

#WWDC19

# Introducing Multiple Windows on iPad

Ken Ferry, iOS System UI  
Steve Holt, UIKit  
James Savage, Safari

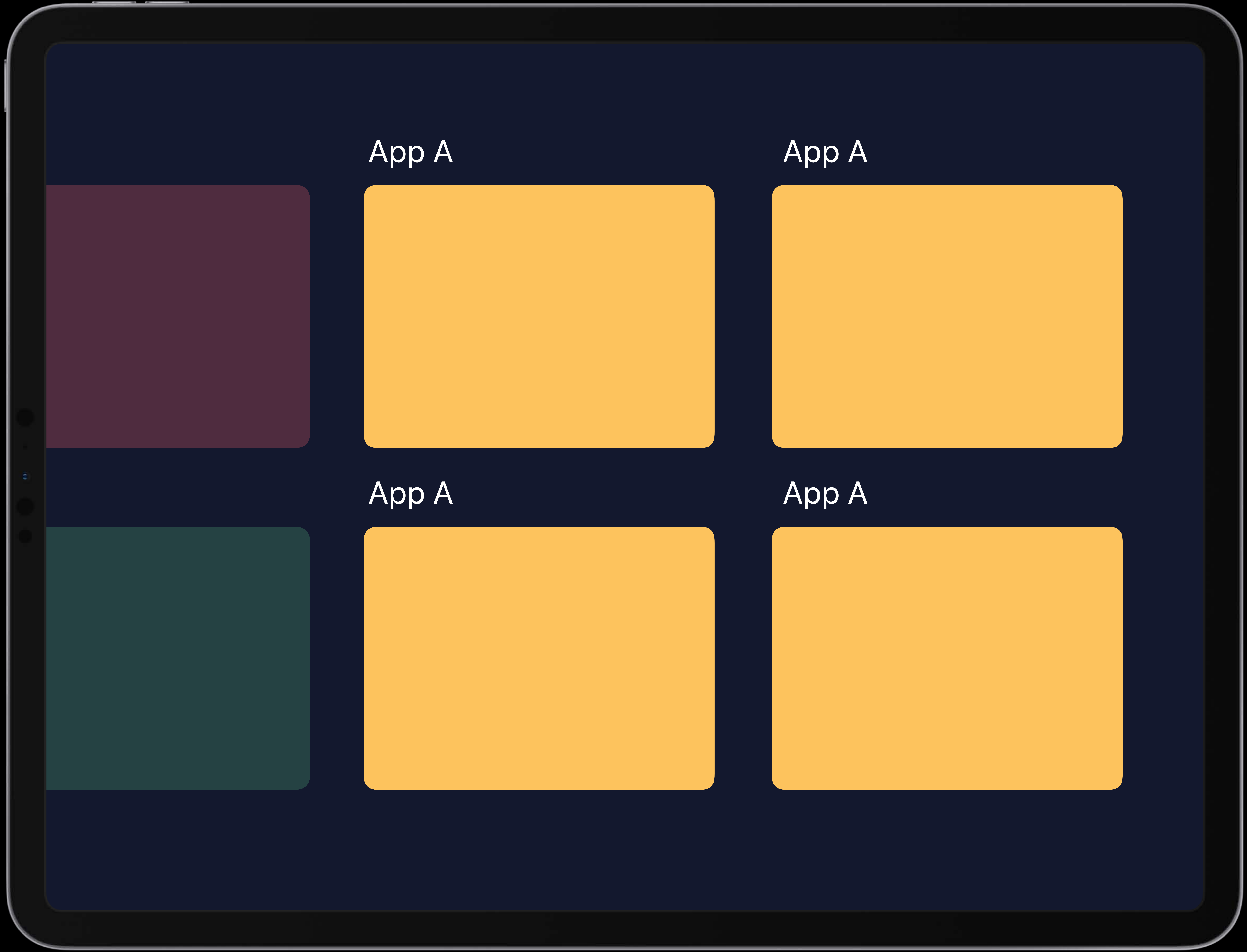


App A

App B

App C

App D



App A

App A

App A

App A

Design intent

App lifecycle changes

Drag and drop

Next steps

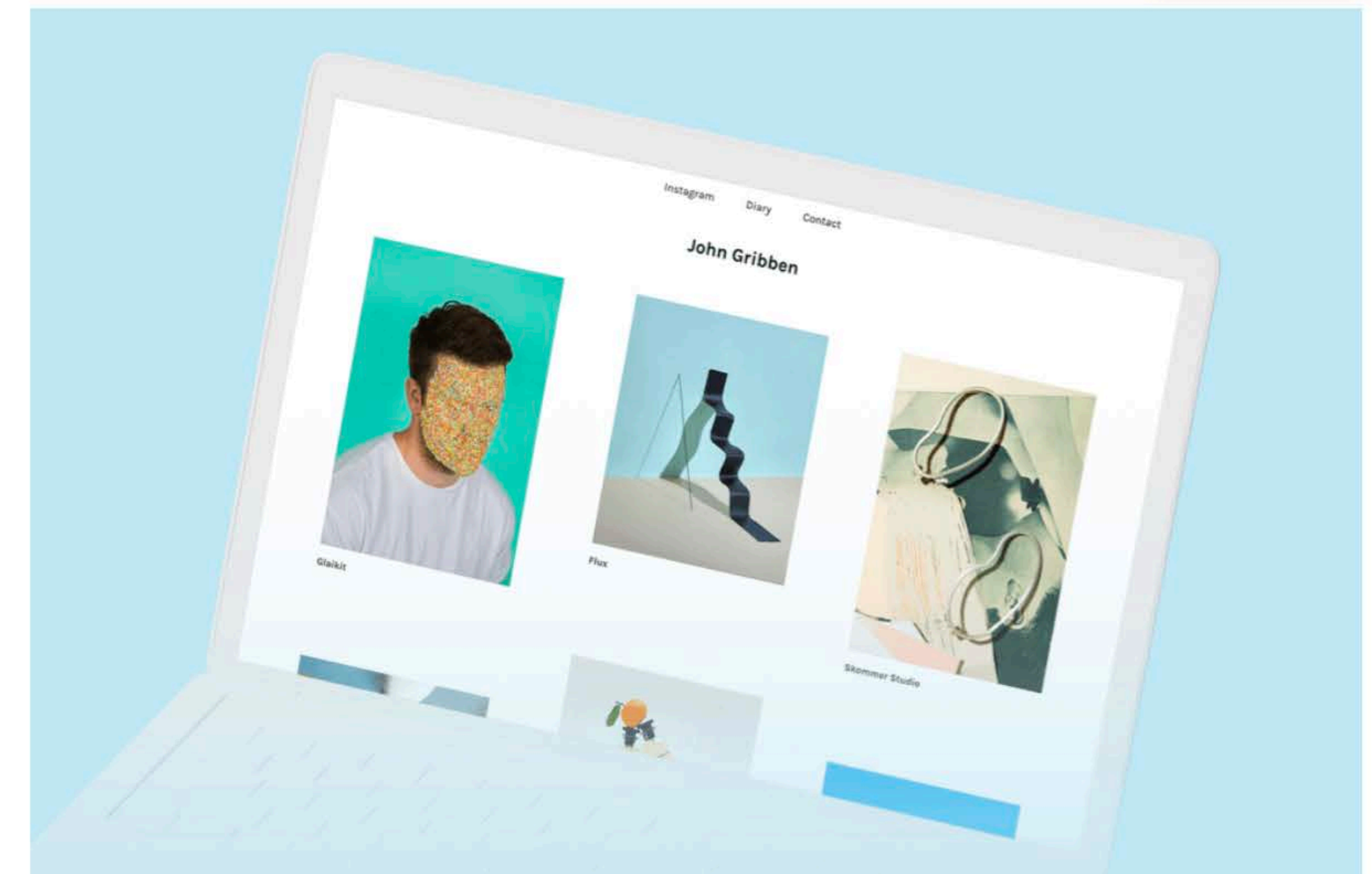
Design intent

App lifecycle changes

Drag and drop

Next steps

Where should I add scenes to my app?



