

CS193P - Lecture 4

iPhone Application Development

Building an Application

Model, View, Controller

Nib Files

Controls and Target-Action

Announcements

- Friday sections
 - Friday, 4-5: 260-113
- Invites to Developer Program will go out this weekend
 - Sign up and get your certificate when you get it
 - Start making apps that will run on Hardware!!
- Waiting for a couple students to reply about P/NC spots
 - If we don't hear back today, we're giving them away

Today's Topics

- Application Lifecycle
- Model, View, Controller design
- Interface Builder and Nib Files
- Controls and Target-Action
- HelloPoly demo

Review

Memory Management

- Alloc/Init
 - -alloc assigns memory; -init sets up the object
 - Override -init, not -alloc
- Retain/Release
 - Increment and decrement retainCount
 - When retainCount is 0, object is deallocated
 - Don't call -dealloc!
- Autorelease
 - Object is released when run loop completes

Setters, Getters, and Properties

- Setters and Getters have a standard format:
 - (int)age;
 - (void)setAge:(int)age;
- Properties allow access to setters and getters through dot syntax:

```
@property age;
```

```
int theAge = person.age;
```

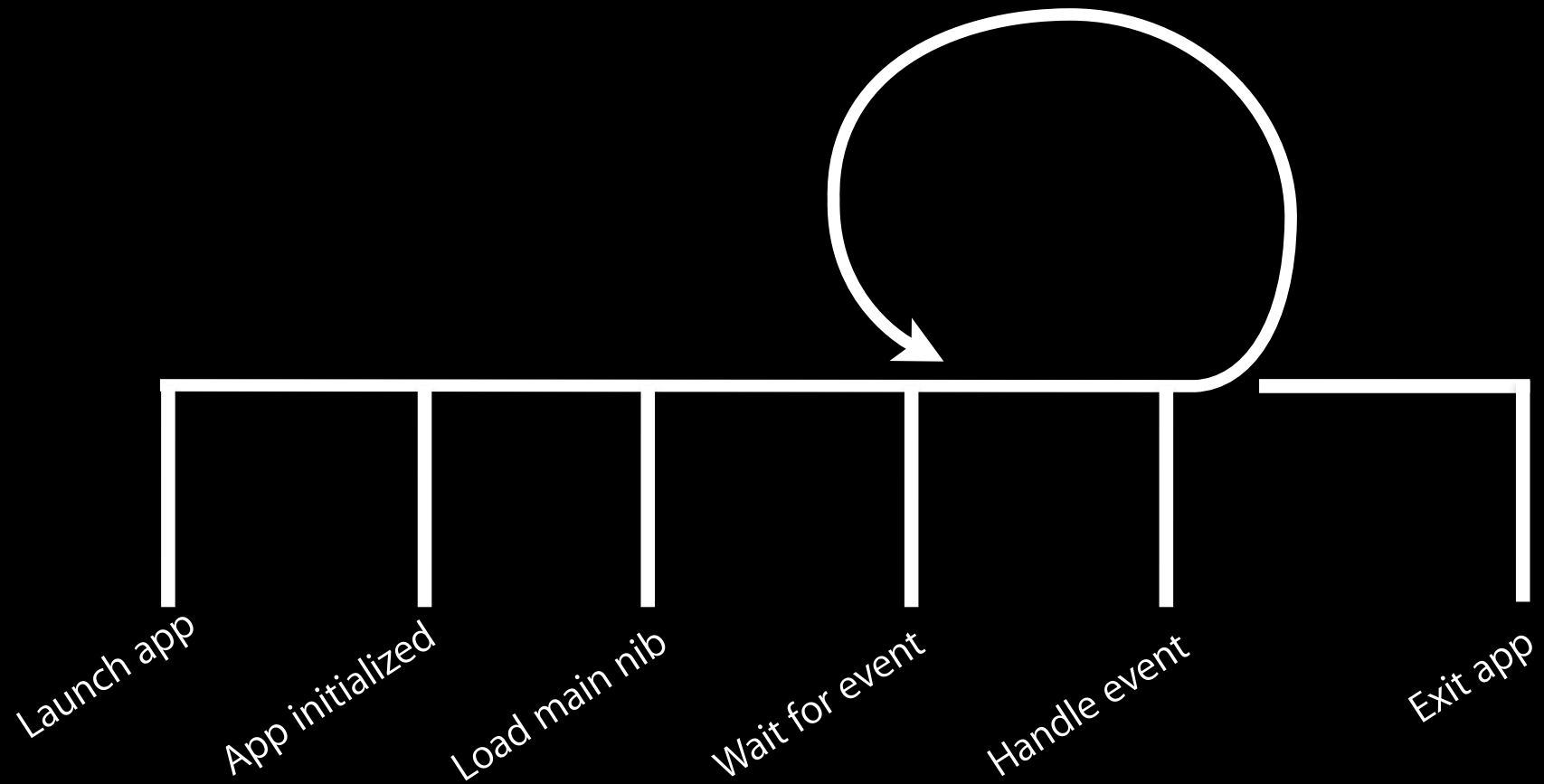
```
person.age = 21;
```

Building an Application

Anatomy of an Application

- Compiled code
 - Your code
 - Frameworks
- Nib files
 - UI elements and other objects
 - Details about object relationships
- Resources (images, sounds, strings, etc)
- Info.plist file (application configuration)

App Lifecycle



UIKit Framework

- Provides standard interface elements
- UIKit and you
 - Don't fight the frameworks
 - Understand the designs and how you fit into them

UIKit Framework

- Starts your application
- Every application has a single instance of UIApplication
 - Singleton design pattern

```
@interface UIApplication  
+ (UIApplication *)sharedApplication  
@end
```

- Orchestrates the lifecycle of an application
- Dispatches events
- Manages status bar, application icon badge
- Rarely subclassed
 - Uses delegation instead

Delegation

- Control passed to delegate objects to perform application-specific behavior
- Avoids need to subclass complex objects
- Many UIKit classes use delegates
 - UIApplication
 - UITableView
 - UITextField

UIApplicationDelegate

- Xcode project templates have one set up by default
- Object you provide that participates in application lifecycle
- Can implement various methods which UIApplication will call
- Examples:

UIApplicationDelegate

- Xcode project templates have one set up by default
- Object you provide that participates in application lifecycle
- Can implement various methods which UIApplication will call
- Examples:
 - (void)applicationDidFinishLaunching:(UIApplication *)application;
 - (void)applicationWillTerminate:(UIApplication *)application;

UIApplicationDelegate

- Xcode project templates have one set up by default
- Object you provide that participates in application lifecycle
- Can implement various methods which UIApplication will call
- Examples:
 - (void)applicationDidFinishLaunching:(UIApplication *)application;
 - (void)applicationWillTerminate:(UIApplication *)application;
 - (void)applicationWillResignActive:(UIApplication *)application;
 - (BOOL)application:(UIApplication *)application handleOpenURL:(NSURL *)url;

UIApplicationDelegate

- Xcode project templates have one set up by default
- Object you provide that participates in application lifecycle
- Can implement various methods which UIApplication will call
- Examples:
 - (void)applicationDidFinishLaunching:(UIApplication *)application;
 - (void)applicationWillTerminate:(UIApplication *)application;
 - (void)applicationWillResignActive:(UIApplication *)application;
 - (BOOL)application:(UIApplication *)application handleOpenURL:(NSURL *)url;
 - (void)applicationDidReceiveMemoryWarning:(UIApplication *)application;

