

# Lecture 5

## Table Views

# Attendance

**[tiny.cc/cis195-att](https://tiny.cc/cis195-att)**

# Today

- Table View Controller
- Delegate + Datasource deque pattern
- Live Demo
  - Table views, Navigation Controller, Tab Bar Controller



# Motivation

2:33 ↗



3

11

11



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Our developers created axe Pro to help  
dev teams get more from accessibility  
testing without needing to become  
accessibility experts



2:33 ↗



3

1

11



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**Deque Systems** @dequesystems

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accessibility experts



2:33 ↗

[Lists](#)

## CIS 195

Revise lecture 5

Revise lecture 6

Revise lecture 7

Revise lecture 8

Revise lecture 9

Revise lecture 10

Tutorial 4

Tutorial 5

Tutorial 6

Tutorial 7

Tutorial 8

App 2b

App 3

App 4

[+ New Reminder](#)

2:33 ↗

3 11 11 1

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 **Deque Systems** @dequesystems

Our developers created axe Pro to help dev teams get more from accessibility testing without needing to become accessibility experts [+ New Reminder](#)

House 🔎 🔔 ⏱

2:33 ↗

...

< Lists

## CIS 195

- Revise lecture 5
- Revise lecture 6
- Revise lecture 7
- Revise lecture 8
- Revise lecture 9
- Revise lecture 10
- Tutorial 4
- Tutorial 5
- Tutorial 6
- Tutorial 7
- Tutorial 8
- App 2b
- App 3
- App 4

+ New Reminder

2:32 ↗

◀ Search

 Instagram 

 **haurora**  
Uptown, Minnesota [New Posts](#) ...



Heart Comment Share

38 likes

haurora i just ordered a Ricoh RZ1050 film camera and two disposables from @filmwholesale for devon... more

Add a comment 

House 🔎 + ⚪ 🔔 ⏱

2:31 ↗



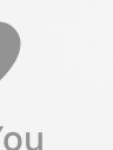
&lt; Library

## Songs

Sort

**Circles**  
Mac Miller**Complicated**  
Mac Miller**Blue World** E  
Mac Miller**I Can See**  
Mac Miller**Everybody**  
Mac Miller**Woods**  
Mac Miller**Hand Me Downs**  
Mac Miller**That's on Me**  
Mac Miller**Hands** E  
Mac Miller**Surf**  
Mac Miller**Surf**

Library



For You



Browse



Radio



Search

2:31 ⓘ

.... ⌂ ⚡

< Library Songs Sort

Circles Mac Miller 

Complicated Mac Miller 

Blue World E Mac Miller 

I Can See Mac Miller 

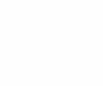
Everybody Mac Miller 

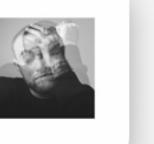
Woods Mac Miller 

Hand Me Downs Mac Miller 

That's on Me Mac Miller 

Hands E Mac Miller 

Surf Mac Miller 

Surf  ▶ ▶

Library For You Browse Radio Search

This screen shows a library of songs by Mac Miller. Each song entry includes a small thumbnail of the artist, the song title, the artist name, and a red cloud icon with a downward arrow for download. At the bottom, there is a player bar for a song titled 'Surf' by Mac Miller, showing album art, a play button, and a skip button. A navigation bar at the bottom includes links for Library, For You, Browse, Radio, and Search.

2:46 ⓘ

.... ⌂ ⚡

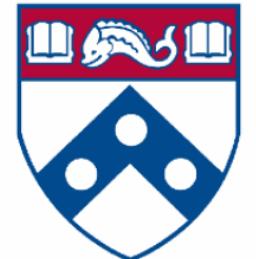
Hi there, Dominic!

  
The Daily Pennsylvanian 15 hours ago

**Penn Dining revives Black History Month celebration after canceling last year**

UNIVERSITY NOTIFICATIONS

**University Events**

 Drop Period ends  
Monday, Feb. 24

GSR LOCATIONS

**GSR Booking**

Home Dining GSR Laundry More

This screen displays a notification from 'The Daily Pennsylvanian' about a Black History Month celebration. Below it is a 'University Events' section featuring a drop period reminder. Further down are sections for 'GSR Locations' and 'GSR Booking'. The top of the screen shows a greeting 'Hi there, Dominic!' and a navigation bar with links for Home, Dining, GSR, Laundry, and More.

2:31 ⓘ

Library Songs Sort

Circles Mac Miller

Complicated Mac Miller

Blue World E Mac Miller

I Can See Mac Miller

Everybody Mac Miller

Woods Mac Miller

Hand Me Downs Mac Miller

That's on Me Mac Miller

Hands E Mac Miller

Surf Mac Miller

Surf

Library For You Browse Radio Search

2:46 ⓘ

Hi there, Dominic!

