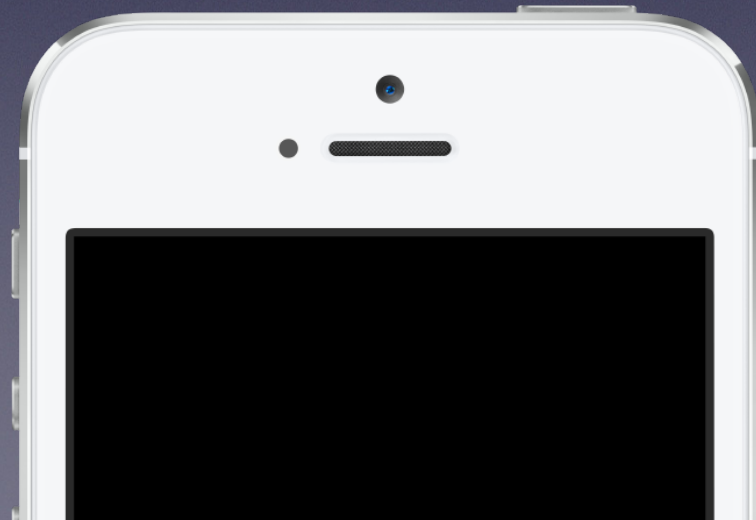


# COMS W3101: Programming for iOS

Michael Vitrano





# Course Goals

- Walk away with the toolset to build real world apps
- Focus on a foundation in Objective-C and core iOS concepts and frameworks
- Exposure to real-world problem domains and app categories
- A resource for transitioning from academic coding to professional coding



# Course Prerequisites

- Fluency in at least one programming language
- Strong understanding of Object-Oriented programming
- Familiarity with Model-View-Controller architecture



# Course Structure

- Each class is going to be a mixture of lecture and demo
  - Will be posted to the course Github page (Link TBD)
  - Will focus on the building blocks of an iOS app
- One course long project
  - We're going to build a note taking app
  - There will be a set of features that your app must have
  - Over the course of the semester you'll gain the skills you need



# Model-View-Controller



```
graph TD; Model[Model] --- View[View]; Model --- Controller[Controller]; View --- Controller;
```