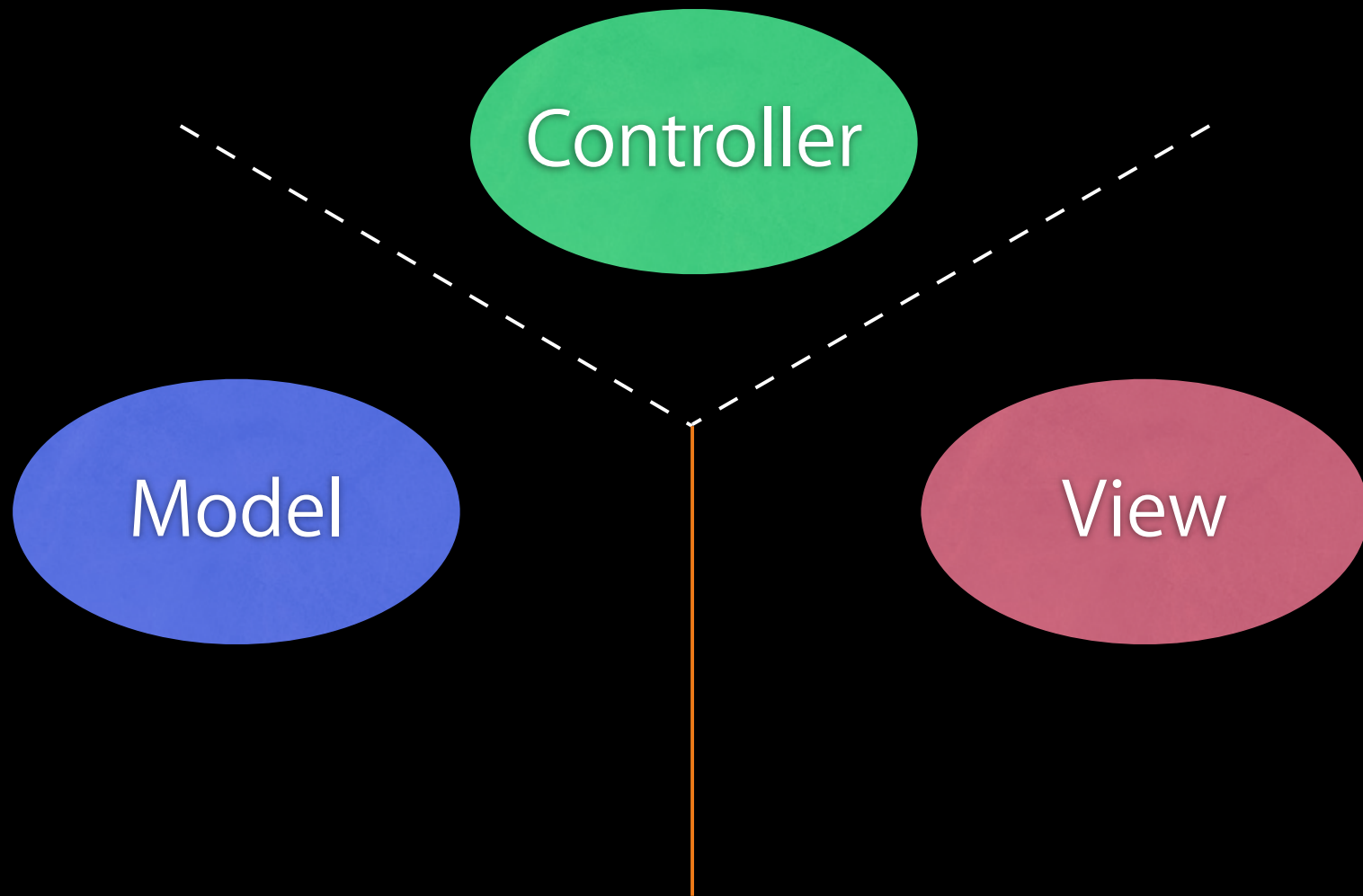
Info.plist file

- Property List (often XML), describing your application
 - Icon appearance
 - Status bar style (default, black, hidden)
 - Orientation
 - Uses Wifi networking
 - System Requirements
- Can edit most properties in Xcode
 - Project > Edit Active Target “Foo” menu item
 - On the properties tab

Model, View, Controller

If you take nothing else away from this class...

Model, View, Controller



Model

- Manages the app data and state
- Not concerned with UI or presentation
- Often persists somewhere
- Same model should be reusable, unchanged in different interfaces

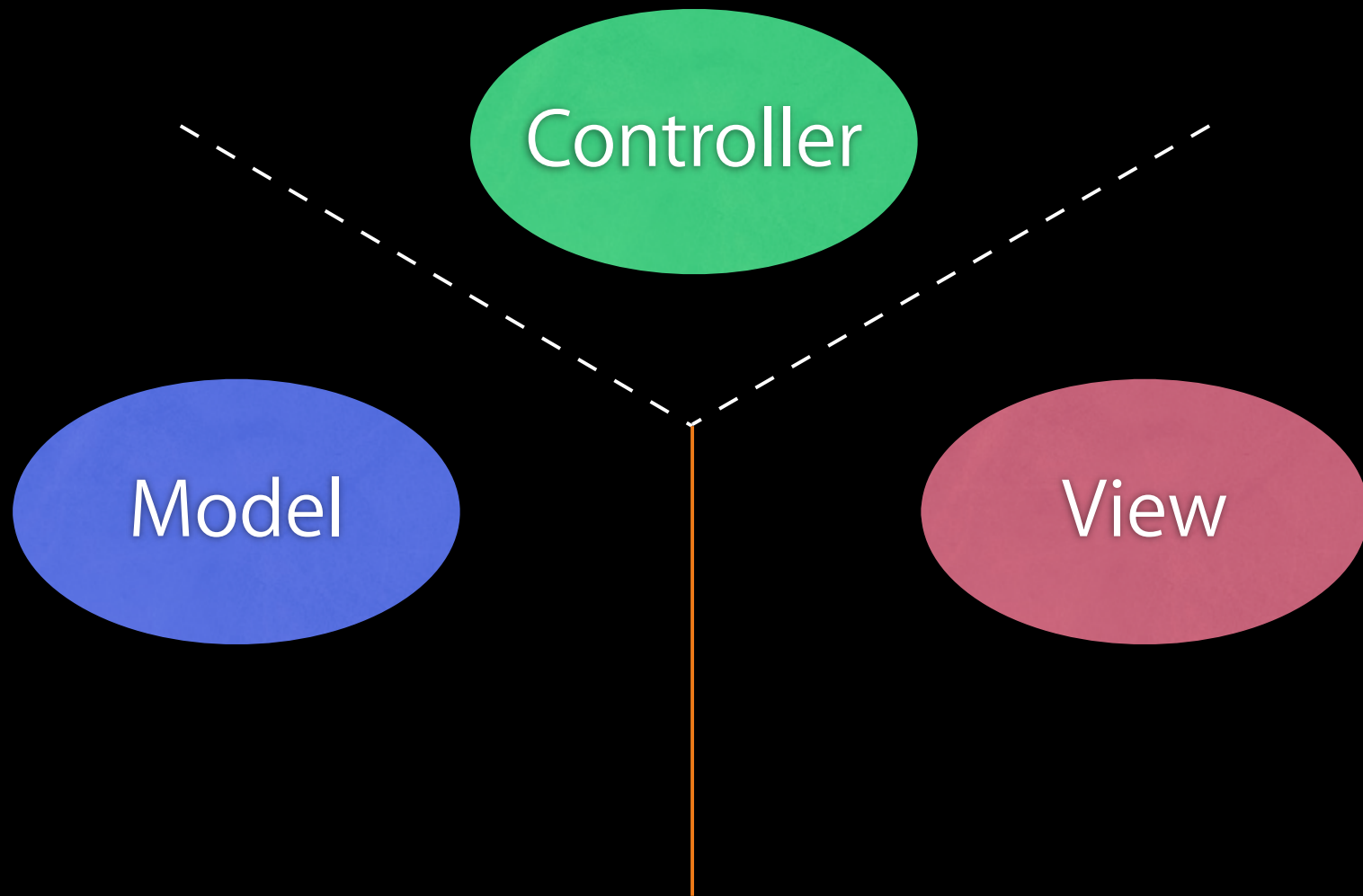
View

- Present the Model to the user in an appropriate interface
- Allows user to manipulate data
- Does not store any data
 - (except to cache state)
- Easily reusable & configurable to display different data

