CS193P - Lecture 6

iPhone Application Development

Designing iPhone Applications
Model-View-Controller (Why and How?)
View Controllers

Announcements

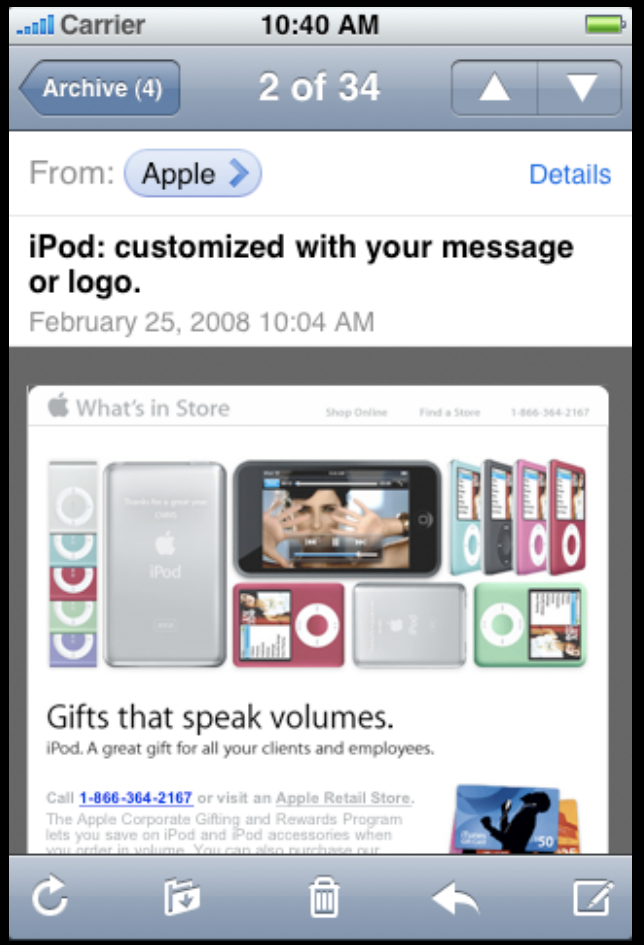
- Questions about Views?
- Friday's optional section...
  - Extended Office Hours
  - Gates 360, 3:30 - 5pm

Today's Topics

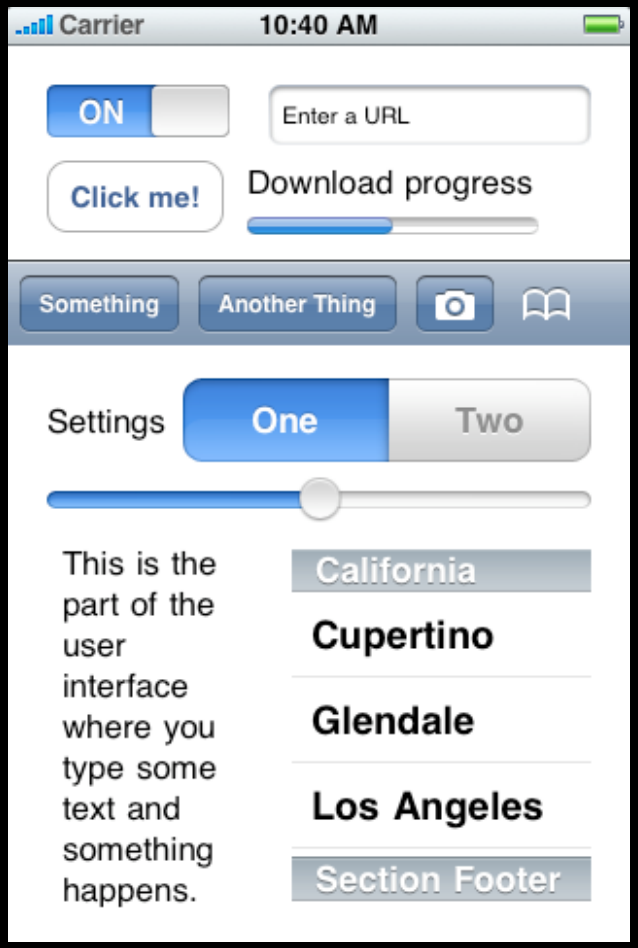
- Designing iPhone Applications
- Model-View-Controller (Why and How?)
- View Controllers