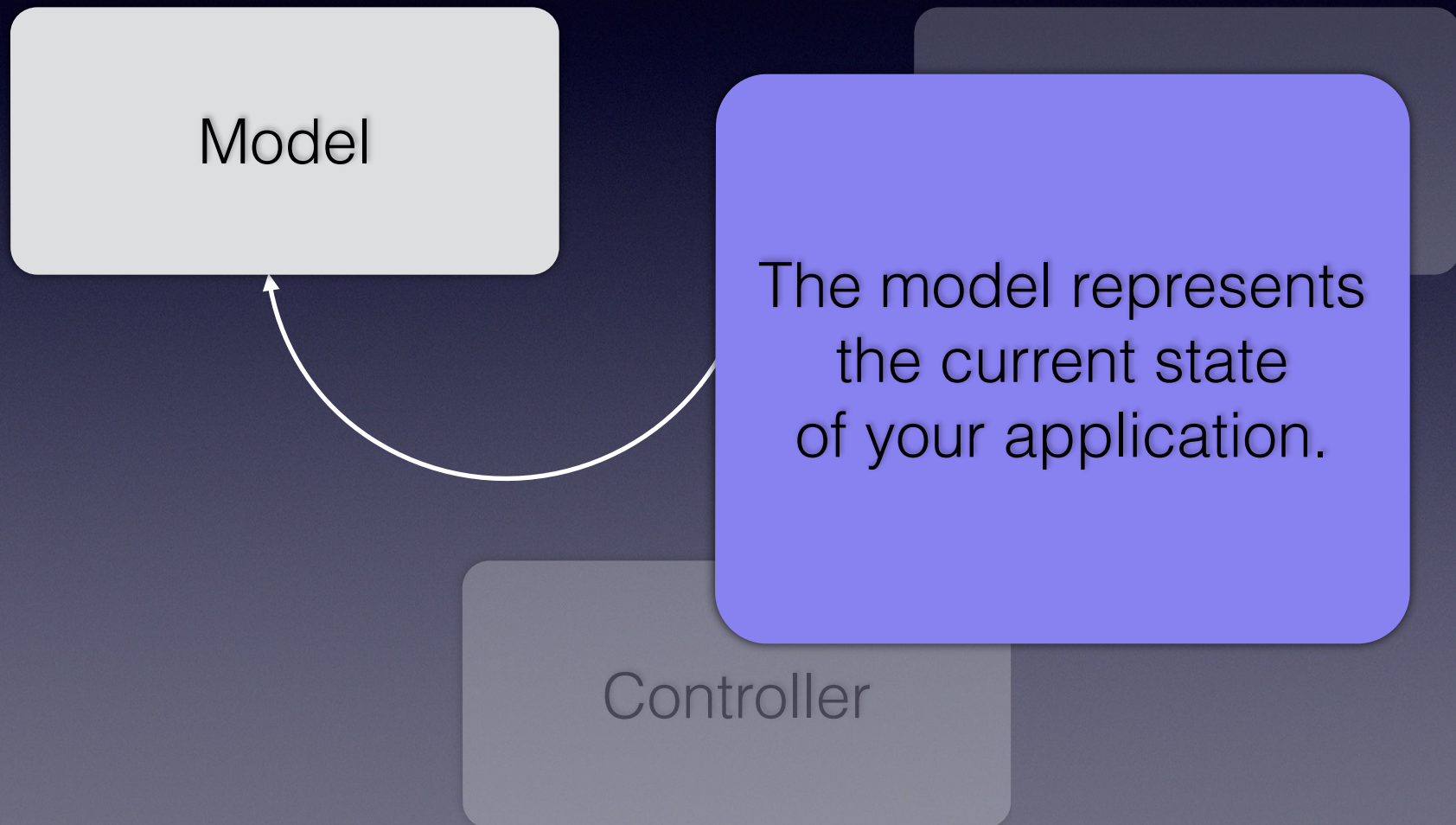
Model

View

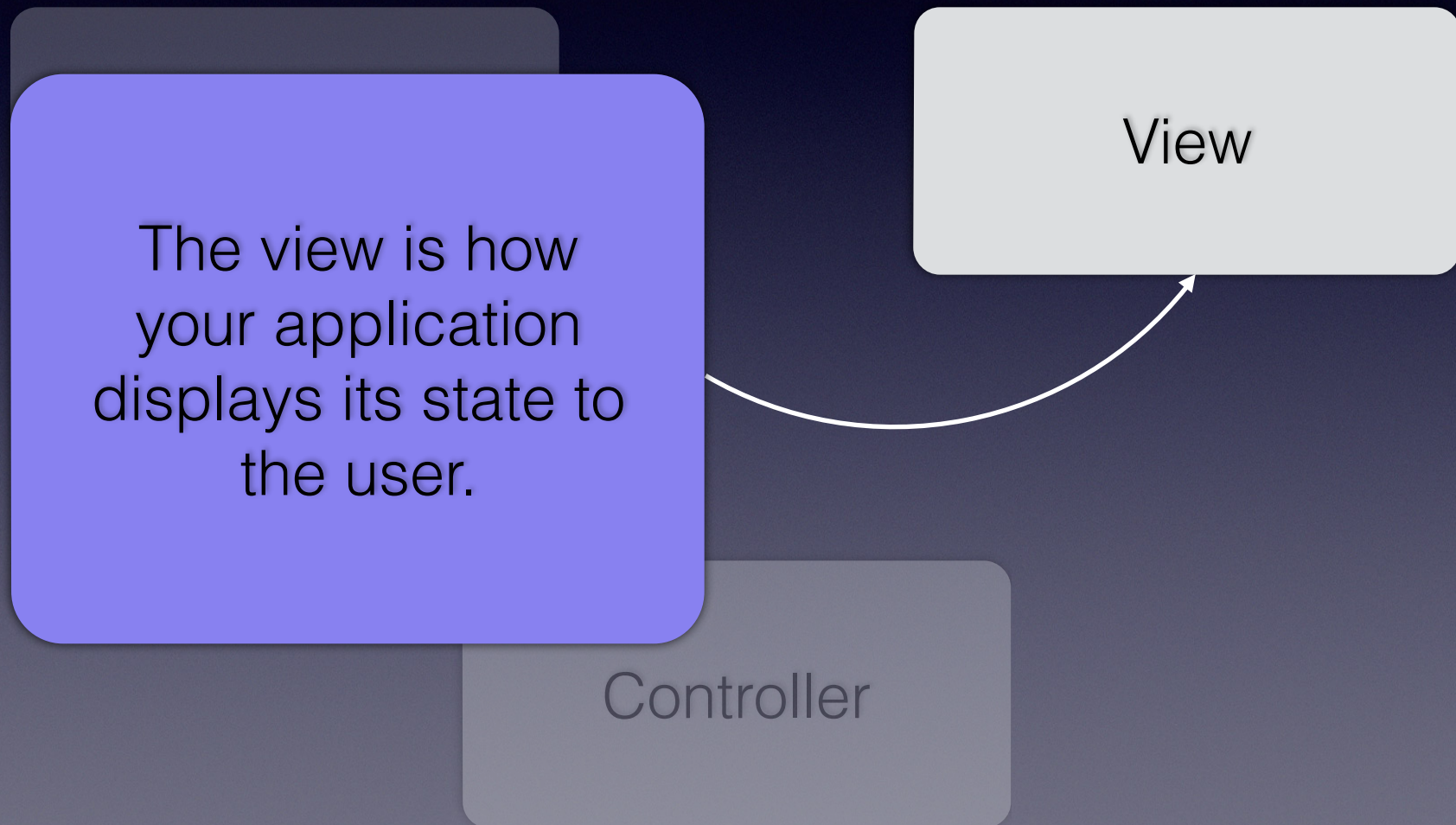
Controller



# Model-View-Controller