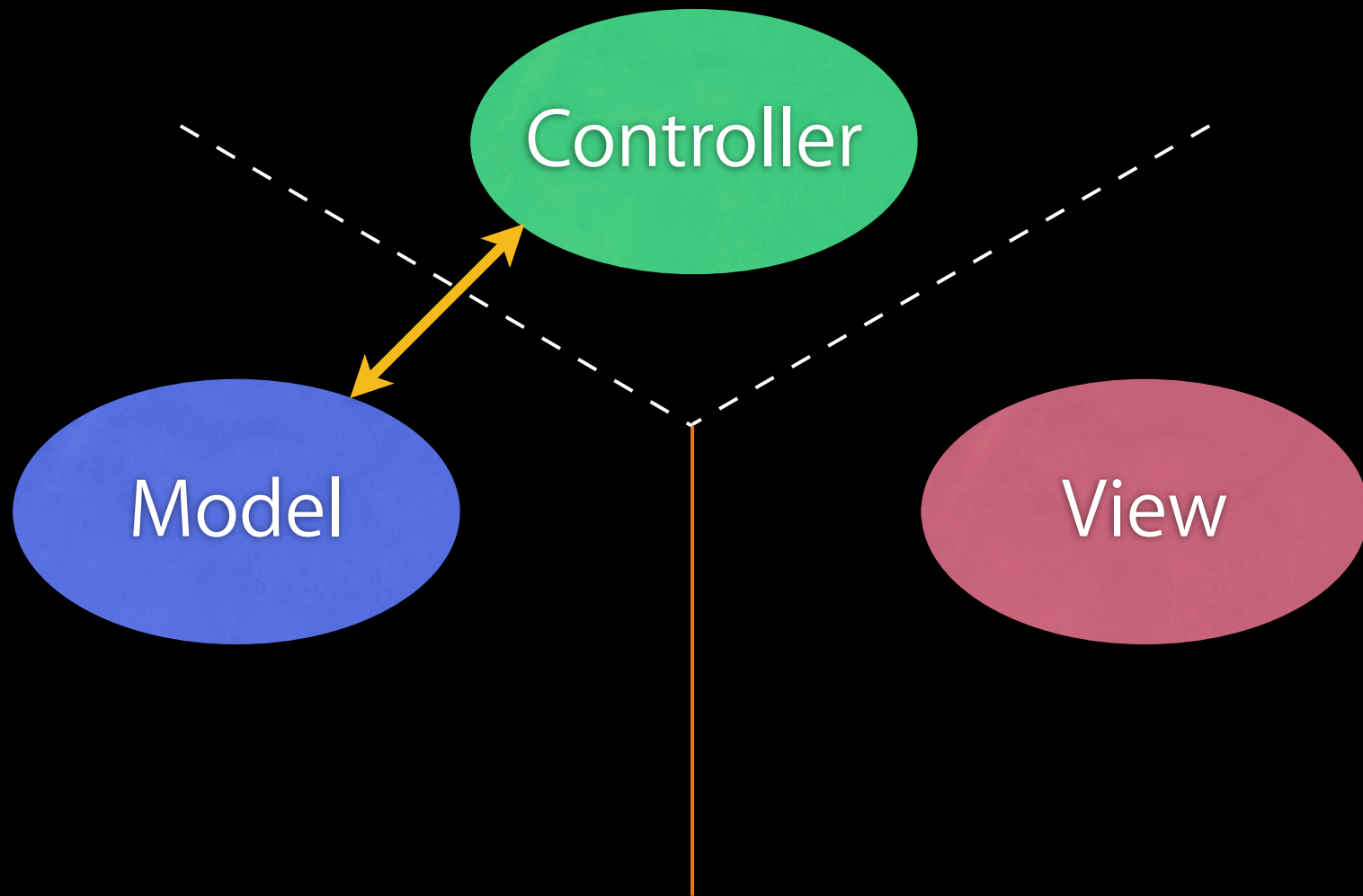
Controller

- Intermediary between Model & View
- Updates the view when the model changes
- Updates the model when the user manipulates the view
- Typically where the app logic lives.

