CS193P - Lecture 7

iPhone Application Development

Navigation & Tab Bar Controllers

Announcements

- Assignment 3 is due tomorrow
- Paparazzi 1 is due on Wednesday February 3rd

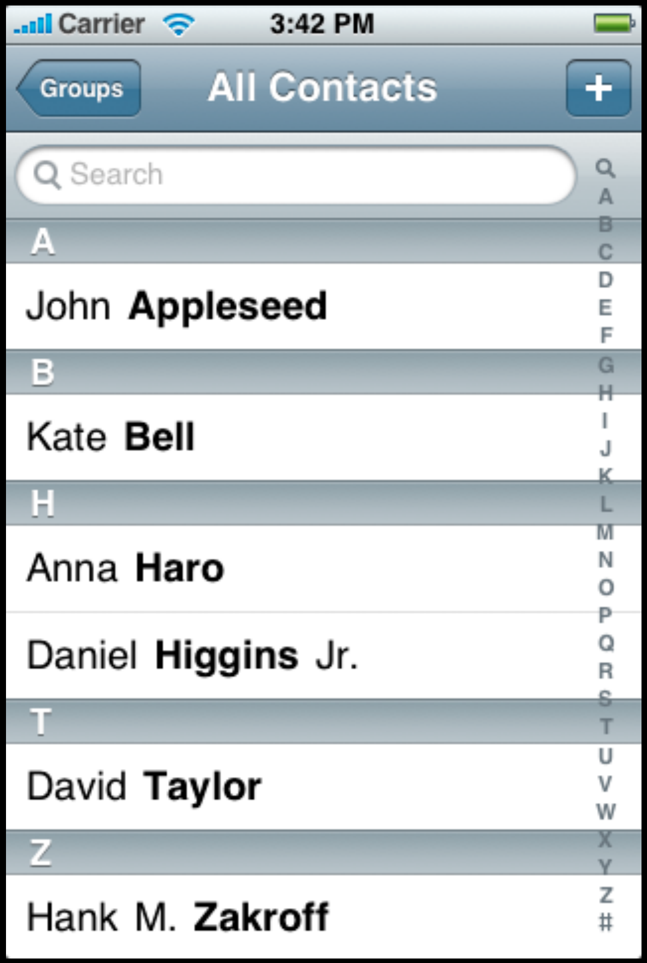
Today’s Topics

- Navigation Controllers
    - Application Data Flow
- Customizing Navigation
- Tab Bar Controllers
- Combining Approaches

Navigation Controllers

UINavigationController

- Stack of view controllers
- Navigation bar



All Contacts

A

John **Appleseed**

B

Kate **Bell**

H

Anna **Haro**

Daniel **Higgins** Jr.

T

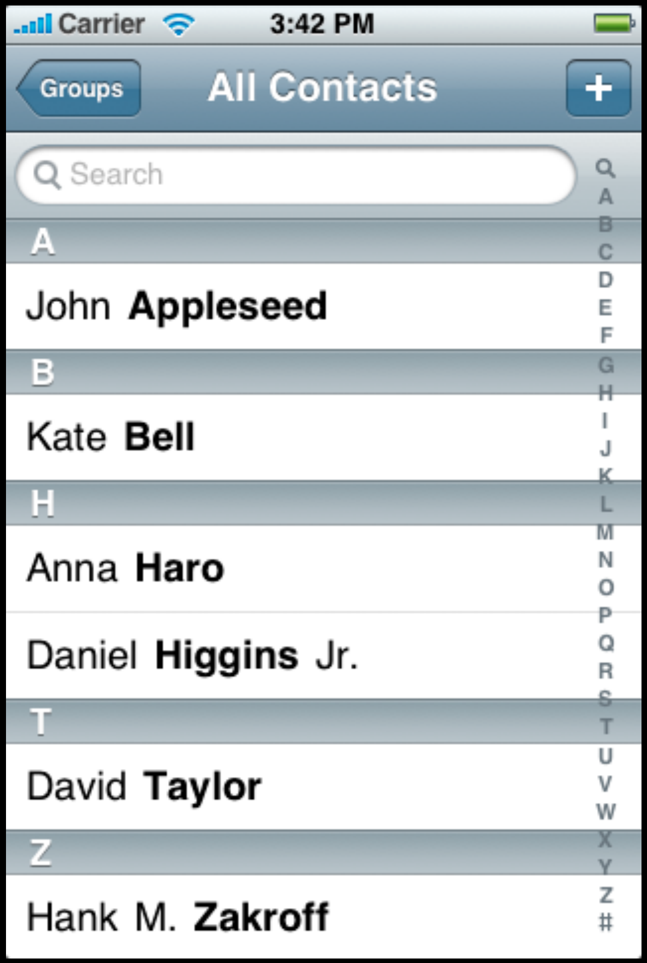
David **Taylor**

Z

Hank M. **Zakroff**

Navigation Controller

UINavigationController



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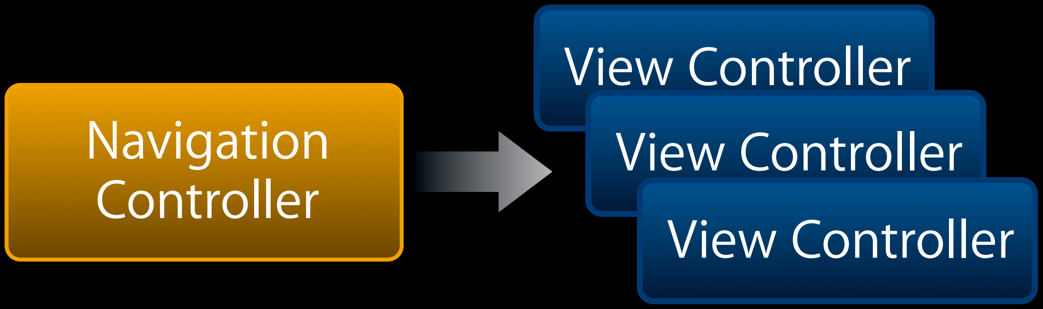
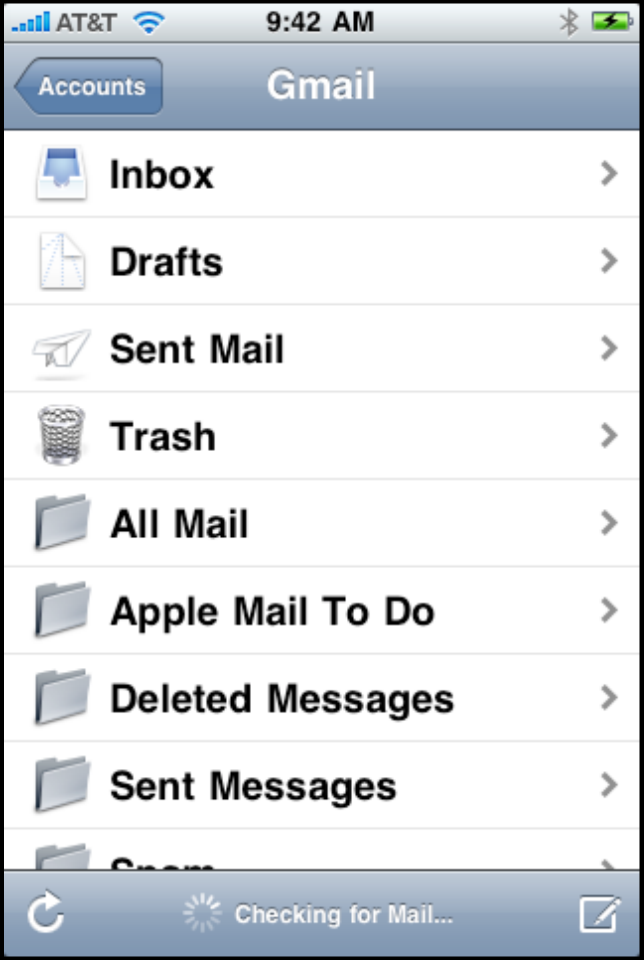


How It Fits Together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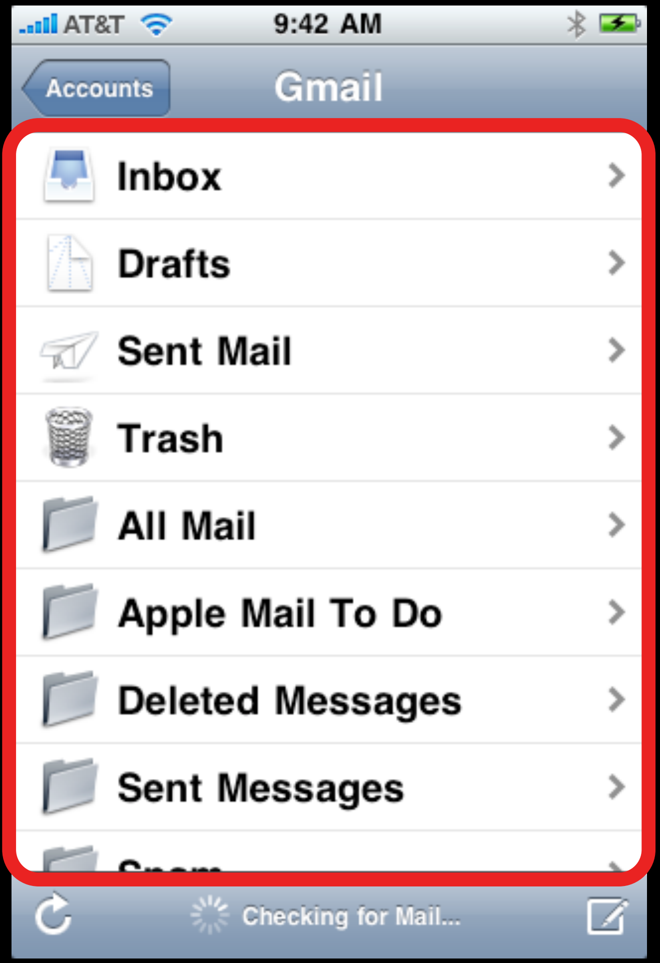
Accounts Gmail

- Inbox
- Drafts
- Sent Mail
- Trash
- All Mail
- Apple Mail To Do
- Deleted Messages
- Sent Messages
- Spam

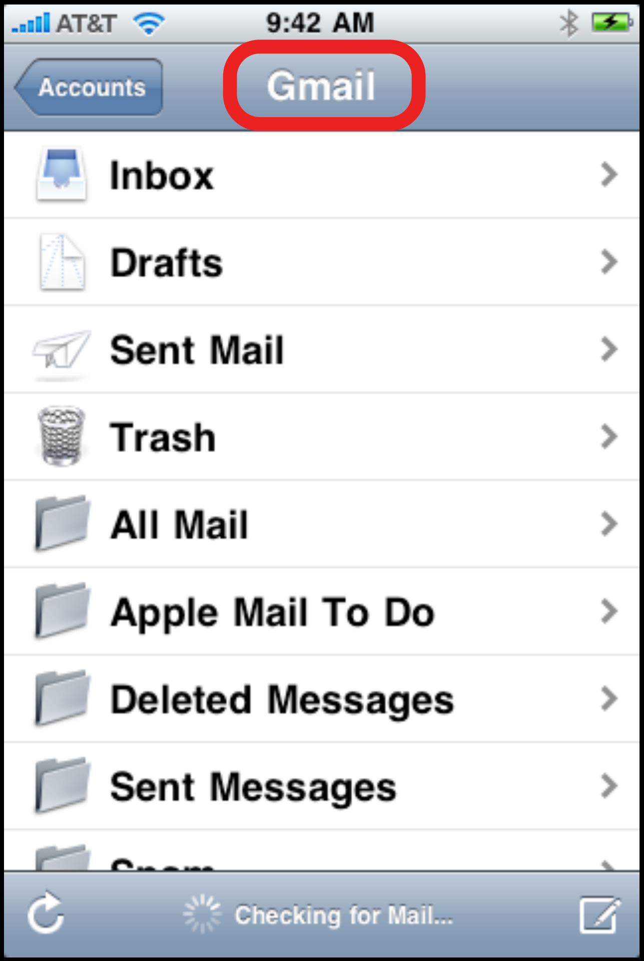
Checking for Mail...