## Take your portfolio to new heights.

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DESIGN

### Fernando Mastrangelo, Design Dissident

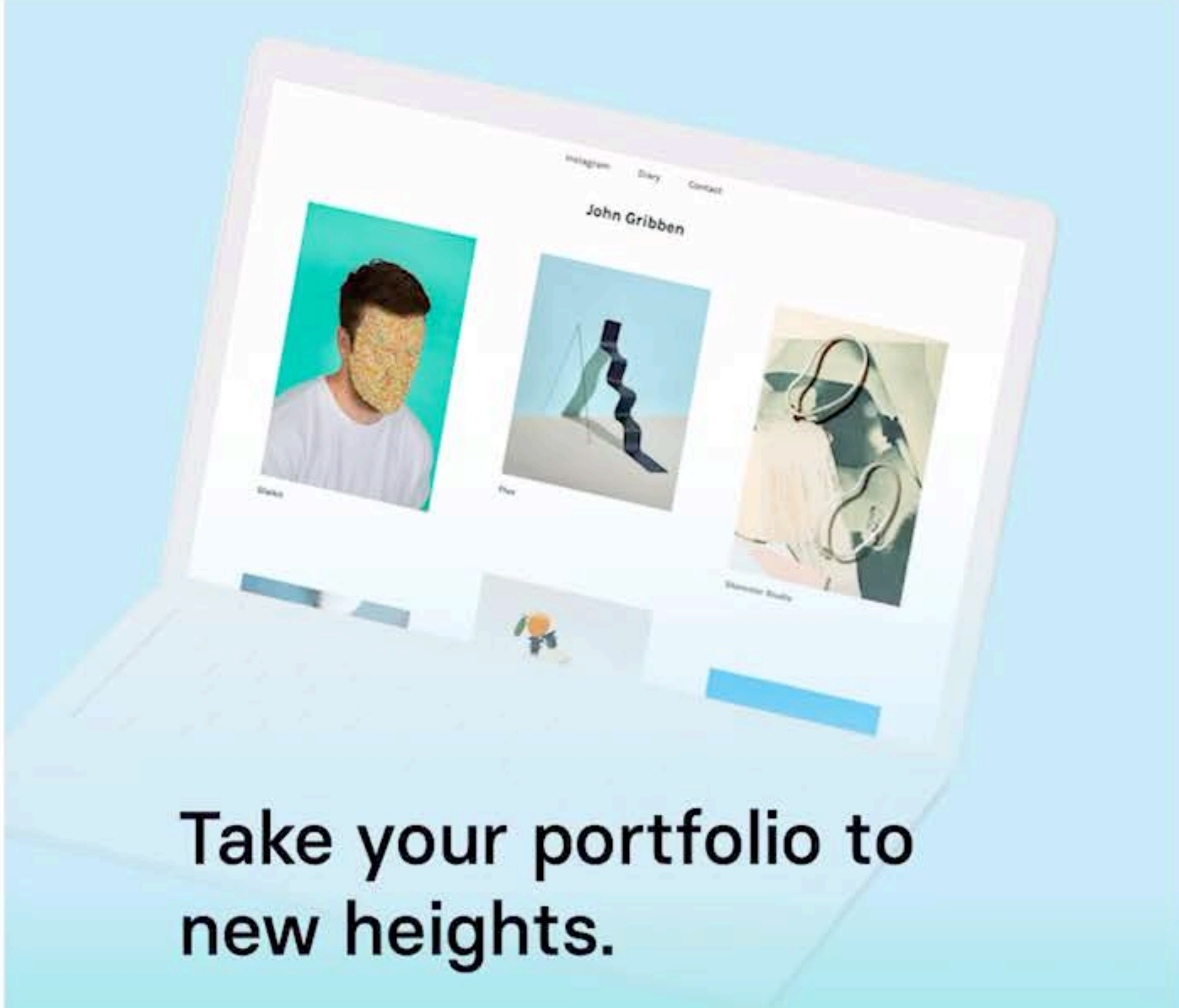
A perennial rule-breaker, Fernando Mastrangelo has become disillusioned with the long-established customs of the design sphere. Here, the Brooklyn furniture designer diagnoses the problem and explains how he plans to...

NEW

9:41 AM Tue Jan 9

format.com

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surfacedmag.com

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Menu Search **SURFACE**



DESIGN

**Fernando Mastrangelo, Design Dissident**

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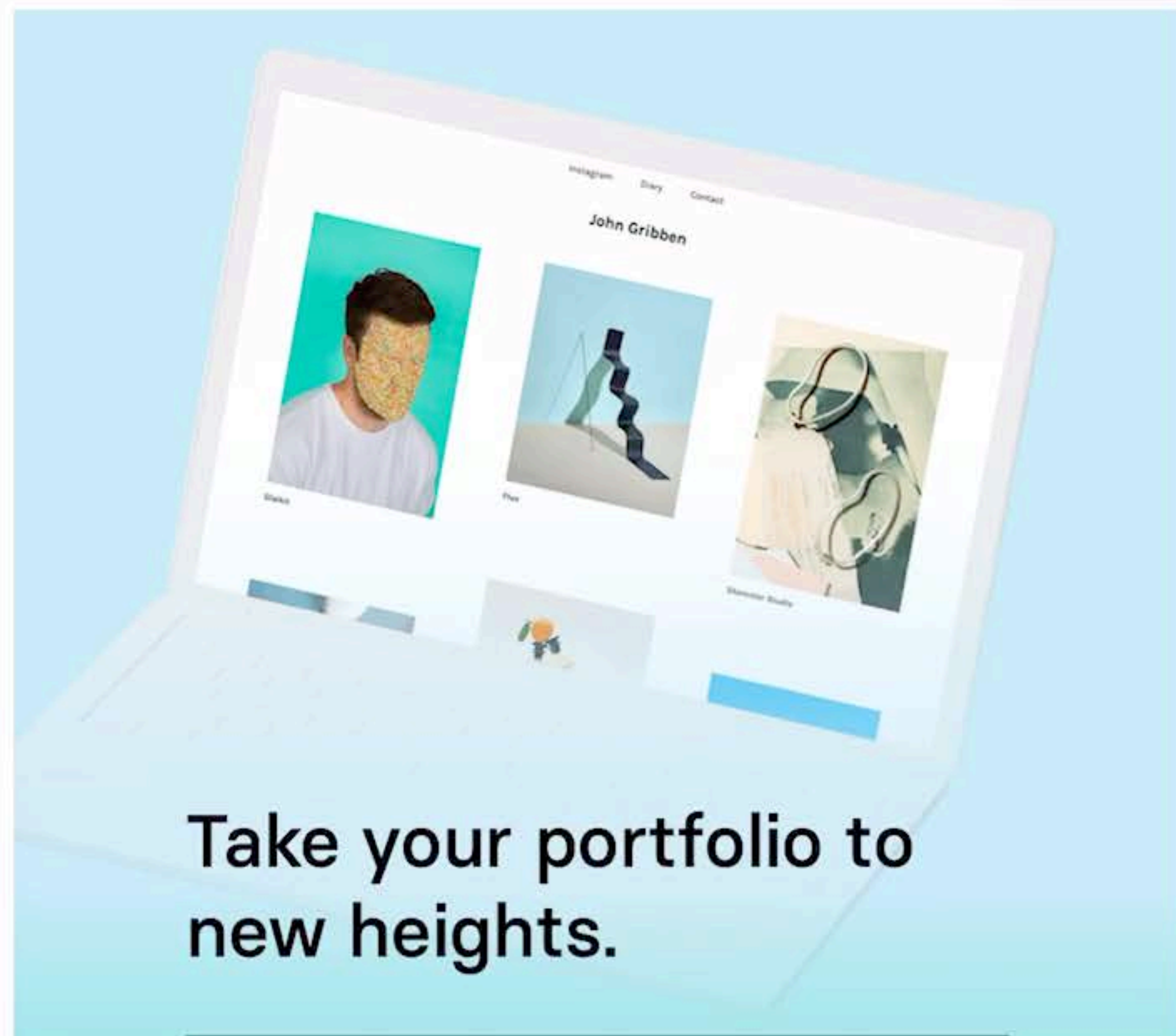
ALL STORIES PREVIOUS NEXT



NEW

Format

Menu Get Started

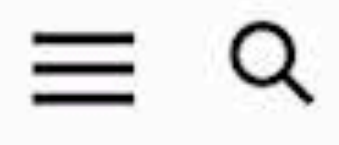


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SURFACE



DESIGN

## Fernando Mastrangelo, Design Dissident

SHARE

ALL STORIES PREVIOUS NEXT

Research Paper Semper 1

Urna Semper

Instructor's Name

Course Title

May 28, 2019

Report Name

Lorem ipsum dolor sit amet, ligula suspendisse nulla pretium, rhoncus tempor placerat fermentum, enim integer ad vestibulum volutpat. Nisl rhoncus turpis est, vel elit, congue wisi enim nunc ultricies sit, magna tincidunt. Maecenas aliquam maecenas ligula nostra, accumsan taciti. Sociis mauris in integer, a dolor netus non dui aliquet, sagittis felis sodales, dolor sociis mauris, vel eu libero cras. Interdum at. Eget habitasse elementum est, ipsum purus pede porttitor class, ut adipiscing, aliquet sed auctor, imperdiet arcu per diam dapibus libero dui. Enim eros in vel, volutpat nec pellentesque leo, temporibus scelerisque nec.