Designing iPhone Applications

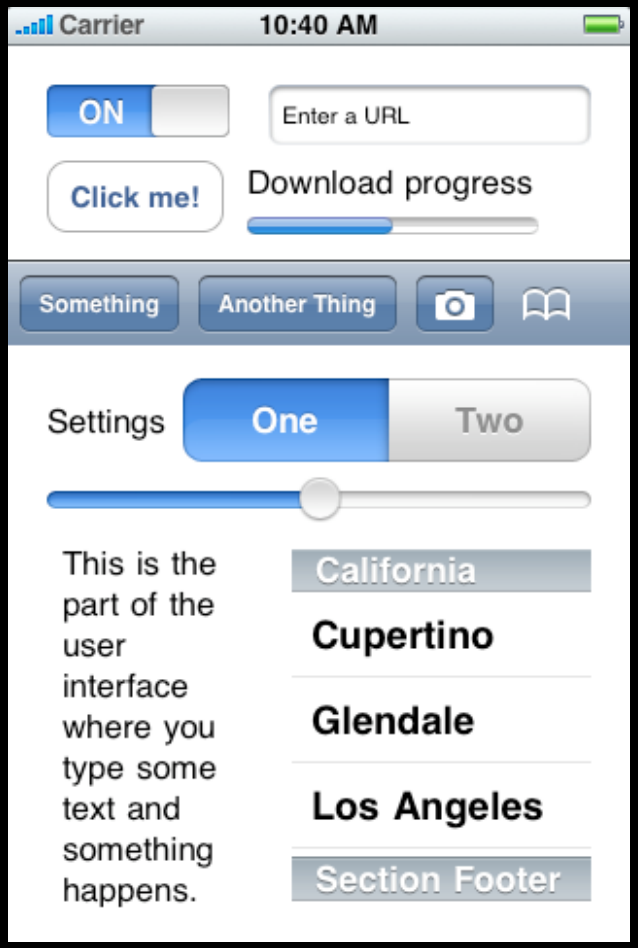
Two Flavors of Mail



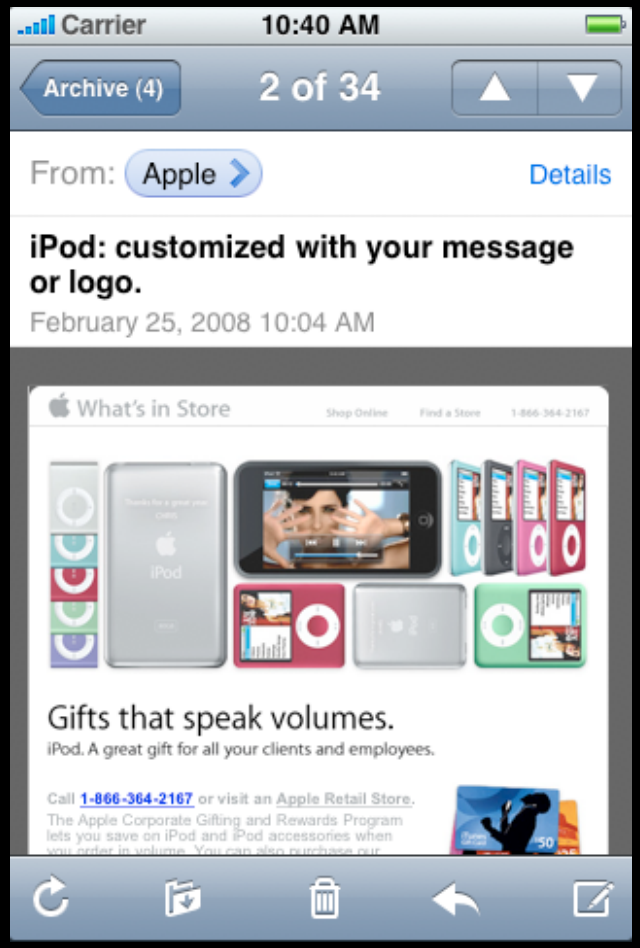
Organizing Content



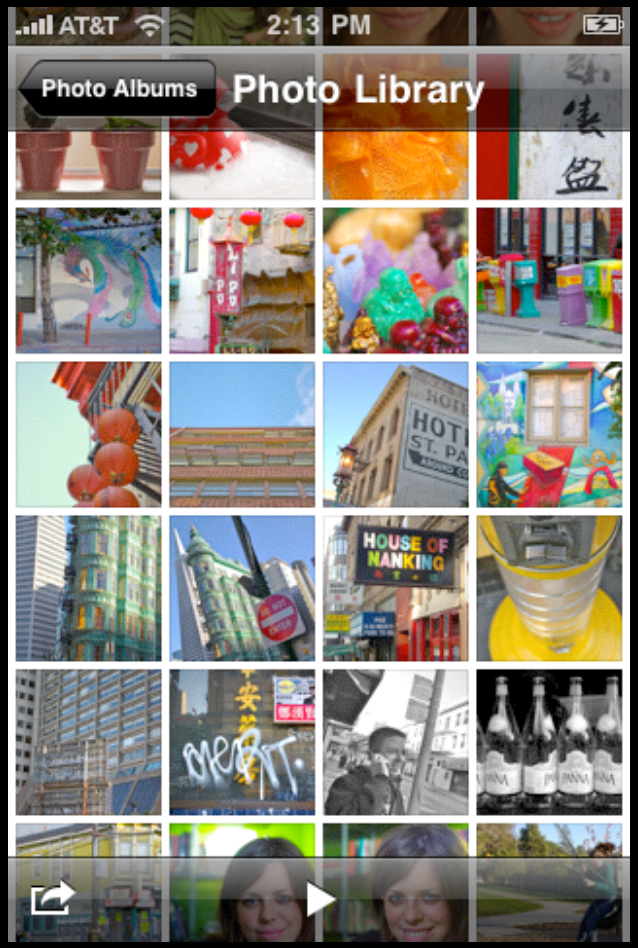
Organizing Content



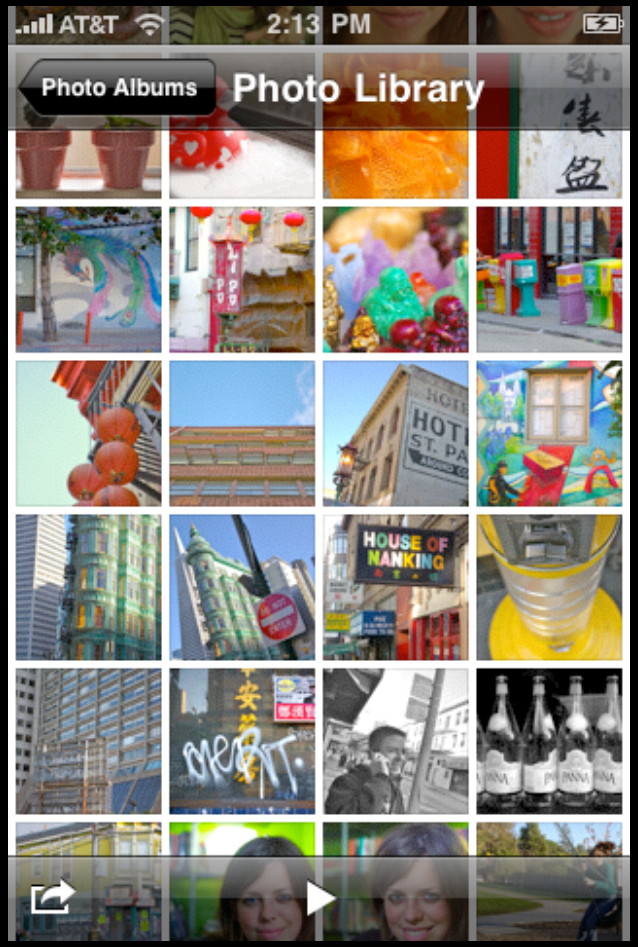
Organizing Content



Organizing Content

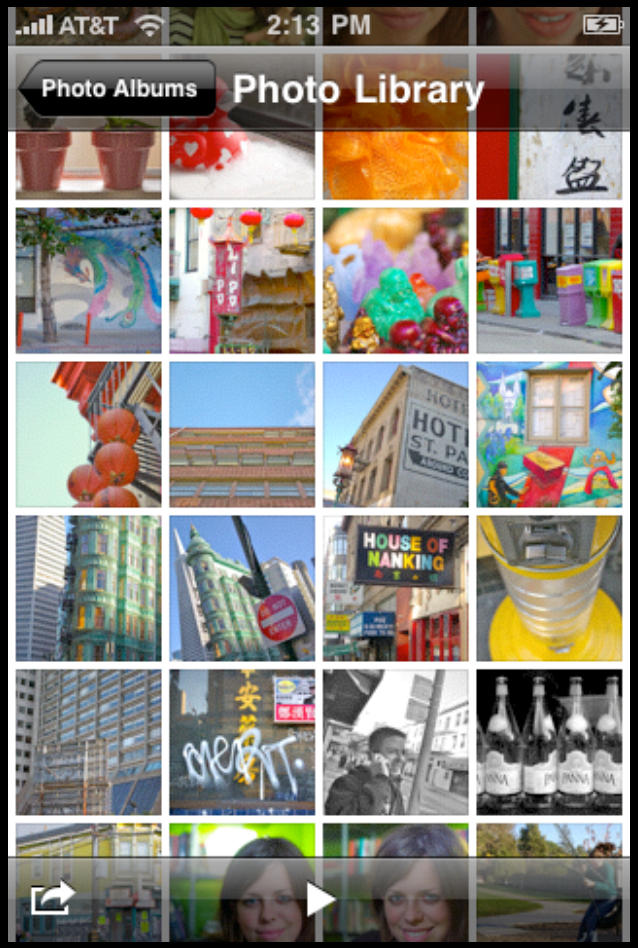


Organizing Content



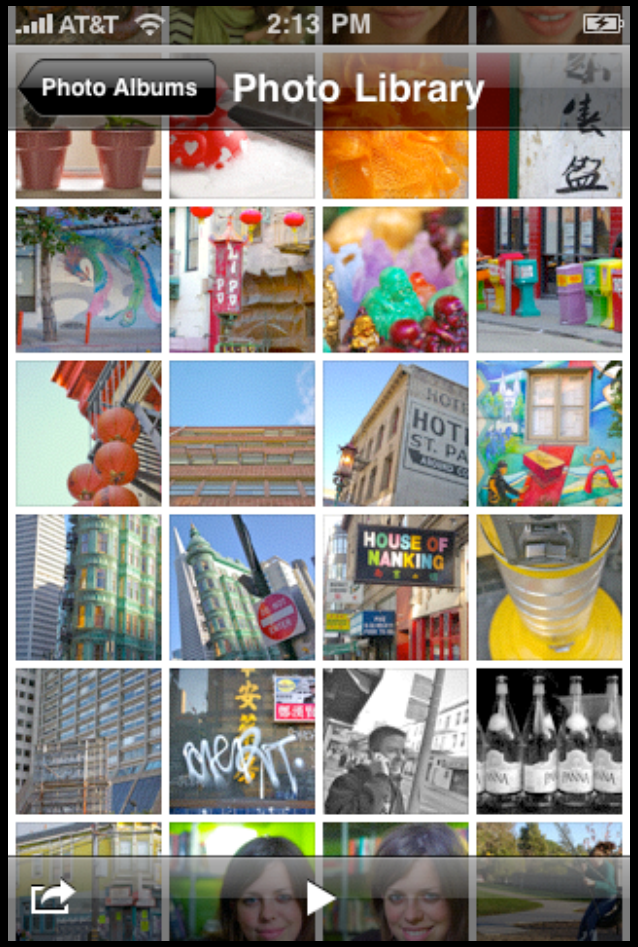
- Focus on your user's data

