Delegation Pattern Explained

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Apple uses a lot of delegates

UITableViewDelegate

UITextFieldDelegate
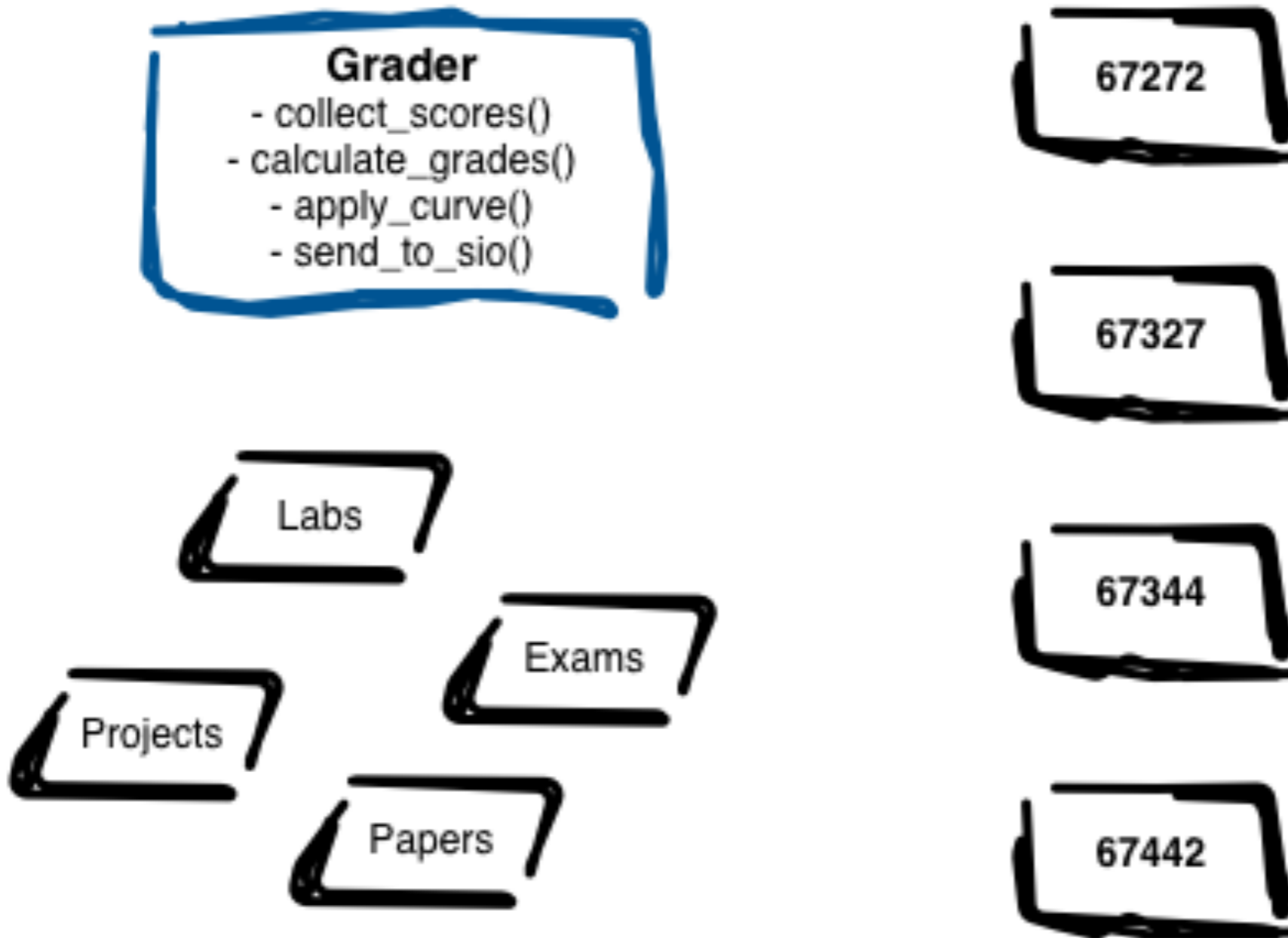
UICollectionViewDelegate

UIScrollViewDelegate

UIScrollViewAccessibilityDelegate

...

NSUserActivityDelegate

NSCacheDelegate

An example close to home…

Grader
- collect_scores()
- calculate_grades()
- apply_curve()
- send_to_sio()

Labs

Exams

Projects

Papers

67272

67327

67344

67442

How does Grader calculate grades?

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?

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?

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?