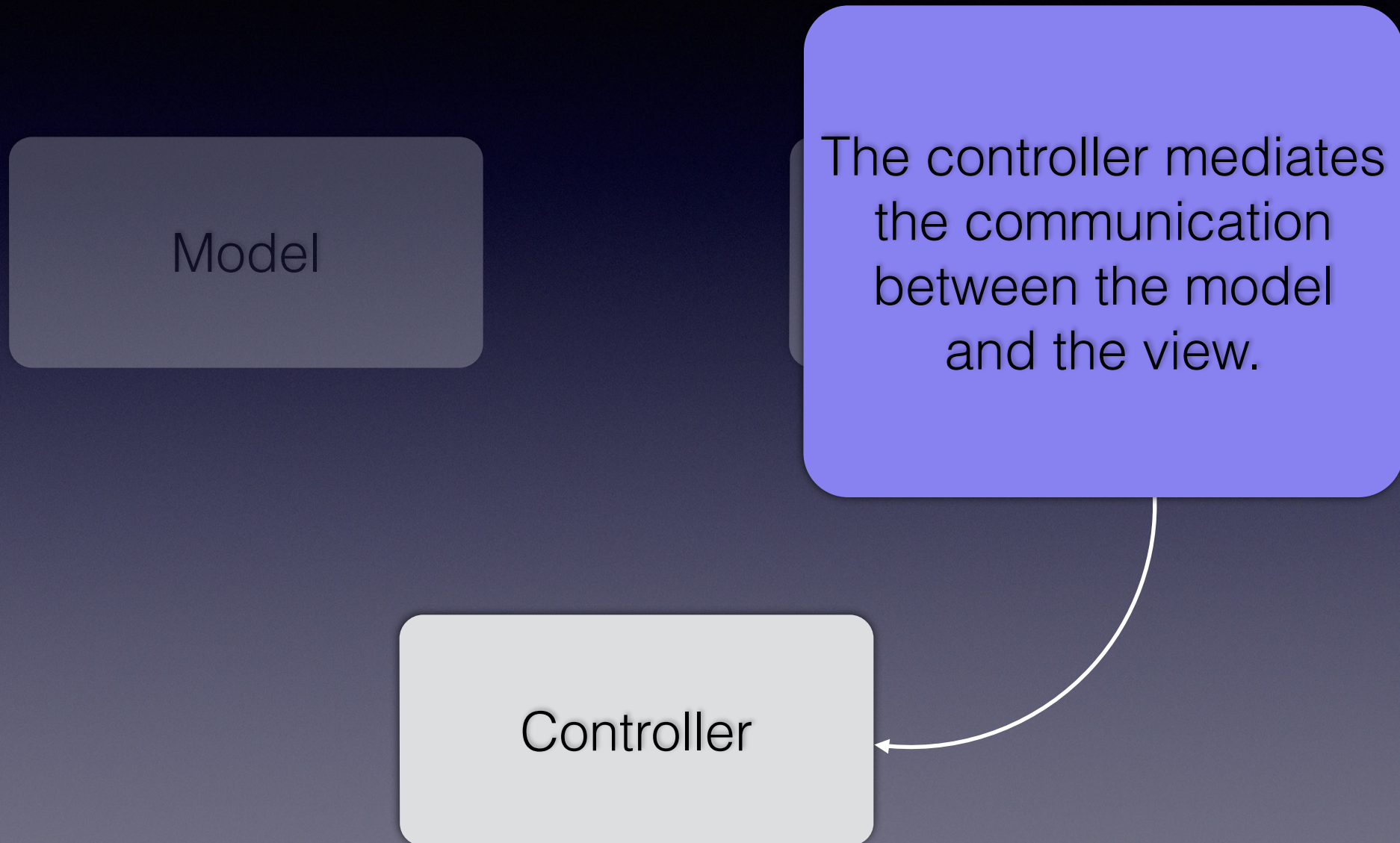


# Model-View-Controller



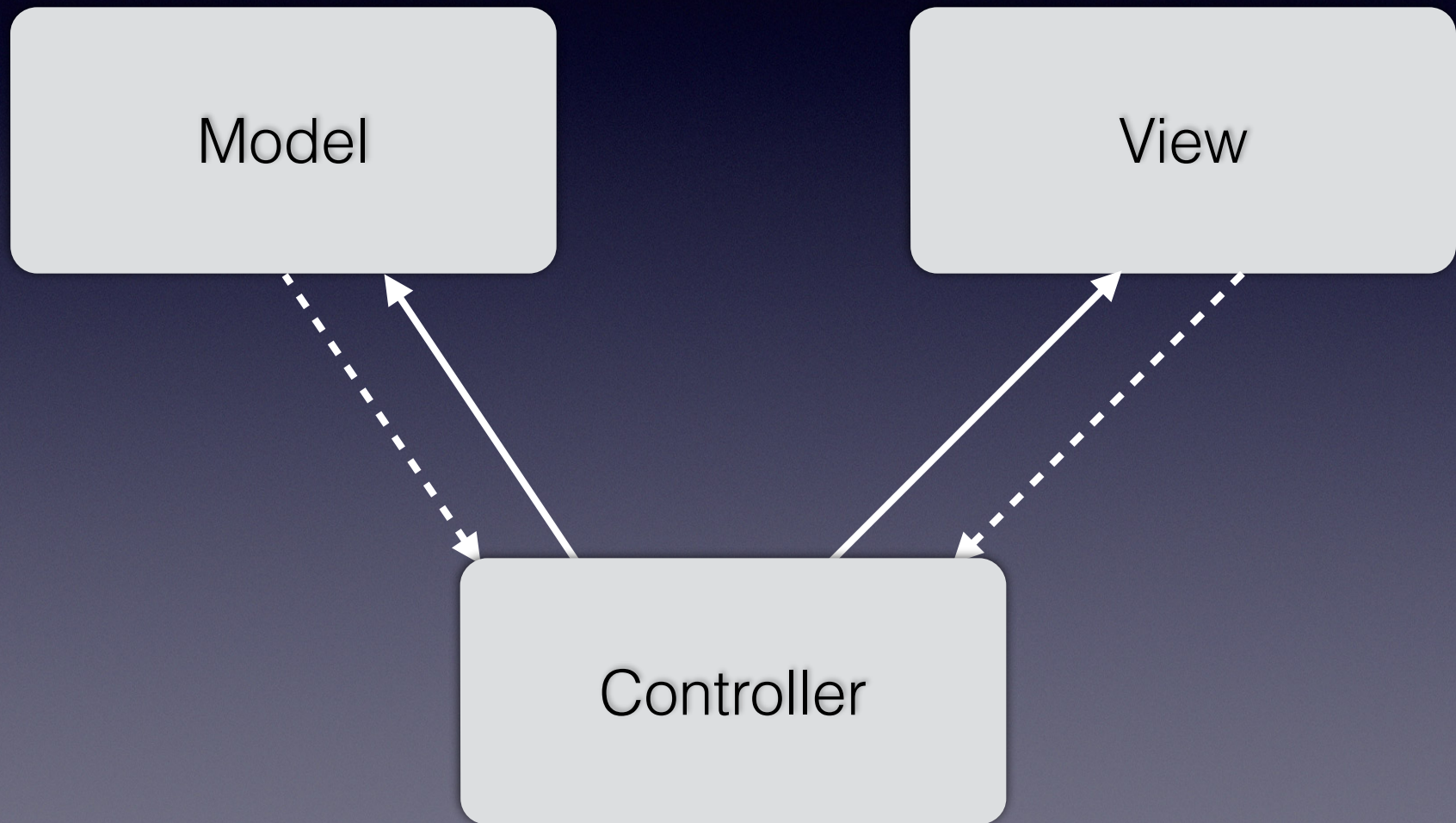


# Model-View-Controller