How It Fits Together

- Top view controller's view

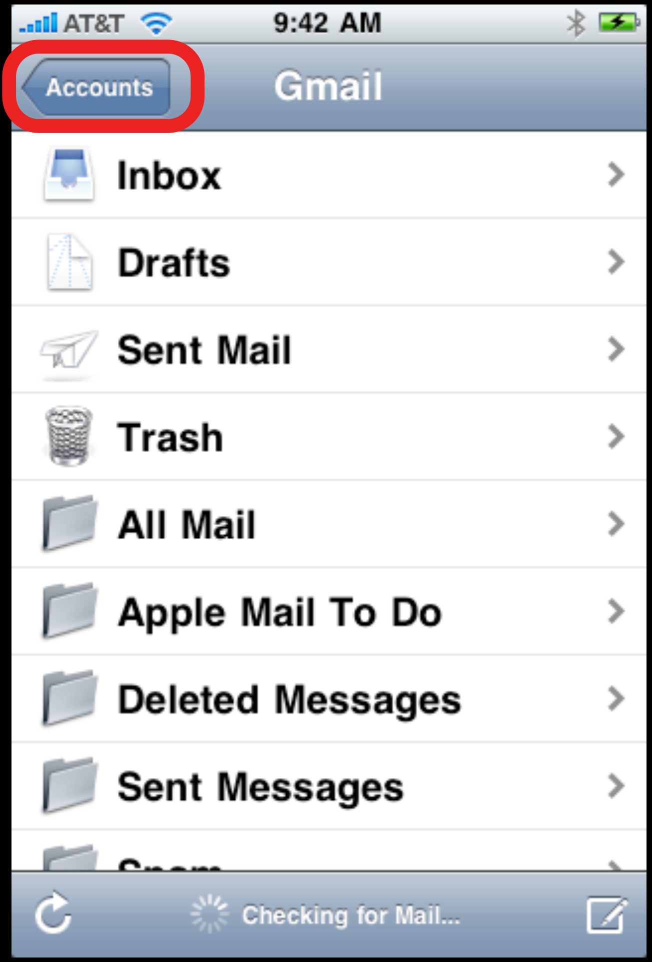


How It Fits Together



- Top view controller’s view
- Top view controller’s title

How It Fits Together



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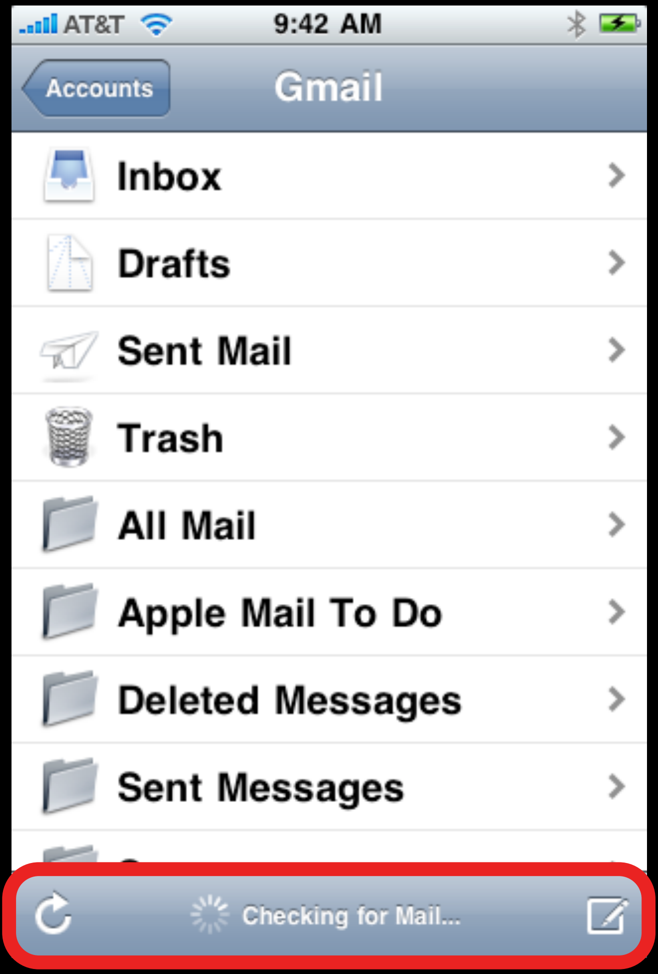
Checking for Mail...

- Top view controller's view
- Top view controller's title
- Previous view controller's title

How It Fits Together



- Top view controller's view
- Top view controller's title
- Previous view controller's title
- Top view controller's toolbar items (iPhone OS 3.0)

Modifying the Navigation Stack

Modifying the Navigation Stack

- **Push** to add a view controller

```
- (void)pushViewController:(UIViewController *)viewController
                  animated:(BOOL)animated;
```

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- **Pop** to remove a view controller

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- (UIViewController *)popViewControllerAnimated:(BOOL)animated;
```

Modifying the Navigation Stack

- **Push** to add a view controller

```
- (void)pushViewController:(UIViewController *)viewController
                  animated:(BOOL)animated;
```

- **Pop** to remove a view controller

```
- (UIViewController *)popViewControllerAnimated:(BOOL)animated;
```

- **Set** to change the entire stack of view controllers (iPhone OS 3.0)

```
- (void)setViewControllers:(NSArray *)viewControllers
                  animated:(BOOL)animated;
```

Pushing Your First View Controller

Pushing Your First View Controller

```
- (void)applicationDidFinishLaunching
    // Create a navigation controller
    navController = [[UINavigationController alloc] init];







}
```

Pushing Your First View Controller

```
- (void)applicationDidFinishLaunching
  // Create a navigation controller
  navController = [[UINavigationController alloc] init];

  // Push the first view controller on the stack
  [navController pushViewController:firstViewController
                           animated:NO];



}
```

Pushing Your First View Controller

```
- (void)applicationDidFinishLaunching
  // Create a navigation controller
  navController = [[UINavigationController alloc] init];

  // Push the first view controller on the stack
  [navController pushViewController:firstViewController
                           animated:NO];

  // Add the navigation controller’s view to the window
  [window addSubview:navController.view];
}
```

In Response to User Actions

In Response to User Actions

- Push from within a view controller on the stack

```
- (void)someAction:(id)sender
{
  // Potentially create another view controller
  UIViewController *viewController = ...;

  [self.navigationController pushViewController:viewController
                                       animated:YES];
}
```

In Response to User Actions

- Push from within a view controller on the stack

```
- (void)someAction:(id)sender
{
  // Potentially create another view controller
  UIViewController *viewController = ...;

