

# Delegation Pattern Explained

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# Apple uses a lot of delegates

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UITableViewDelegate

UITextFieldDelegate

UICollectionViewDelegate

UIScrollViewDelegate

UIScrollViewAccessibilityDelegate

...

NSUserActivityDelegate

NSCacheDelegate

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**Grader**

- collect\_scores()
- calculate\_grades()
- apply\_curve()
- send\_to\_sio()

Labs

Exams

Projects

Papers

67272

67327

67344

67442

# How does Grader calculate grades?

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## Grader

- collect\_scores()
- calculate\_grades()
- apply\_curve()
- send\_to\_sio()

## Option 1: *if / else if / else*

```
if course == "67272"  
    ...  
else if course == "67327"  
    ...  
else if course == "67327"  
    ...  
else if course == "67344"  
    ...  
else if course == "67373"  
    ...  
else if course == "67442"  
    ...  
else if course == "67475"  
    ...  
else  
    ...
```

# How does Grader calculate grades?

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## Grader

- collect\_scores()
- calculate\_grades()
- apply\_curve()
- send\_to\_sio()

## Problems

- length quickly grows
- complexity high
- constantly needs to be updated

## Option 1: *if / else if / else*

```
if course == "67272"  
    ...  
else if course == "67327"  
    ...  
else if course == "67327"  
    ...  
else if course == "67344"  
    ...  
else if course == "67373"  
    ...  
else if course == "67442"  
    ...  
else if course == "67475"  
    ...  
else  
    ...
```

# How does Grader calculate grades?

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## **Grader**

- collect\_scores()
- calculate\_grades()
  - apply\_curve()
  - send\_to\_sio()

## **Option 2:** *use closures*

```
calculate_grades() { 67272_closure }
```

```
calculate_grades() { 67327_closure }
```

```
calculate_grades() { 67344_closure }
```

```
calculate_grades() { 67442_closure }
```

# How does Grader calculate grades?

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## Grader

- collect\_scores()
- calculate\_grades()
  - apply\_curve()
  - send\_to\_sio()

## Issues

- overall much better!
- blocks can still be long, error-prone
- managing multiple blocks

## Option 2: *use closures*

```
calculate_grades() { 67272_closure }  
calculate_grades() { 67327_closure }  
calculate_grades() { 67344_closure }  
calculate_grades() { 67442_closure }
```

# How does Grader calculate grades?

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## **Grader**

- collect\_scores()
- calculate\_grades()
  - apply\_curve()
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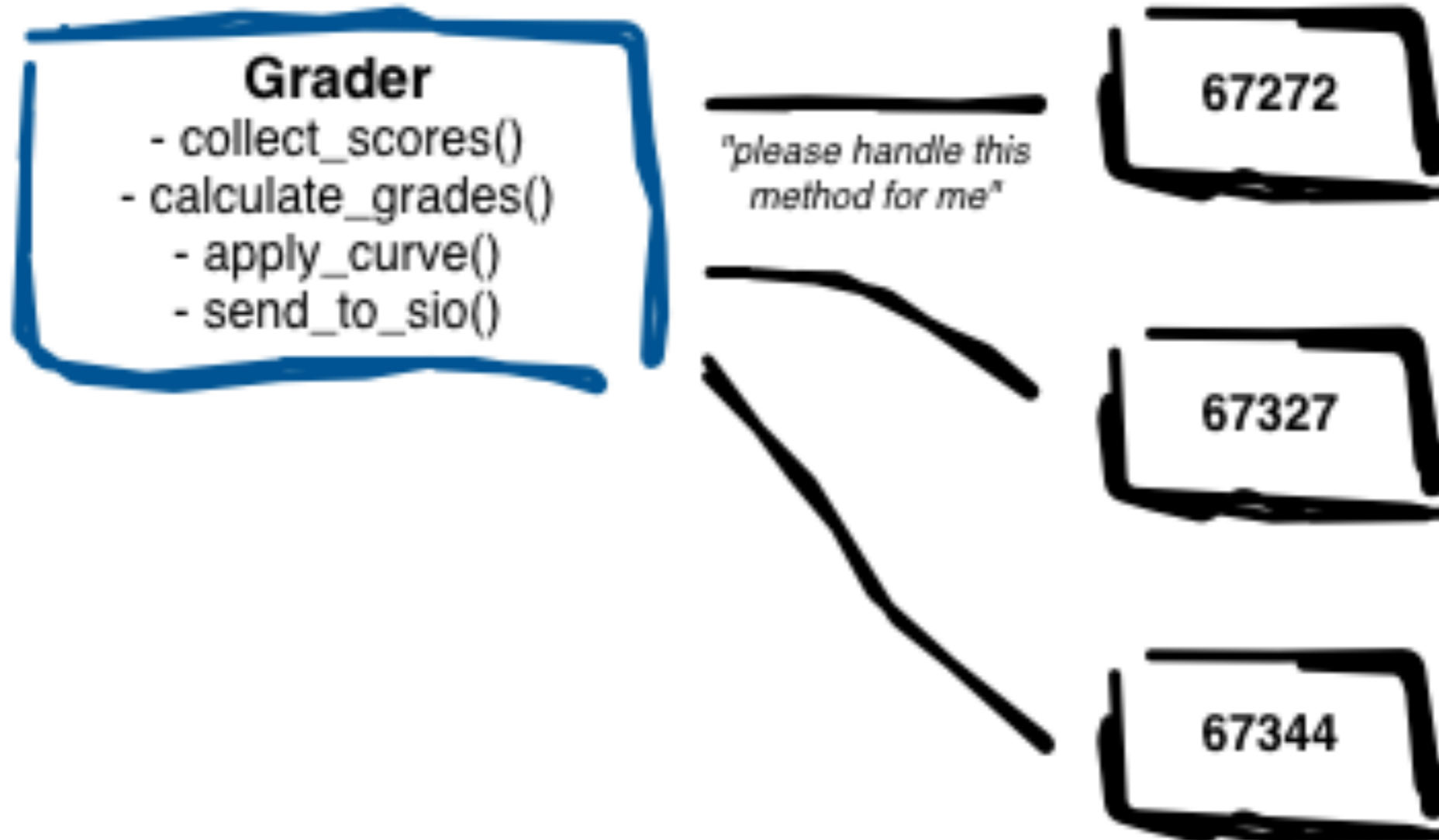
**Option 3:** *rely on delegation*