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UNIVERSITY NOTIFICATIONS

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GSR LOCATIONS

**GSR Booking**

Home Dining GSR Laundry More

2:46 ⓘ

Laundry +

QUAD

**Chestnut Butcher** X

Washers 11 of 11 open

Dryers 10 of 11 open

Popular Times Thursday

12p 2p 4p 6p 8p

HILL

**Hill House** X

Washers 12 of 16 open

Home Dining GSR Laundry More



# Delegate & Datasource

# Delegate & Datasource

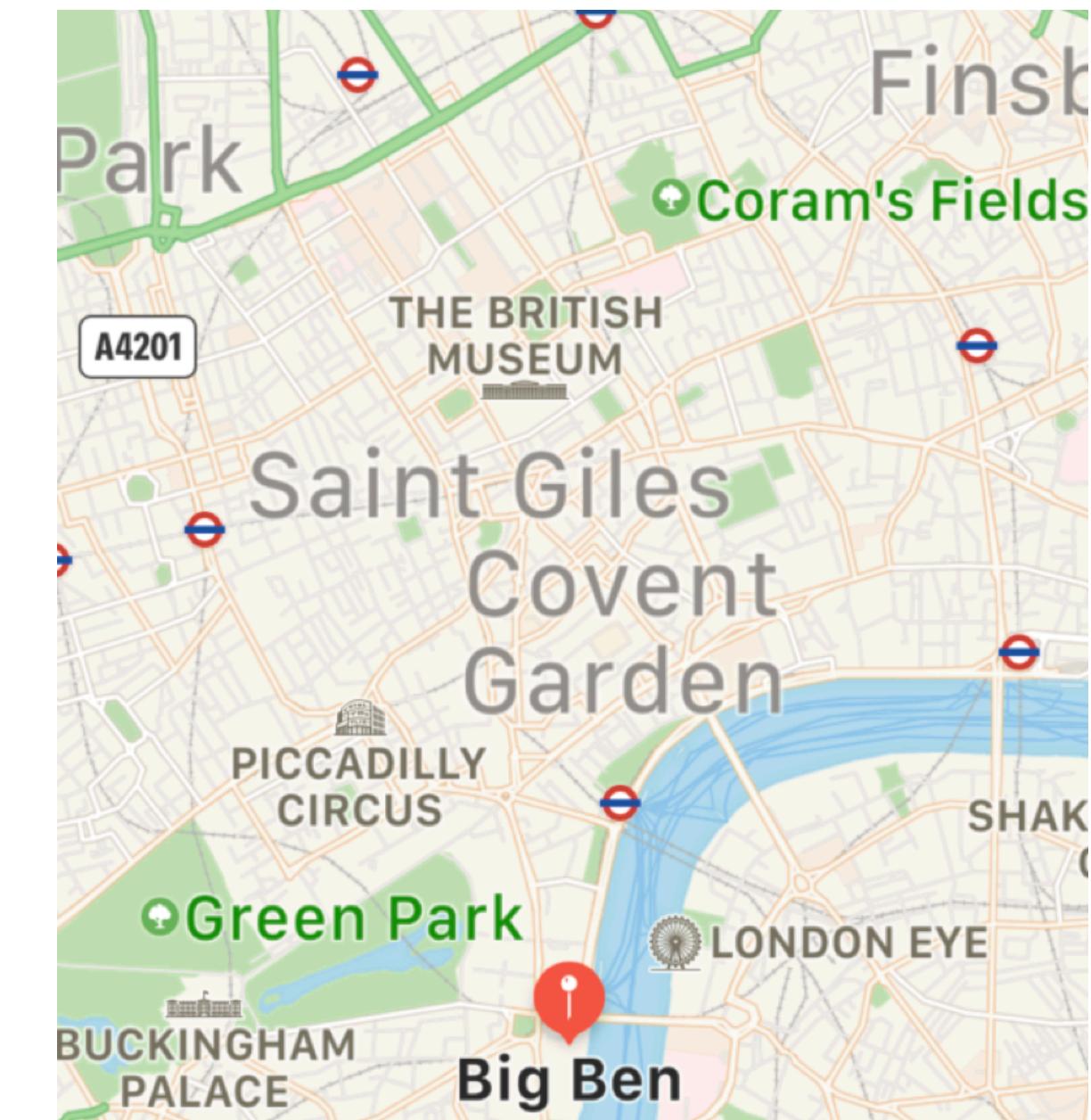
- *What's the difference?*
- To **Delegate** is to specify an object that will *receive and handle* some set of events.
  - User did tap, user did scroll, photo did download, \_\_ did \_\_
- To set a **Datasource** is to specify an object that will provide you data. You call that object's functions with *questions*.
  - How many rows? How many sections? Which content?

***Put simply – the datasource supplies the data,  
while the delegate supplies the behavior.***

*– Dominic Holmes*

# Delegate & Datasource

- *We talk about delegate and datasource in the abstract because this pattern is used throughout the system.*
- Used for UITableView
- It is also used for
  - Photo Picker views
  - MapKit views
  - Collection (n-direction) views
- .... and most complex views in UIKit.



# UITableViewDelegate

Methods for managing selections, configuring section headers and footers, deleting and reordering cells, and performing other actions in a table view.

SDKs

iOS 2.0+

Mac Catalyst 13.0+

Beta

tvOS 9.0+

Framework

UIKit

On This Page

[Declaration](#) ▾[Overview](#) ▾[Topics](#) ▾[Relationships](#) ▾[See Also](#) ▾

## Declaration

```
protocol UITableViewDelegate
```

## Overview

Use the methods of this protocol to manage the following features:

- Create and manage custom header and footer views.
- Specify custom heights for rows, headers, and footers.
- Provide height estimates for better scrolling support.

# Declaration

```
protocol UITableViewDelegate
```

Framework  
UIKit

On This Page

[Declaration](#) ▾

[Overview](#) ▾

[Topics](#) ▾

[Relationships](#) ▾

[See Also](#) ▾

## Overview

Use the methods of this protocol to manage the following features:

- Create and manage custom header and footer views.
- Specify custom heights for rows, headers, and footers.
- Provide height estimates for better scrolling support.
- Indent row content.
- Respond to row selections.
- Respond to swipes and other actions in table rows.
- Support editing the table's content.



# Protocols

# Protocols

- “A protocol defines a blueprint of methods, properties, and other requirements that suit a particular task or piece of functionality.
- The protocol can then be adopted by a class, structure, or enumeration to provide an actual implementation of those requirements.
- Any type that satisfies the requirements of a protocol is said to conform to that protocol.”