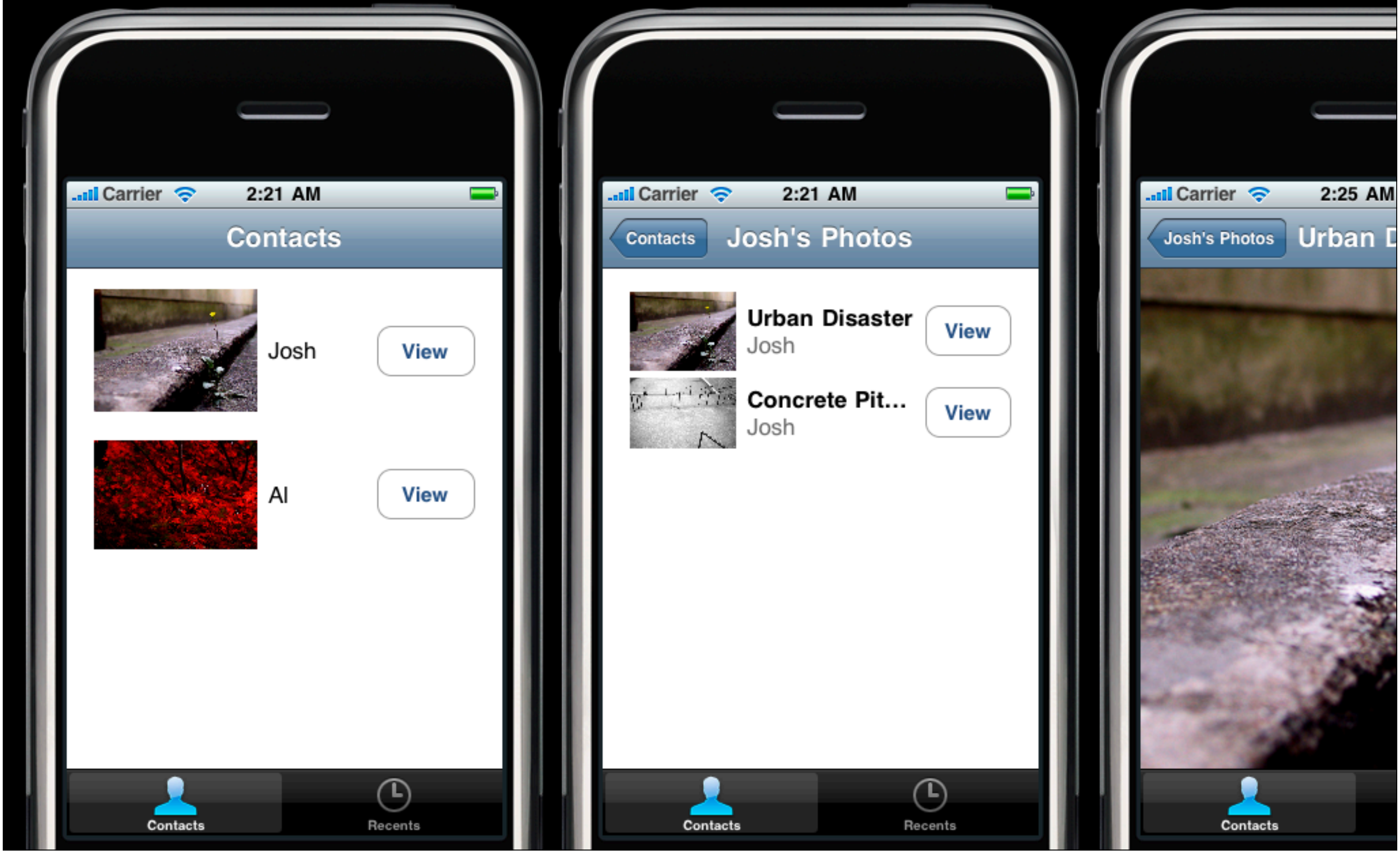
  [self.navigationController pushViewController:viewController
                                        animated:YES];
}
```

- Almost **never** call pop directly!
  - Automatically invoked by the back button

Demo:
Pushing & Popping

Application Data Flow

Paparazzi


Carrier
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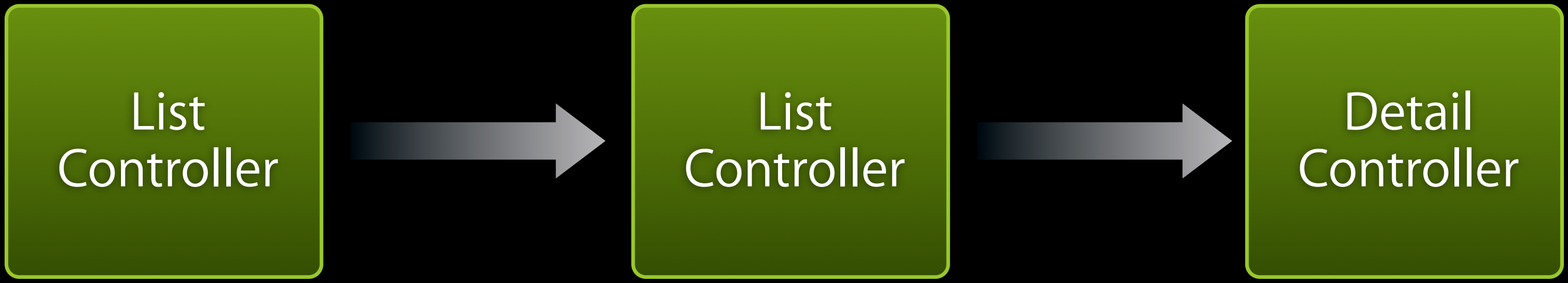
Contacts

A Controller for Each Screen



Connecting View Controllers

Connecting View Controllers

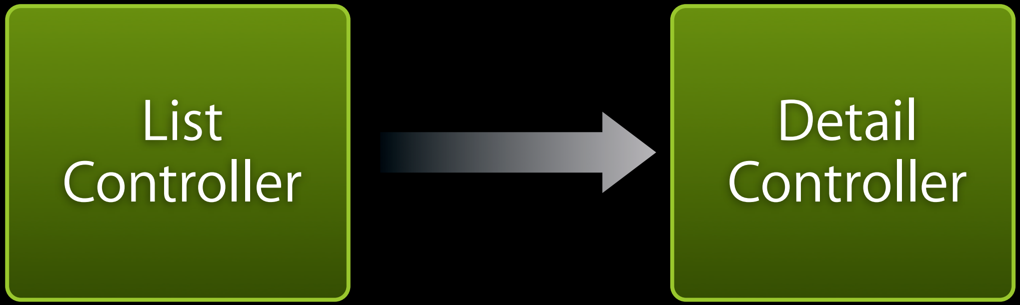
- Multiple view controllers may need to **share data**

Connecting View Controllers

- Multiple view controllers may need to **share data**
- One may need to know about what another is doing
    - Watch for added, removed or edited data
    - Other interesting events

How Not To Share Data

- Global variables or singletons
  - This includes your **application delegate**!
- Direct dependencies make your code less reusable
  - And more difficult to debug & test



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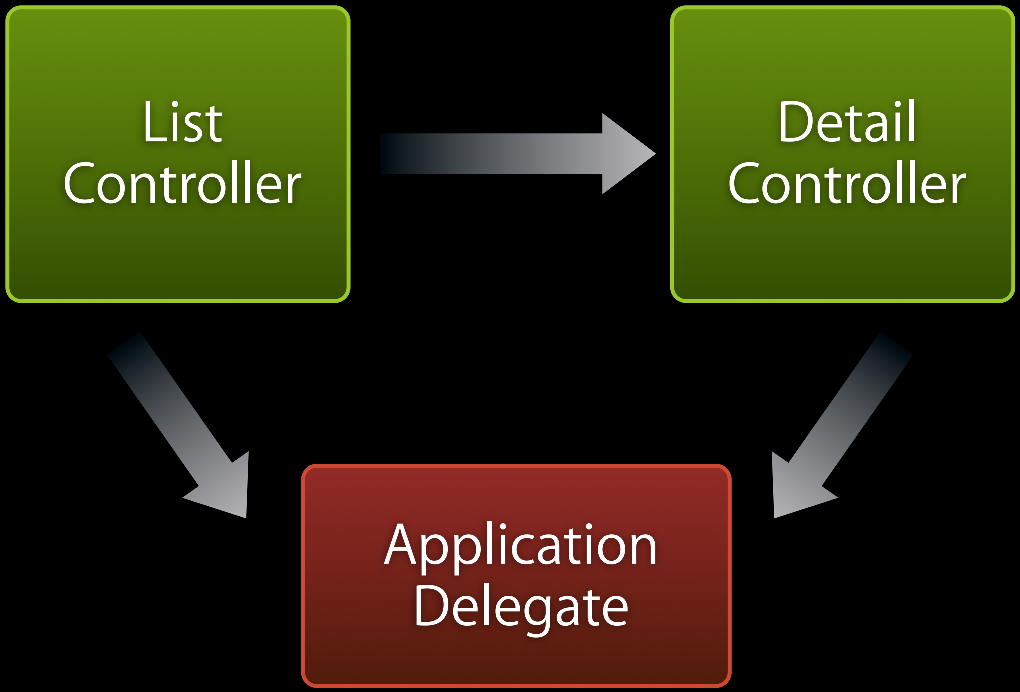

List Controller

Detail Controller

Application Delegate

How Not To Share Data

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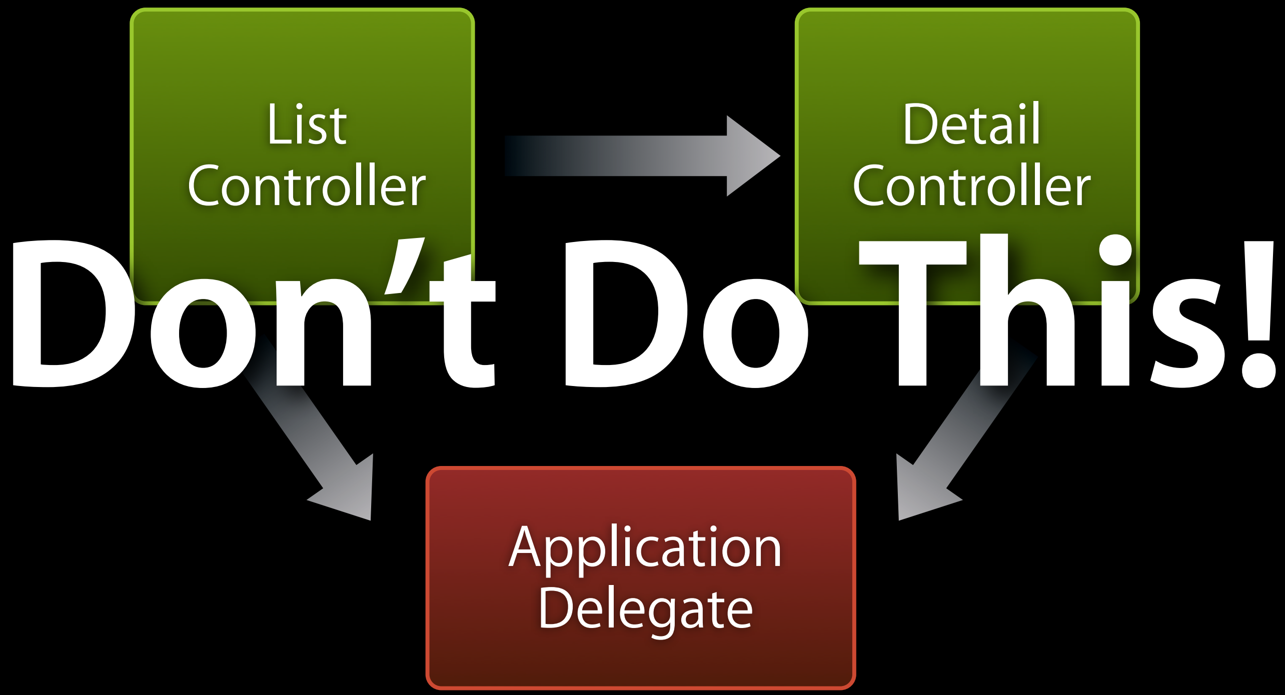


List Controller

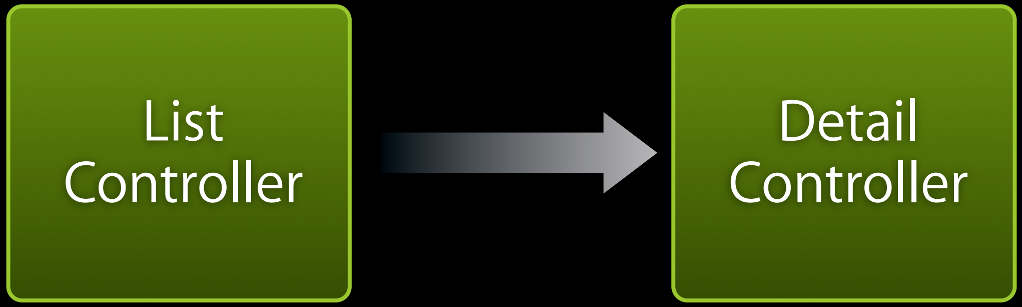
Detail Controller

Application Delegate

Don’t Do This!

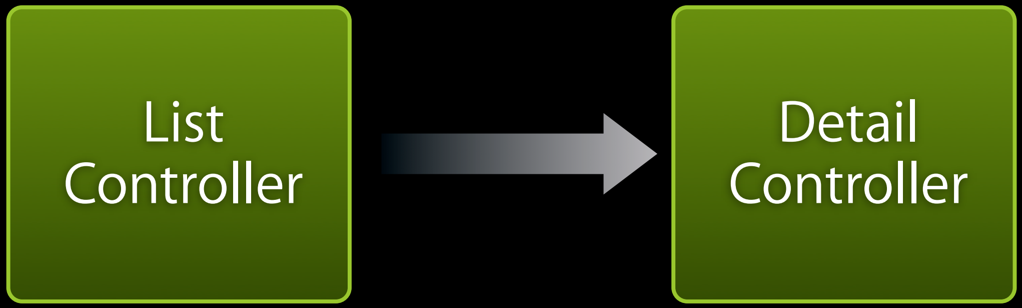
Best Practices for Data Flow

- Figure out **exactly** what needs to be communicated



Best Practices for Data Flow

- Figure out **exactly** what needs to be communicated
- **Define input parameters** for your view controller



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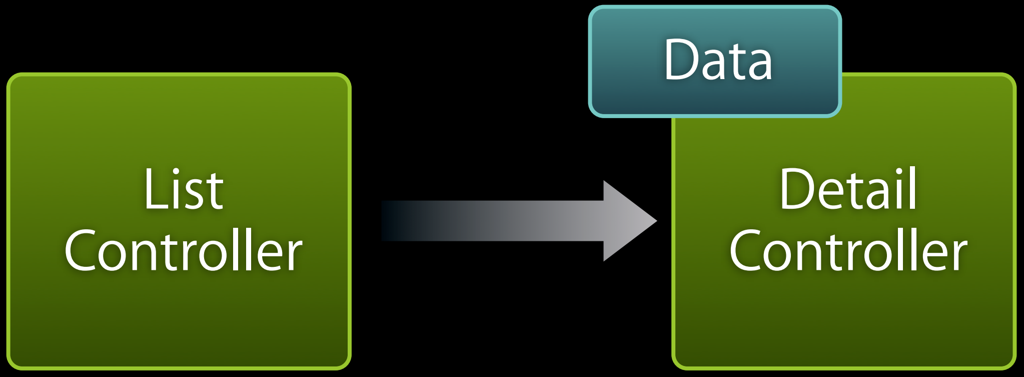
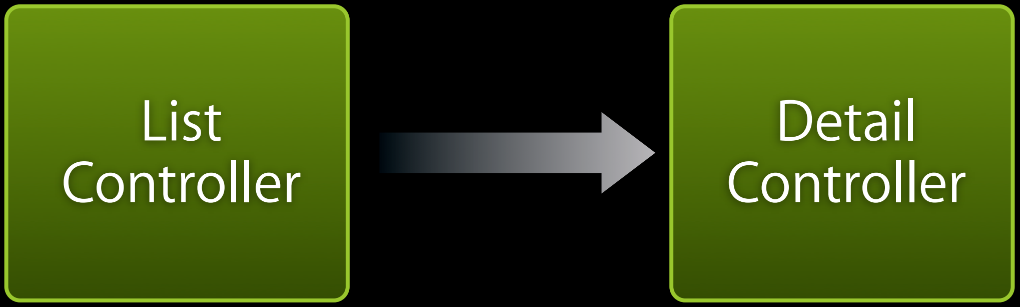


Best Practices for Data Flow

- Figure out **exactly** what needs to be communicated
- **Define input parameters** for your view controller
- For communicating back up the hierarchy, **use loose coupling**
  - Define a generic interface for observers (like delegation)



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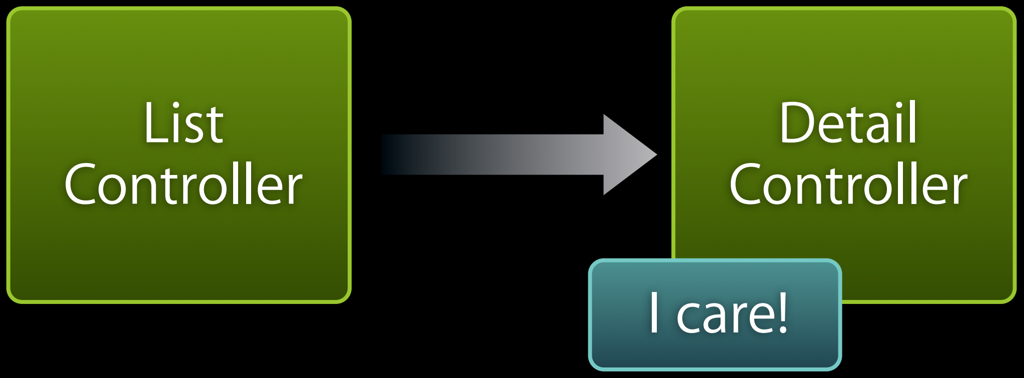

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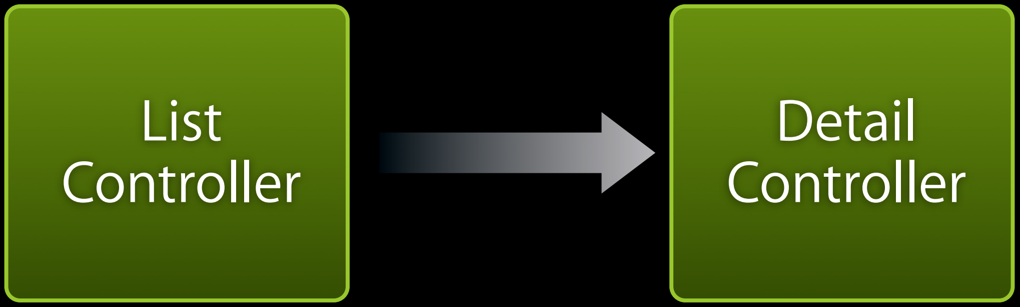