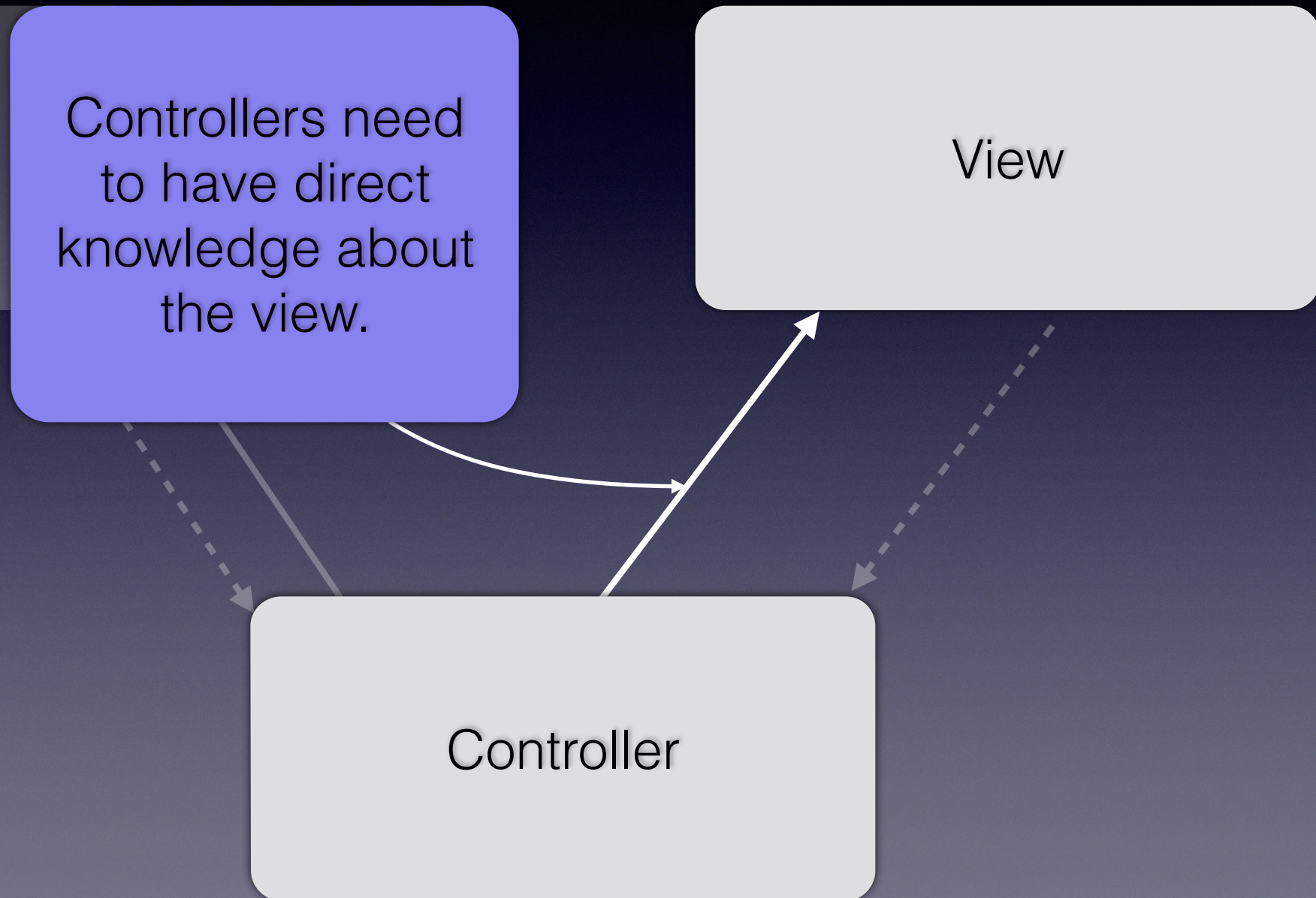


# Model-View-Controller



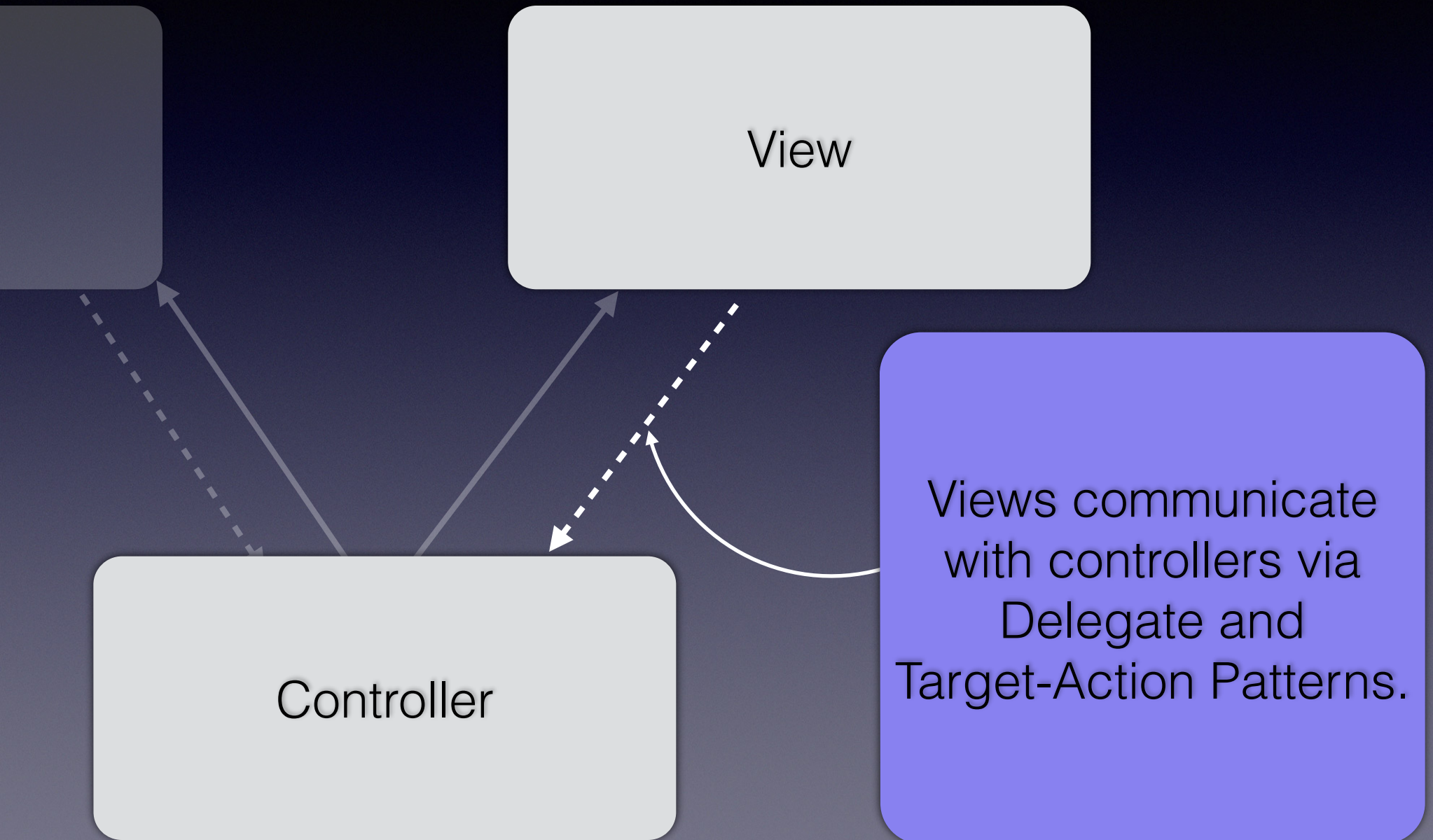