## Example: FullyNamed

```
protocol FullyNamed {  
    var fullName: String { get }  
}
```

## Example: FullyNamed

```
protocol FullyNamed {  
    var fullName: String { get }  
}
```

```
struct Person: FullyNamed {  
    var fullName: String  
}
```

**Note: protocols can also have required functions**

## Example: FullyNamed

```
protocol FullyNamed {  
    var fullName: String { get }  
}  
  
struct Person: FullyNamed {  
    var fullName: String  
}  
  
let john = Person(fullName: "John Appleseed")  
// john.fullName is "John Appleseed"
```

**Note: protocols can also have required functions**

# FullyNamed Demo

How do we add a function to our protocol?

```
protocol FullyNamed {
    var fullName: String { get }
    func printName()
}
```

```
struct Person: FullyNamed {
    var fullName: String
}
```

```
let john = Person(fullName: "John Appleseed")
// john.fullName is "John Appleseed"
```

# FullyNamed Demo

How do we add a function to our protocol?

```
protocol FullyNamed {  
    var fullName: String { get }  
    func printName()  
}
```

```
let john = Person(fullName: "John Appleseed")  
john.printName()
```

// printName MUST be implemented by the Person struct

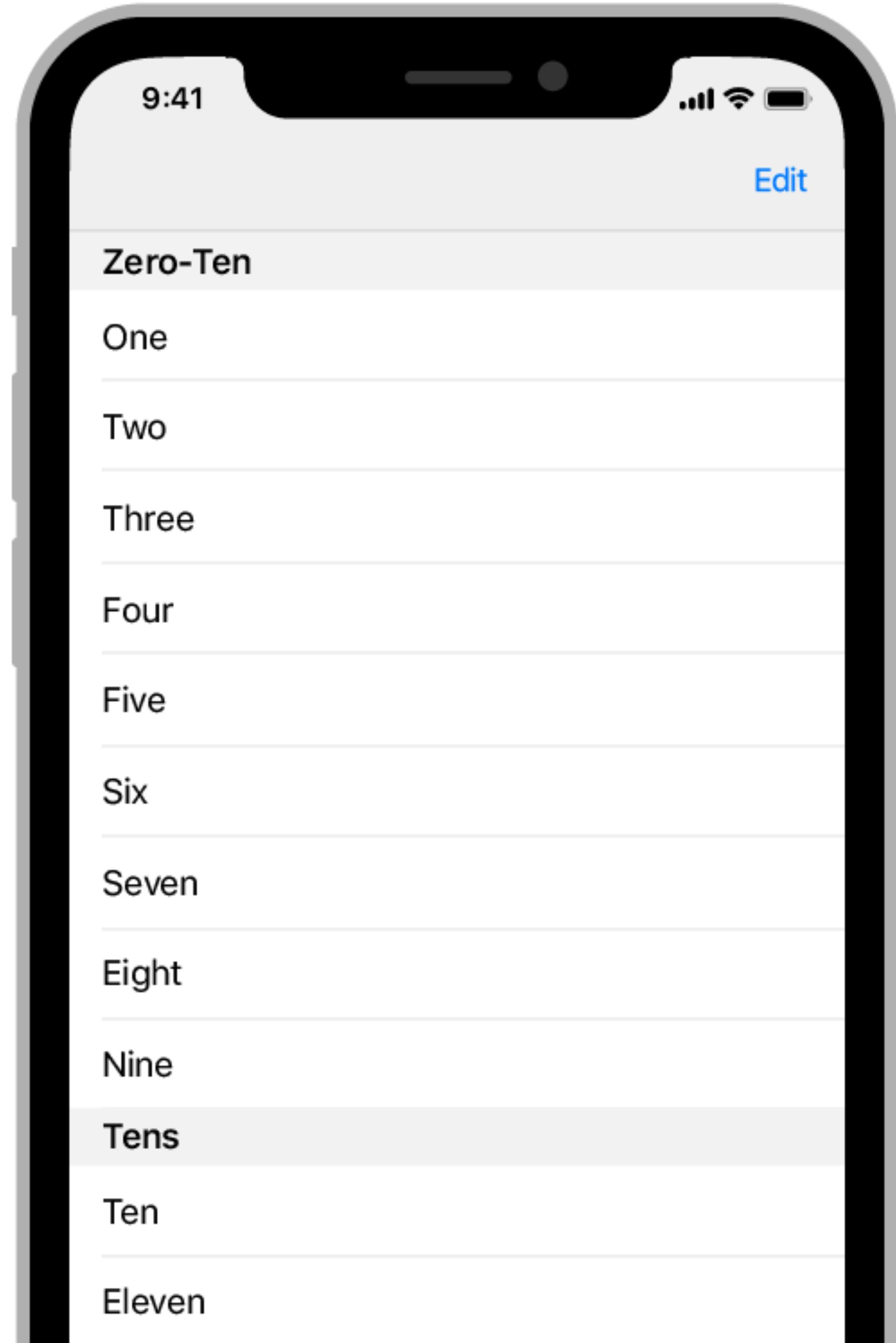


# Table Views

# Table View Datasource/Delegate

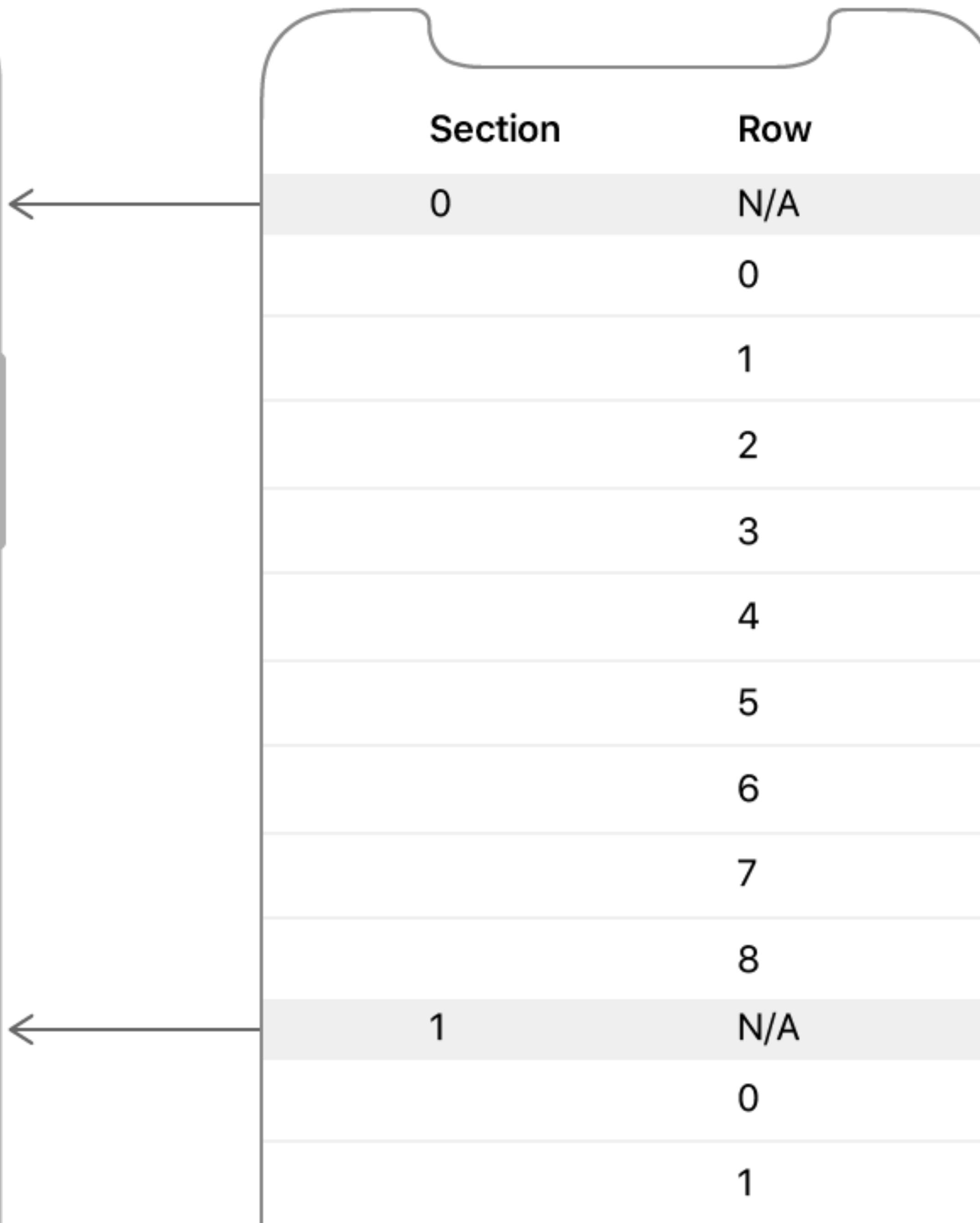
- **What are some UITableViewDelegate methods?**
  - didSelectRowAt, heightForRowAt
- **What are some UITableViewDatasource methods?**
