27.
28.     // clear input
29.     self.amount = 0;
30.     [self show];
31. }
32.
33. - (IBAction)digit:(id)sender
34. {
35.     // append digit to amount
36.     UIButton *b = (UIButton *)sender;
37.     self.amount = self.amount * 10 + b.tag;
38.     [self show];
39. }
40.
41. - (void)show
42. {
43.     // show balance
44.     self.balanceLabel.text = [NSString stringWithFormat:@"%llu", self.account.balance];
45.
46.     // show input
47.     self.depositLabel.text = [NSString stringWithFormat:@"%llu", self.amount];
48. }
```

```
49.  
50. - (void)viewDidLoad  
51. {  
52.     // create account  
53.     self.account = [[Account alloc] init];  
54.     [self show];  
55. }  
56.  
57. @end
```

```
1. //
2. // AppDelegate.h
3. // Gestures
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates gestures.
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. // Gestures
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates gestures.
10. //
11.
12. #import "AppDelegate.h"
13.
14. #import "ViewController.h"
15.
16. @implementation AppDelegate
17.
18. @synthesize viewController=_viewController;
19. @synthesize window=_window;
20.
21. - (BOOL)application:(UIApplication *)application didFinishLaunchingWithOptions:(NSDictionary *)launchOptions
22. {
23.     self.window = [[UIWindow alloc] initWithFrame:[[UIScreen mainScreen] bounds]];
24.     self.viewController = [[ViewController alloc] initWithNibName:@"ViewController" bundle:nil];
25.     self.window.rootViewController = self.viewController;
26.     [self.window makeKeyAndVisible];
27.     return YES;
28. }
29.
30. @end
```

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

```
1. //
2. // ViewController.m
3. // Gestures
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates gestures.
10. //
11.
12. #import "ViewController.h"
13.
14.
15. @interface ViewController ()
16.
17. // private properties
18. @property (assign, nonatomic, readwrite) BOOL alertInProgress;
19. @property (nonatomic, readwrite, weak) IBOutlet UIImageView *imageView;
20. @property (assign, nonatomic, readwrite) int index;
21. @property (nonatomic, readwrite, strong) NSArray *robs;
22.
23. // private methods
24. - (void)alertView:(UIAlertView *)alertView didDismissWithButtonIndex:(NSInteger)buttonIndex;
25. - (void)handleLongPress:(UILongPressGestureRecognizer *)sender;
26. - (void)handleSwipe:(UISwipeGestureRecognizer *)sender;
27.
28. @end
29.
30.
31. @implementation ViewController
32.
33. - (void)alertView:(UIAlertView *)alertView didDismissWithButtonIndex:(NSInteger)buttonIndex
34. {
35.     self.alertInProgress = NO;
36. }
37.
38. - (void)handleLongPress:(UILongPressGestureRecognizer *)sender
39. {
40.     if (!self.alertInProgress) {
41.         self.alertInProgress = YES;
42.         UIAlertView *alertView = [[UIAlertView alloc] initWithTitle:@"Hey!"
43.                                     message:@"Stop that."
44.                                     delegate:self
45.                                     cancelButtonTitle:@"Fine"
46.                                     otherButtonTitles:nil];
47.         [alertView show];
48.     }
```

```
49. }
50.
51. - (void)handleSwipe:(UISwipeGestureRecognizer *)sender
52. {
53.     // handle swipe
54.     UISwipeGestureRecognizerDirection direction = [(UISwipeGestureRecognizer *)sender direction];
55.     switch (direction)
56.     {
57.         // ignore up, down
58.         case UISwipeGestureRecognizerDirectionUp:
59.         case UISwipeGestureRecognizerDirectionDown:
60.             break;
61.
62.         // left
63.         case UISwipeGestureRecognizerDirectionLeft:
64.             self.index = (self.index + 1) % [self.robs count];
65.             break;
66.
67.         // right
68.         case UISwipeGestureRecognizerDirectionRight:
69.             self.index = (self.index + [self.robs count] - 1) % [self.robs count];
70.             break;
71.     }
72.
73.     // update Rob
74.     self.imageView.image = [UIImage imageNamed:[self.robs objectAtIndex:self.index]];
75. }
76.
77. - (id)initWithNibName:(NSString *)nibNameOrNil bundle:(NSBundle *)nibBundleOrNil
78. {
79.     if (self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil])
80.     {
81.         // keep track of alerts
82.         self.alertInProgress = NO;
83.
84.         // prepare Robs
85.         self.robs = [[NSArray alloc] initWithObjects:@"rob1.jpg", @"rob2.jpg", @"rob3.jpg", nil];
86.         self.index = 0;
87.     }
88.     return self;
89. }
90.
91. - (void)viewDidLoad
92. {
93.     [super viewDidLoad];
94.
95.     // load image
96.     self.imageView.image = [UIImage imageNamed:[self.robs objectAtIndex:self.index]];
```