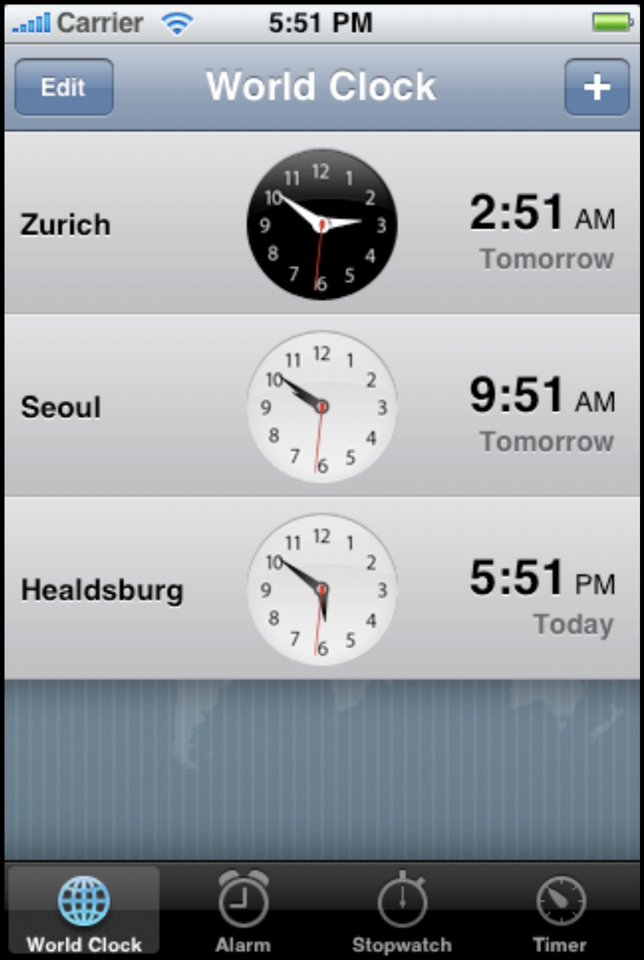
Example: UIImagePickerController

Demo:
Passing Data Along

Customizing Navigation

Customizing Navigation

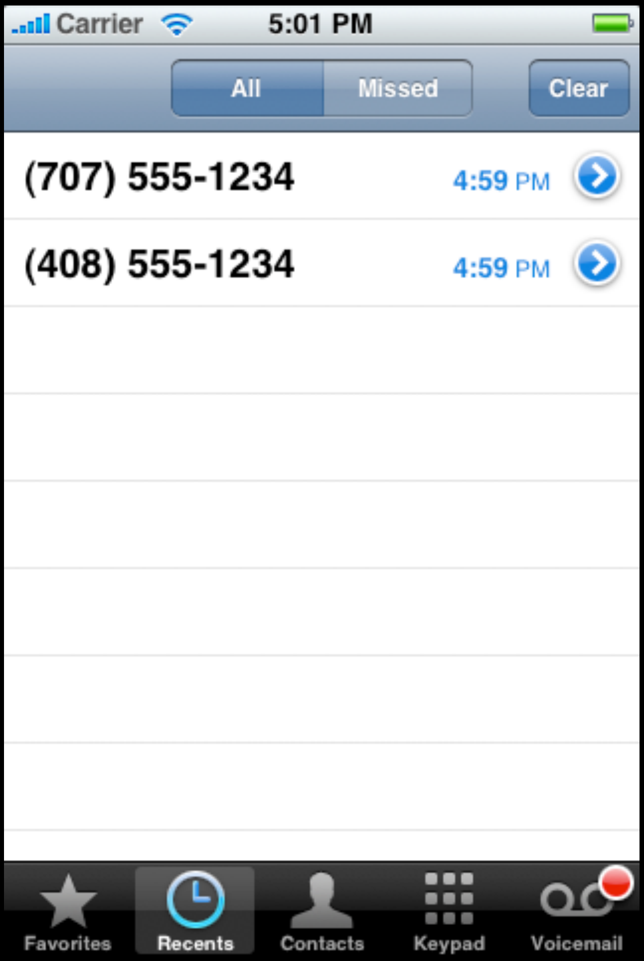
- Buttons or custom controls
- Interact with the entire screen



Zurich 2:51 AM Tomorrow

Seoul 9:51 AM Tomorrow

Healdsburg 5:51 PM Today



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(408) 555-1234 4:59 PM

Customizing Navigation

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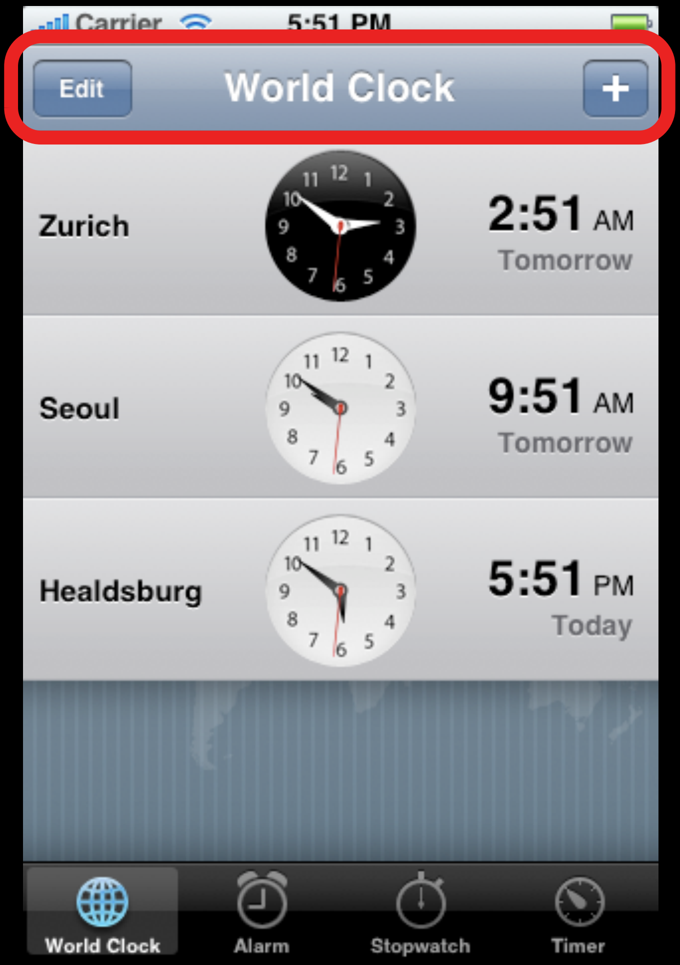

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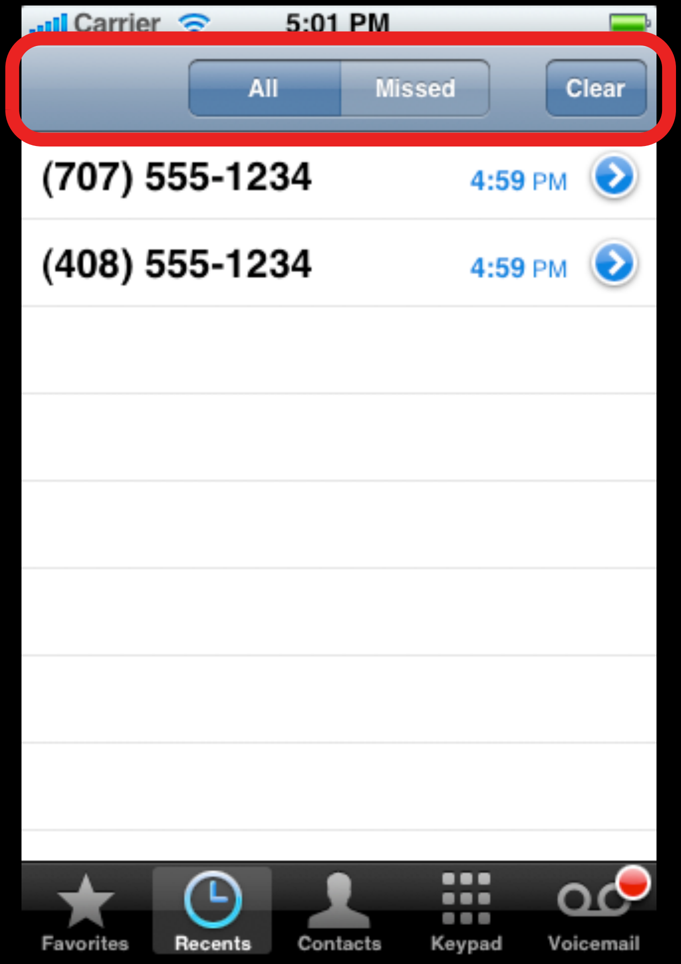

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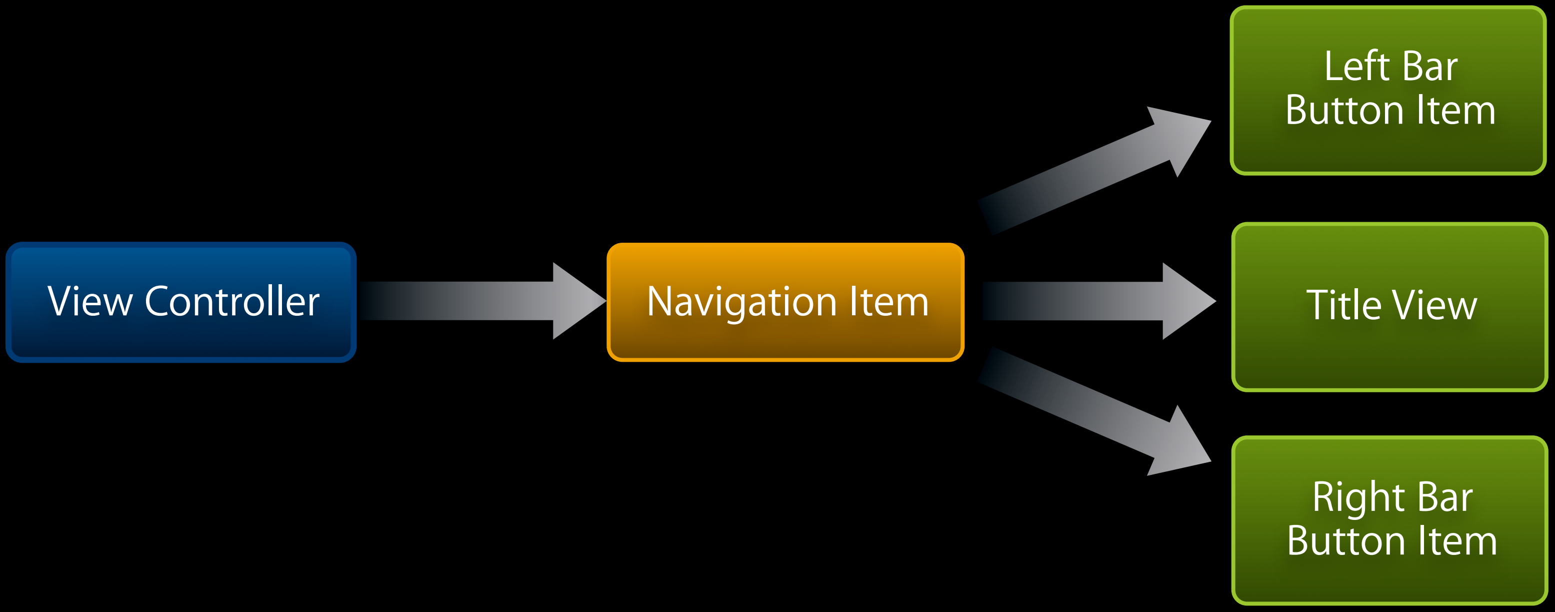
UINavigationItem

- Describes appearance of the navigation bar
    - Title string or custom title view
    - Left & right bar buttons
    - More properties defined in UINavigationBar.h

UINavigationItem

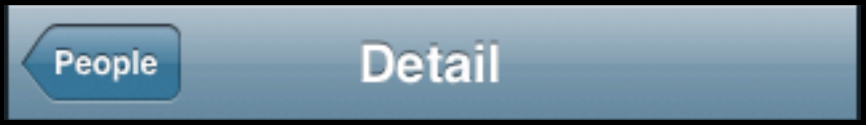
- Describes appearance of the navigation bar
  - Title string or custom title view
  - Left & right bar buttons
  - More properties defined in UINavigationBar.h
- **Every view controller has a navigation item** for customizing
  - Displayed when view controller is on **top of the stack**

Navigation Item Ownership



Displaying a Title

- UIViewController already has a title property
  - `@property(nonatomic,copy) NSString *title;`
- Navigation item inherits automatically
  - Previous view controller’s title is displayed in back button



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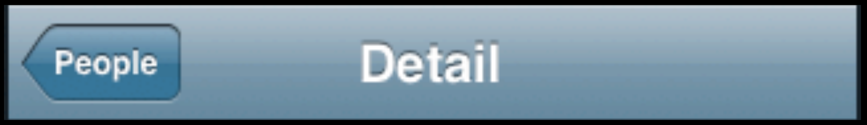


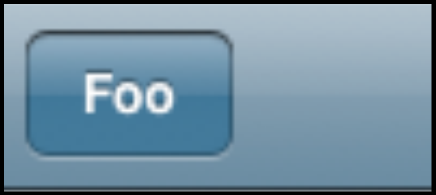
```
viewController.title = @“Detail”;
```

Left & Right Buttons

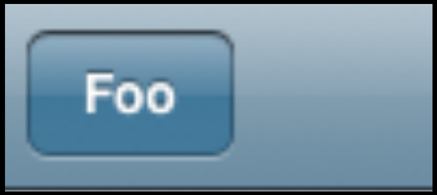
- UIBarButtonItem
    - Special object, defines appearance & behavior for items in navigation bars and toolbars
- Display a string, image or predefined system item
- Target + action (like a regular button)

Text Bar Button Item

Text Bar Button Item



Text Bar Button Item



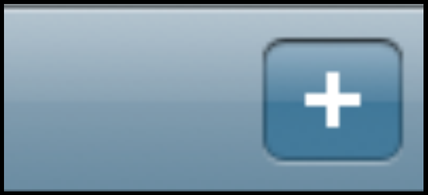
```
- (void)viewDidLoad
{
  UIBarButtonItem *fooButton = [[UIBarButtonItem alloc]
    initWithTitle:@"Foo”
    style:UIBarButtonItemStyleBordered
    target:self
    action:@selector(foo:)];