  - cellForRowAt\*, numberOfRowsInSection\*

\* == required



A screenshot of an iPhone displaying a list of items. The items are listed vertically, separated by horizontal lines. The first item is "Zero-Ten", followed by "One", "Two", "Three", "Four", "Five", "Six", "Seven", "Eight", "Nine", "Tens", "Ten", and "Eleven". In the top right corner of the screen, there is a blue "Edit" button. The status bar at the top shows the time as 9:41 and some connectivity icons.

Section	Row
0	N/A
	0
	1
	2
	3
	4
	5
	6
	7
	8
Section	Row
1	N/A
	0
	1



A detailed view of the data structure. It consists of two sections: Section 0 and Section 1. Section 0 contains 9 rows, indexed from 0 to 8. Section 1 contains 2 rows, indexed from 0 to 1. The rows are represented by horizontal lines. Arrows point from the labels "Zero-Ten" through "Eleven" in the left screenshot to the corresponding rows in the table.

Section	Row
0	N/A
	0
	1
	2
	3
	4
	5
	6
	7
	8
Section	Row
1	N/A
	0
	1

2:58 ↗

◀ Search



Library

Songs

Sort

W



Dead Leaves and the Dirty Gr...

The White Stripes



Fell In Love With a Girl

The White Stripes



We're Going to Be Friends

The White Stripes



Southern Nights

Whitney



The Late Greats (Live)

Wilco



No Sleep E

Wiz Khalifa

X



Ahead of Myself E

X Ambassadors



Unconsolable

X Ambassadors



BOOM

X Ambassadors



Renegades

Surf

A  
B  
C  
D  
E  
F  
G  
H  
I  
J  
K  
L  
M  
N  
O  
P  
Q  
R  
S  
T  
U  
V  
W  
X  
Y  
Z  
#  
?