```
97.
98.     // listen for long press
99.     UILongPressGestureRecognizer *longpressGesture = [[UILongPressGestureRecognizer alloc] initWithTarget:self action:@selector(
handleLongPress:)];
100.     [self.imageView addGestureRecognizer:longpressGesture];
101.
102.     // listen for right swipe
103.     UISwipeGestureRecognizer *swipeGesture = [[UISwipeGestureRecognizer alloc] initWithTarget:self action:@selector(handleSwipe:)];
104.     swipeGesture.direction = UISwipeGestureRecognizerDirectionRight;
105.     [self.imageView addGestureRecognizer:swipeGesture];
106.
107.     // listen for left swipe
108.     swipeGesture = [[UISwipeGestureRecognizer alloc] initWithTarget:self action:@selector(handleSwipe:)];
109.     swipeGesture.direction = UISwipeGestureRecognizerDirectionLeft;
110.     [self.imageView addGestureRecognizer:swipeGesture];
111. }
112.
113. @end
```

```
1. //
2. // AppDelegate.h
3. // MasterDetail
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Master-Detail Application.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @interface AppDelegate : UIResponder <UIApplicationDelegate>
15.
16. @property (strong, nonatomic) UINavigationController *navigationController;
17. @property (strong, nonatomic) UIWindow *window;
18.
19. @end
```

```
1. //
2. // AppDelegate.m
3. // MasterDetail
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Master-Detail Application.
10. //
11.
12. #import "AppDelegate.h"
13. #import "MasterViewController.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.     MasterViewController *masterViewController = [[MasterViewController alloc] initWithNibName:@"MasterViewController" bundle:nil];
21.     self.navigationController = [[UINavigationController alloc] initWithRootViewController:masterViewController];
22.     self.window.rootViewController = self.navigationController;
23.     [self.window makeKeyAndVisible];
24.     return YES;
25. }
26.
27. @end
```

```
1. //
2. // DetailViewController.h
3. // MasterDetail
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Master-Detail Application.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @interface DetailViewController : UIViewController
15.
16. @property (weak, nonatomic) IBOutlet UILabel *detailDescriptionLabel;
17. @property (strong, nonatomic) id detailItem;
18.
19. @end
```



```
1. //
2. // DetailViewController.m
3. // MasterDetail
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Master-Detail Application.
10. //
11.
12. #import "DetailViewController.h"
13.
14. @interface DetailViewController ()
15. - (void)configureView;
16. @end
17.
18. @implementation DetailViewController
19.
20. - (void)setDetailItem:(id)newDetailItem
21. {
22.     if (_detailItem != newDetailItem) {
23.         _detailItem = newDetailItem;
24.         [self configureView];
25.     }
26. }
27.
28. - (void)configureView
29. {
30.     if (self.detailItem) {
31.         self.detailDescriptionLabel.text = [self.detailItem description];
32.     }
33. }
34.
35. - (id)initWithNibName:(NSString *)nibNameOrNil bundle:(NSBundle *)nibBundleOrNil
36. {
37.     self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil];
38.     if (self) {
39.         self.title = NSLocalizedString(@"Detail", @"Detail");
40.     }
41.     return self;
42. }
43.
44. @end
```

```
1. //
2. // MasterViewController.h
3. // MasterDetail
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Master-Detail Application.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @class DetailViewController;
15.
16. @interface MasterViewController : UITableViewController
17.
18. @property (strong, nonatomic) DetailViewController *detailViewController;
19.
20. @end
```

```
1. //
2. // MasterViewController.m
3. // MasterDetail
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Master-Detail Application.
10. //
11.
12. #import "DetailViewController.h"
13. #import "MasterViewController.h"
14.
15. @interface MasterViewController () {
16.     NSMutableArray *_objects;
17. }
18. @end
19.
20. @implementation MasterViewController
21.
22. - (id)initWithNibName:(NSString *)nibNameOrNil bundle:(NSBundle *)nibBundleOrNil
23. {
24.     self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil];
25.     if (self) {
26.         self.title = NSLocalizedString(@"Master", @"Master");
27.     }
28.     return self;
29. }
30.
31. - (void)viewDidLoad
32. {
33.     [super viewDidLoad];
34.     self.navigationItem.leftBarButtonItem = self.editButtonItem;
35.
36.     UIBarButtonItem *addButton = [[UIBarButtonItem alloc] initWithBarButtonSystemItem:UIBarButtonSystemItemAdd target:self action:@selector(
insertNewObject:)];
37.     self.navigationItem.rightBarButtonItem = addButton;
38. }
39.
40. - (void)insertNewObject:(id)sender
41. {
42.     if (!_objects) {
43.         _objects = [[NSMutableArray alloc] init];
44.     }
45.     [_objects insertObject:[NSDate date] atIndex:0];
46.     NSIndexPath *indexPath = [NSIndexPath indexPathForRow:0 inSection:0];
47.     [self.tableView insertRowsAtIndexPaths:@[indexPath] withRowAnimation:UITableViewRowAnimationAutomatic];

```