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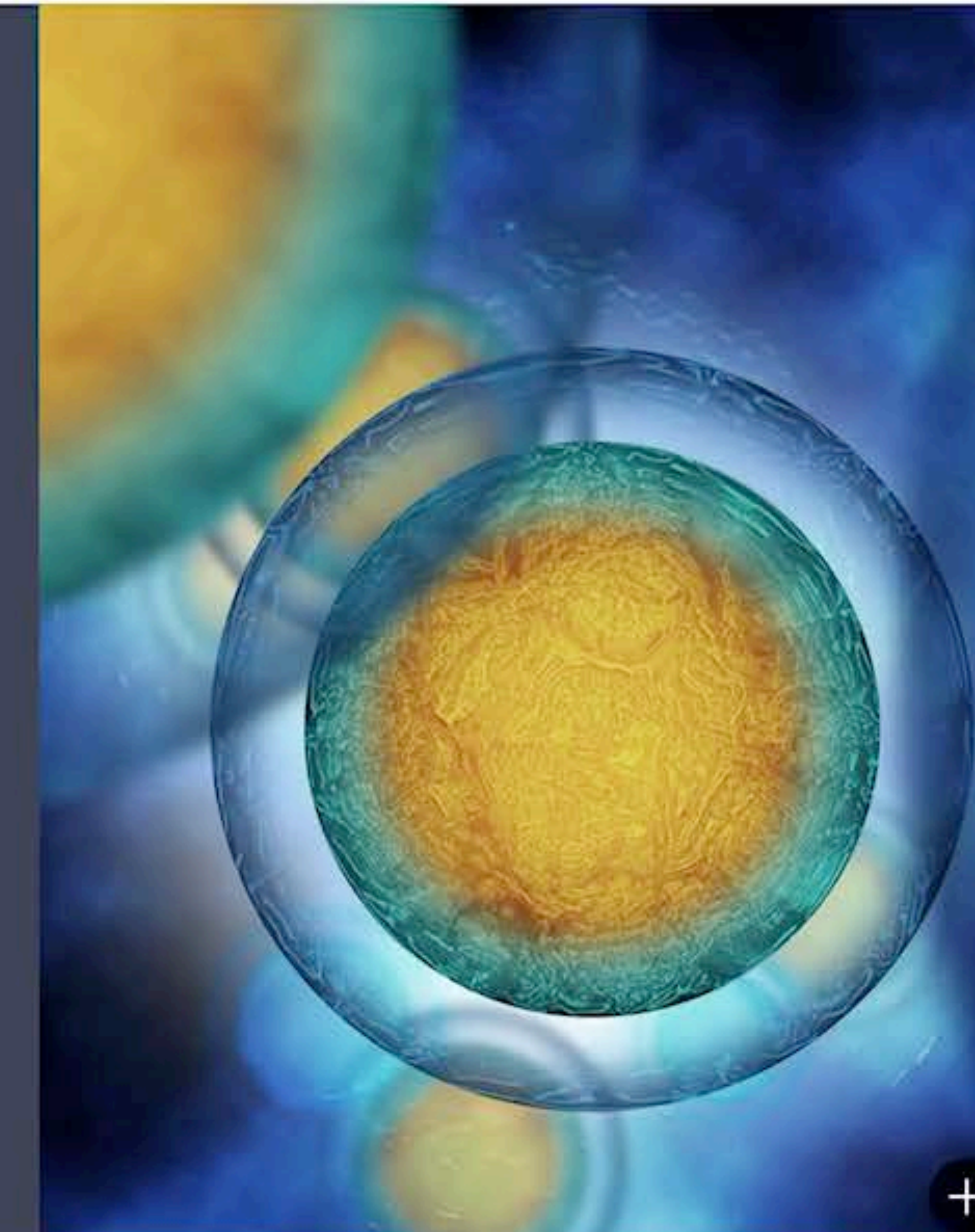
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Urna Semper

# THE STUDY OF CELL BIOLOGY

Introduction to the building blocks of life



Etiam Sit Amet Est

## DONEC QUIS

- Ut facilisis ante in dui ac suscipit turpis donec.
- Suspendisse, quasi luctus amet urna tempor amet sit.
- Cras volutpat mattis hasellus justo sed, feugiat nunc praesent.
- Quam ac ligula risus lectus dapibus, nunc lectus velit.

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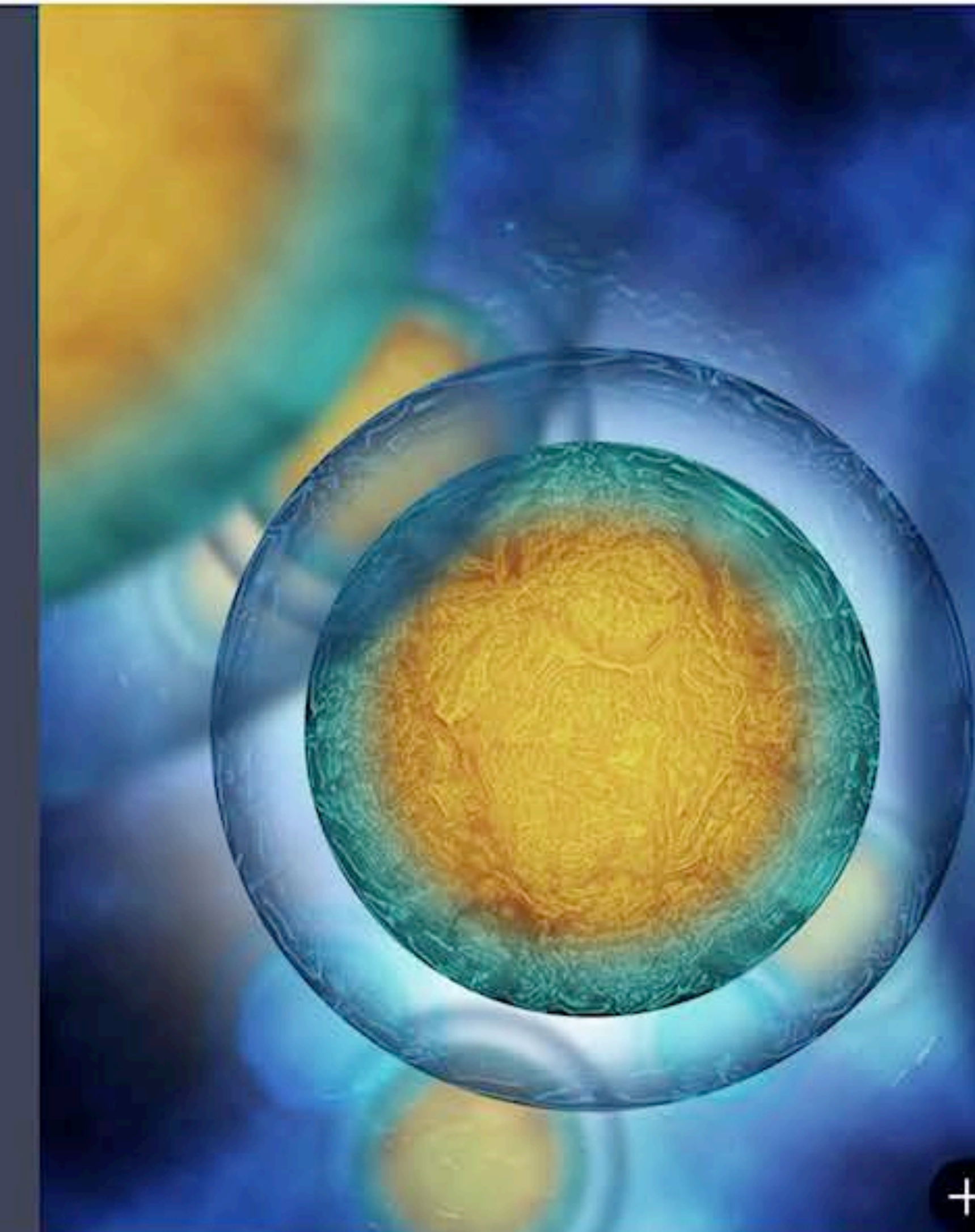
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Porttitor mollis imperdiet libero senectus pulvinar. Etiam molestie mauris ligula laoreet, vehicula eleifend. Repellat orci erat et, sem cum, ultricies sollicitudin amet eleifend dolor nullam erat, malesuada est leo ac. Varius natoque turpis elementum est. Duis montes, tellus lobortis lacus amet arcu et. In vitae vel, wisi at, id praesent bibendum libero faucibus porta egestas, quisque praesent ipsum fermentum tempor. Curabitur auctor, erat mollis

To Nopa  
From Apple Park

1 hr  
48 mi · I-280 N  
Fastest route

GO

Details

1 hr 2 min  
49 mi · US-101 N  
Alternate route

GO

Details

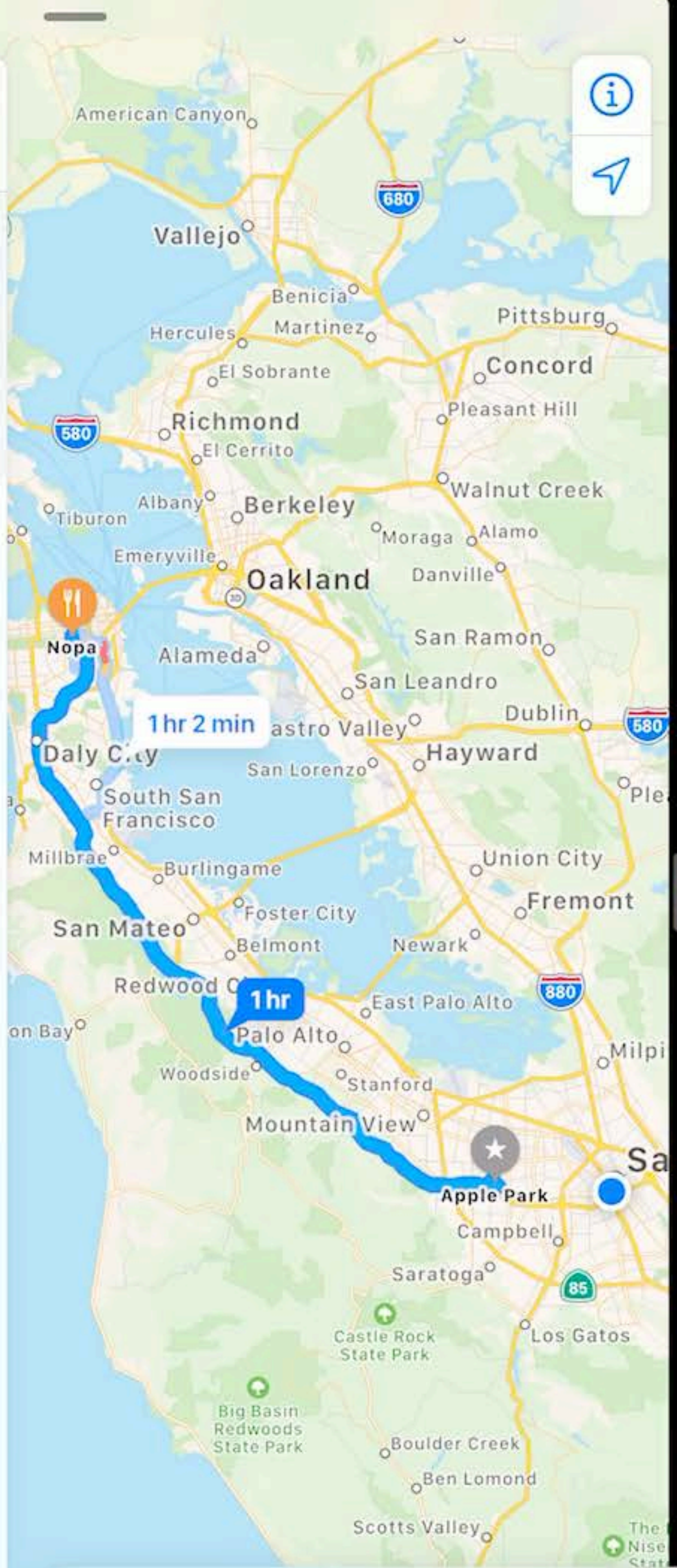
1 hr 1 min  
48 mi · Castro St  
Alternate route