Sections

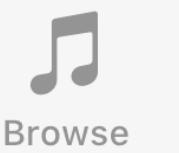
Rows



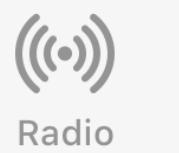
Library



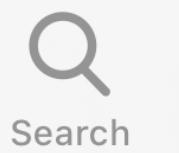
For You



Browse



Radio



Search



2:58 ⓘ

◀ Search

Library Songs Sort

W

 Dead Leaves and the Dirty Gr...  
The White Stripes

 Fell In Love With a Girl  
The White Stripes

 We're Going to Be Friends  
The White Stripes

 Southern Nights  
Whitney

 The Late Greats (Live)  
Wilco

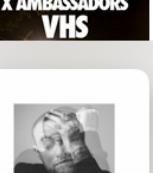
 No Sleep E  
Wiz Khalifa

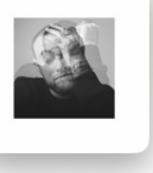
X

 Ahead of Myself E  
X Ambassadors

 Unconsolable  
X Ambassadors

 BOOM  
X Ambassadors

 Renegades

 Surf ▶ ▶

Library For You Browse Radio Search

2:59 ⓘ

◀ Search

Groups Contacts +

D

Tyler Dullinger

E

Griffin Elison

Emiline

Emily

David Erikson

F

County Fair

Leonardo Felipe Nerone

Hannah Fiedler

Ty Finke

Paul Francis

G

Carin Gan

Marta Garcia Ferreiro

Ryan Geraets

Zachary Geraets

Search Microphone icon

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z # ?

2:58 ↗  
◀ Search

◀ Library Songs Sort

W

 Dead Leaves and the Dirty Gr...  
The White Stripes

 Fell In Love With a Girl  
The White Stripes

 We're Going to Be Friends  
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Wilco

 No Sleep E  
Wiz Khalifa

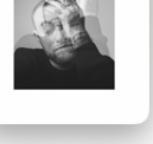
X

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 Surf ▶ ▶

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2:59 ↗  
◀ Search

Groups Contacts +

D

Tyler Dullinger

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F

County Fair

Leonardo Felipe Nerone

Hannah Fiedler

Ty Finke

Paul Francis

G

Carin Gan

Marta Garcia Ferreiro

Ryan Geraets

Zachary Geraets

Search Microphone

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z # ?

2:59 ↗  
◀ Search

Cancel Done

 Dominic

Holmes

Dom

Company

- home > [REDACTED]

- iPhone > [REDACTED]

+ add phone

- home > [REDACTED]