  self.navigationItem.leftBarButtonItem = fooButton;

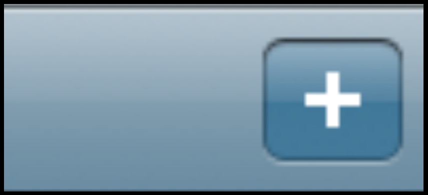
  [fooButton release];
}
```

System Bar Button Item

System Bar Button Item



System Bar Button Item



```
- (void)viewDidLoad
{
  UIBarButtonItem *addButton = [[UIBarButtonItem alloc]
    initWithBarButtonSystemItem:UIBarButtonSystemItemAdd
    style:UIBarButtonItemStyleBordered
    target:self
    action:@selector(add:)];

  self.navigationItem.rightBarButtonItem = addButton;

  [addButton release];
}
```

Edit/Done Button

- Very common pattern
- Every view controller has one available
  - Target/action already set up

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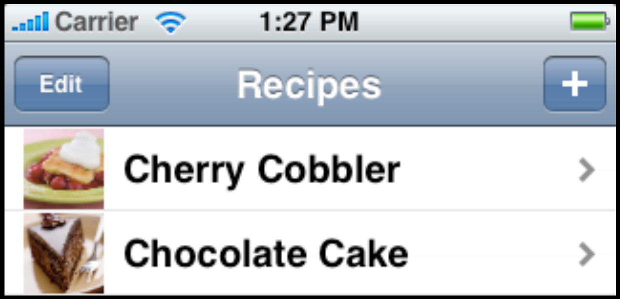

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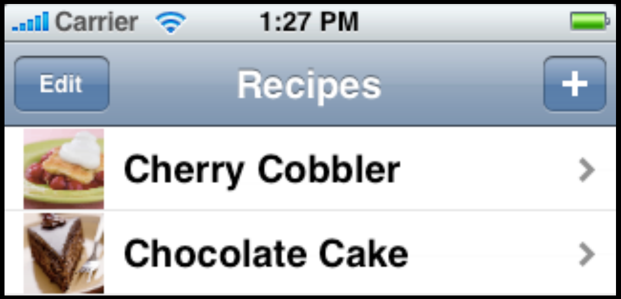
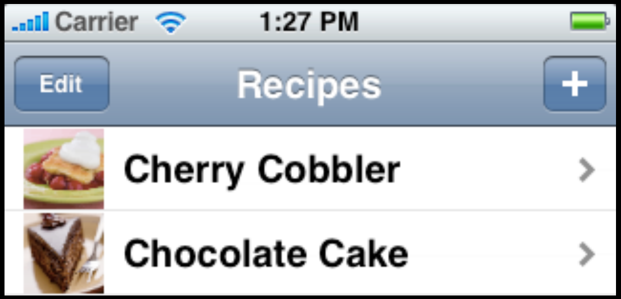


```
self.navigationItem.leftBarButtonItem = self.editButtonItem;
```

Edit/Done Button

- Very common pattern
- Every view controller has one available
    - Target/action already set up



```
self.navigationItem.leftBarButtonItem = self.editButtonItem;

// Called when the user toggles the edit/done button
- (void)setEditing:(BOOL)editing animated:(BOOL)animated
{
   // Update appearance of views
}
```

Custom Title View

- Arbitrary view in place of the title

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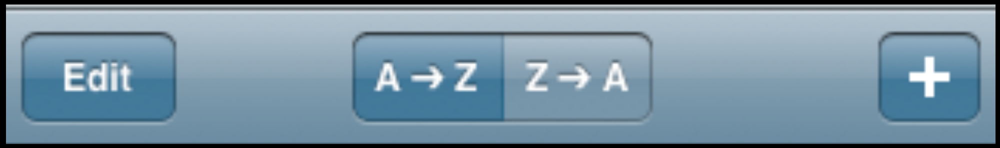
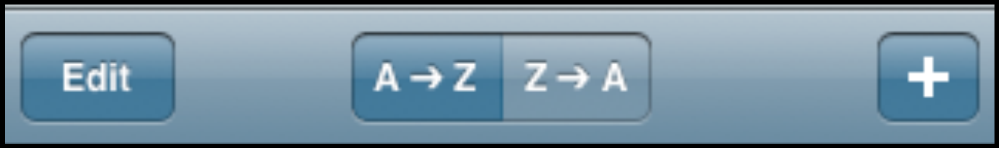


Custom Title View

- Arbitrary view in place of the title



```
UISegmentedControl *segmentedControl = ...
self.navigationItem.titleView = segmentedControl;
[segmentedControl release];
```

Back Button

- Sometimes a shorter back button is needed

Back Button

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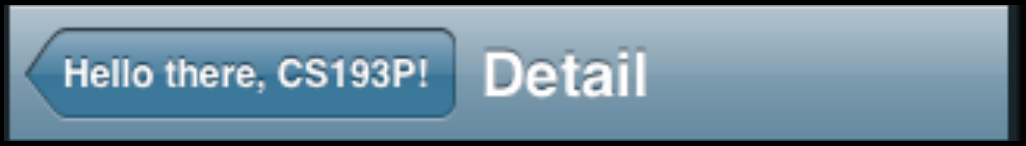
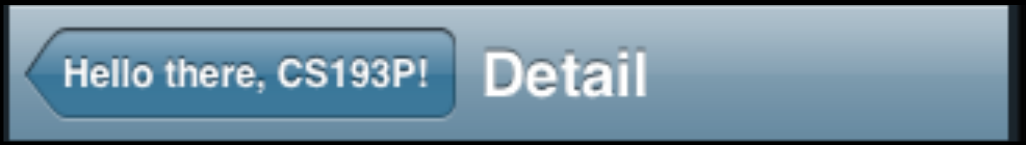


Back Button

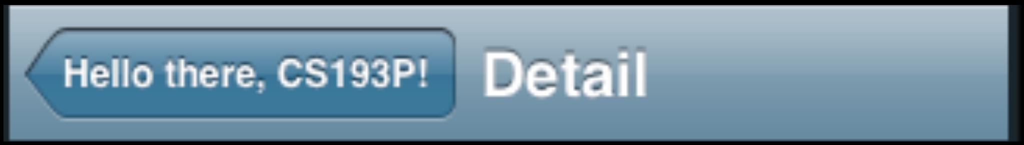
- Sometimes a shorter back button is needed