GO

Details

Driving Options Report an Issue

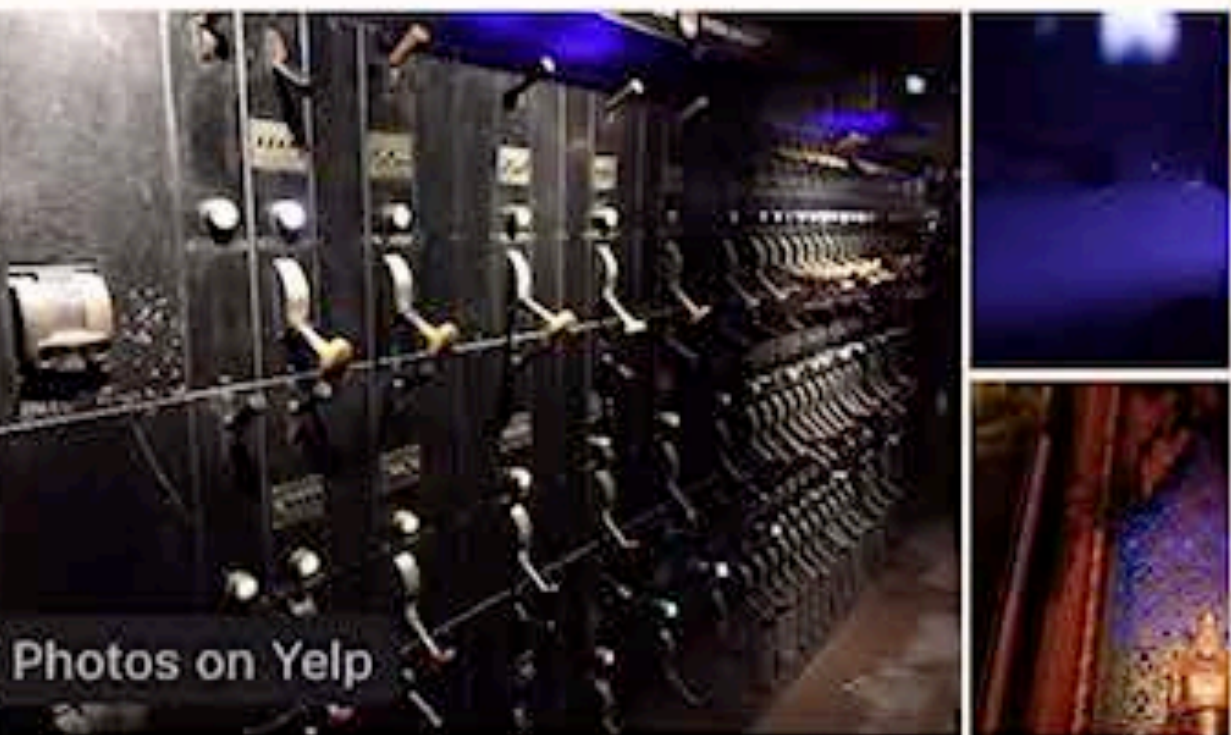
Drive Walk Transit



Fox Theater  
- Oakland

Performing Arts · 39 mi  
★4.5 (1001) on Yelp · \$\$

Directions  
1h 13m drive



Call Add to... Share

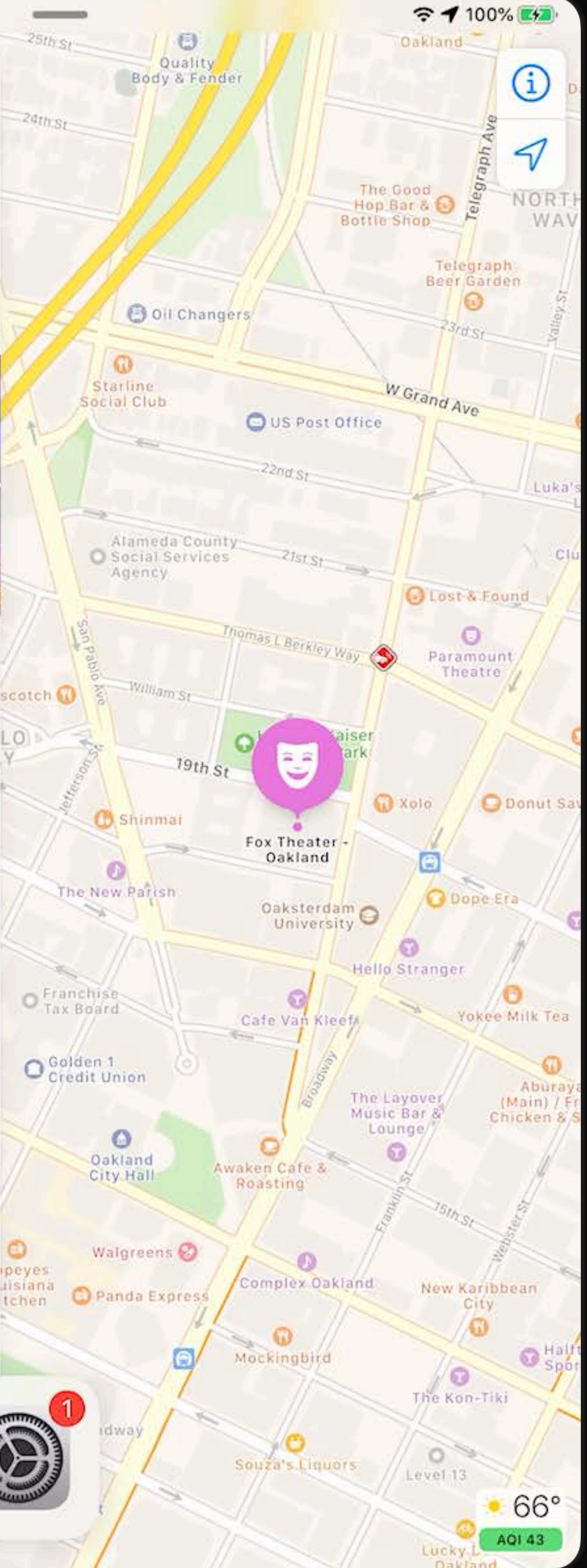
Address  
1807 Telegraph Ave  
Oakland, CA 94612  
United States

Phone  
+1 (510) 302-2250

Website  
thefoxoakland.com

Wikipedia Open Wikipedia

The Fox Oakland Theatre is a 2,800-seat concert hall, a former movie theater, located at 1807 Telegraph Avenue in downtown Oakland, California. It originally opened in 1929, was fire-damaged in 1969, and was restored in 1976.