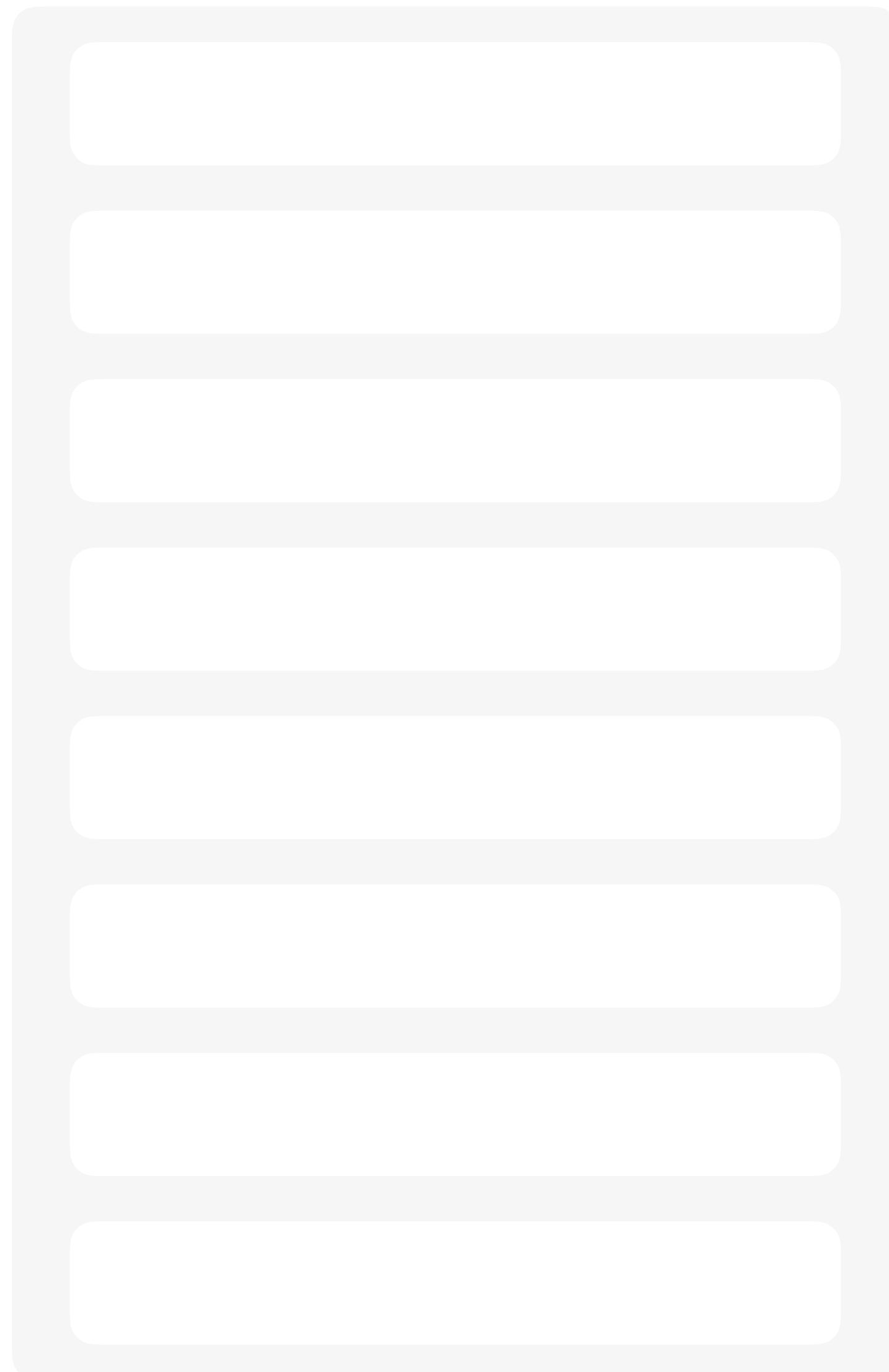
+ add email

Ringtone Default >

Text Tone Default >

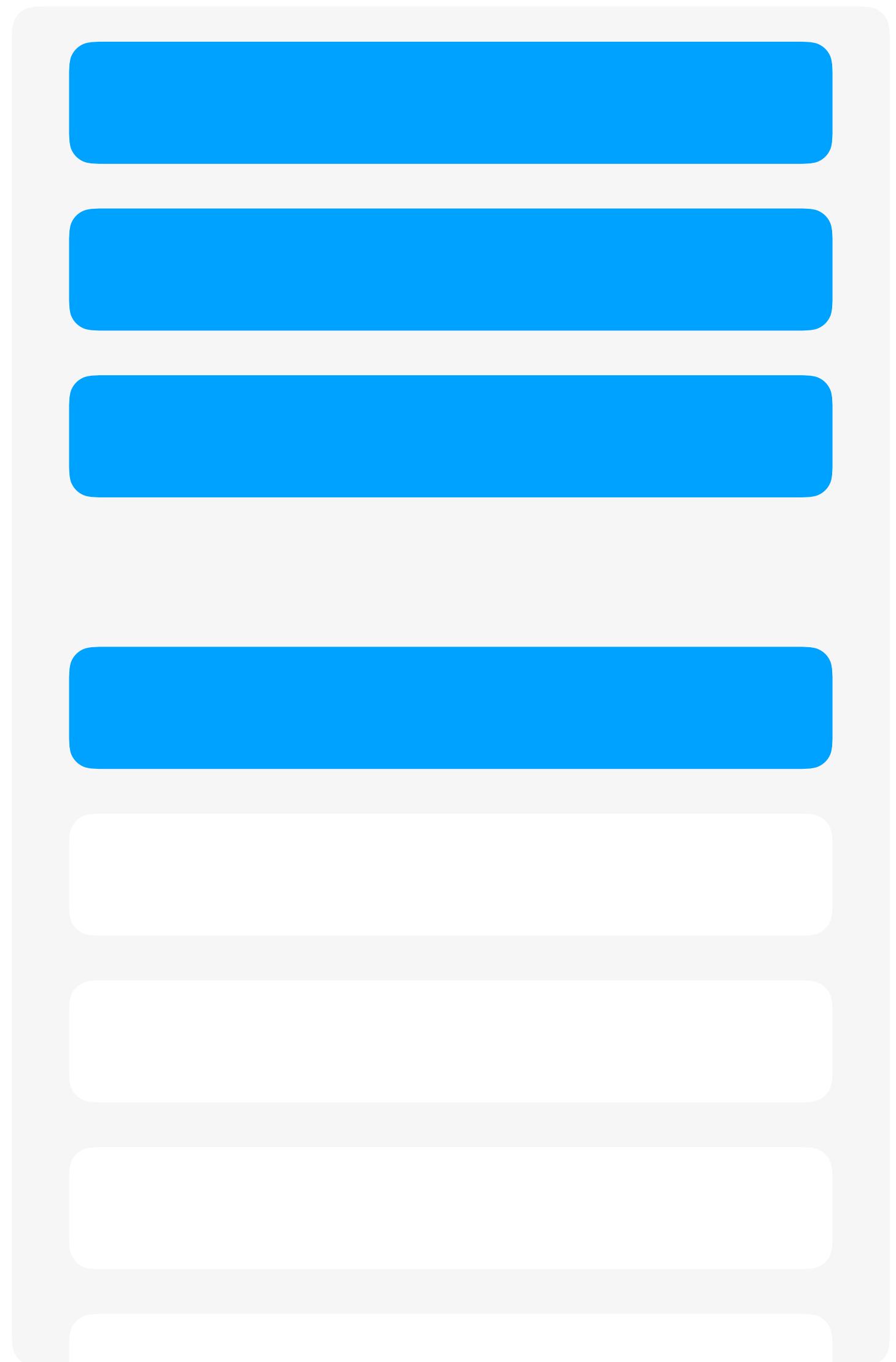
## Table View - Timeline

- Initially — no rows, no sections, no content



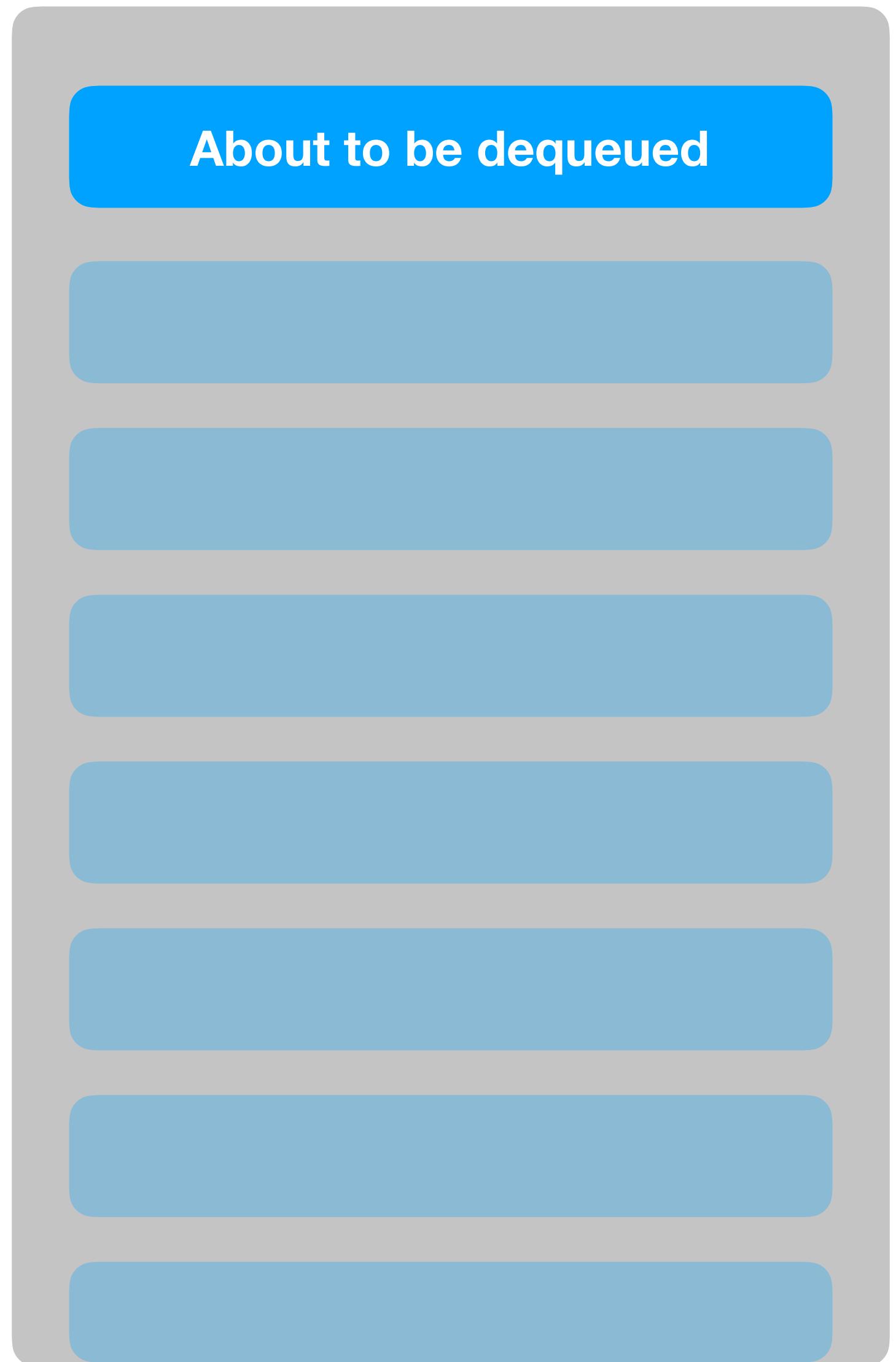
## Table View - Timeline

- Initially — no rows, no sections, no content
- **rowsInSection** and **numSections** called by TableView