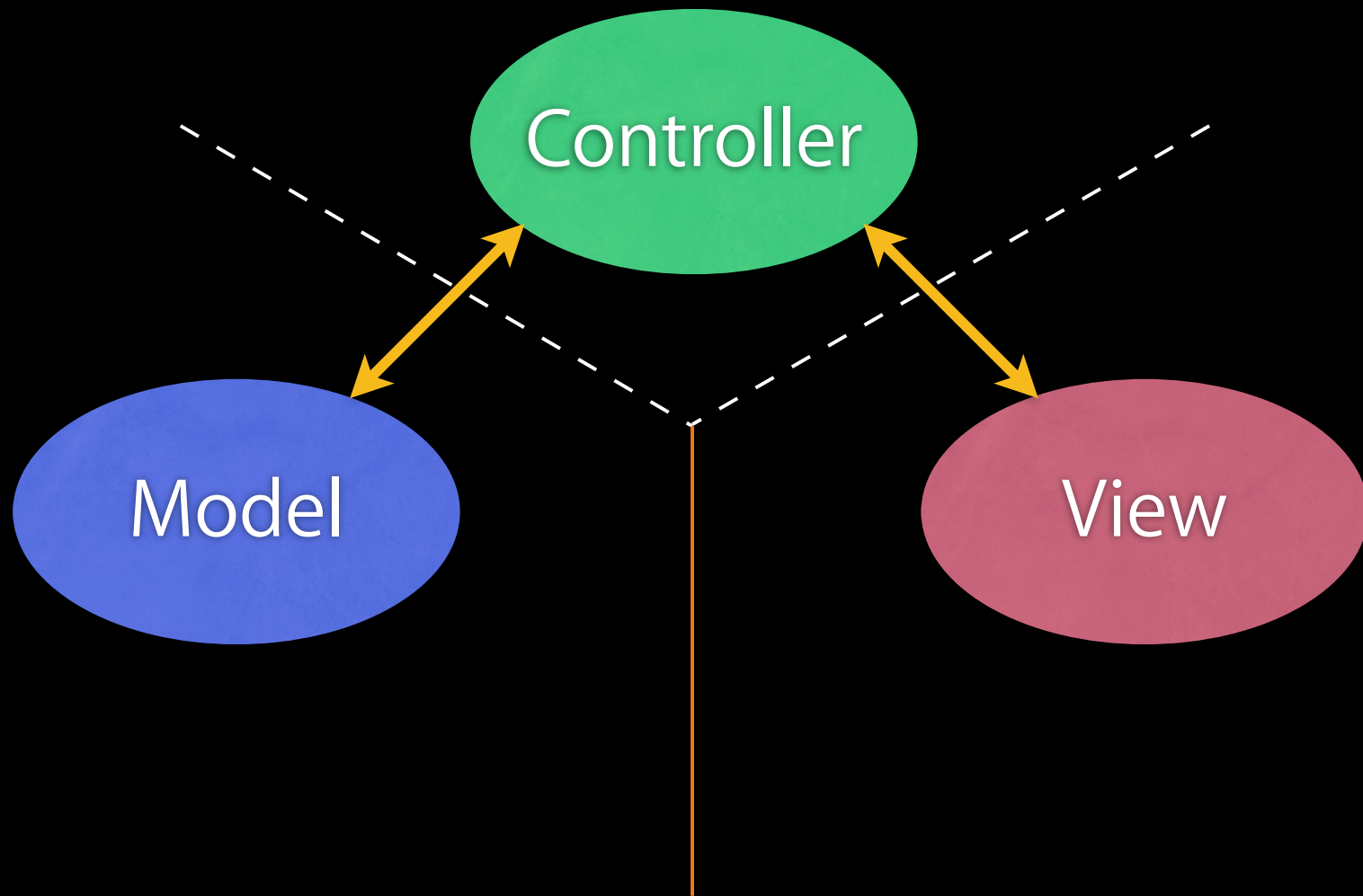
Model, View, Controller



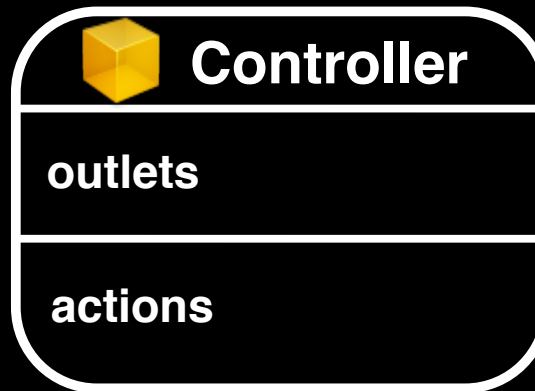
Model, View, Controller



Model, View, Controller



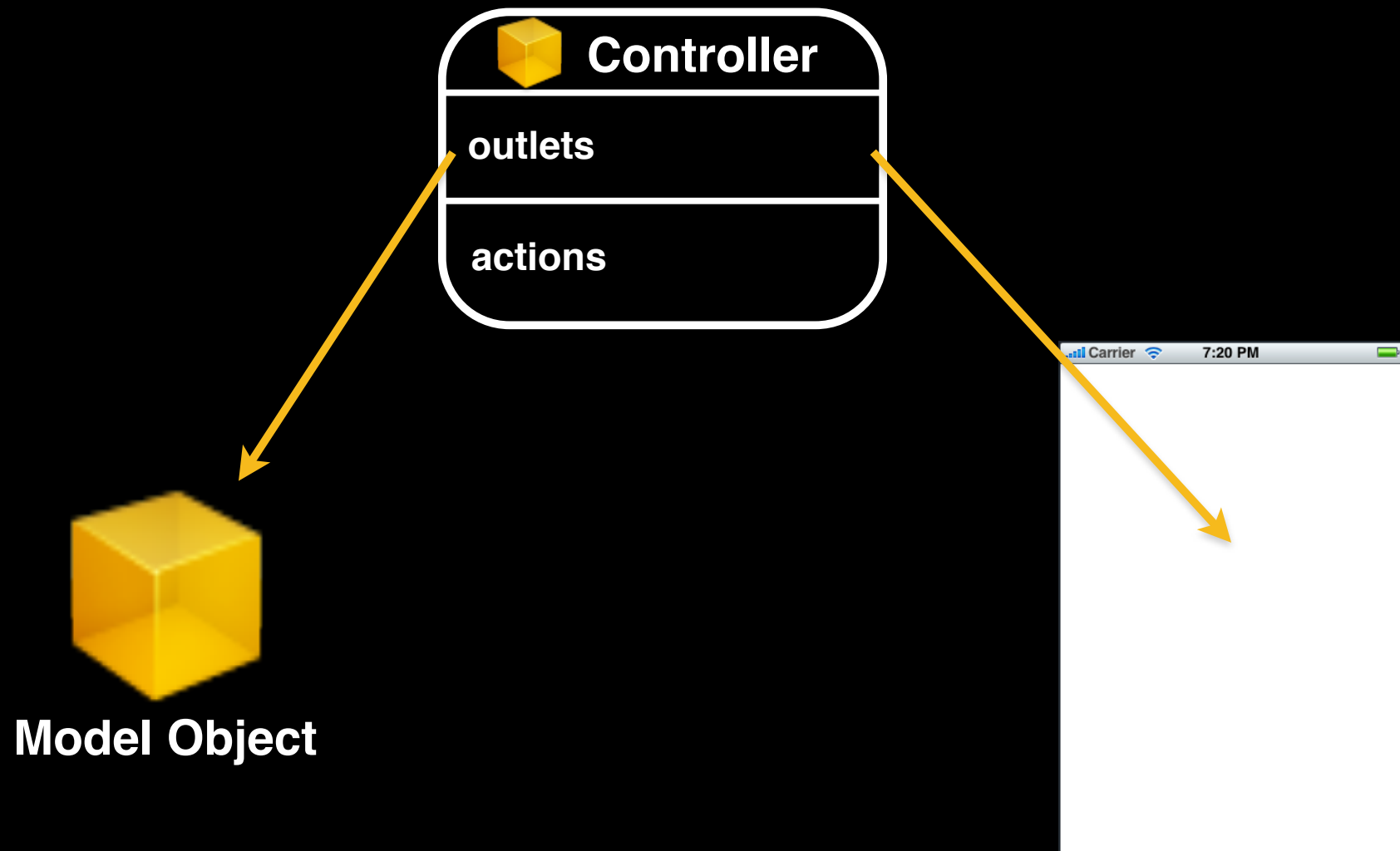
Model, View, Controller



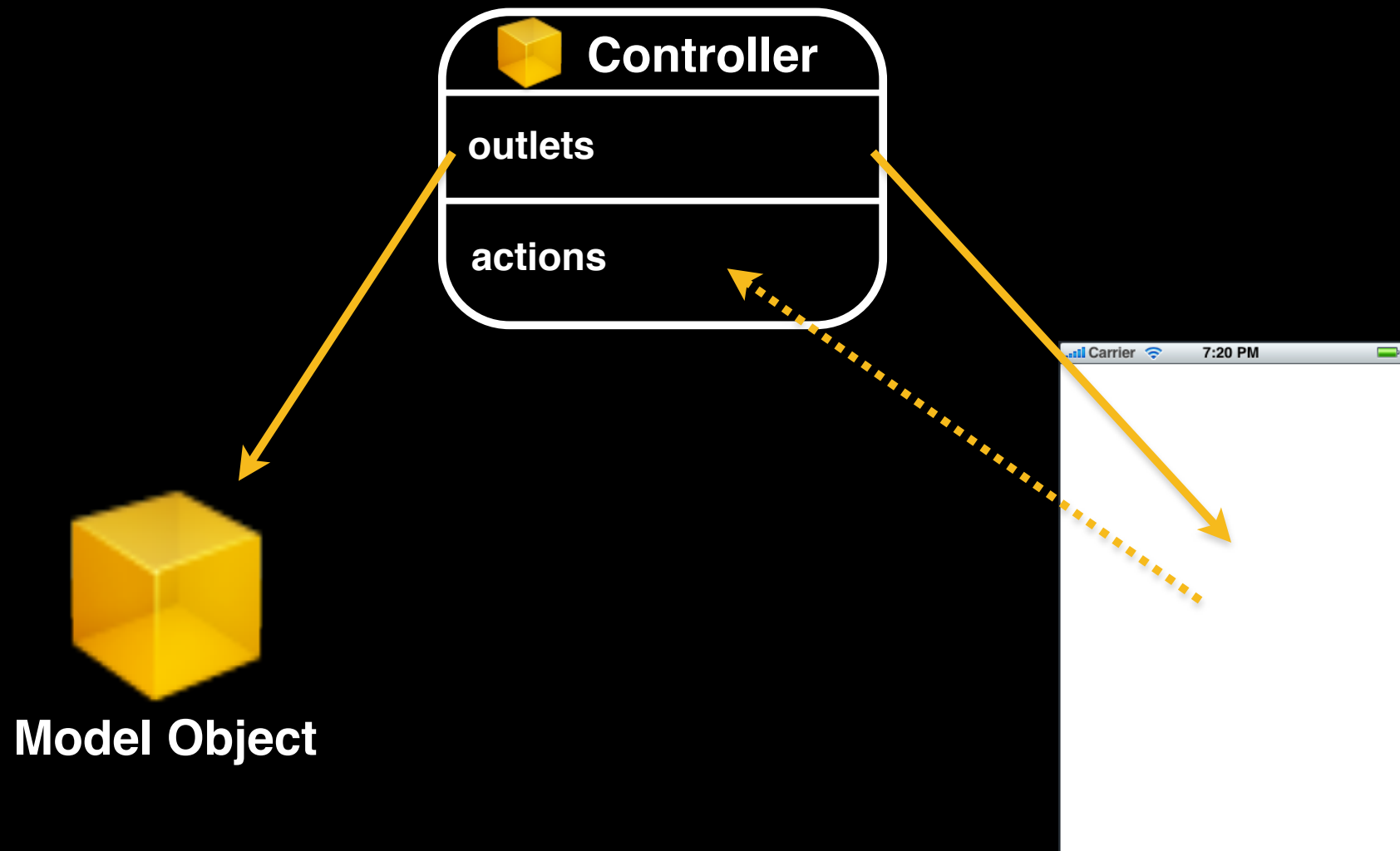
Model Object



Model, View, Controller



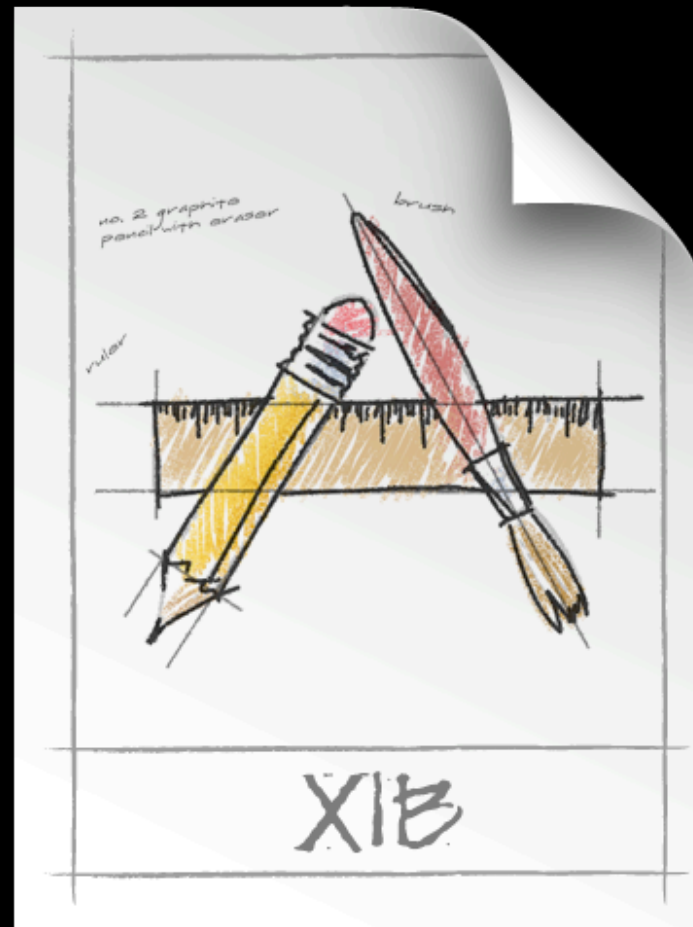
Model, View, Controller



Interface Builder and Nibs

Nib files

Nib files



Nib Files - Design time

- Helps you design the 'V' in MVC:
 - layout user interface elements
 - add controller objects
 - Connect the controller and UI

Nib Loading

- At runtime, objects are unarchived
 - Values/settings in Interface Builder are restored
 - Ensures all outlets and actions are connected
 - Order of unarchiving is not defined
- If loading the nib automatically creates objects and order is undefined, how do I customize?
 - For example, to displaying initial state

-awakeFromNib

- Control point to implement any additional logic after nib loading
- Default empty implementation on NSObject
- You often implement it in your controller class
 - e.g. to restore previously saved application state
- Guaranteed everything has been unarchived from nib, and all connections are made before -awakeFromNib is called
 - (void)awakeFromNib {
 // do customization here

}

Controls and Target-Action

Controls - Events

- View objects that allows users to initiate some type of action
- Respond to variety of events
 - Touch events
 - touchDown
 - touchDragged (entered, exited, drag inside, drag outside)
 - touchUp (inside, outside)
 - Value changed
 - Editing events
 - editing began
 - editing changed
 - editing ended