# Model-View-Controller



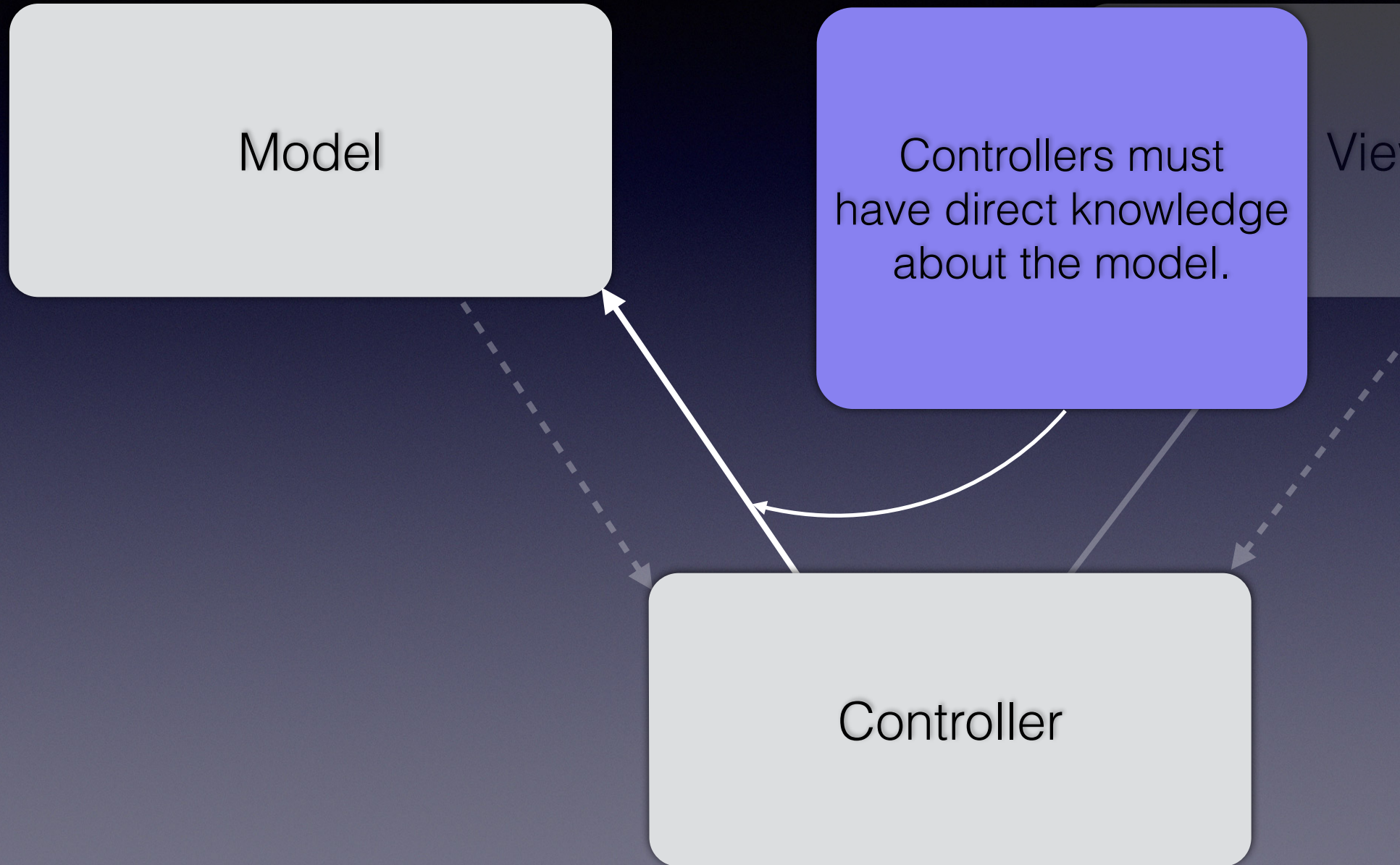


# Model-View-Controller





# Model-View-Controller





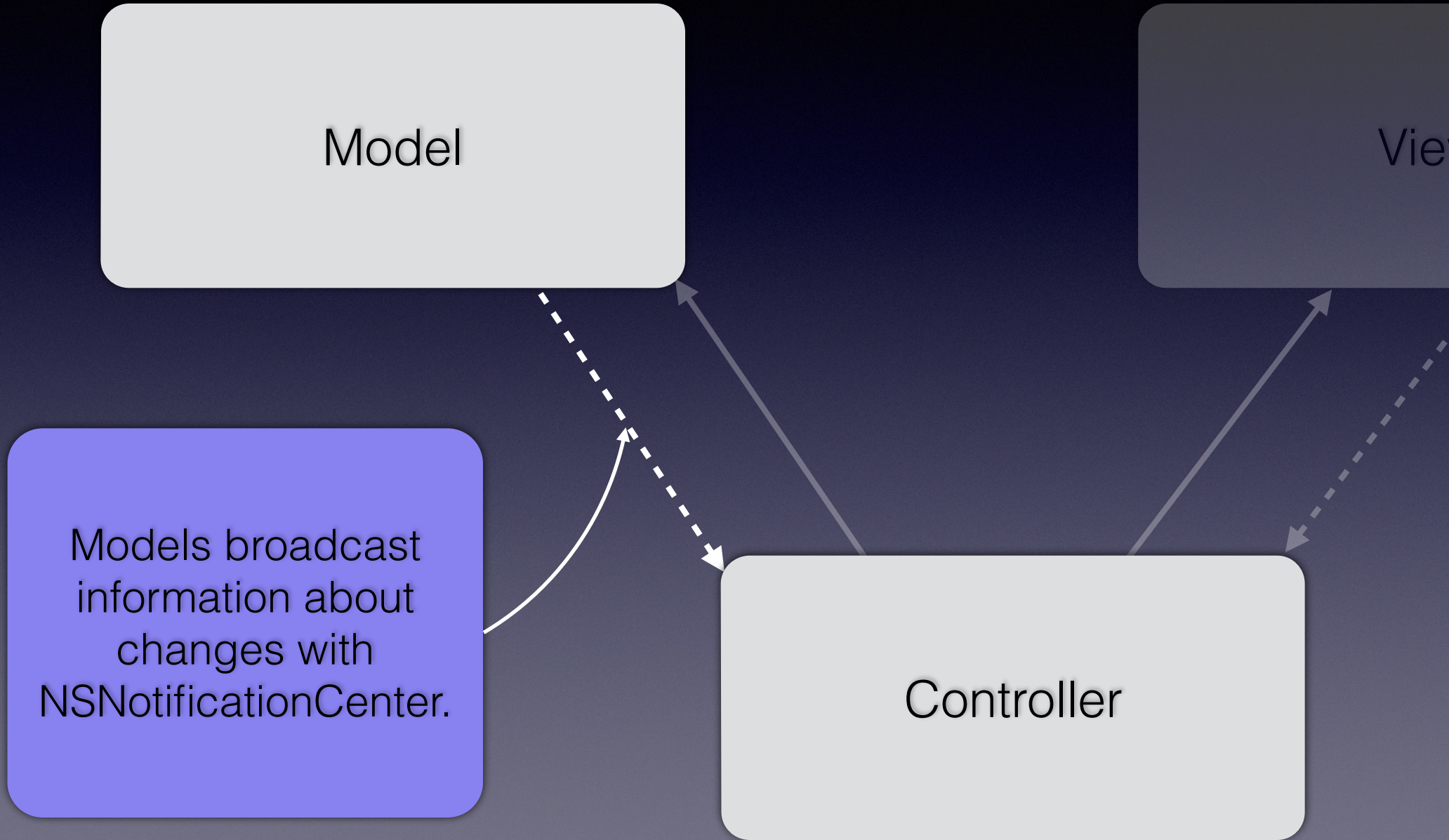
# Model-View-Controller

Model

View

Models broadcast  
information about  
changes with  
NSNotificationCenter.