Organizing Content



- Focus on your user's data
- One thing at a time

Organizing Content

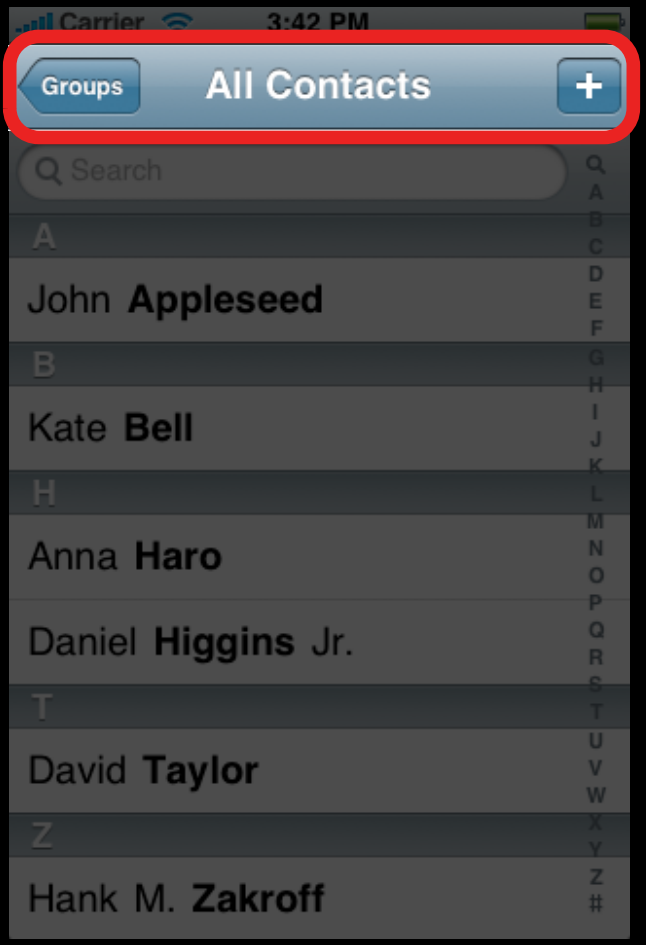


- Focus on your user's data
- One thing at a time
- Screenfuls of content

Patterns for Organizing Content

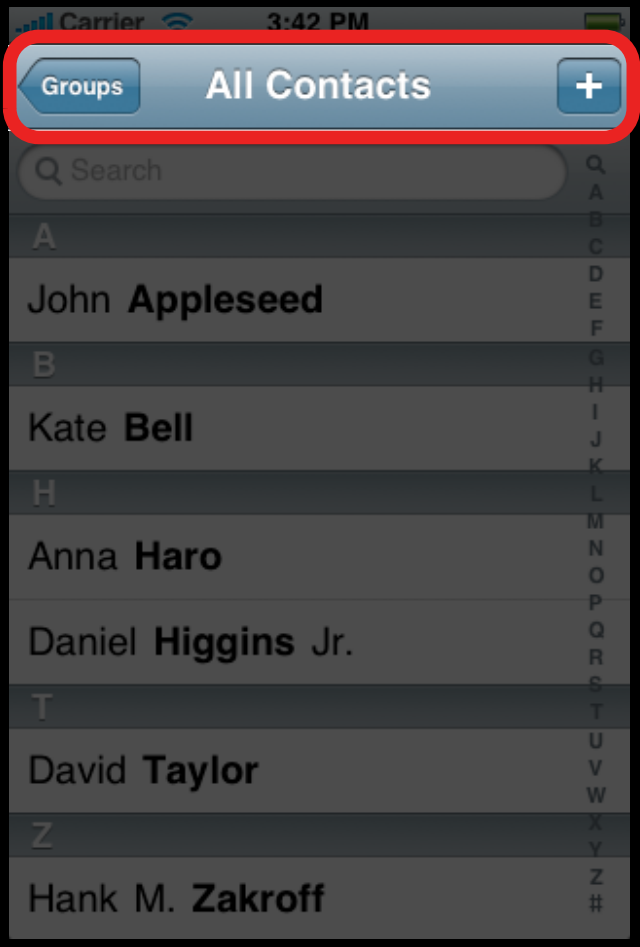
Patterns for Organizing Content

Navigation Bar



Patterns for Organizing Content

Navigation Bar

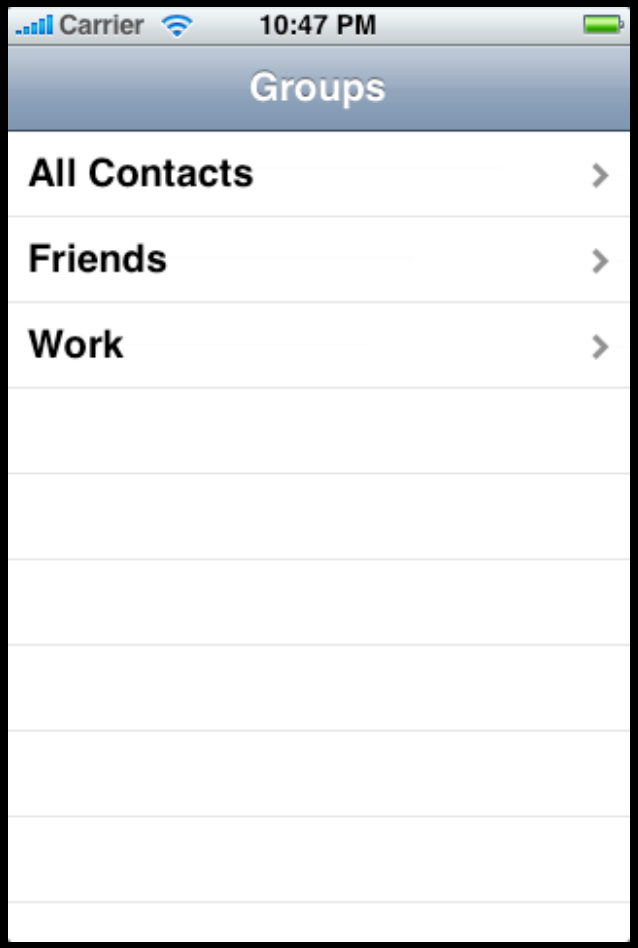


Tab Bar

Navigation Bar