Controls - Target/Action

- When event occurs, action is invoked on target object



Controller



Controls - Target/Action

- When event occurs, action is invoked on target object



target:	myObject
action:	@selector(decrease)
event:	UIControlEventTouchUpInside

Controller



Controls - Target/Action

- When event occurs, action is invoked on target object



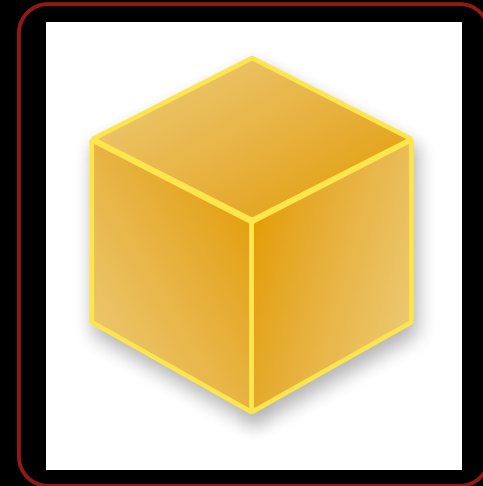
target:
action:
event:

myObject

@selector(decrease)

UIControlEventTouchUpInside

Controller



Controls - Target/Action

- When event occurs, action is invoked on target object



target:	myObject
action:	@selector(decrease)
event:	UIControlEventTouchUpInside

Controller



Controls - Target/Action

- When event occurs, action is invoked on target object



UIControlEventTouchUpInside

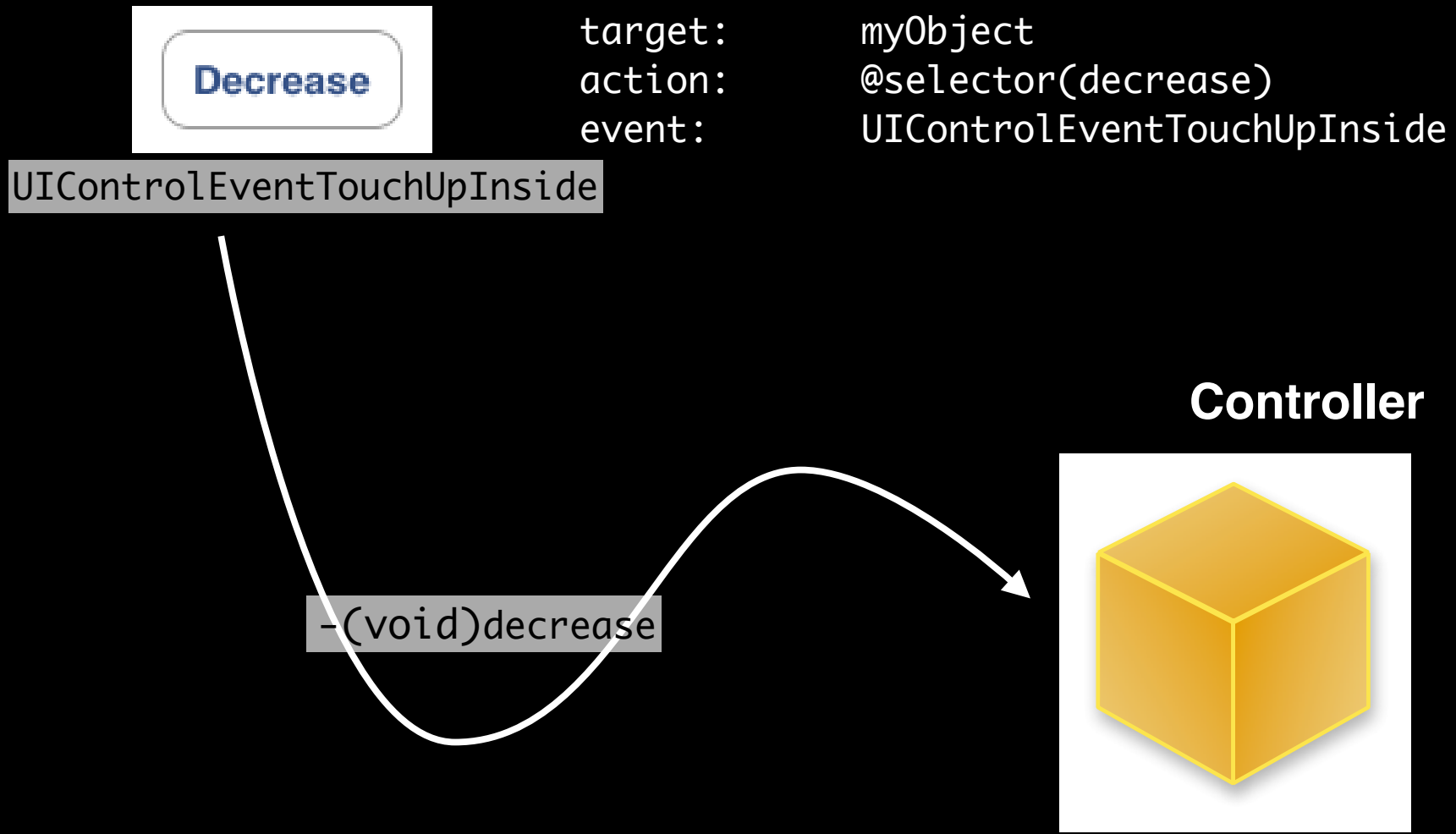
target:	myObject
action:	@selector(decrease)
event:	UIControlEventTouchUpInside

Controller



Controls - Target/Action

- When event occurs, action is invoked on target object



Action Methods

- 3 different flavors of action method selector types
 - (void)actionMethod;
 - (void)actionMethod:(id)sender;
 - (void)actionMethod:(id)sender withEvent:(UIEvent *)event;
- UIEvent contains details about the event that took place

Action Method Variations

- Simple no-argument selector

```
- (void)increase {  
    // bump the number of sides of the polygon up  
    polygon.numberOfSides += 1;  
}
```

- Single argument selector - control is 'sender'

```
// for example, if control is a slider...  
- (void)adjustNumberOfSides:(id)sender {  
    polygon.numberOfSides = [sender value];  
}
```

Action Method Variations

- Two-arguments in selector (sender & event)

```
- (void)adjustNumberOfSides:(id)sender  
    withEvent:(UIEvent *)event  
{  
    // could inspect event object if you needed to  
}
```

Multiple target-actions

- Controls can trigger multiple actions on different targets in response to the same event
- Different than Cocoa on the desktop where only one target-action is supported
- Different events can be setup in IB

Manual Target-Action

- Same information IB would use
- API and UIControlEvents found in UIControl.h
- UIControlEvents is a bitmask

```
@interface UIControl
```

- ```
- (void)addTarget:(id)target action:(SEL)action
 forControlEvents:(UIControlEvents)controlEvents;

- (void)removeTarget:(id)target action:(SEL)action
 forControlEvents:(UIControlEvents)controlEvents;
```

```
@end
```