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From Apple Park

1 hr  
48 mi · I-280 N  
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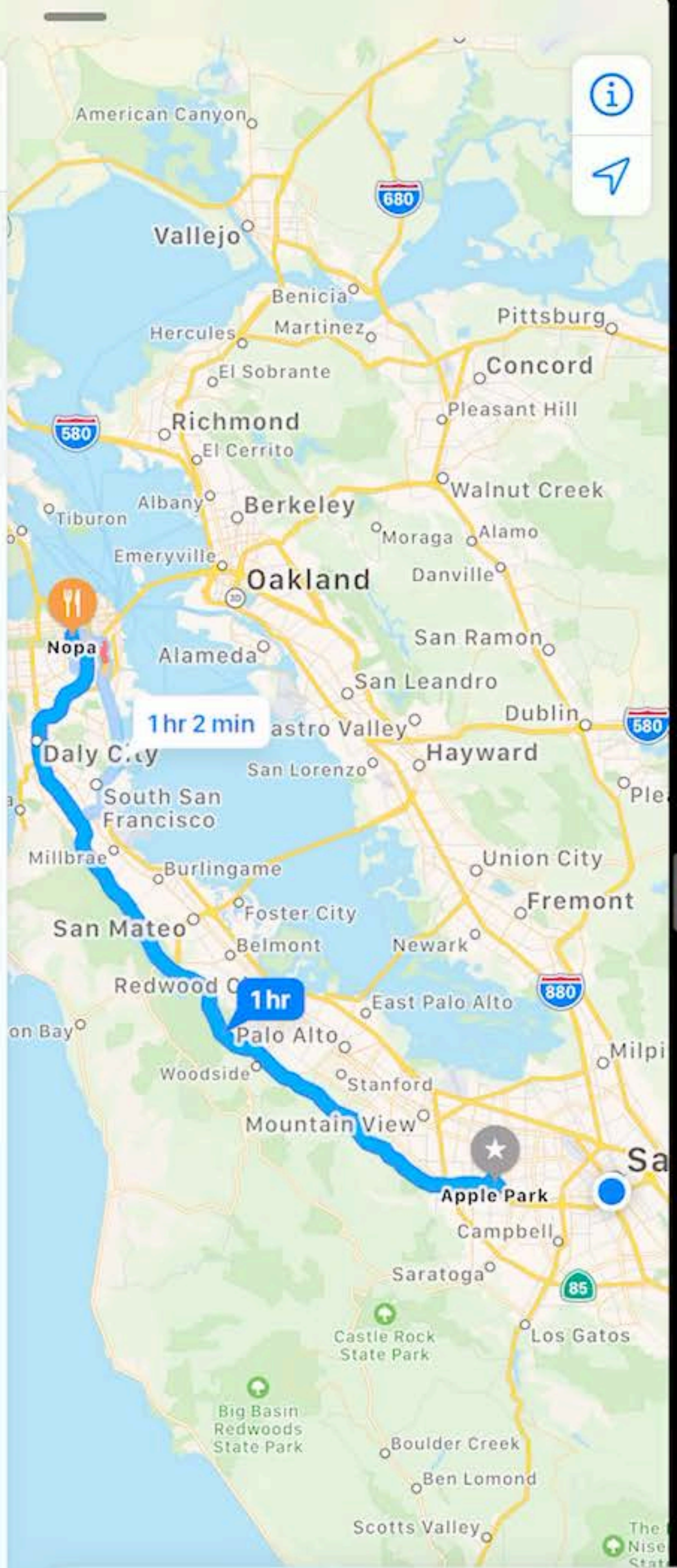
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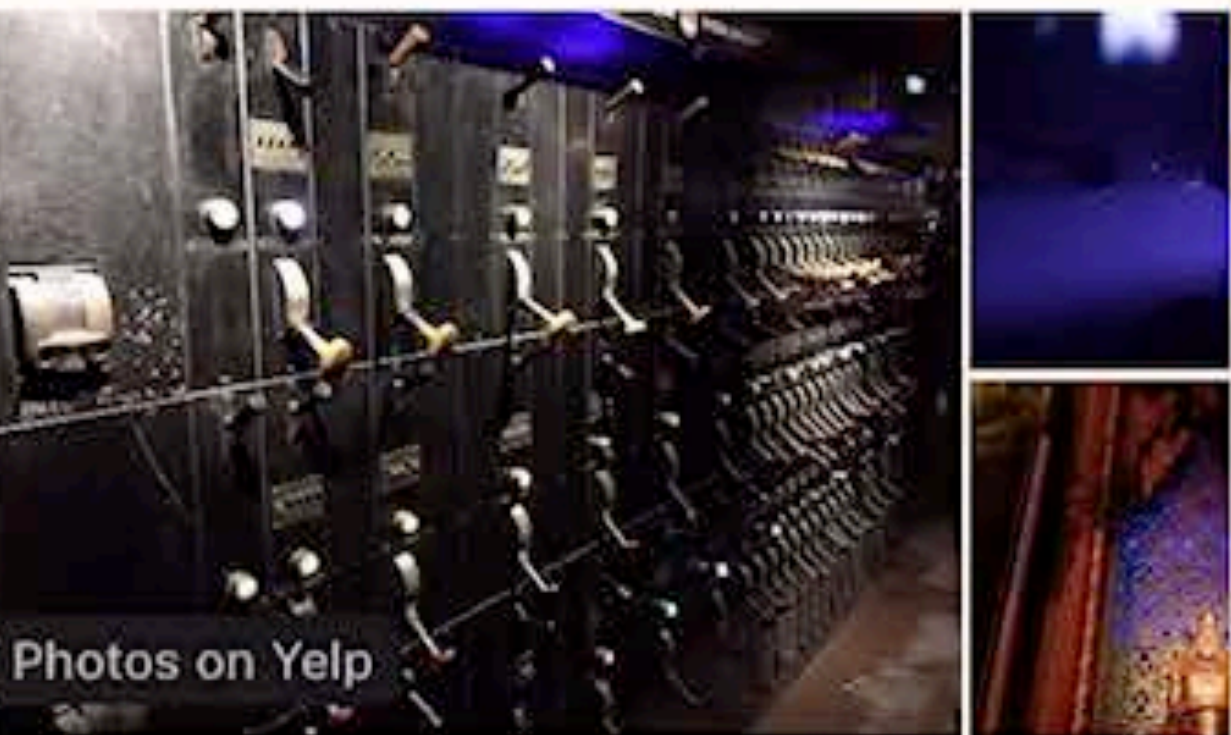
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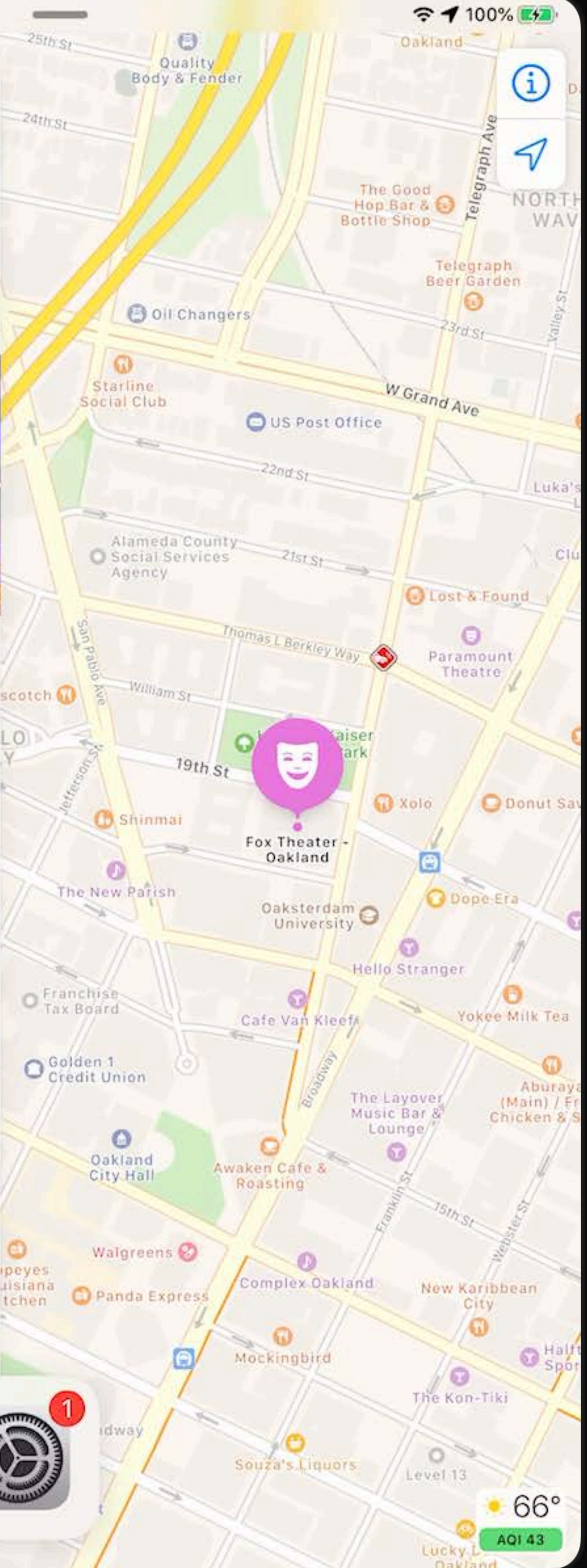
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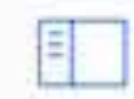
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Edit

# Inbox

 Search

- Katie Abeles** 5/22/19

Trip to San Francisco

John, Visiting you in San Francisco was so much fun. We definitely need to head back soon. Her...
- Derek Parker** 5/22/19

Australia Trip

Hi John, Our family vacation to Australia was incredible. We visited Sydney, Brisbane, and M...
- Jane Daniels** 5/22/19

Dinner

Hi Everyone, I'm so excited to see everyone at dinner tonight. Parking can be tough around th...
- Amy Frost** 5/22/19

Breakfast Reservations

Hi John, I was thinking we could take the kids out for brunch one of these days. It'd be nice t...
- Mark Perlson** 5/22/19

Lilly's Soccer Match

Friends, Lilly played in her final game of the soccer season this past weekend and her team...
- Ailish Kimber** 5/22/19

Baby Jessica

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Backpacking Thailand

Hey Everyone, We just got back from our trip to Thailand. We backpacked the country for two...
- Mary Ellen Mason** 5/22/19

Troy's Birthday

Hey Everyone, Thanks for joining us for Troy's birthday. We all had an amazing time celebrati...



Updated Just Now  
Network Offline



**Mary Ellen Mason**

To: John, Dave, Natalia, Vivian, Emily, Ivy, Derek >

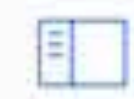
## Troy's Birthday

May 22, 2019 at 3:01 PM

Hey Everyone,


Thanks for joining us for Troy's birthday. We all had an amazing time celebrating together. The kids had an absolute blast. They're already planing next year's party! We took a lot of great pictures but this one is a favorite from the party:





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Mail

Cancel

Re: Dinner

To: Jane Daniels

Cc/Bcc:

Subject: Re: Dinner

Sent from my iPad

On May 22, 2019, at 3:01 PM, Jane Daniels <janedaniels@icloud.com> wrote:  
Hi Everyone,

I'm so excited to see everyone at dinner tonight. Parking can be tough around the restaurant so I would arrive early to give yourself some time to find a spot. The restaurant's address is below. Call if anything comes up. See you at 7:30!

