Protocols, Delegates, and Segues
Protocols

- A *protocol* is the declaration of a group of related properties, initializers, and methods that provide a desired task or level of functionality.

- Some other languages refer to them as *interfaces*.

- When a class implements the properties, initializers, and methods of a protocol, it is said to *adopt* or *conform* to the protocol.

- The parts of a protocol can be implemented in any class. As such, they are independent of any class.

- When you define a protocol, you identify which parts are required and which parts are optional. When a class conforms to a protocol, all *required* methods must be implemented.

- Just like classes, protocols can inherit from other protocols.
The syntax of a protocol looks very much like that of a class or struct:

```swift
Protocol <ProtocolName> {
    // definition of protocol
}
```
For a type to adopt the protocol, you list the protocol name after the colon in the type definition:

class ClassName: Protocol1, Protocol2 {
    // class definition
}

Note that a type can adopt multiple protocols.
If a class has a superclass, it **must** go first:

class ClassName: MySuperClass, Protocol1, Protocol2 |
  // class definition
}
Here's the definition of a protocol called `Resizable`:

```swift
protocol Resizable {
    var width: Float { get set }
    var height: Float { get set }

    init(width: Float, height: Float)

    func resizeBy(wFactor: Float,
                  hFactor: Float)
}
```

When a protocol requires a property, it provides the name and type, and indicates whether the property is gettable, settable, or both.
Here’s a class called Rectangle that conforms to the Resizable protocol:

class Rectangle: Resizable {
    var width: Float
    var height: Float

    required init(width: Float, height: Float) {
        self.width = width
        self.height = height
    }

    func resizeBy(wFactor: Float, hFactor: Float) {
        width *= wFactor
        height *= hFactor
    }
}
class Rectangle: Resizable { 
    var width: Float 
    var height: Float 
    var description: String { 
        return "Rectangle, width \(\text{width}\), height \(\text{height}\)"
    } 
    required init(width: Float, height: Float) { 
        self.width = width 
        self.height = height 
    } 
    func resizeBy(wFactor: Float, hFactor: Float) { 
        width *= wFactor 
        height *= hFactor 
    } 
} 

let rect = Rectangle(width:10, height:20) 
rect.resizeBy(wFactor:2, hFactor:2)
Example (cont.)

class Rectangle: Resizable, CustomStringConvertible {
    var width: Float
    var height: Float
    var description: String {
        return "Rectangle, width \(width), height \(height)"
    }
    required init(width: Float, height: Float) {
        self.width = width
        self.height = height
    }
    func resizeBy(wFactor: Float, hFactor: Float) {
        width *= wFactor
        height *= hFactor
    }
}

let rect = Rectangle(width: 10, height: 20)
rect.resizeBy(wFactor: 2, hFactor: 2)
print(rect)  // prints "Rectangle, width 20.0, height 40.0"
Multiple inheritance

Note that protocols are a way to have *fake* multiple inheritance.

It is a way to define a set of additional methods a class must (required) or could (optional) implement, since neither Swift nor Objective-C support multiple inheritance.
A *delegate* is a simple but powerful pattern in which one object acts on behalf of or in coordination with another object.

- The delegating object keeps a reference to another object (the delegate) and at the appropriate time, sends a message to it. The main value of delegation is that it allows you to easily customize the behavior of several objects in one central object.

- There’s nothing that says you can’t have more than one delegate.
A delegate is a pointer to *some object* that has implemented the protocol’s methods.

- The “some object” means we don’t really know or care specifically what kind of object the delegate is referring to – only that the methods defined in the protocol are implemented in that object.

Class A conforms to a protocol needed by Class B
Class B calls a method of the protocol that lives in Class A’s object

Class A invokes method in B
Class B calls back method in A

Delegate for Class B’s protocol
Delegates (cont.)

Protocol

- Will do [x]
- Will do [y]
- Will do [z]

Delegate

Conforms to protocol...
- Can dependably do [x] if asked
- Can dependably do [y] if asked
- Can dependably do [z] if asked

Delegator

Needs a delegate who can dependably
- Do [x] when asked
- Do [y] when asked
- Do [z] when asked
Segue

A *segue* is a named transition between one part of the UI to another. Its purpose is to make it easier to move from one VC to another.

- A segue is created in IB and code is written to make use of it.