# How does Grader calculate grades?

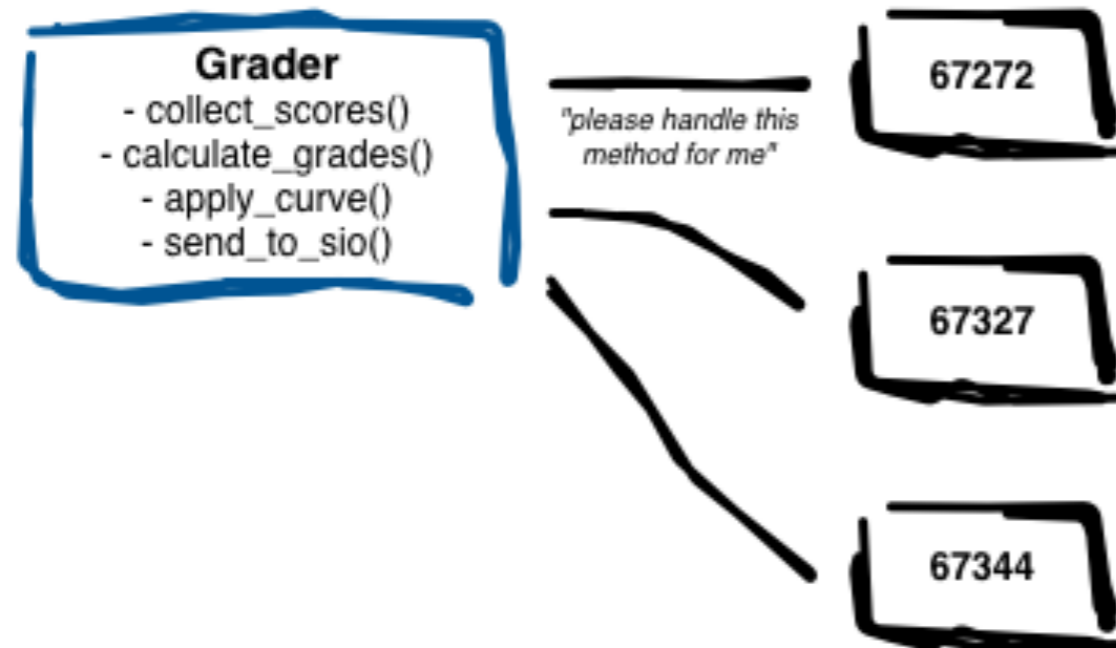
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## Option 3: *rely on delegation*



# What does it generally take to delegate?

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**Step 1:** establish a 'contract' defining the delegate's responsibility.

**Step 2:** establish two-way channels of communication between delegate and constituent.

**Step 3:** constituent uses channels to inform delegate of important changes; delegate responds.

# Delegate pattern in iOS *(5 easy steps)*

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Five steps for setting up the delegate pattern between two objects, where object B is the delegate for object A, and object A will send out the messages:

1. Define a delegate protocol for object A; consider protocol extensions as appropriate.
2. Make object B conform to the delegate protocol. It should put the name of the protocol in its class line and implement the methods from the protocol.
3. Give object A an optional delegate variable. *(This variable should be weak.)*
4. Tell object A that object B is now its delegate.
5. Make object A send messages to its delegate when something interesting happens, such as the user pressing the Cancel or Done buttons, or when it needs a piece of information.

# Simple Delegation Example

# Revisiting Apple delegates

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UITableViewDelegate

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