```
self.title = @“Hello there, CS193P!”;
```

Back Button

- Sometimes a shorter back button is needed



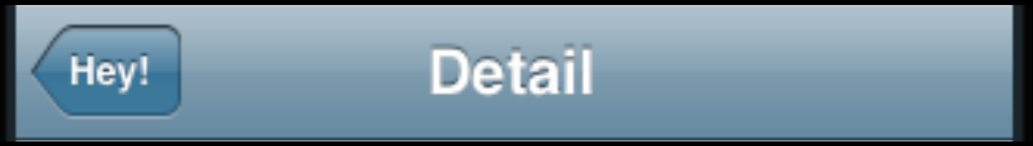
```
self.title = @“Hello there, CS193P!”;

UIBarButtonItem *heyButton = [[UIBarButtonItem alloc]
                               initWithTitle:@“Hey!”
                               ...];
self.navigationItem.backButtonItem = heyButton;

[heyButton release];
```

Back Button

- Sometimes a shorter back button is needed



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                                ...];
self.navigationItem.backButtonItem = heyButton;

[heyButton release];
```
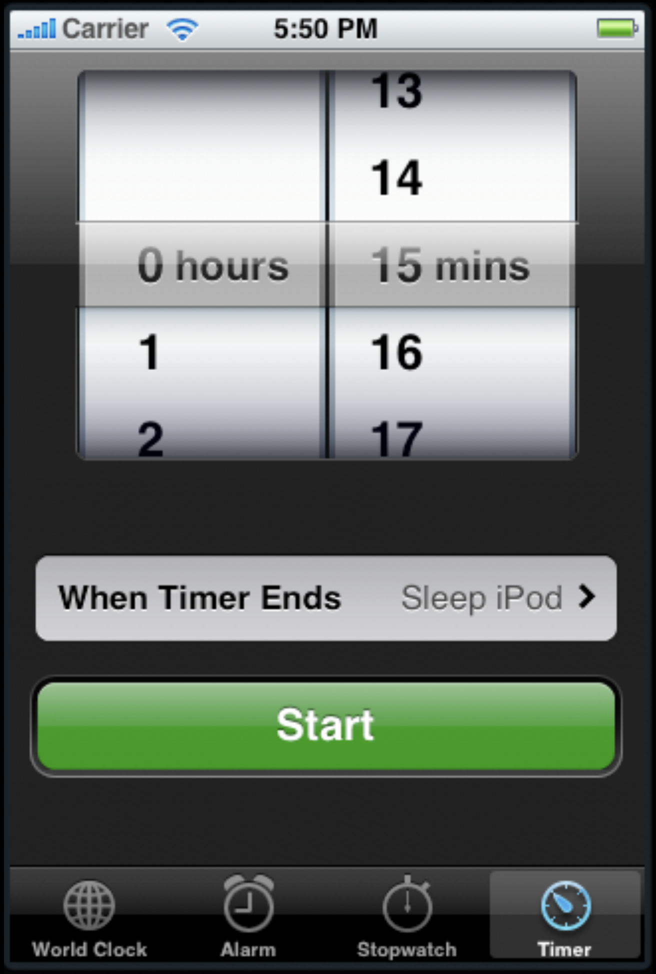

Demo:
Customizing Buttons

Tab Bar Controllers

UITabBarController

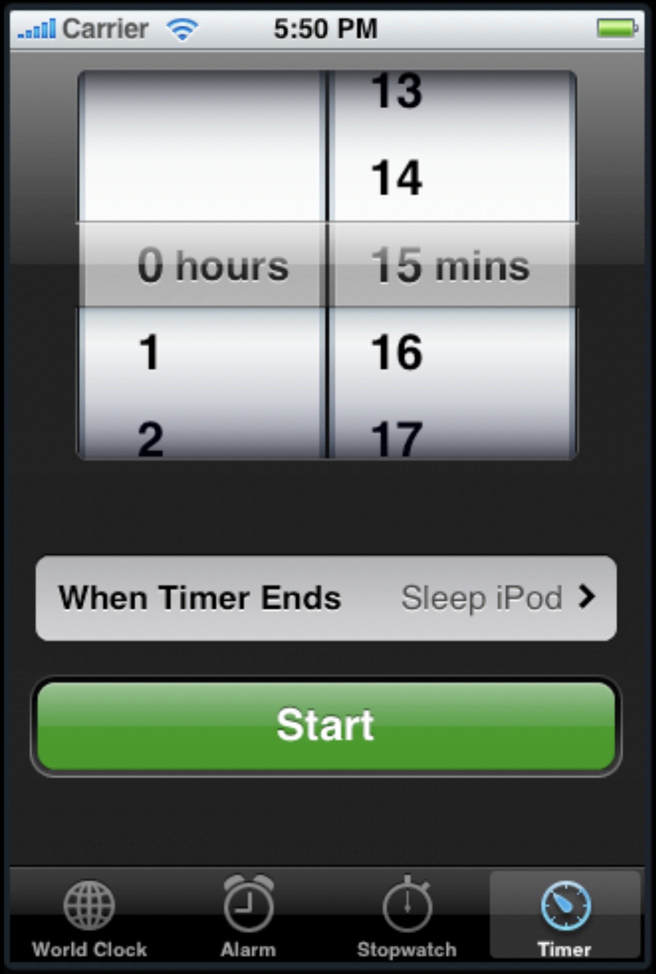
- Array of view controllers
- Tab bar



Tab Bar Controller

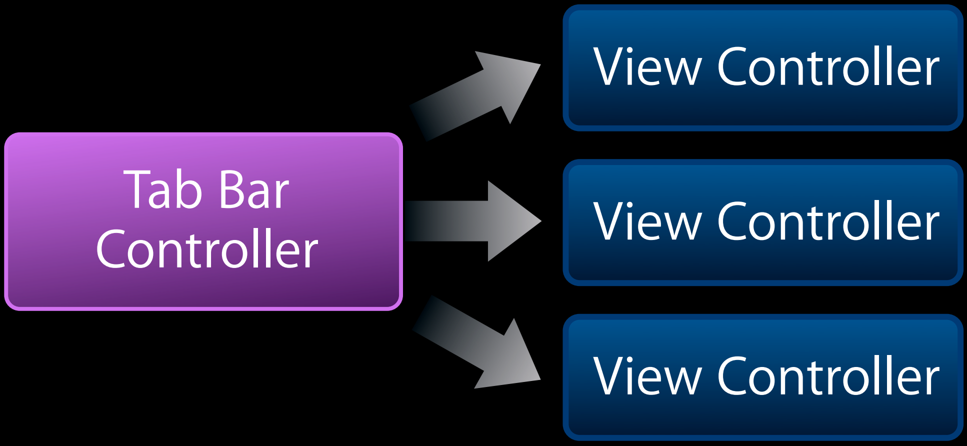
UITabBarController

- Array of view controllers
- Tab bar



0 hours 15 mins

When Timer Ends Sleep iPod ›



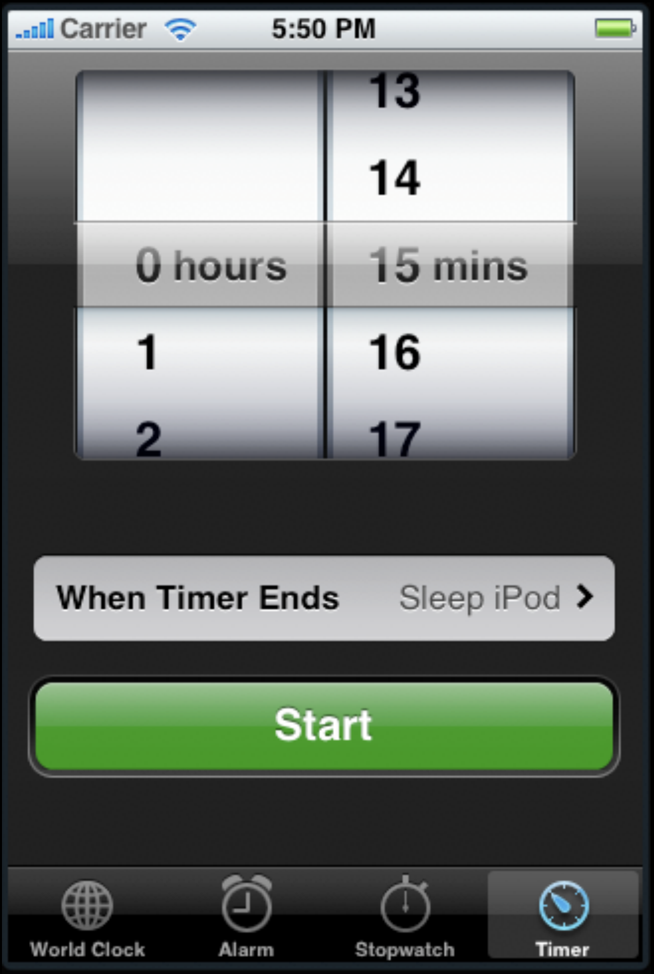
Tab Bar Controller

View Controller

View Controller

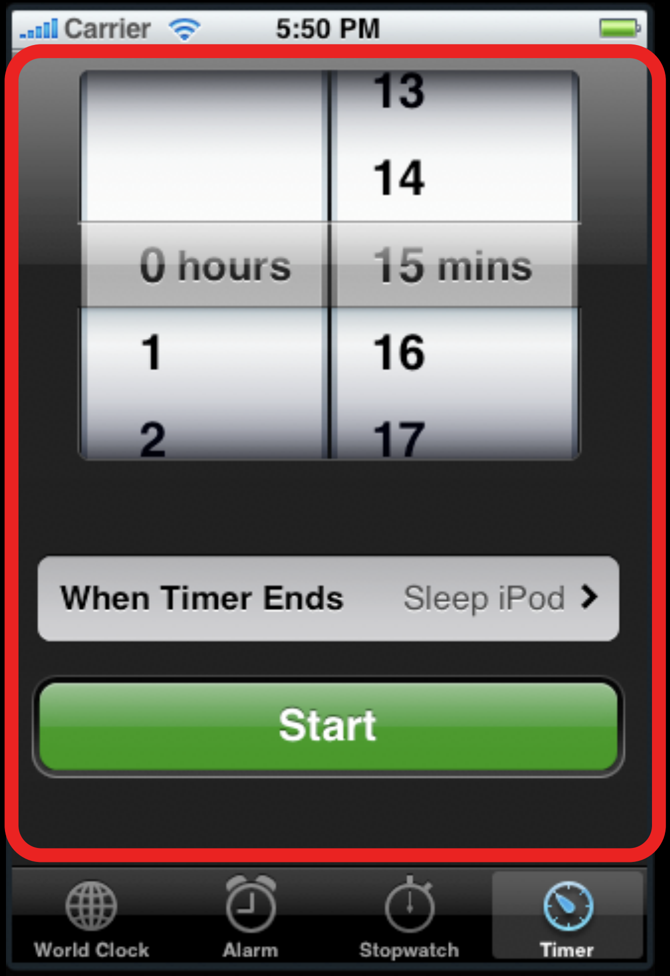
View Controller

How It Fits Together



How It Fits Together

- Selected view controller's view



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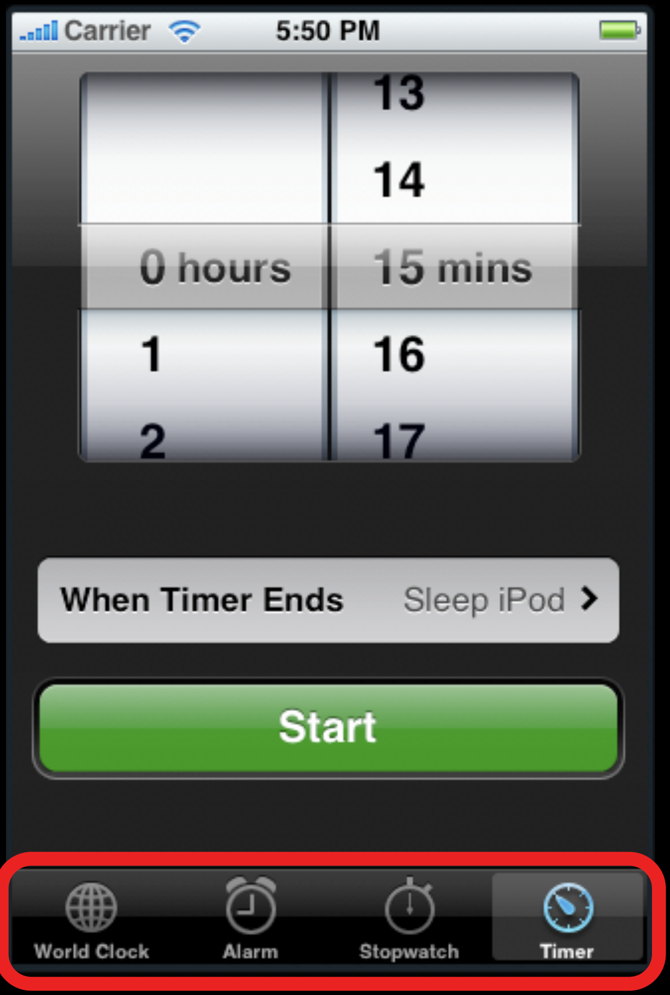