```
48. }
49.
50. #pragma mark - Table View
51.
52. - (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView
53. {
54.     return 1;
55. }
56.
57. - (NSInteger)tableView:(UITableView *)tableView numberOfRowsInSection:(NSInteger)section
58. {
59.     return _objects.count;
60. }
61.
62. - (UITableViewCell *)tableView:(UITableView *)tableView cellForRowAtIndexPath:(NSIndexPath *)indexPath
63. {
64.     static NSString *CellIdentifier = @"Cell";
65.
66.     UITableViewCell *cell = [tableView dequeueReusableCellWithIdentifier:CellIdentifier];
67.     if (cell == nil) {
68.         cell = [[UITableViewCell alloc] initWithStyle:UITableViewCellStyleDefault reuseIdentifier:CellIdentifier];
69.         cell.accessoryType = UITableViewCellAccessoryDisclosureIndicator;
70.     }
71.
72.     NSDate *object = _objects[indexPath.row];
73.     cell.textLabel.text = [object description];
74.     return cell;
75. }
76.
77. - (BOOL)tableView:(UITableView *)tableView canEditRowAtIndexPath:(NSIndexPath *)indexPath
78. {
79.     return YES;
80. }
81.
82. - (void)tableView:(UITableView *)tableView commitEditingStyle:(UITableViewCellEditingStyle)editingStyle forRowAtIndexPath:(NSIndexPath *)indexPath
83. {
84.     if (editingStyle == UITableViewCellEditingStyleDelete) {
85.         [_objects removeObjectAtIndex:indexPath.row];
86.         [tableView deleteRowsAtIndexPaths:@[indexPath] withRowAnimation:UITableViewRowAnimationFade];
87.     }
88. }
89.
90. - (void)tableView:(UITableView *)tableView didSelectRowAtIndexPath:(NSIndexPath *)indexPath
91. {
92.     if (!self.detailViewController) {
93.         self.detailViewController = [[DetailViewController alloc] initWithNibName:@"DetailViewController" bundle:nil];
94.     }
```

```
95.     NSDate *object = _objects[indexPath.row];
96.     self.detailViewController.detailItem = object;
97.     [self.navigationController pushViewController:self.detailViewController animated:YES];
98. }
99.
100. @end
```

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



```
1. //
2. // ViewController.m
3. // Plist
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates property lists.
10. //
11.
12. #import "ViewController.h"
13.
14.
15. @interface ViewController ()
16.
17. // private property
18. @property (nonatomic, readwrite, strong) NSArray *words;
19.
20. @end
21.
22.
23. @implementation ViewController
24.
25. - (id)initWithNibName:(NSString *)nibNameOrNil bundle:(NSBundle *)nibBundleOrNil
26. {
27.     if (self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil])
28.     {
29.         // load words
30.         NSString *path = [[NSBundle mainBundle] pathForResource:@"small" ofType:@"plist"];
31.         NSArray *words = [[NSArray alloc] initWithContentsOfFile:path];
32.         self.words = words;
33.     }
34.     return self;
35. }
36.
37. - (NSInteger)numberOfSectionsInTableView:(UITableView *)tableView
38. {
39.     return 1;
40. }
41.
42. - (UITableViewCell *)tableView:(UITableView *)tableView cellForRowAtIndexPath:(NSIndexPath *)indexPath
43. {
44.     // allocate cell, reusing if possible
45.     static NSString *CellIdentifier = @"Cell";
46.     UITableViewCell *cell = [tableView dequeueReusableCellWithIdentifier:CellIdentifier];
47.     if (cell == nil) {
48.         cell = [[UITableViewCell alloc] initWithStyle:UITableViewCellStyleDefault reuseIdentifier:CellIdentifier];
```

```
49.     }
50.
51.     // configure cell
52.     cell.selectionStyle = UITableViewCellSelectionStyleNone;
53.     cell.textLabel.text = [self.words objectAtIndex:[indexPath row]];
54.
55.     return cell;
56. }
57.
58. - (NSInteger)tableView:(UITableView *)tableView numberOfRowsInSection:(NSInteger)section
59. {
60.     return [self.words count];
61. }
62.
63. @end
```