# HelloPoly Demo

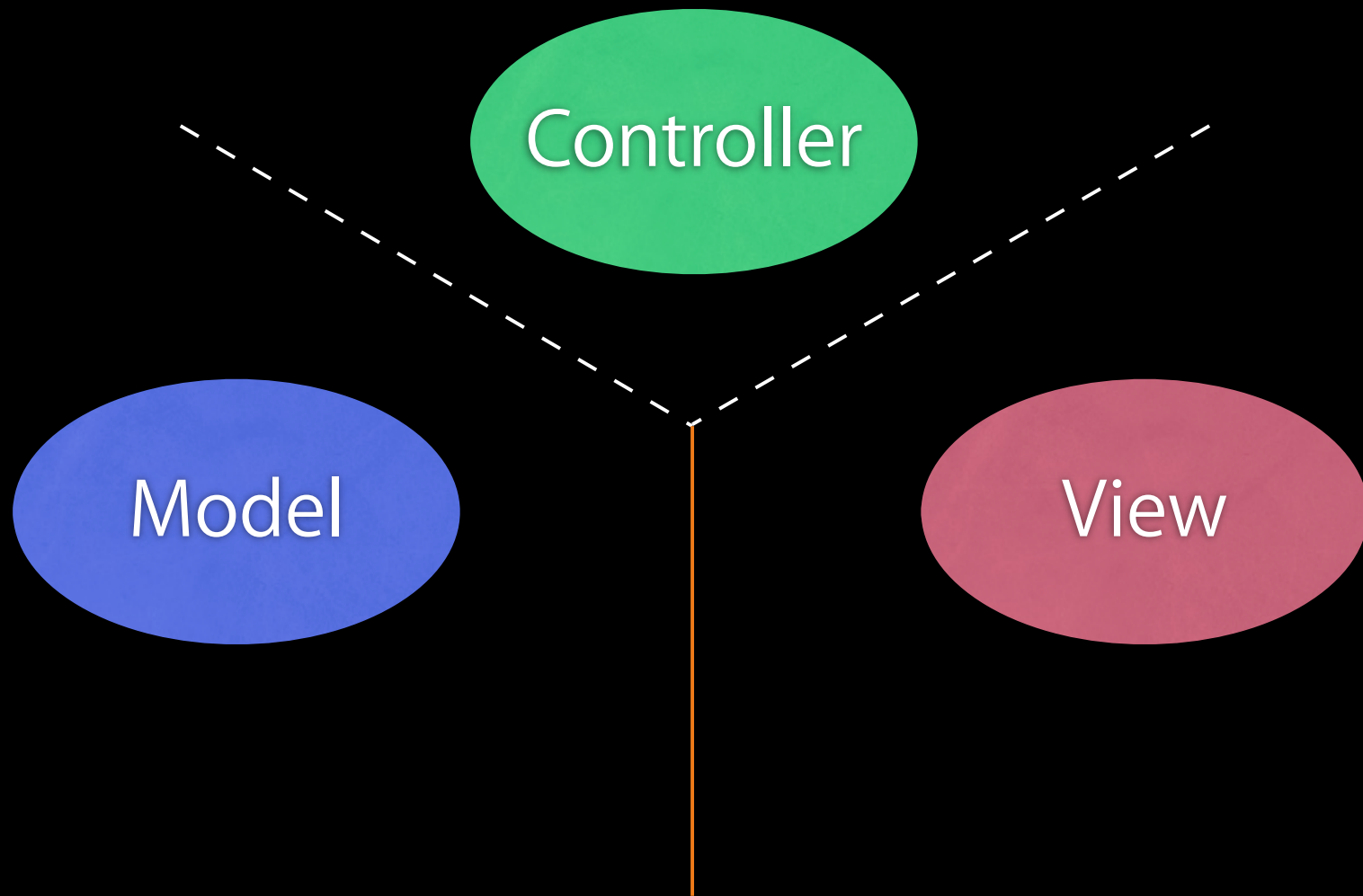


# HelloPoly

- This week's assignment is a full MVC application
- Next week's assignment will flesh it out further
- It is not designed to be a complex application
  - rather, provide a series of small studies of the fundamentals of a Cocoa Touch application