- Selected view controller’s view
- All view controllers’ titles

Setting Up a Tab Bar Controller

Setting Up a Tab Bar Controller

```
- (void)applicationDidFinishLaunching
  // Create a tab bar controller
  tabBarController = [[UITabBarController alloc] init];







}
```

Setting Up a Tab Bar Controller

```
- (void)applicationDidFinishLaunching
    // Create a tab bar controller
    tabBarController = [[UITabBarController alloc] init];

    // Set the array of view controllers
    tabBarController.viewControllers = myViewControllers;




}
```

Setting Up a Tab Bar Controller

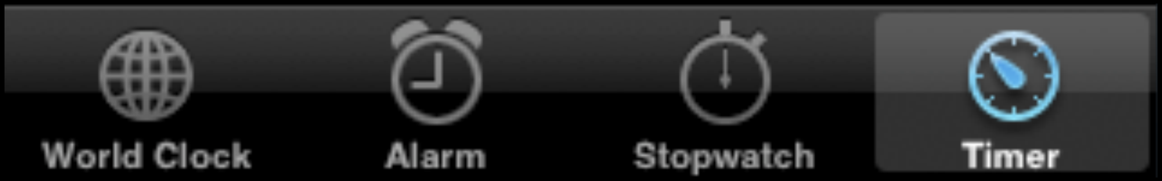
```
- (void)applicationDidFinishLaunching
  // Create a tab bar controller
  tabBarController = [[UITabBarController alloc] init];

  // Set the array of view controllers
  tabBarController.viewControllers = myViewControllers;

  // Add the tab bar controller’s view to the window
  [window addSubview:tabBarController.view];
}
```

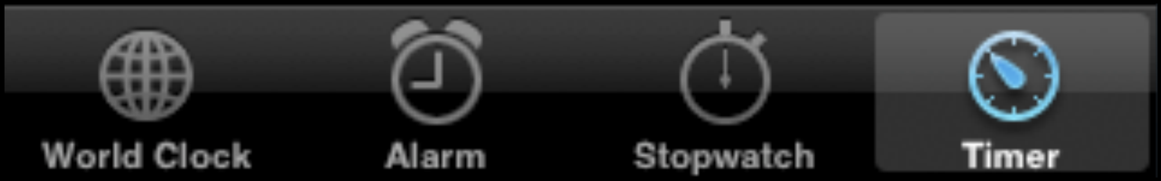
Tab Bar Appearance

- View controllers can define their appearance in the tab bar



Tab Bar Appearance

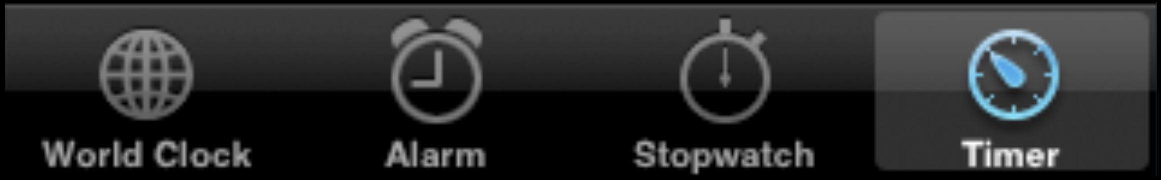
- View controllers can define their appearance in the tab bar



- UITabBarItem
  - Title + image or system item

Tab Bar Appearance

- View controllers can define their appearance in the tab bar



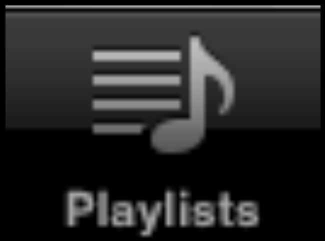
- UITabBarItem
  - Title + image or system item
- Each view controller comes with a tab bar item for customizing

Creating Tab Bar Items

- Title and image

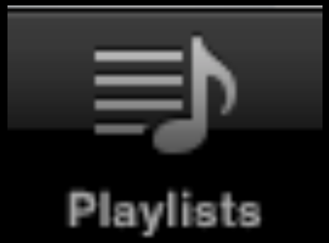
Creating Tab Bar Items

- Title and image



Creating Tab Bar Items

- Title and image



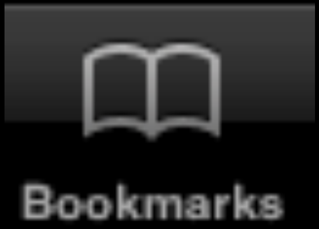
```
- (void)viewDidLoad
{
  UITabBarItem *item = [[UITabBarItem alloc]
                        initWithTitle:@“Playlists”
                        image:[UIImage imageNamed:@“music.png”]
                        tag:0];
  self.tabBarItem = item;
  [item release];
}
```

Creating Tab Bar Items

- System item

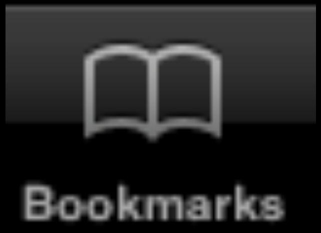
Creating Tab Bar Items

- System item



Creating Tab Bar Items

- System item

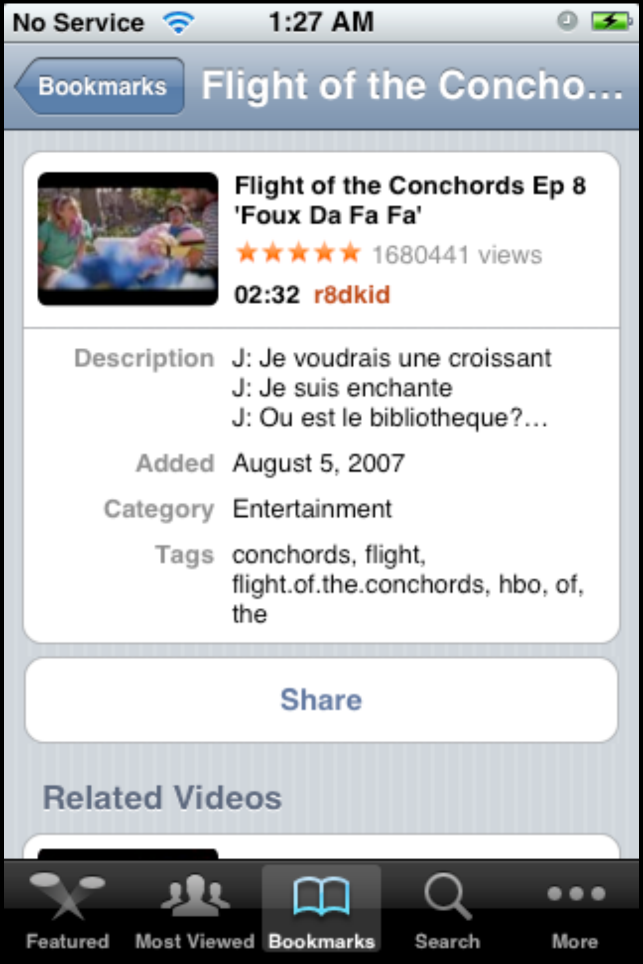


```
- (void)viewDidLoad
{
  UITabBarItem *item = [[UITabBarItem alloc]
                      initWithTabBarSystemItem:
                        UITabBarSystemItemBookmarks
                      tag:0]
  self.tabBarItem = item;
  [item release];
}
```

Demo:
Using a Tab Bar Controller

More View Controllers

- What happens when a tab bar controller has too many view controllers to display at once?



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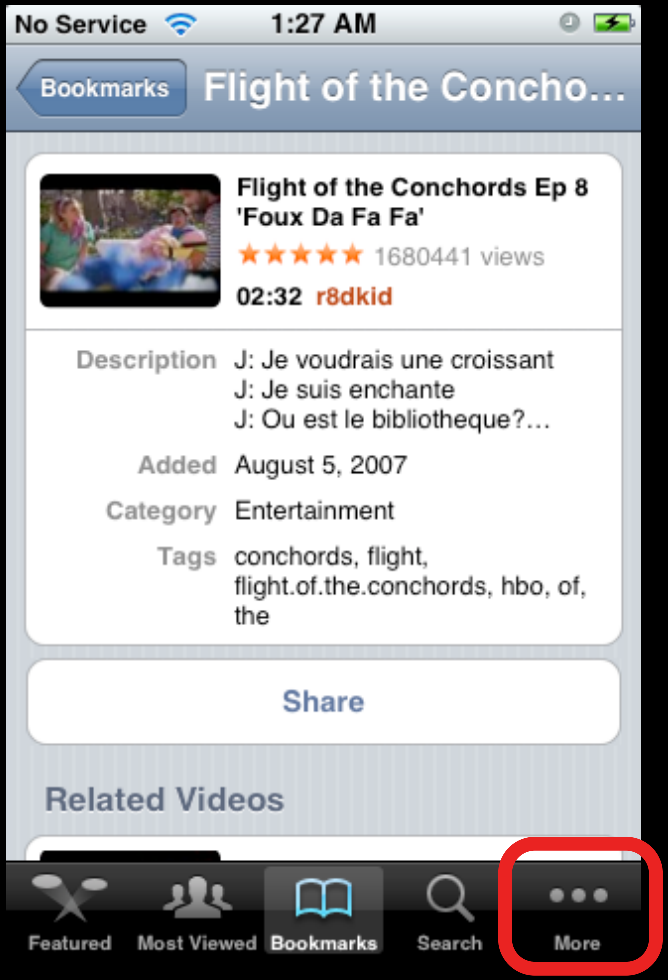
More View Controllers

- What happens when a tab bar controller has too many view controllers to display at once?
  - “More” tab bar item displayed automatically