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 }
```
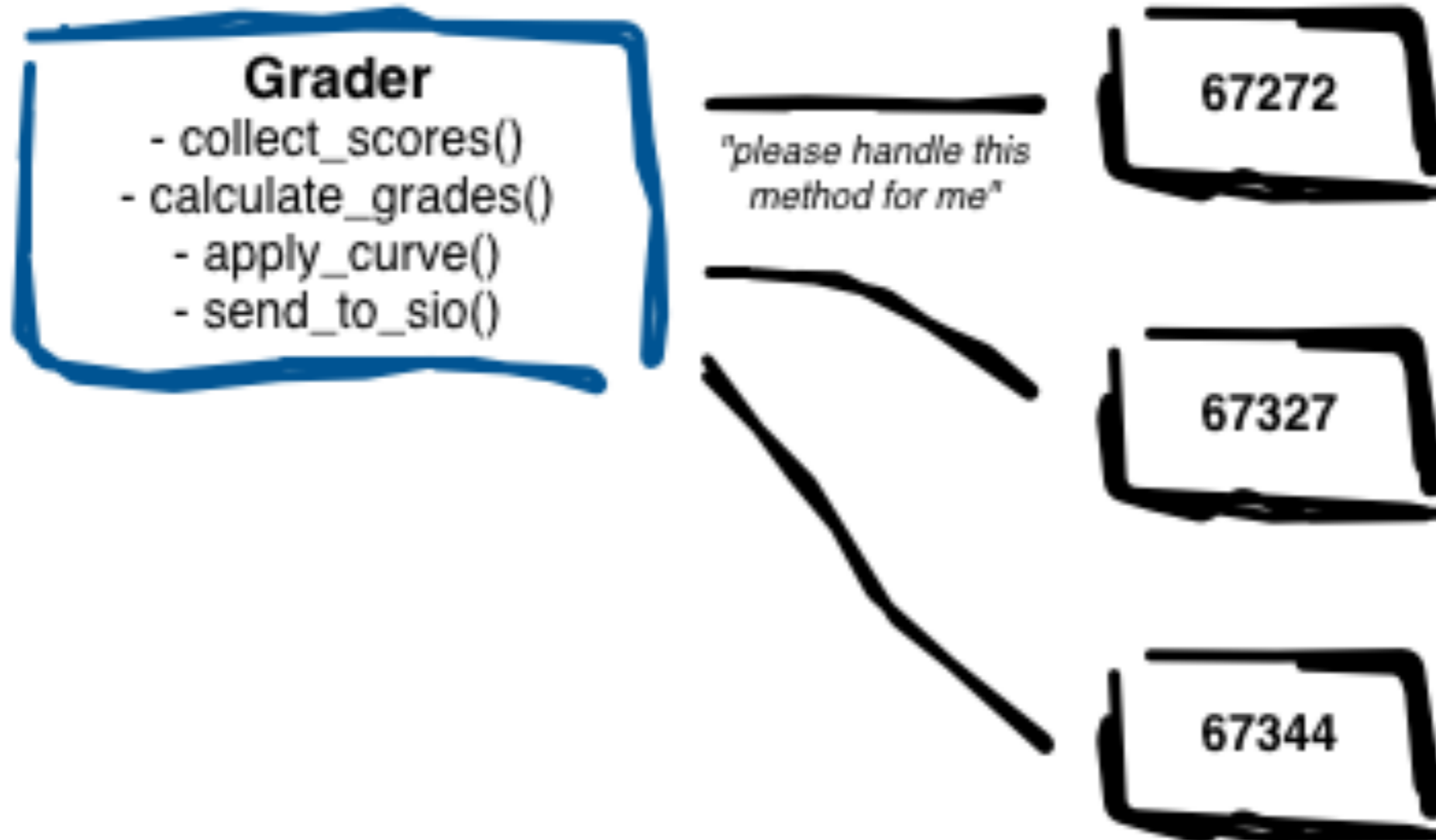
How does Grader calculate grades?

Grader
- collect_scores()
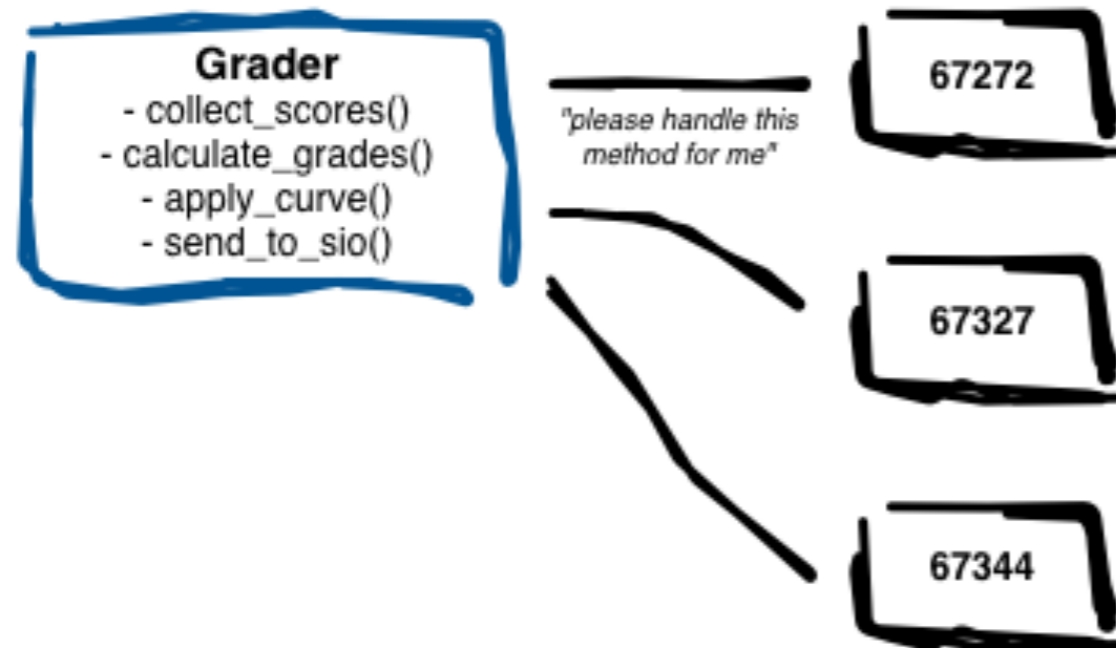- calculate_grades()
- apply_curve()
- send_to_sio()

Option 3: *rely on delegation*

How does Grader calculate grades?

Option 3: *rely on delegation*

What does it generally take to delegate?

Grader
- collect_scores()
- calculate_grades()
  - apply_curve()
  - send_to_sio()

"please handle this method for me"

67272

67327

67344

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)*

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

```
UITableViewDelegate

UITextFieldDelegate

UICollectionViewDelegate

UIScrollViewDelegate

UIScrollViewAccessibilityDelegate

...

NSUserActivityDelegate

NSCacheDelegate
```