- Hierarchy of content
- Drill down into greater detail

Navigation Bar



- Hierarchy of content
- Drill down into greater detail

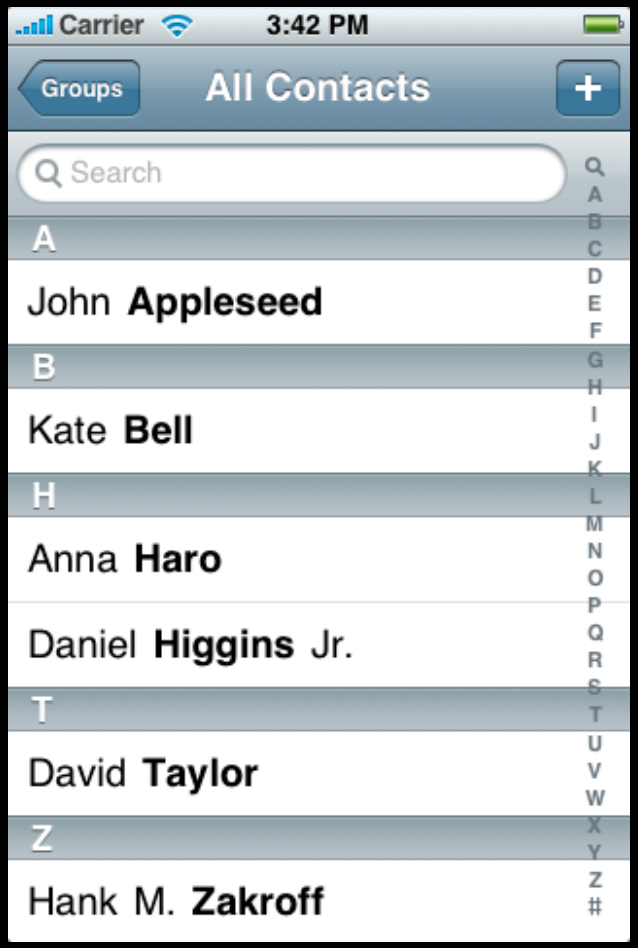
Tab Bar

- Self-contained modes

Tab Bar

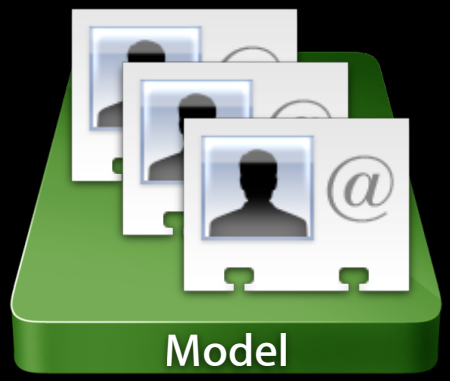
- Self-contained modes

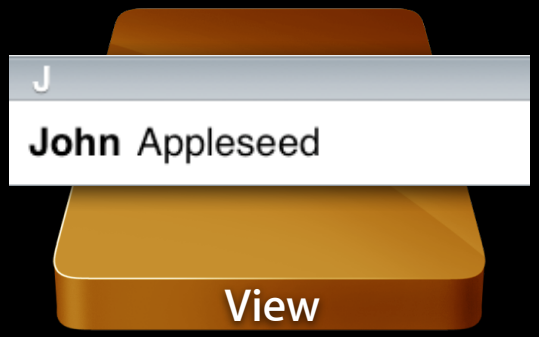
A Screenful of Content



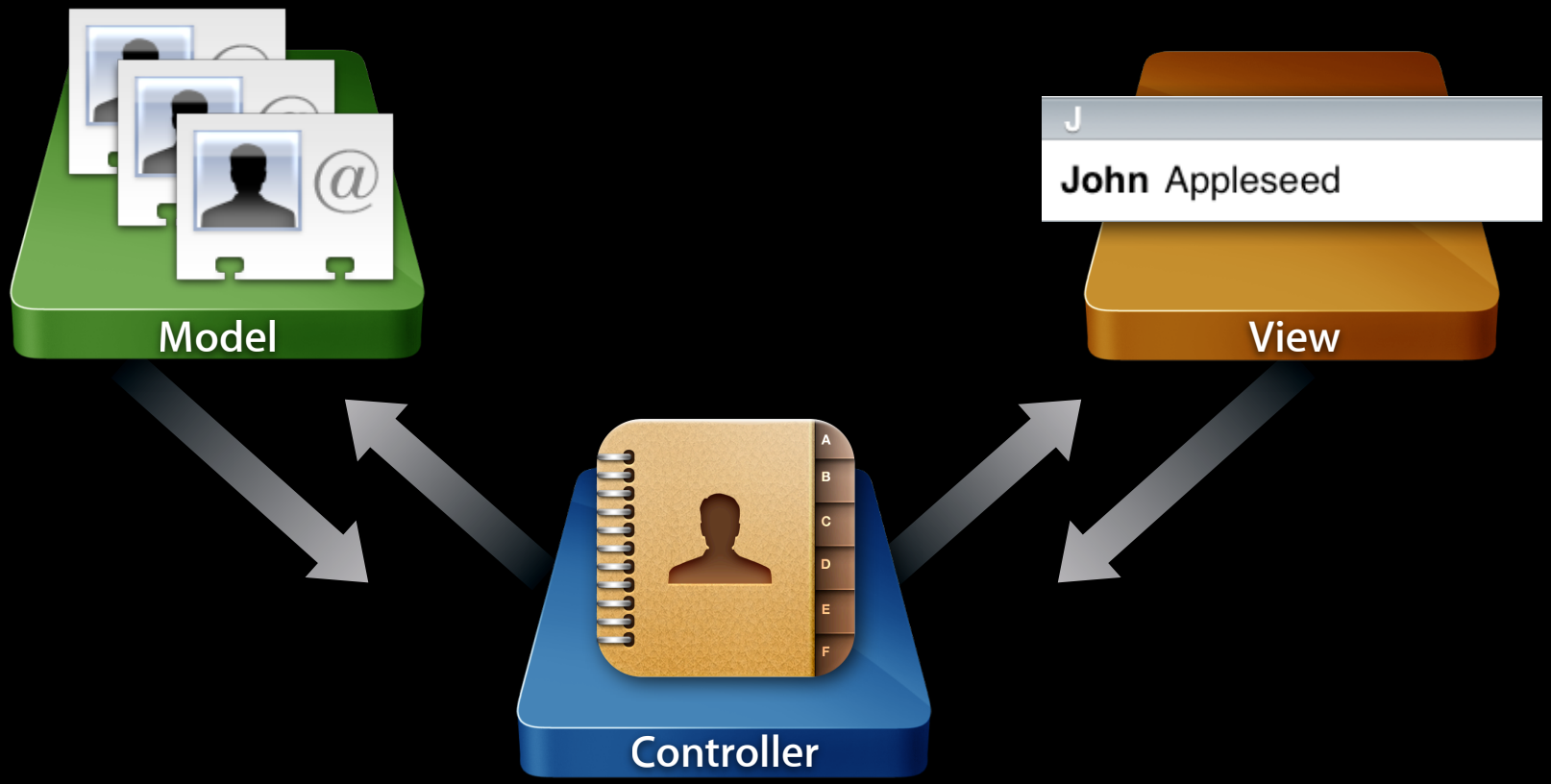
- Slice of your application
- Views, data, logic