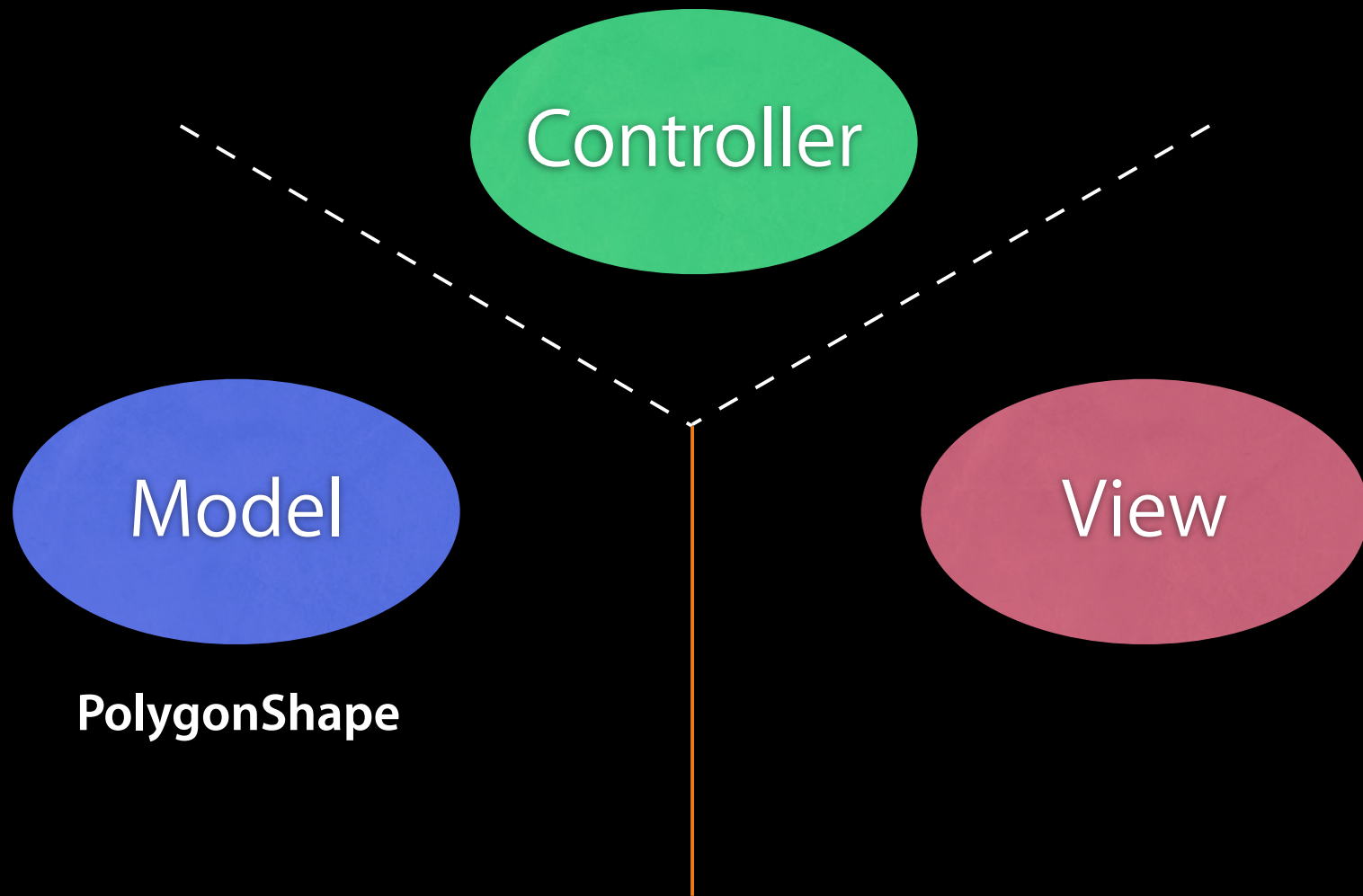
# Model, View, Controller

HelloPoly



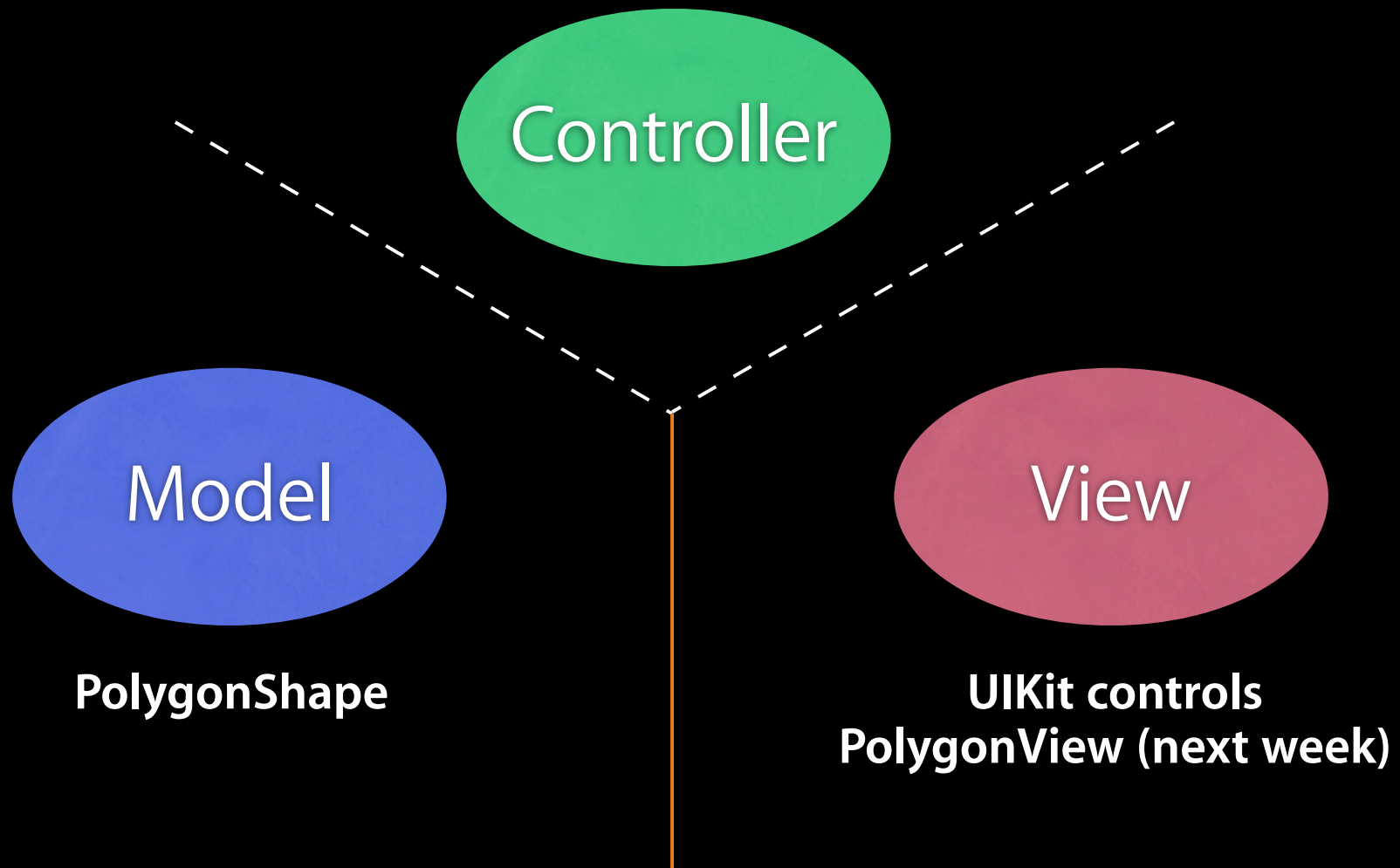
# Model, View, Controller

HelloPoly



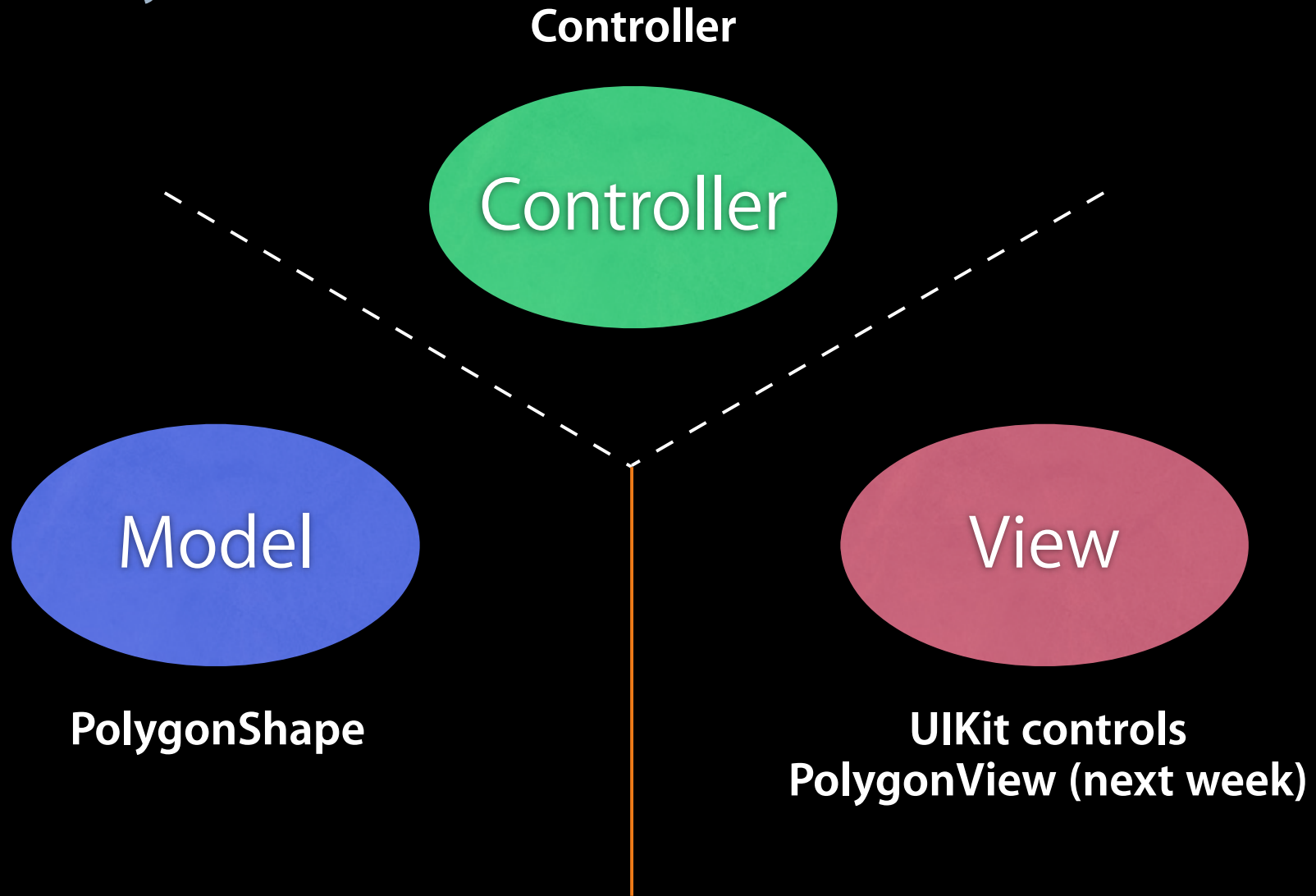
# Model, View, Controller

HelloPoly



# Model, View, Controller

HelloPoly



# Model, View, Controller

## HelloPoly



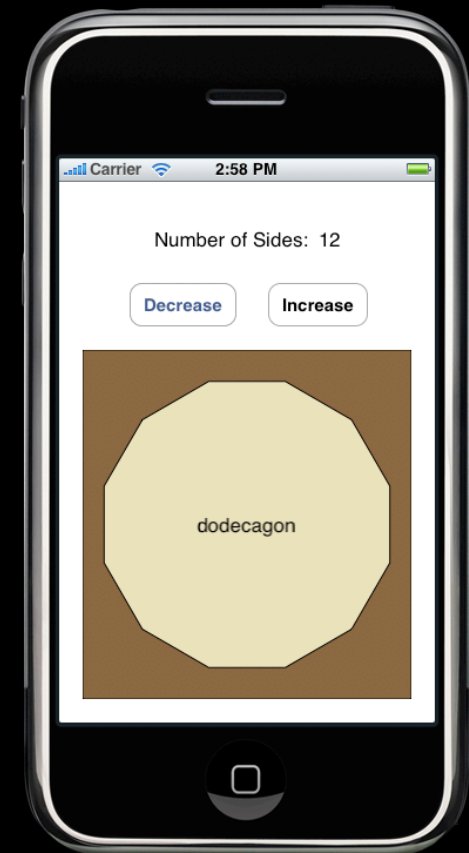
### Controller

numberOfSidesLabel  
increaseButton  
decreaseButton  
polygonShape

increase  
decrease

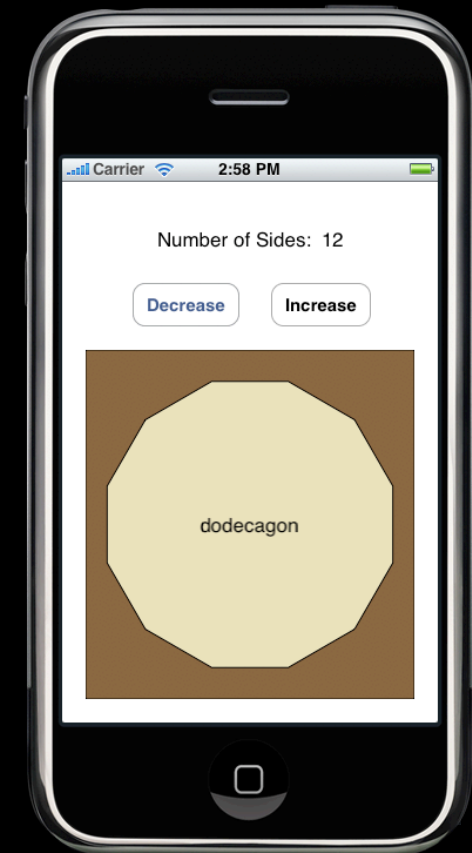
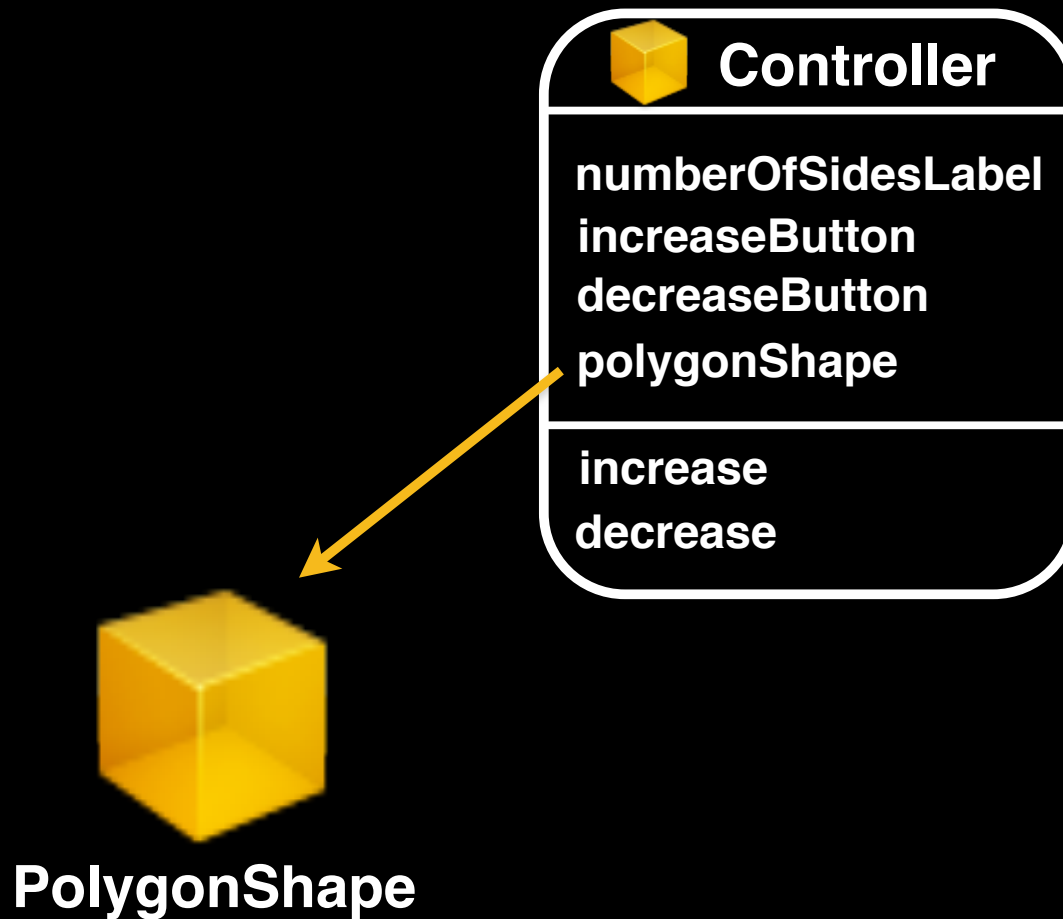