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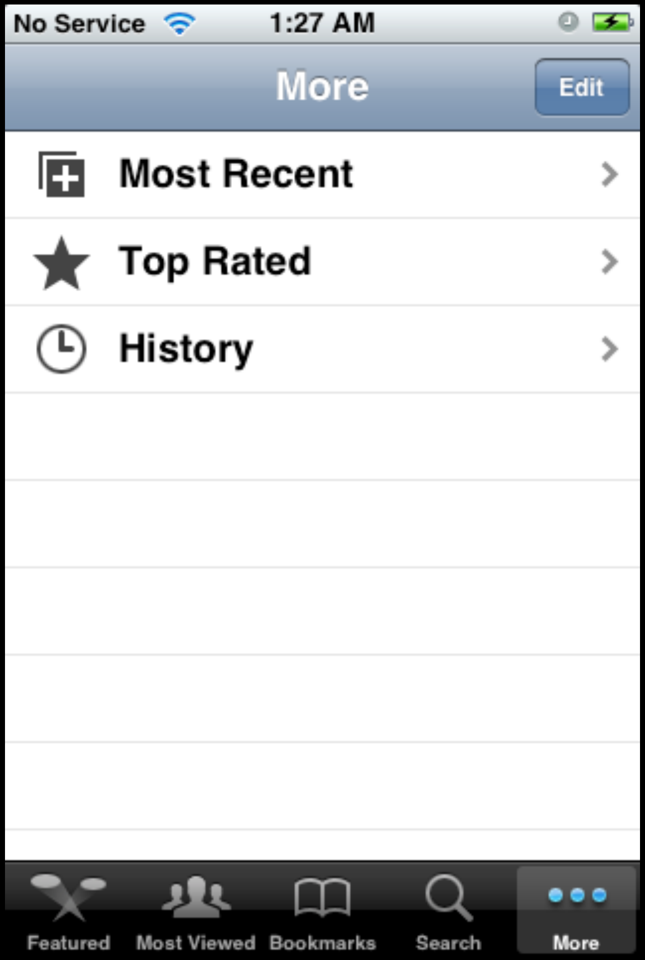
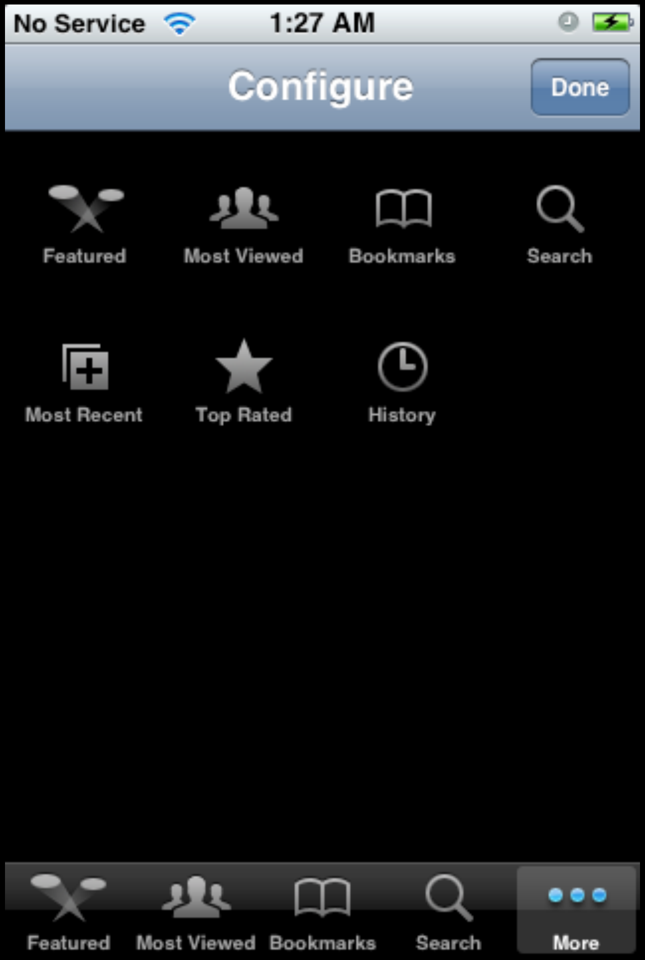
More View Controllers

- What happens when a tab bar controller has too many view controllers to display at once?
    - “More” tab bar item displayed automatically
    - User can navigate to remaining view controllers



More View Controllers

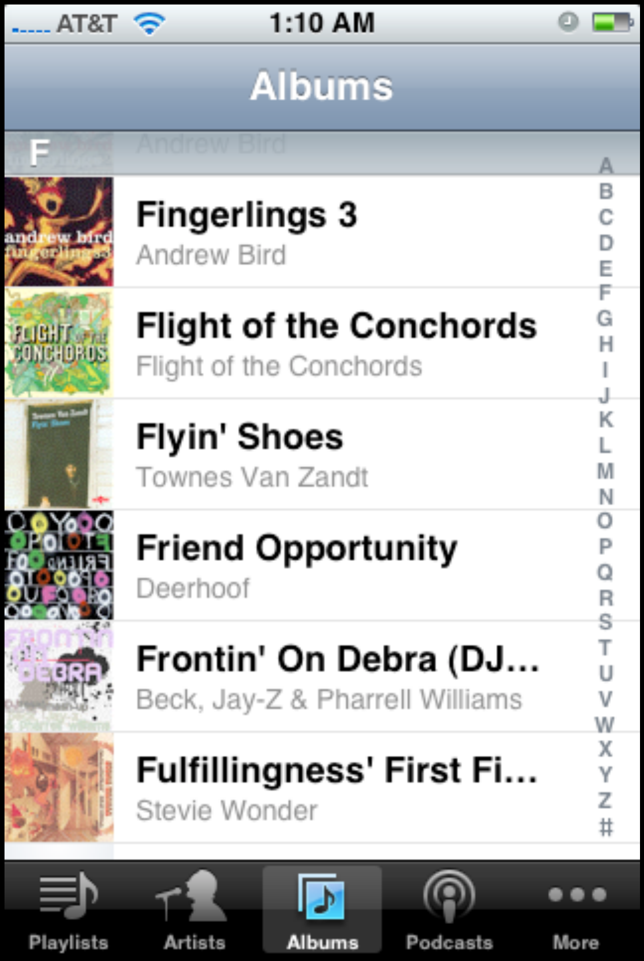
- What happens when a tab bar controller has too many view controllers to display at once?
  - "More" tab bar item displayed automatically
  - User can navigate to remaining view controllers
  - Customize order



Combining Approaches

Tab Bar + Navigation Controllers

Multiple parallel hierarchies



Fingerlings 3
Andrew Bird

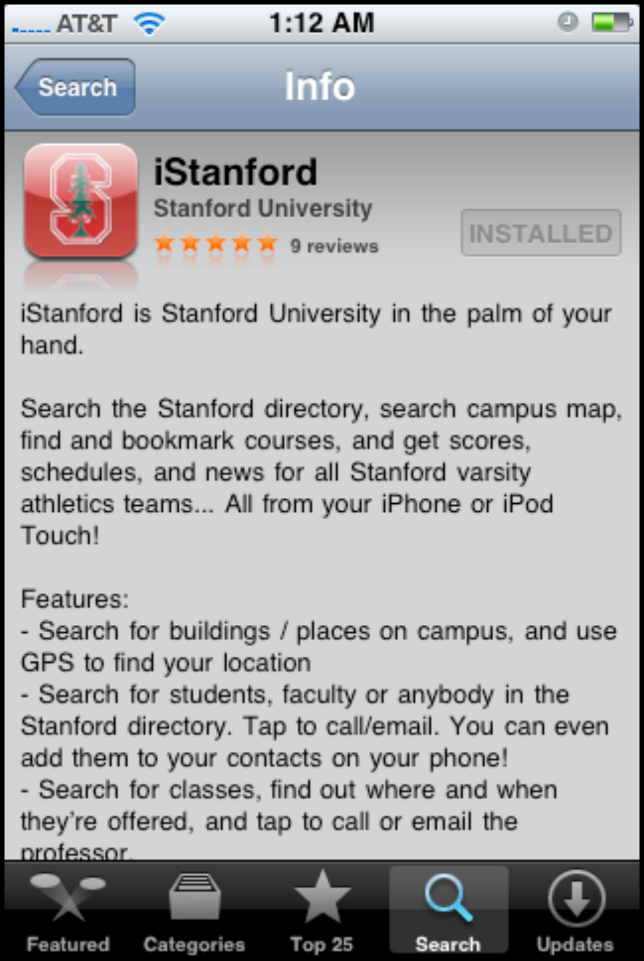
Flight of the Conchords
Flight of the Conchords

Flyin' Shoes
Townes Van Zandt

Friend Opportunity
Deerhoof

Frontin' On Debra (DJ...
Beck, Jay-Z & Pharrell Williams

Fulfillingness' First Fi...
Stevie Wonder



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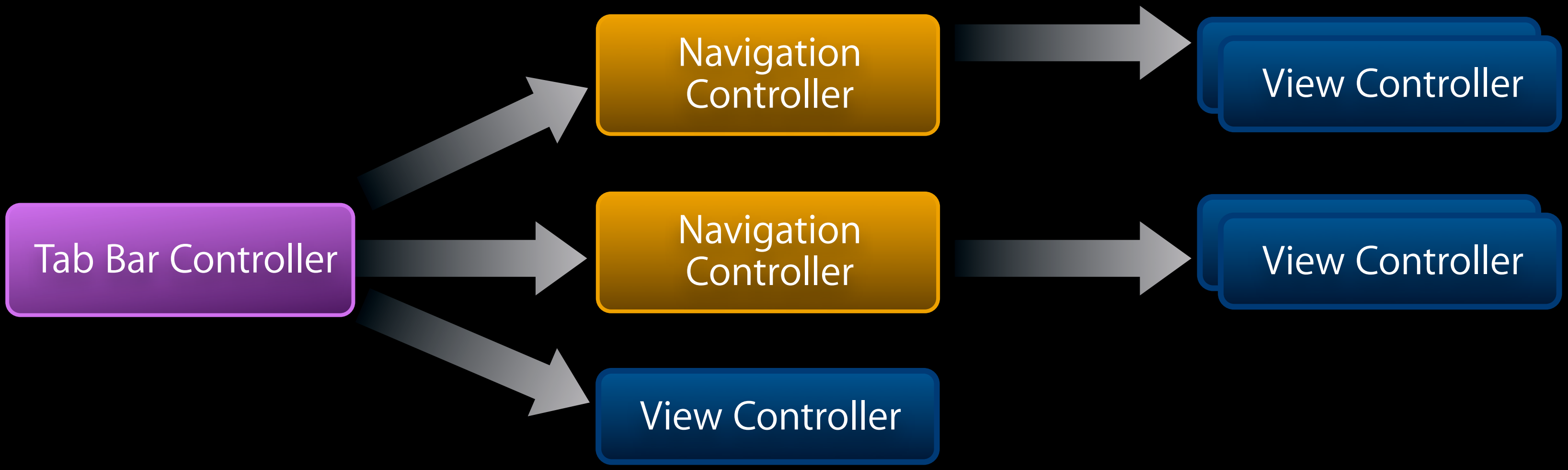
Tab Bar + Navigation Controllers

Tab Bar Controller

Tab Bar + Navigation Controllers



Nesting Navigation Controllers

Nesting Navigation Controllers

- Create a tab bar controller

```
tabBarController = [[UITabBarController alloc] init];
```

Nesting Navigation Controllers

- Create a tab bar controller

```
tabBarController = [[UITabBarController alloc] init];
```

- Create each navigation controller

```
navController = [[UINavigationController alloc] init];
[navController pushViewController:firstViewController
                         animated:NO];
```

Nesting Navigation Controllers

- Create a tab bar controller

```
tabBarController = [[UITabBarController alloc] init];
```

- Create each navigation controller

```
navController = [[UINavigationController alloc] init];
[navController pushViewController:firstViewController
                         animated:NO];
```

- Add them to the tab bar controller

```
tabBarController.viewControllers = [NSArray arrayWithObjects:
                                    navController,
                                    anotherNavController,
                                    someViewController,
                                    nil];
```

Questions?