- **cellForRowAt** called (how many times?)



# Table View - Timeline

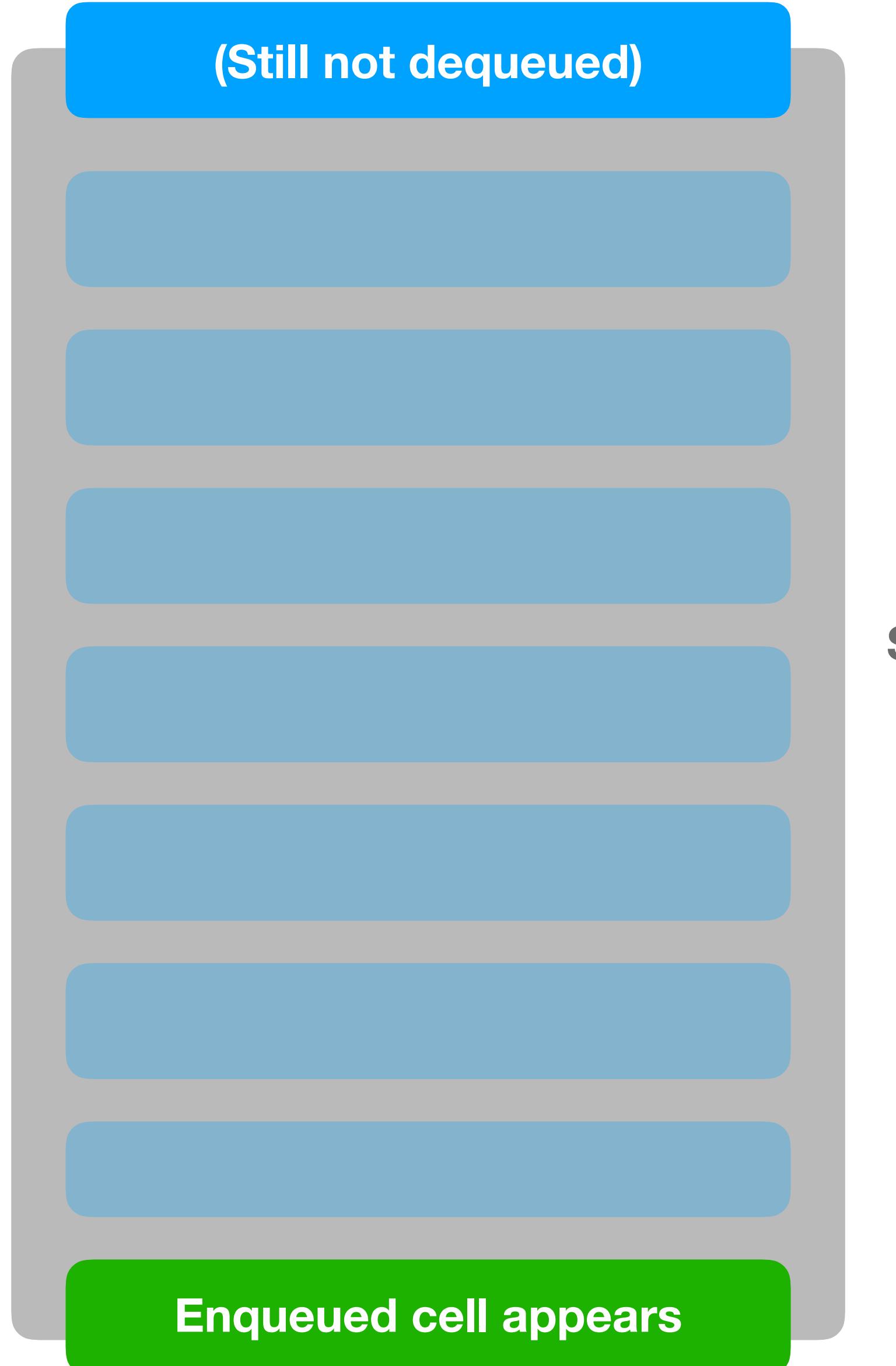
- **cellForRowAt** called (how many times?)
- On scroll
  - **cellForRowAt** called when needed
  - Cells are **dequeued** when they are no longer needed
  - Cells are **enqueued** when needed (when are they needed?)