Parts of a Screenful

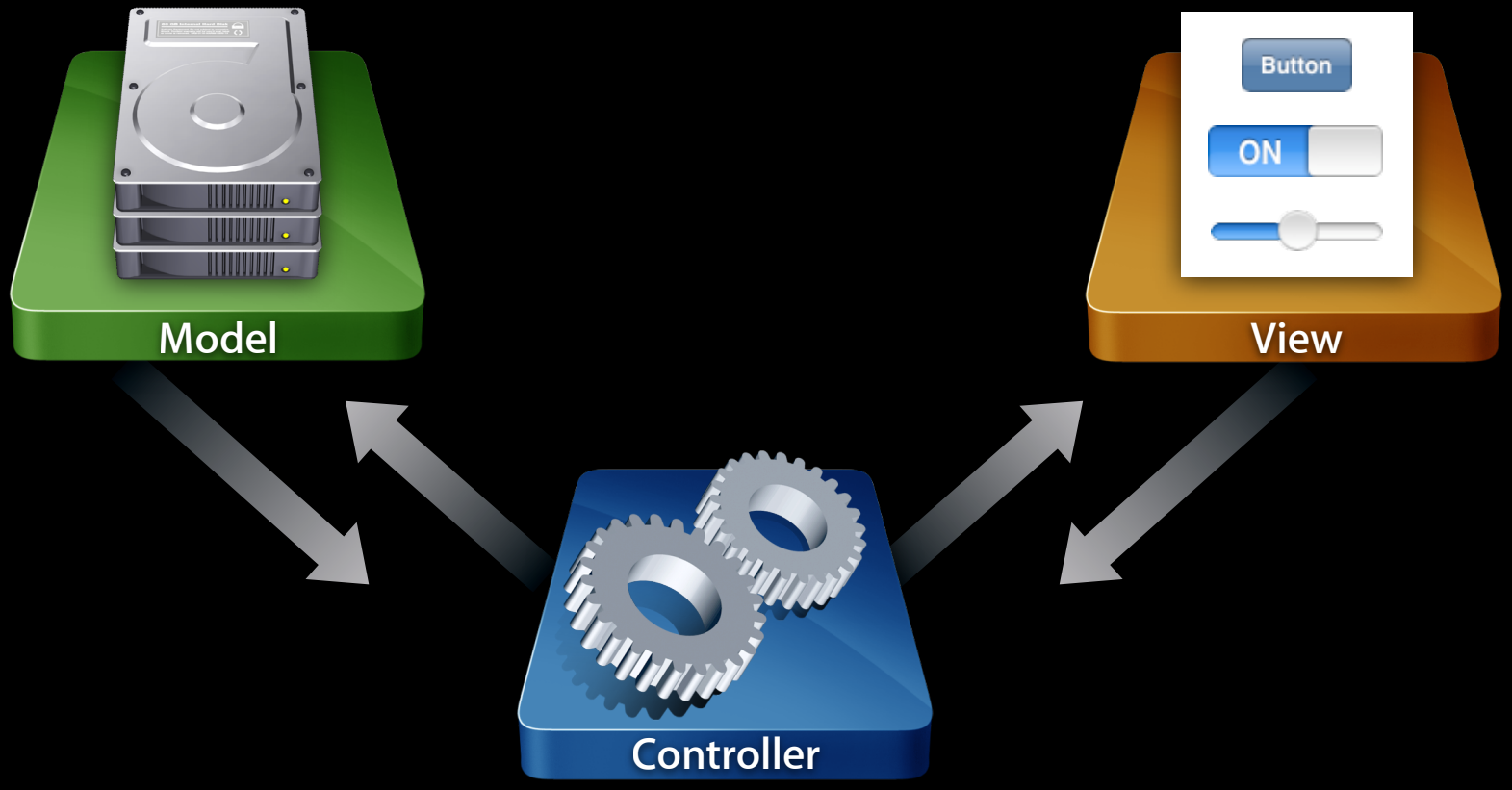




Parts of a Screenful



Parts of a Screenful



Model-View-Controller (Why and How?)

Why Model-View-Controller?

- Ever used the word "spaghetti" to describe code?
- Clear responsibilities make things **easier to maintain**
- Avoid having one monster class that does everything

Why Model-View-Controller?

- Ever used the word "spaghetti" to describe code?
- Clear responsibilities make things **easier to maintain**
- Avoid having one monster class that does everything

Why Model-View-Controller?

- Separating responsibilites also leads to **reusability**
- By minimizing dependencies, you can take a model or view class you've already written and use it elsewhere
- Think of ways to **write less code**

Communication and MVC

- How should objects communicate?
- Which objects know about one another?

Communication and MVC

- How should objects communicate?
- Which objects know about one another?

Model

- Example: **Polygon class**
- Not aware of views or controllers
- Typically the **most reusable**
- Communicate generically using...
  - Key-value observing
  - Notifications

Communication and MVC

- How should objects communicate?
- Which objects know about one another?

View

- Example: **PolygonView class**
- Not aware of controllers, may be aware of relevant model objects
- Also **tends to be reusable**
- Communicate with controller using...
  - Target-action
  - Delegation

Communication and MVC

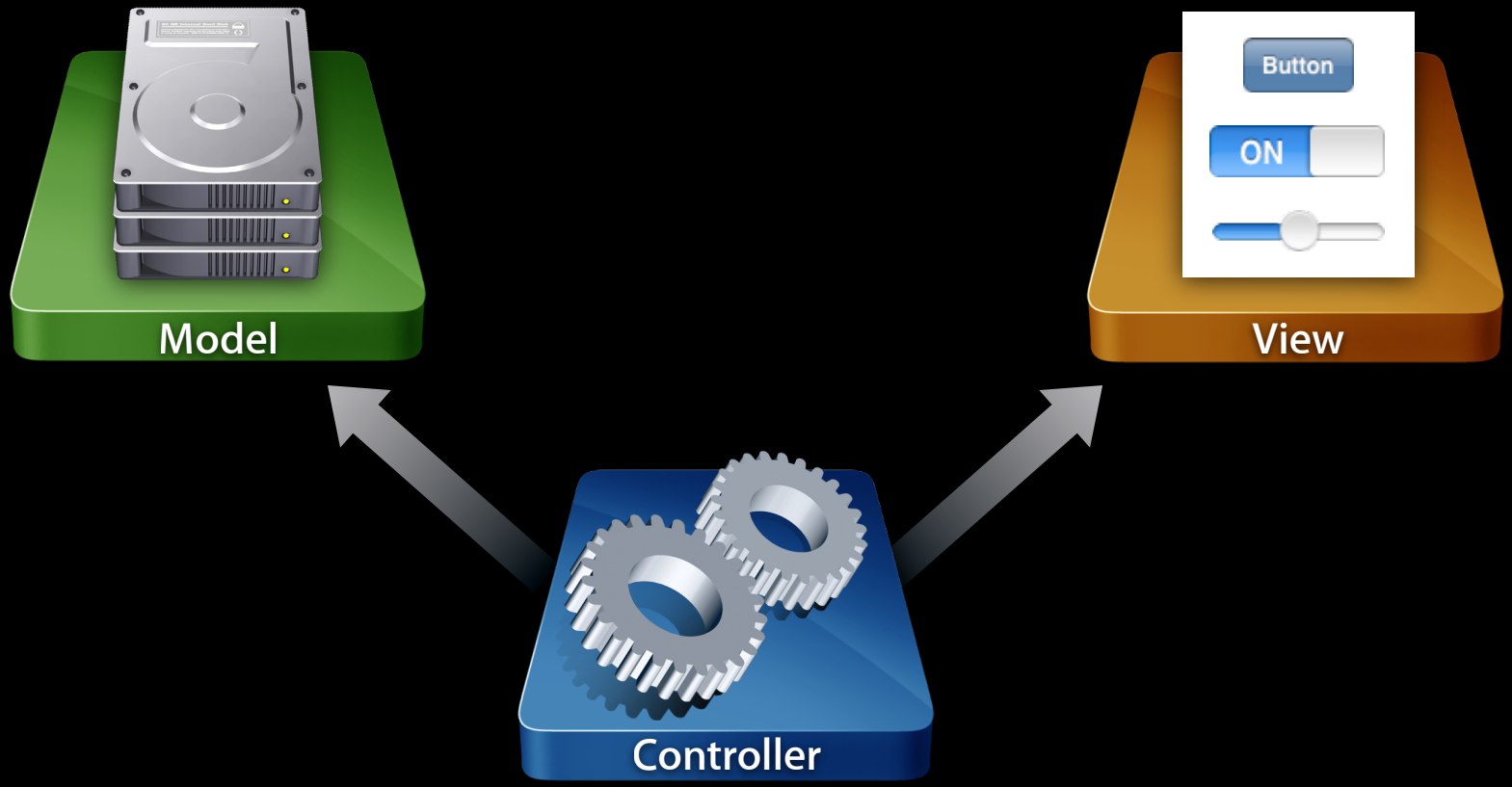
- How should objects communicate?
- Which objects know about one another?