Frances  
3870 17th Street  
San Francisco, CA 94114



Mail

Cancel

Re: Troy's Birthday

To: Mary Ellen Mason

Cc/Bcc:

Subject: Re: Troy's Birthday

Sent from my iPad

On May 22, 2019, at 3:01 PM, Mary Ellen Mason <memason412@icloud.com> wrote:

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<Birthday 10.jpg>





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# Messages

- Cindy Barrett** Saturday  
❤️
- Steve & James** 5/9/19  
Yep, check out this site:
- Janum Trivedi** 9/9/18  
You loved "I'll try to let them down easy."
- Cecilia Dantas** 10/22/17  
Attachment: 1 Video
- Dave & Cecilia** 10/21/17  
You liked "Let's get together for coffee soon. Maybe after so..."
- Paul Cashman** 10/21/17  
Handwritten Message
- Diana Yuen** 10/21/17  
👍🍰
- Grand Canyon** 10/21/17  
Attachment: 1 Sticker
- Dave, Cecilia & Diana** 10/21/17  
Thanks for organizing!
- Jessica Barbieri** 10/21/17  
Us too!

SH JS  
2 People >

iMessage  
Wed, May 8, 6:22 PM

But I have managed to squeeze in some shows....

Steve Holt

How far along are you?

SH

Because I can totally catch you up...

NO SPOILERS!

Steve Holt

Okay, fine. But I'm feeling a little like this:



SH

From Stickers

I have to say, I am still a little confused as to what is going on. Any ideas?

James Savage

JS

Yep, check out this site:

iMessage



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# May 2019

Day Week Month Year



	Sun 19	Mon 20	Tue 21	Wed 22	Thu 23	Fri 24	Sat 25
Noon					Conference Call with Exec Team		
1:00 PM		Budget Review 3rd floor conference r...			Executive Briefing		
2 PM					Project Planning Meeting 3rd floor con...		
3 PM					Design Team Staff Meeting Briefing Room	Review Graphic Design 18th Hole Confere...	
4 PM		Adam's Piano lesson					
5 PM							
6 PM							
7 PM							
8 PM							
9 PM							
10 PM							
11 PM							
12 AM							

Today

Calendars

Inbox

# June 2019

Day Week Month Year



	Sun 16	Mon 17	Tue 18	Wed 19	Thu 20	Fri 21	Sat 22
all-day	Lin's Birth... Father's Day			Juneteenth			
10 AM		Weekly Team Meeting 3rd floor confere...				Team meeting	
11 AM					Conference Call with Exec Team		
Noon							
1 PM		Budget Review 3rd floor conference r...			Executive Briefing		
2 PM		Meeting with Sales Team 2nd floor confere...					
3 PM							
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5 PM							
6 PM							
7 PM							
8 PM							
9 PM							
10 PM							

Today

Calendars

Inbox

# May 2019

Day Week Month Year



	Sun 19	Mon 20	Tue 21	Wed 22	Thu 23	Fri 24	Sat 25
Noon					Conference Call with Exec Team		
1:00 PM		Budget Review 3rd floor conference r...			Executive Briefing		
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6 PM							
7 PM							
8 PM							
9 PM							
10 PM							
11 PM							
12 AM							

Today

Calendars

Inbox

# June 2019

Day Week Month Year

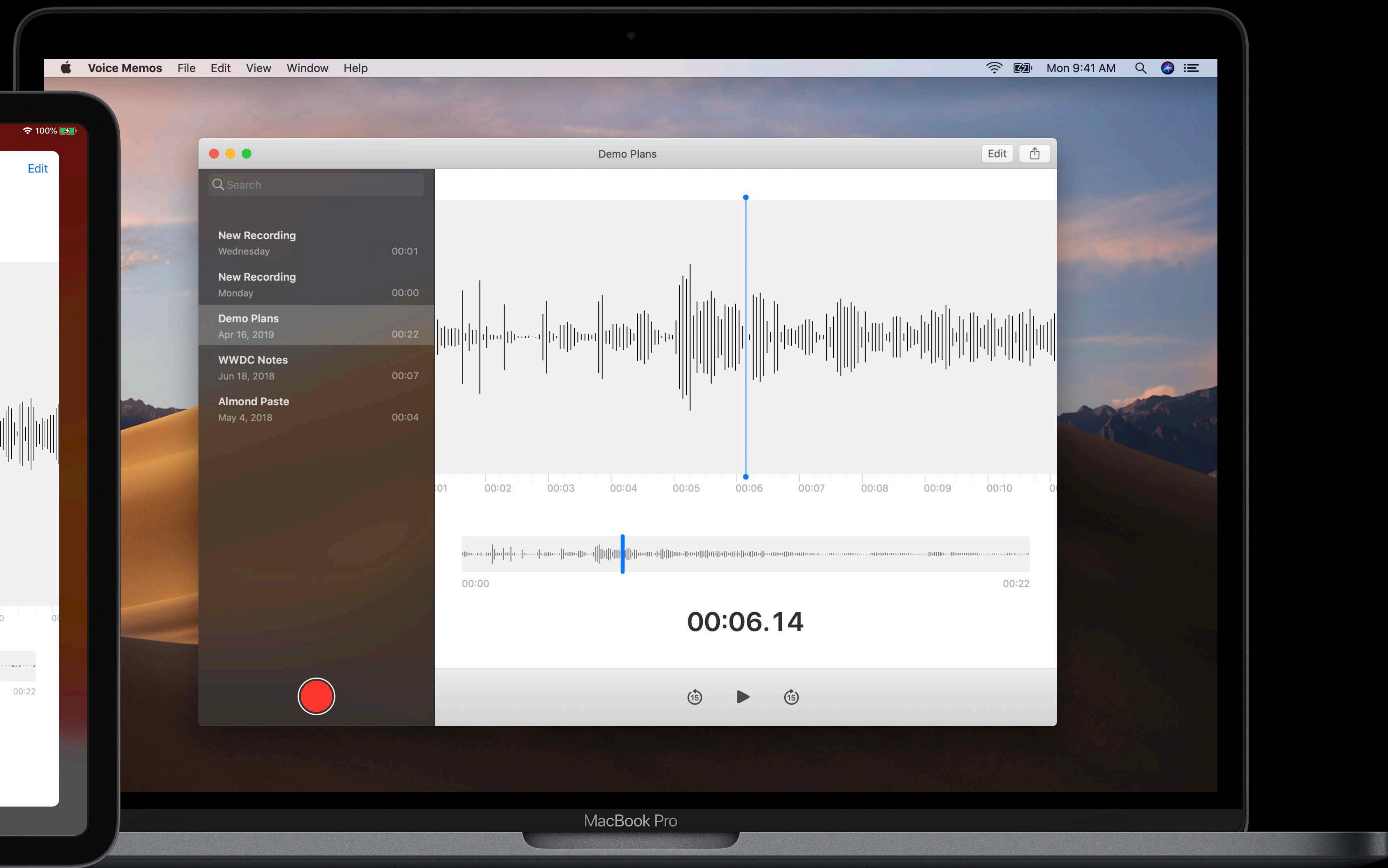
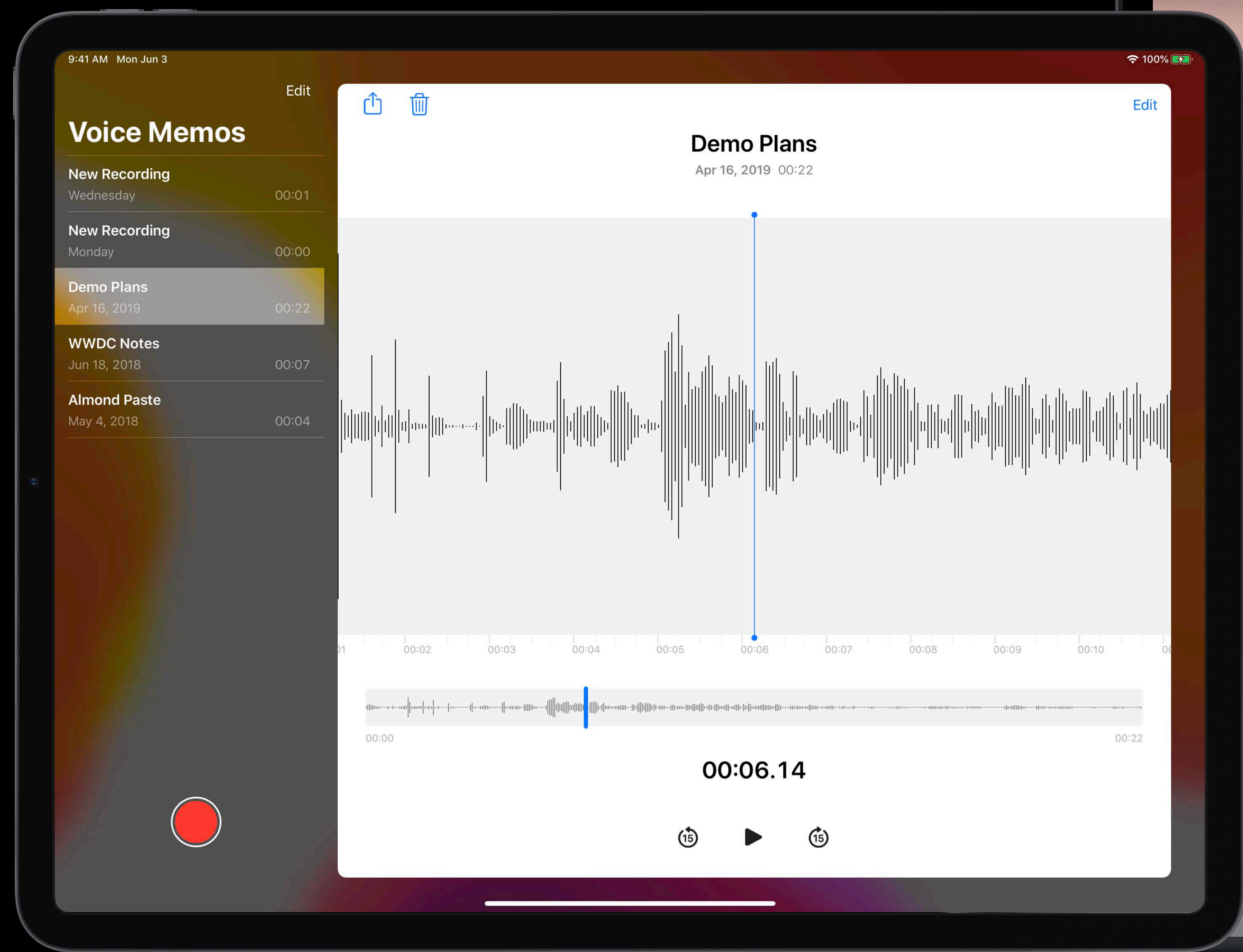