```
1. //
2. // main.m
3. // Storyboard
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Utility Application using a storyboard.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @interface AppDelegate : UIResponder <UIApplicationDelegate>
15.
16. @property (strong, nonatomic) UIWindow *window;
17.
18. @end
```

```
1. //
2. // main.m
3. // Storyboard
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Utility Application using a storyboard.
10. //
11.
12. #import "AppDelegate.h"
13.
14. @implementation AppDelegate
15. @end
```

```
1. //
2. // main.m
3. // Storyboard
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Utility Application using a storyboard.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @class FlipsideViewController;
15.
16. @protocol FlipsideViewControllerDelegate
17. - (void)flipsideViewControllerDidFinish:(FlipsideViewController *)controller;
18. @end
19.
20. @interface FlipsideViewController : UIViewController
21.
22. @property (weak, nonatomic) id <FlipsideViewControllerDelegate> delegate;
23.
24. - (IBAction)done:(id)sender;
25.
26. @end
```

```
1. //
2. // main.m
3. // Storyboard
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Utility Application using a storyboard.
10. //
11.
12. #import "FlipsideViewController.h"
13.
14. @implementation FlipsideViewController
15.
16. - (IBAction)done:(id)sender
17. {
18.     [self.delegate flipsideViewControllerDidFinish:self];
19. }
20.
21. @end
```

```
1. //
2. // main.m
3. // Storyboard
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Utility Application using a storyboard.
10. //
11.
12. #import "FlipsideViewController.h"
13.
14. @interface MainViewController : UIViewController <FlipsideViewControllerDelegate>
15. @end
```

```
1. //
2. // main.m
3. // Storyboard
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Utility Application using a storyboard.
10. //
11.
12. #import "MainViewController.h"
13.
14. @implementation MainViewController
15.
16. - (void)flipsideViewControllerDidFinish:(FlipsideViewController *)controller
17. {
18.     [self dismissViewControllerAnimated:YES completion:nil];
19. }
20.
21. - (void)prepareForSegue:(UIStoryboardSegue *)segue sender:(id)sender
22. {
23.     if ([[segue identifier] isEqualToString:@"showAlternate"]) {
24.         [[segue destinationViewController] setDelegate:self];
25.     }
26. }
27.
28. @end
```



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

```
1. //
2. // AppDelegate.m
3. // Tabbed
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Tabbed Application.
10. //
11.
12. #import "AppDelegate.h"
13. #import "FirstViewController.h"
14. #import "SecondViewController.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.     UIViewController *viewController1 = [[FirstViewController alloc] initWithNibName:@"FirstViewController" bundle:nil];
22.     UIViewController *viewController2 = [[SecondViewController alloc] initWithNibName:@"SecondViewController" bundle:nil];
23.     self.tabBarController = [[UITabBarController alloc] init];
24.     self.tabBarController.viewControllers = @[viewController1, viewController2];
25.     self.window.rootViewController = self.tabBarController;
26.     [self.window makeKeyAndVisible];
27.     return YES;
28. }
29.
30. @end
```

```
1. //
2. // FirstViewController.h
3. // Tabbed
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Tabbed Application.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @interface FirstViewController : UIViewController
15. @end
```

```
1. //
2. // FirstViewController.m
3. // Tabbed
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Tabbed Application.
10. //
11.
12. #import "FirstViewController.h"
13.
14. @implementation FirstViewController
15.
16. - (id)initWithNibName:(NSString *)nibNameOrNil bundle:(NSBundle *)nibBundleOrNil
17. {
18.     self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil];
19.     if (self) {
20.         self.title = NSLocalizedString(@"First", @"First");
21.         self.tabBarItem.image = [UIImage imageNamed:@"first"];
22.     }
23.     return self;
24. }
25.
26. @end
```

```
1. //
2. // SecondViewController.h
3. // Tabbed
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Tabbed Application.
10. //
11.
12. #import <UIKit/UIKit.h>
13.
14. @interface SecondViewController : UIViewController
15. @end
```

```
1. //
2. // SecondViewController.m
3. // Tabbed
4. //
5. // David J. Malan
6. // Harvard University
7. // malan@harvard.edu
8. //
9. // Demonstrates a Tabbed Application.
10. //
11.
12. #import "SecondViewController.h"
13.
14. @implementation SecondViewController
15.
16. - (id)initWithNibName:(NSString *)nibNameOrNil bundle:(NSBundle *)nibBundleOrNil
17. {
18.     self = [super initWithNibName:nibNameOrNil bundle:nibBundleOrNil];
19.     if (self) {
20.         self.title = NSLocalizedString(@"Second", @"Second");
21.         self.tabBarItem.image = [UIImage imageNamed:@"second"];
22.     }
23.     return self;
24. }
25.
26. @end
```