### PolygonShape



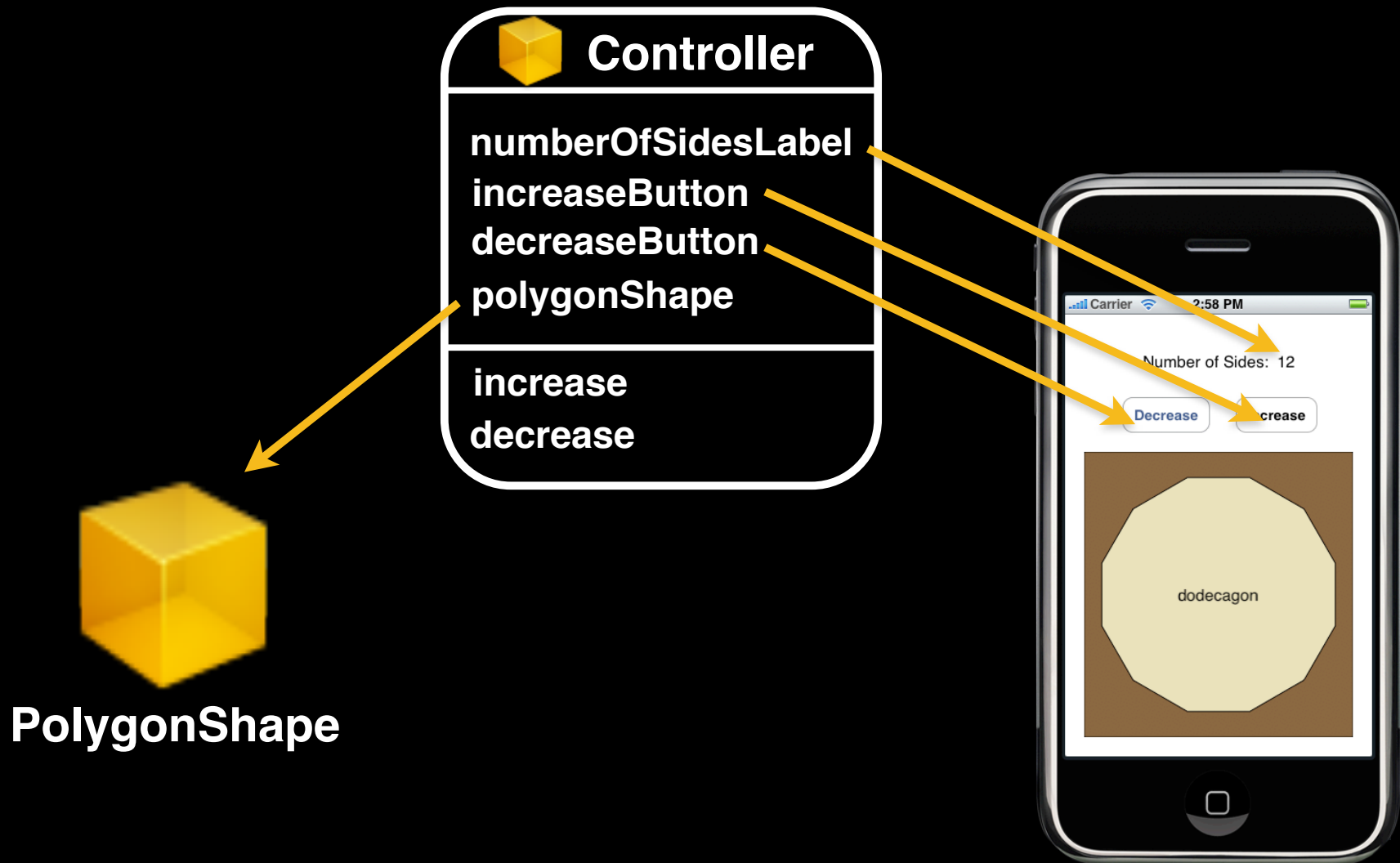
# Model, View, Controller

## HelloPoly



# Model, View, Controller

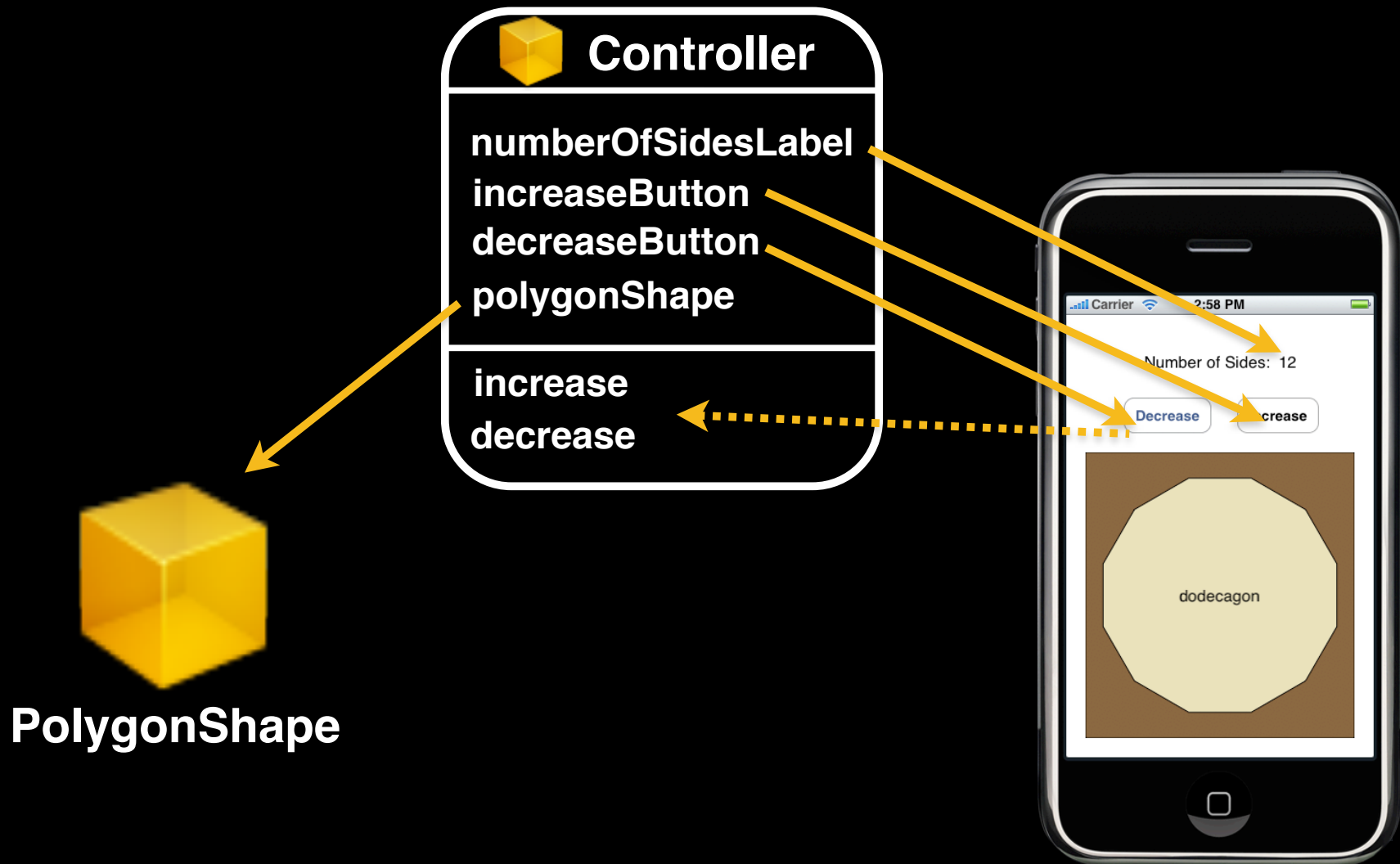
HelloPoly





# Model, View, Controller

HelloPoly



# Nib Files - HelloPoly example

- HelloPoly has all objects (model, view and controller) contained in the same MainWindow.xib file
  - More common to have UI broken up into several nib files
- UIKit provides a variety of “View Controllers”
  - We will be introducing them with the Presence projects

# Questions?