Controller



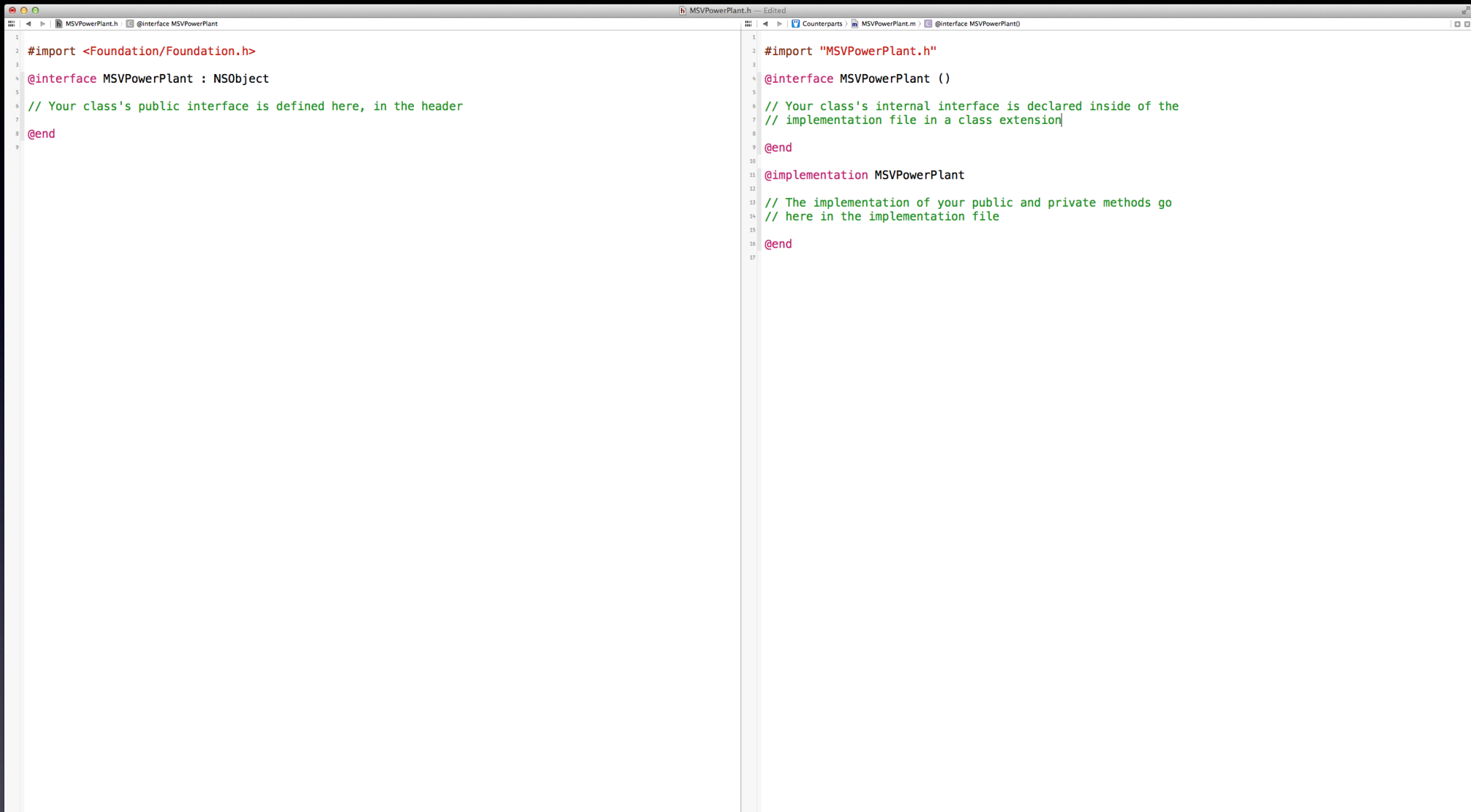


The image shows a code editor with two files open. The left file, `MSVPowerPlant.h`, contains the header file code. The right file, `MSVPowerPlant.m`, contains the implementation code. The code is written in Objective-C and uses syntax highlighting.

```
1 #import <Foundation/Foundation.h>
2
3
4 @interface MSVPowerPlant : NSObject
5
6 // This is the basic declaration of a class called MSVPowerPlant
7 // it inherits from NSObject. Objects are defined in header files (.h)
8
9 @end
```

```
1 #import "MSVPowerPlant.h"
2
3
4 @implementation MSVPowerPlant
5
6 // For every class defined, there is also an implementation
7 // which lives in the implementation file (.m)
8
9 @end
```





```
1 #import <Foundation/Foundation.h>
2
3
4 @interface MSVPowerPlant : NSObject
5
6 // Your class's public interface is defined here, in the header
7
8 @end
9
```

```
1 #import "MSVPowerPlant.h"
2
3
4 @interface MSVPowerPlant ()
5
6 // Your class's internal interface is declared inside of the
7 // implementation file in a class extension
8
9 @end
10
11 @implementation MSVPowerPlant
12
13 // The implementation of your public and private methods go
14 // here in the implementation file
15
16 @end
17
```



```
MSVPowerPlant.h @Interface MSVPowerPlant
1
2 #import <Foundation/Foundation.h>
3
4 // We need to let the compiler know that there exists
5 // a class called MSVCity that we are going to use in our
6 // sendPowerToCity:amount: method. We do that with the @class
7 // directive
8 @class MSVCity;
9
10 @interface MSVPowerPlant : NSObject
11
12 // We define a method like this:
13
14 - (void)sendPowerToCity:(MSVCity *)city
15     amount:(double)powerInWatts;
16
17 // This method takes a city object and an amount of power
18 // to send it. It returns void.
19
20 @end
21
```

```
MSVPowerPlant.h
1
2 #import "MSVPowerPlant.h"
3
4 // We need to import the MSVCity header so that
5 // we can know the a MSVCity object's interface
6 #import "MSVCity.h"
7
8 @interface MSVPowerPlant ()
9
10 @end
11
12 @implementation MSVPowerPlant
13
14 // We implement methods like this:
15
16 - (void)sendPowerToCity:(MSVCity *)city amount:(double)powerInWatts
17 {
18     // We call methods like this:
19     [city addPower:powerInWatts];
20 }
21
22 @end
23
```



```
MSVPowerPlant.h — Edited
MSVPowerPlant.h @Interface MSVPowerPlant
1 #import <Foundation/Foundation.h>
2
3
4 @class MSVCity;
5
6 @interface MSVPowerPlant : NSObject
7
8 // Properties are how we define storage for an object to
9 // keep state in. When declaring a property, the compiler automatically
10 // generates a accessor and setter for us as well as an instance variable
11 // to store that information in.
12
13 @property (nonatomic) double currentPower;
14
15 - (void)sendPowerToCity:(MSVCity *)city
16     amount:(double)powerInWatts;
17
18
19 @end
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```
MSVPowerPlant.h @interface MSVPowerPlant
1
2 #import <Foundation/Foundation.h>
3
4 @class MSVCity;
5
6 @interface MSVPowerPlant : NSObject
7
8 // Some properties should not be writable to outsiders.
9 // We restrict the writability of a property using 'readonly'.
10 // This means that only the accessor method is available outside of the class.
11
12 @property (nonatomic, readonly) double currentPower;
13
14 - (void)sendPowerToCity:(MSVCity *)city
15     amount:(double)powerInWatts;
16
17 @end
18
19
MSVPowerPlant.h MSVPowerPlant.m @interface MSVPowerPlant()
1
2 #import "MSVPowerPlant.h"
3 #import "MSVCity.h"
4
5 @interface MSVPowerPlant ()
6
7 // Since we still need to set the current power when sending power
8 // to a city, we need to have a writable property internal to the class.
9 // We do this by re-defining the property as writable inside the class extension
10 |
11 @property (nonatomic) double currentPower;
12
13 @end
14
15 @implementation MSVPowerPlant
16
17 - (void)sendPowerToCity:(MSVCity *)city amount:(double)powerInWatts
18 {
19     // The accessor method is just the name of the property. In ObjC
20     // we do not prepend 'get' to the beginning of our accessors
21     double currentPower = [self currentPower];
22
23     if (currentPower >= powerInWatts) {
24
25         // The setter method is the name of the property prepended by