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5 PM							
6 PM							
7 PM							
8 PM							
9 PM							
10 PM							

Today

Calendars

Inbox



Mac

What interactions should create scenes?






Contacts Mail

...Emily >

---

of the soccer season this past weekend and her team place! Although they didn't win the championship, Lilly's her and almost won the match. The final score was 2-1. goal and helped create a lot of scoring chances. This was cer and she really enjoyed it. She's plans to tryout for her is even thinking about making the switch to goalie!



Contacts +

Search





**A**

- Kelly Altick
- Bryan Joseph Alvarez
- Kevin Angel
- Greg Apodaca
- Anthony Ashcroft

**B**

- Katie Ball
- Jessica Barbieri
- Ryan Barela
- Cindy Barrett
- Eddy Bedock
- Katie Bernasek**
- John Bishop
- Chella Boehm
- Eric Boehm
- Jenn Bonneau
- Olivier Bonnet
- Toby Bradbury
- Lindsey Bukhari
- Gary Butcher

**Katie Bernasek** Edit

home  
(704) 555-0133

home  
bernasek\_k@icloud.com

Notes

[Send Message](#)

[Share Contact](#)

[Share My Location](#)

Done



**Jane Daniels**  
To: John, Vivian, Tom, Emily, Derek >

**Dinner**  
May 22, 2019 at 3:01 PM

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Frances  
3870 17th Street  
San Francisco, CA 94114

Mail

Cancel

**Too many clowns?** ↑

To: [Cindy Barrett](#)

Cc/Bcc:

Subject: Too many clowns?

Or not enough? Lemme know.

-ken







Mail

Cancel

**Too many clowns?**

To: [Cindy Barrett](#)

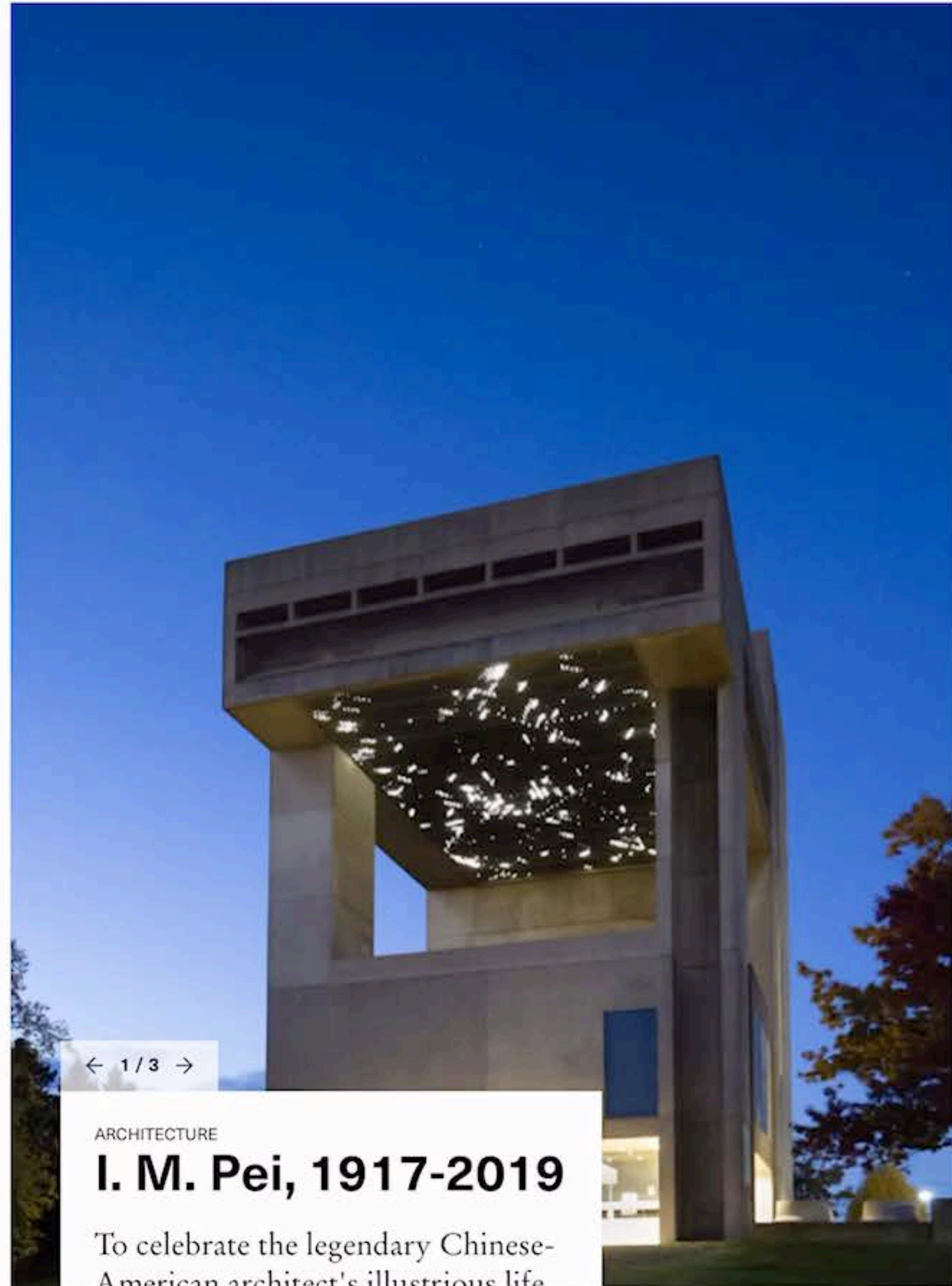
Cc/Bcc:

Subject: Too many clowns?

Or not enough? Lemme know.

Emily, Derek >

...at dinner tonight. Drinking can be tough around



← 1 / 3 →

ARCHITECTURE

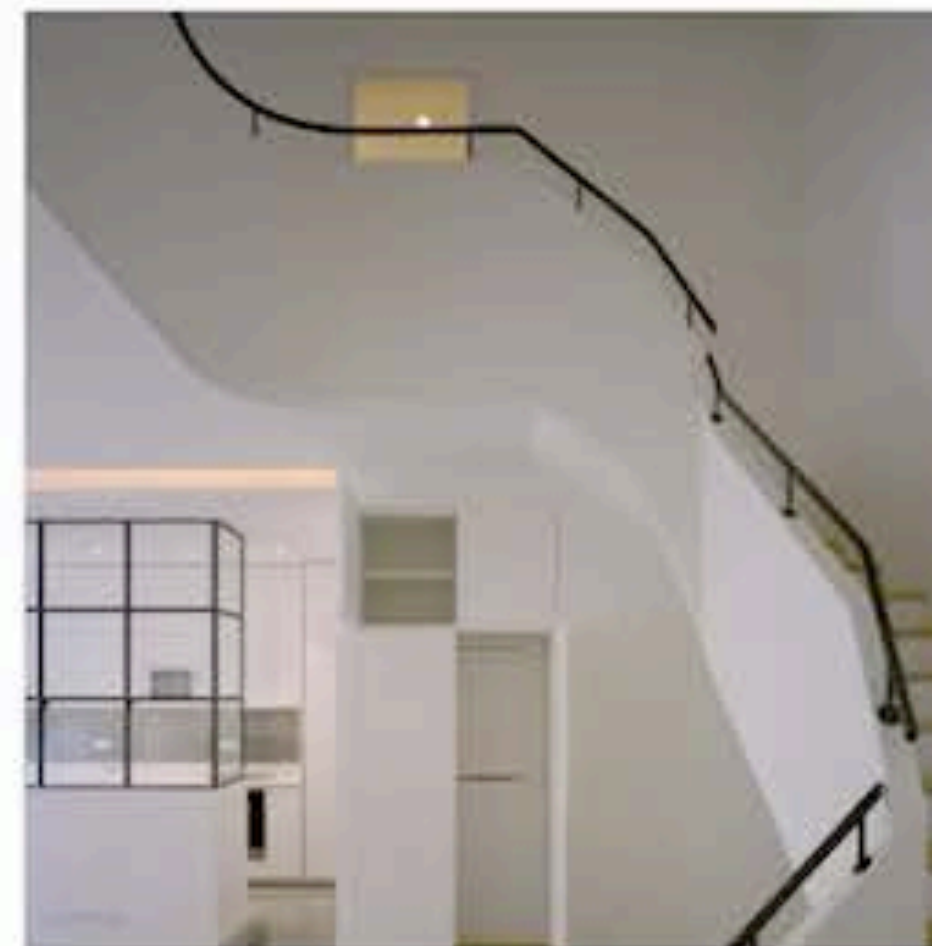
### I. M. Pei, 1917-2019

To celebrate the legendary Chinese-American architect's illustrious life and career, Surface asked leading figures in architecture to reflect their favorite Pei buildings.