Controller

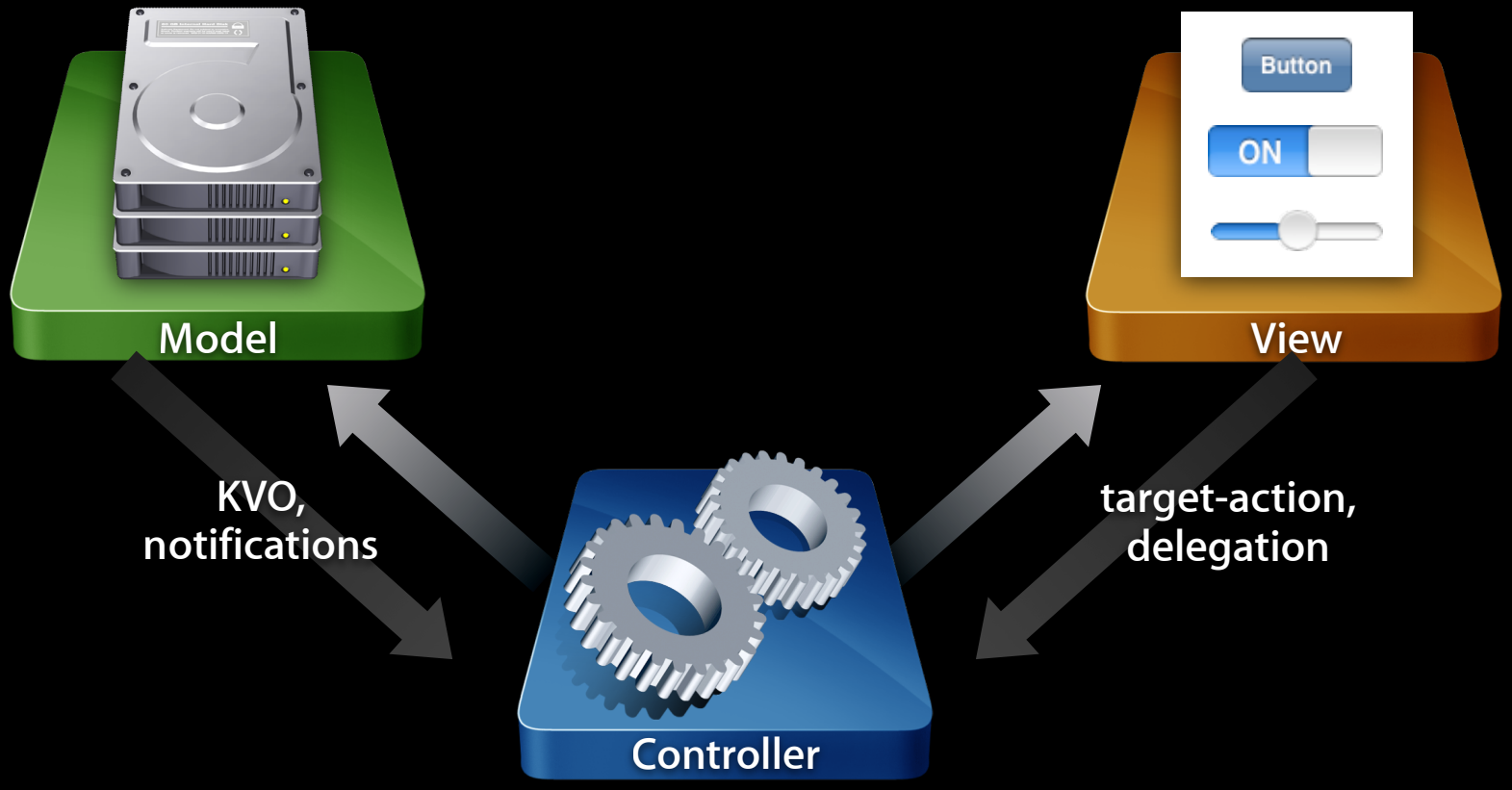
- Knows about model and view objects
- The brains of the operation
- Manages relationships and data flow
- Typically app-specific,
  so **rarely reusable**

Communication and MVC

Communication and MVC



Communication and MVC



View Controllers

Problem: Managing a Screenful

- Controller manages views, data and application logic
- Apps are made up of many of these
- Would be nice to have a well-defined starting point
  - A la UIView for views
  - Common language for talking about controllers

Problem: Building Typical Apps

- Some application flows are very common
  - Navigation-based
  - Tab bar-based
  - Combine the two
- Don’t reinvent the wheel
- Plug individual screens together to build an app

UIViewController

- Basic building block
- Manages a screenful of content
- Subclass to add your application logic

UIViewController

- Basic building block
- Manages a screenful of content
- Subclass to add your application logic

UIViewController

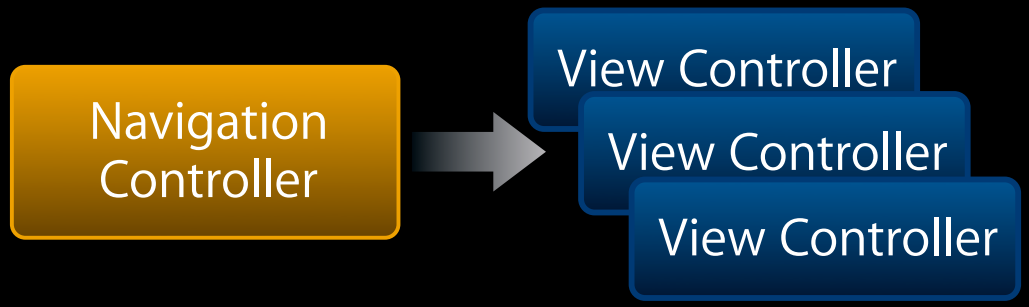
- Basic building block
- Manages a screenful of content
- Subclass to add your application logic

“Your” and “Our” View Controllers

- **Create your own** UIViewController subclass for each screenful
- Plug them together using existing **composite** view controllers

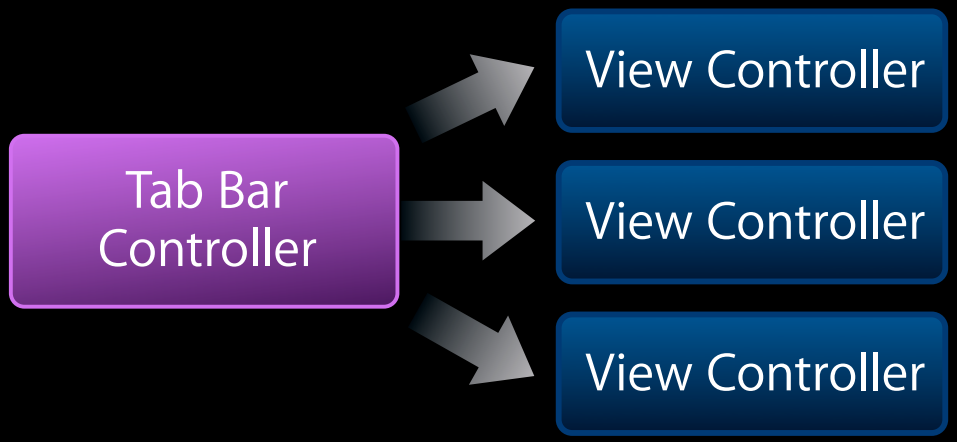
“Your” and “Our” View Controllers

- **Create your own** UIViewController subclass for each screenful
- Plug them together using existing **composite** view controllers