26         // 'set'
27
28         [self setCurrentPower:(currentPower - powerInWatts)];
29
30         [city addPower:powerInWatts];
31     }
32 }
33
34 @end
35
```

```
MSVPowerPlant.h — Edited
MSVPowerPlant.h  currentPower

1 #import <Foundation/Foundation.h>
2
3
4 @class MSVCity;
5
6 @interface MSVPowerPlant : NSObject
7
8 @property (nonatomic, readonly) double currentPower;
9
10 - (void)sendPowerToCity:(MSVCity *)city
11     amount:(double)powerInWatts;
12
13
14 @end
15

MSVPowerPlant.m  Counterparts  MSVPowerPlant.m  -sendPowerToCity:amount:
1
2 #import "MSVPowerPlant.h"
3 #import "MSVCity.h"
4
5 @interface MSVPowerPlant ()
6
7 @property (nonatomic) double currentPower;
8
9 @end
10
11 @implementation MSVPowerPlant
12
13 - (void)sendPowerToCity:(MSVCity *)city amount:(double)powerInWatts
14 {
15     // Properties are so important to the language that there is special syntax for accessing
16     // and setting them.
17
18     // Use dot-notation to access a property. This is equivalent to calling the accessor
19     // with the bracket notation.
20     double currentPower = self.currentPower;
21
22     if (currentPower >= powerInWatts) {
23
24         // You can also use dot-notation to write to a property. This is equivalent to calling
25         // the setter with bracket notation
26         self.currentPower = currentPower - powerInWatts;
27
28         [city addPower:powerInWatts];
29     }
30 }
31
32 @end
33
```



```
MSVPowerPlant.h — Edited
MSVPowerPlant.h  currentPower

1 #import <Foundation/Foundation.h>
2
3
4 @class MSVCity;
5
6 @interface MSVPowerPlant : NSObject
7
8 @property (nonatomic, readonly) double currentPower;
9
10 - (void)sendPowerToCity:(MSVCity *)city
11     amount:(double)powerInWatts;
12
13
14 @end
15

MSVPowerPlant.m  -setCurrentPower:
Counterparts  MSVPowerPlant.m  -setCurrentPower:

1 #import "MSVPowerPlant.h"
2 #import "MSVCity.h"
3
4
5 @interface MSVPowerPlant ()
6
7 @property (nonatomic) double currentPower;
8
9 @end
10
11 @implementation MSVPowerPlant
12
13 // You can override the generated accessors and setters by providing
14 // your own method implementation
15
16 - (void)setCurrentPower:(double)currentPower
17 {
18     // _currentPower is the automatically generated instance variable for the currentPower
19     // property. All automatically generated instance variables will be of the form _(Property Name)
20
21     currentPower = MAX(currentPower, 0);
22     _currentPower = currentPower;
23 }
24
25 - (void)sendPowerToCity:(MSVCity *)city amount:(double)powerInWatts
26 {
27     double currentPower = self.currentPower;
28
29     if (currentPower >= powerInWatts) {
30
31         self.currentPower = currentPower - powerInWatts;
32
33         [city addPower:powerInWatts];
34     }
35 }
36
37 @end
38
```

```
MSVPowerPlant.h — Edited
MSVPowerPlant.h  currentPower

1 #import <Foundation/Foundation.h>
2
3
4 @class MSVCity;
5
6 @interface MSVPowerPlant : NSObject
7
8 @property (nonatomic, readonly) double currentPower;
9
10 - (void)sendPowerToCity:(MSVCity *)city
11     amount:(double)powerInWatts;
12
13
14 @end
15
```

```
MSVPowerPlant.m  No Selection
Counterparts  MSVPowerPlant.m  No Selection

1 #import "MSVPowerPlant.h"
2 #import "MSVCity.h"
3
4
5 @interface MSVPowerPlant ()
6
7 @property (nonatomic) double currentPower;
8
9 @end
10
11 @implementation MSVPowerPlant
12
13 // When we override both the getter and setter, we must tell the compiler
14 // that we still want it to create an instance variable for it. The @synthesize
15 // directive says "I want to create an instance variable named _currentPower for the
16 // property currentPower". _currentPower will be of type double because of the type in
17 // the property definition
18
19 @synthesize currentPower = _currentPower;
20
21 - (void)setCurrentPower:(double)currentPower
22 {
23     currentPower = MAX(currentPower, 0);
24     _currentPower = currentPower;
25 }
26
27 - (double)currentPower
28 {
29     return _currentPower;
30 }
31
32 - (void)sendPowerToCity:(MSVCity *)city amount:(double)powerInWatts
33 {
34     double currentPower = self.currentPower;
35
36     if (currentPower >= powerInWatts) {
37         self.currentPower = currentPower - powerInWatts;
38
39         [city addPower:powerInWatts];
40     }
41 }
42
43
44 @end
45
```