Cell is enqueueued (not visible yet!)

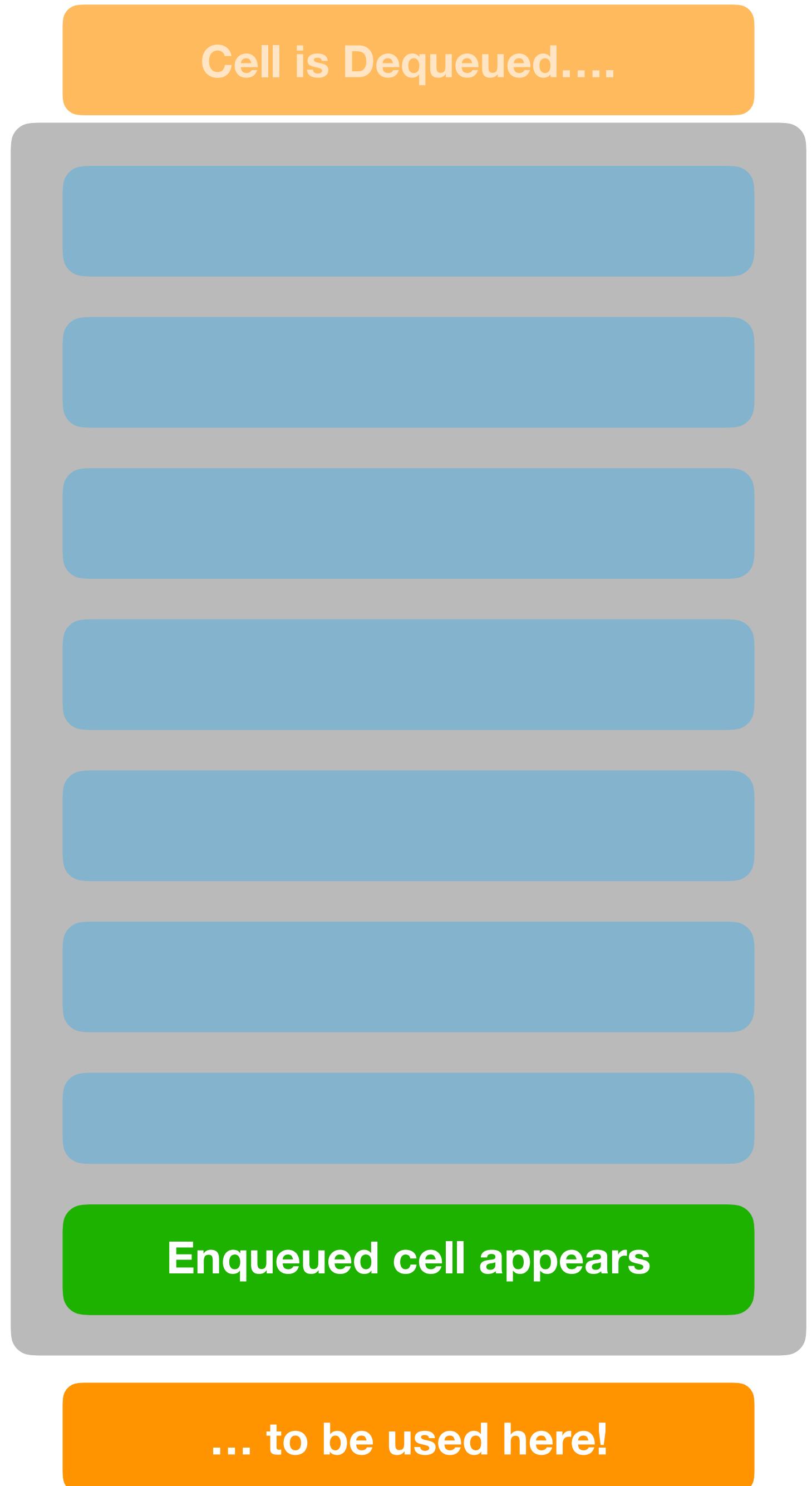
# Table View - Timeline

- **cellForRowAt** called (how many times?)
- On scroll
  - **cellForRowAt** called when needed
  - Cells are **dequeued** when they are no longer needed
  - Cells are **enqueued** when needed (when are they needed?)



# Table View - Timeline

- **cellForRowAt** called (how many times?)
- On scroll
  - **cellForRowAt** called when needed
  - Cells are **dequeued** when they are no longer needed
  - Cells are **enqueued** when needed (when are they needed?)







## Live Demo: Newsfeed

# **Due Before Next Class**

- **App 3: Checklist**
- **Tutorial 3: Autolayout**

## **Links**

- Survey: [tiny.cc/cis195-att](http://tiny.cc/cis195-att)
- Piazza: [tiny.cc/cis195-piazza](http://tiny.cc/cis195-piazza)