“Your” and “Our” View Controllers

- **Create your own** UIViewController subclass for each screenful
- Plug them together using existing **composite** view controllers



Your View Controller Subclass

Your View Controller Subclass

```
#import <UIKit/UIKit.h>

@interface MyViewController : UIViewController {
  // A view controller will usually
  // manage views and data
  NSMutableArray *myData;
  UILabel *myLabel;
}
```

Your View Controller Subclass

```
#import <UIKit/UIKit.h>

@interface MyViewController : UIViewController {
  // A view controller will usually
  // manage views and data
  NSMutableArray *myData;
  UILabel *myLabel;
}

// Expose some of its contents to clients
@property (readonly) NSArray *myData;
```

Your View Controller Subclass

```
#import <UIKit/UIKit.h>

@interface MyViewController : UIViewController {
  // A view controller will usually
  // manage views and data
  NSMutableArray *myData;
  UILabel *myLabel;
}

// Expose some of its contents to clients
@property (readonly) NSArray *myData;

// And respond to actions
- (void)doSomeAction:(id)sender;
```

The “View” in “View Controller”

The “View” in “View Controller”

- UIViewController superclass has a view property
  - `@property (retain) UIView *view;`

The “View” in “View Controller”

- UIViewController superclass has a view property
  - `@property (retain) UIView *view;`
- Loads lazily
  - On demand when requested
  - Can be purged on demand as well (low memory)

The “View” in “View Controller”

- UIViewController superclass has a view property
  - `@property (retain) UIView *view;`
- Loads lazily
  - On demand when requested
  - Can be purged on demand as well (low memory)
- Sizing and positioning the view?
  - Depends on where it’s being used
  - Don’t make assumptions, be flexible

When to call -loadView?

When to call -loadView?

- **Don’t do it!**

When to call -loadView?

- **Don't do it!**
- Cocoa tends to embrace a lazy philosophy
  - Call -release instead of -dealloc
  - Call -setNeedsDisplay instead of -drawRect:

When to call -loadView?

- **Don't do it!**
- Cocoa tends to embrace a lazy philosophy
  - Call -release instead of -dealloc
  - Call -setNeedsDisplay instead of -drawRect:
- Allows work to be deferred or coalesced
  - Performance!

Creating Your View in Code

Creating Your View in Code

- Override -loadView
  - Never call this directly

```
// Subclass of UIViewController
- (void)loadView
{



}
```

Creating Your View in Code

- Override -loadView
  - Never call this directly
- Create your views

```
// Subclass of UIViewController
- (void)loadView
{
   MyView *myView = [[MyView alloc] initWithFrame:frame];

   [myView release];
}
```

Creating Your View in Code

- Override -loadView
  - Never call this directly
- Create your views
- Set the view property

```
// Subclass of UIViewController
- (void)loadView
{
   MyView *myView = [[MyView alloc] initWithFrame:frame];
   self.view = myView; // The view controller now owns the view
   [myView release];
}
```

Creating Your View in Code

- Override -loadView
  - Never call this directly
- Create your views
- Set the view property
- Create view controller with -init

```
// Subclass of UIViewController
- (void)loadView
{
   MyView *myView = [[MyView alloc] initWithFrame:frame];
   self.view = myView; // The view controller now owns the view
   [myView release];
}
```

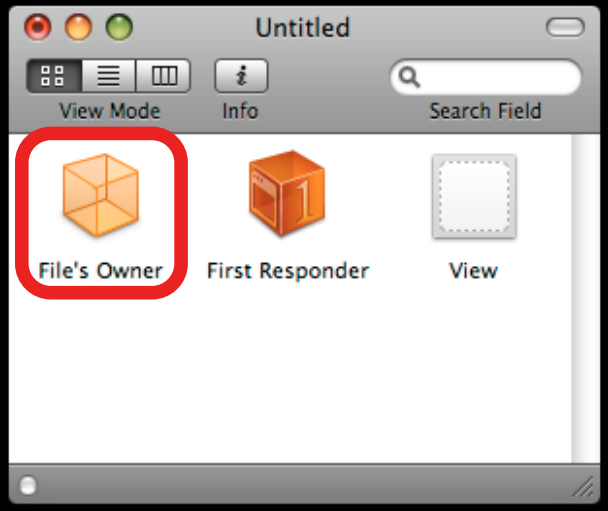
Creating Your View with Interface Builder

Creating Your View with Interface Builder

- Lay out a view in Interface Builder

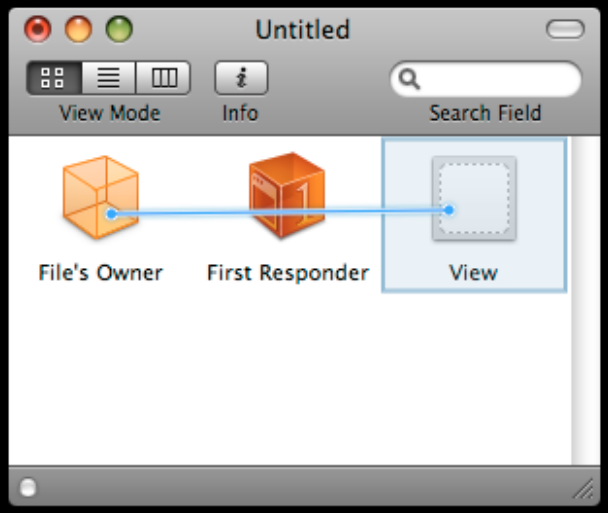
Creating Your View with Interface Builder

- Lay out a view in Interface Builder
- File's owner is view controller class



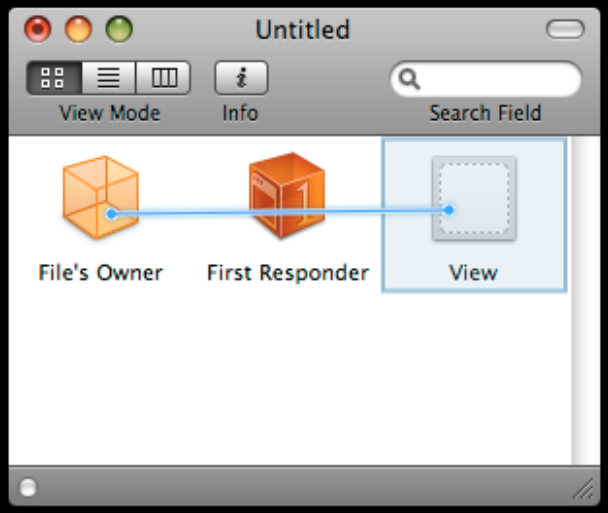
Creating Your View with Interface Builder

- Lay out a view in Interface Builder
- File's owner is view controller class
- Hook up view outlet



Creating Your View with Interface Builder

- Lay out a view in Interface Builder
- File's owner is view controller class
- Hook up view outlet
- Create view controller with -initWithNibName:bundle:



Demo:
View Controllers with IB

View Controller Lifecycle

View Controller Lifecycle

```
- (id)initWithNibName:(NSString *)nibName
bundle:(NSBundle *)bundle
{
  if (self == [super init...]) {
    // Perform initial setup, nothing view-related
    myData = [[NSMutableArray alloc] init];
    self.title = @“Foo”;
  }
  return self;
}
```

View Controller Lifecycle

View Controller Lifecycle

```
- (void)viewDidLoad
{
  // Your view has been loaded
  // Customize it here if needed
  view.someWeirdProperty = YES;
}
```

View Controller Lifecycle

View Controller Lifecycle

```
- (void)viewWillAppear:(BOOL)animated
{
  [super viewWillAppear:animated];

  // Your view is about to show on the screen
  [self beginLoadingDataFromTheWeb];
  [self startShowingLoadingProgress];
}
```

View Controller Lifecycle

View Controller Lifecycle

```
- (void)viewWillDisappear:(BOOL)animated
{
  [super viewWillDisappear:animated];

  // Your view is about to leave the screen
  [self rememberScrollPosition];
  [self saveDataToDisk];
}
```

Loading & Saving Data

- Lots of options out there, depends on what you need
  - NSUserDefaults
  - Property lists
  - CoreData
  - SQLite
  - Web services
- Covering in greater depth in Lecture 9 on 4/29

Demo:
Loading & Saving Data

More View Controller Hooks

- Automatically rotating your user interface
- Low memory warnings

Supporting Interface Rotation

Supporting Interface Rotation

```
- (BOOL)shouldAutorotateToInterfaceOrientation:
      (UIInterfaceOrientation)interfaceOrientation
{
  // This view controller only supports portrait
  return (interfaceOrientation ==
          UIInterfaceOrientationPortrait);
}
```

Supporting Interface Rotation

Supporting Interface Rotation

```
- (BOOL)shouldAutorotateToInterfaceOrientation:
        (UIInterfaceOrientation)interfaceOrientation
{
  // This view controller supports all orientations
  // except for upside-down.
  return (interfaceOrientation !=
          UIInterfaceOrientationPortraitUpsideDown);
}
```

Demo:
Rotating Your Interface

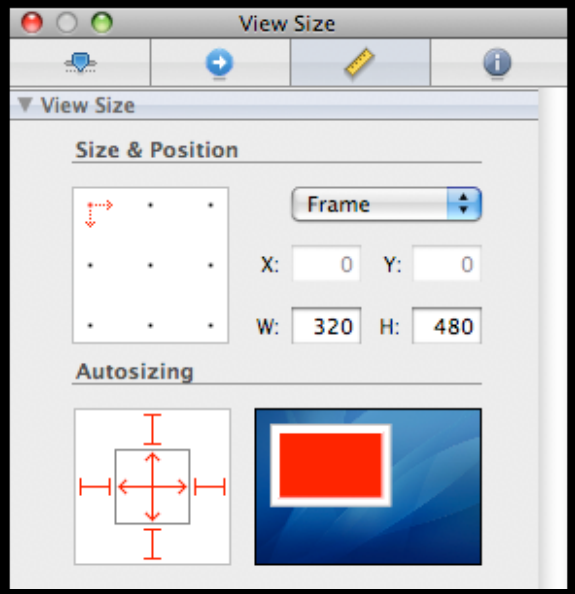
Autoresizing Your Views

Autoresizing Your Views

```
view.autoresizingMask = UIViewAutoresizingFlexibleWidth |
                        UIViewAutoresizingFlexibleHeight;
```

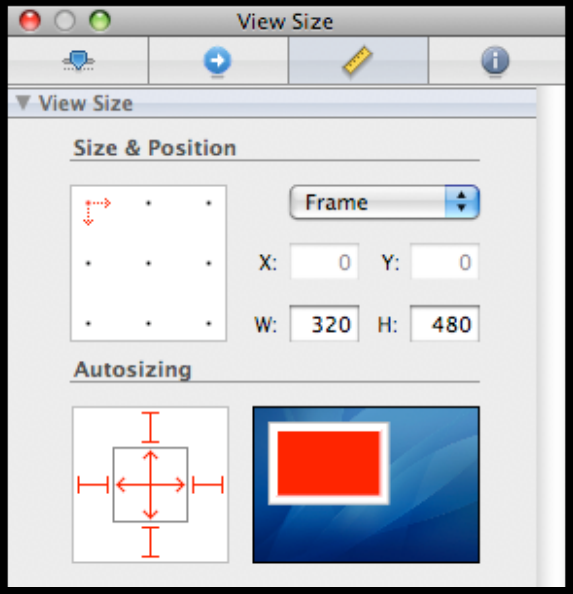
Autoresizing Your Views

```
view.autoresizingMask = UIViewAutoresizingFlexibleWidth |
                        UIViewAutoresizingFlexibleHeight;
```



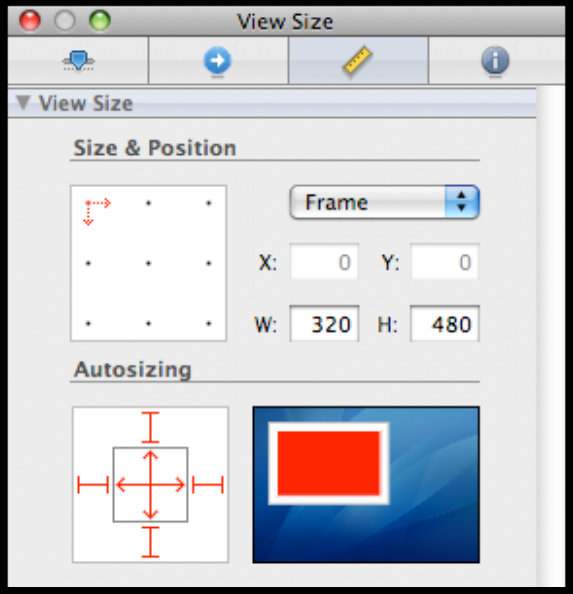
Autoresizing Your Views

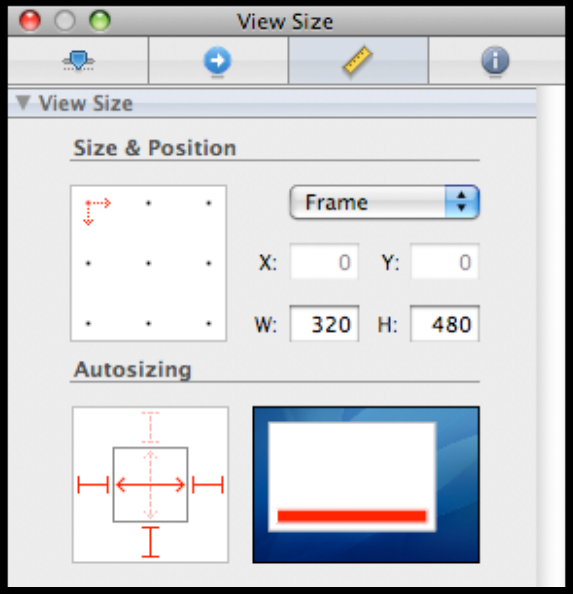
```
view.autoresizingMask = UIViewAutoresizingFlexibleWidth |
                        UIViewAutoresizingFlexibleHeight;

view.autoresizingMask = UIViewAutoresizingFlexibleWidth |
                        UIViewAutoresizingFlexibleTopMargin;
```



Autoresizing Your Views

```
view.autoresizingMask = UIViewAutoresizingFlexibleWidth |
                        UIViewAutoresizingFlexibleHeight;

view.autoresizingMask = UIViewAutoresizingFlexibleWidth |
                        UIViewAutoresizingFlexibleTopMargin;
```





Questions?