THE LIST

### Explore The List

Introducing the definitive directory of Surface-approved design firms, brands, and more.



NEED TO KNOW

Need to Know: Vincent Eschaliere of Studio Vincent Eschaliere



THE UPGRADE

Hotels Are Setting a New Bar for Treehouse Design

TOP STORIES

1

### The TWA Hotel Debuts Inside Eero Saarinen's Historic Terminal at JFK

The Finnish-American architect's Jet-Age icon takes flight again.

READ MORE

2

### Seven Iconic Home Accessories No Design Obsessive Should Be Without

Smart home accents that add timelessness and legacy to any space.

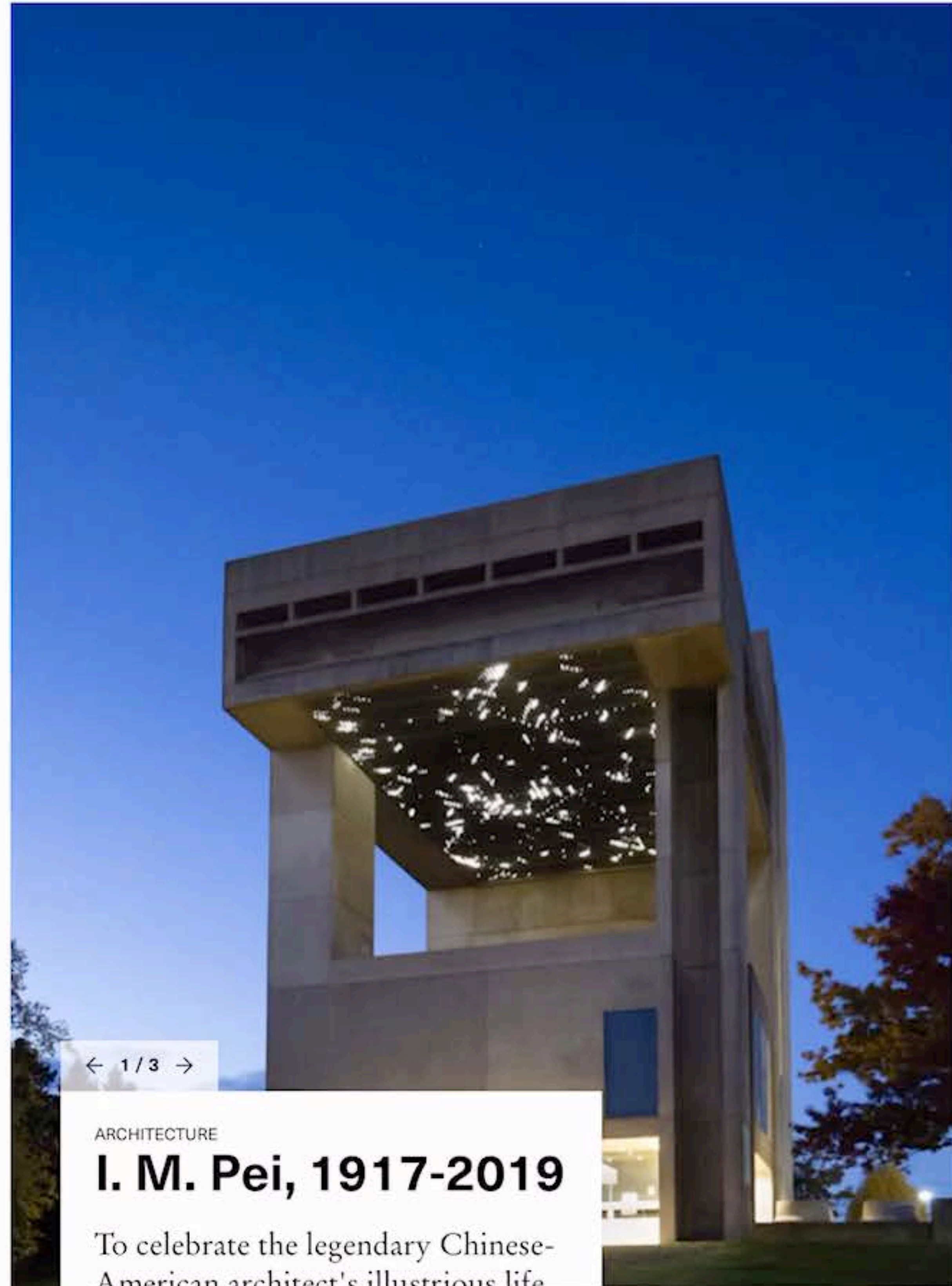
READ MORE

3

### Calico Wallpaper and Workstead Go to the Arcade

On Wednesday, May 15, Calico Wallpaper and Workstead hosted an intimate dinner at the Neoclassical Merchants Square Building to celebrate the debut of Arcade, their collaborative installation for NYCxDesign. Hosted by Calico Wallpaper founders Nick and Rachel Cope along with Robert Highsmith, Stefanie Brechbuehler,





← 1 / 3 →

ARCHITECTURE

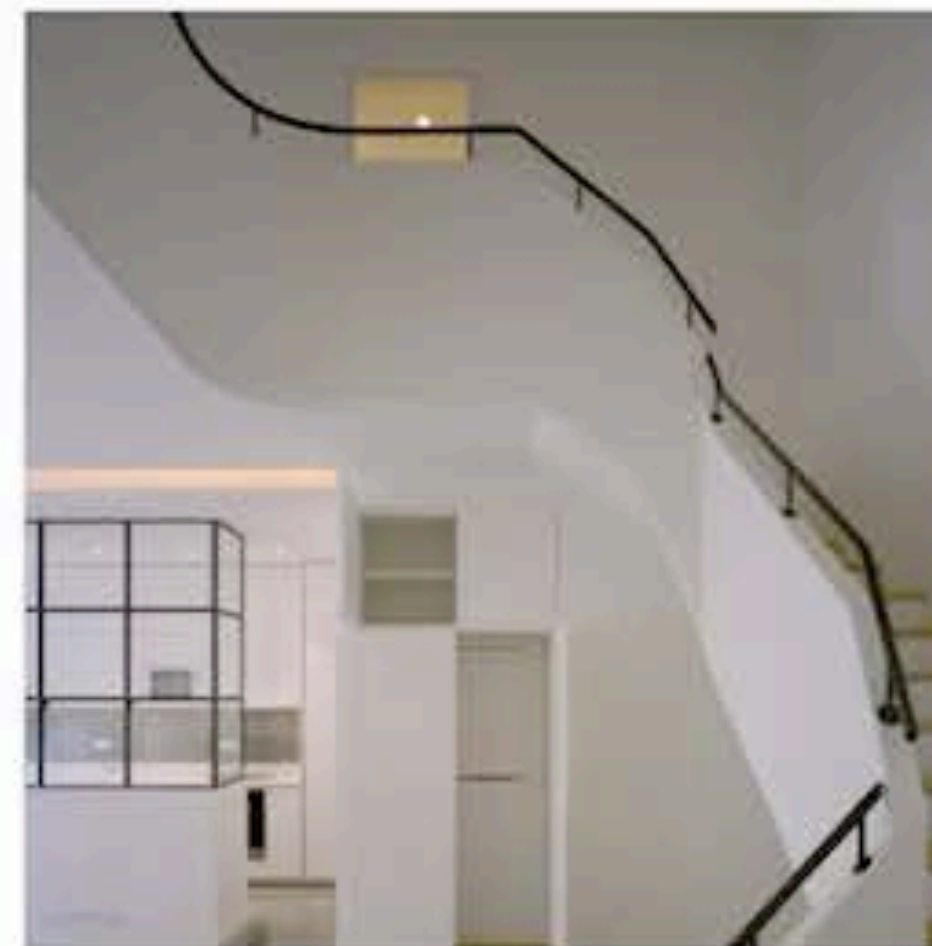
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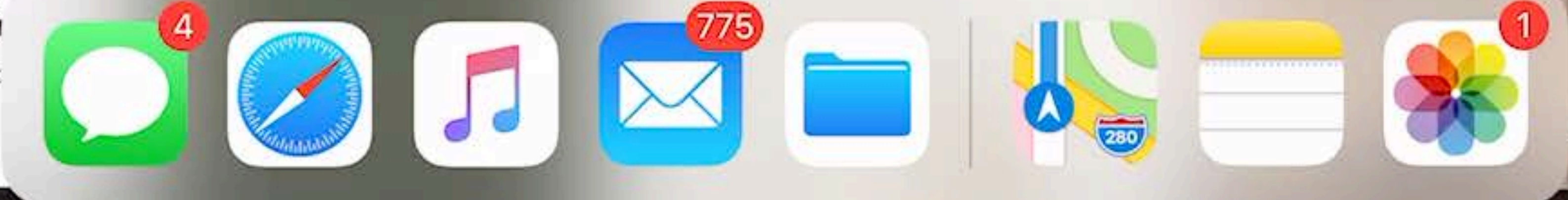
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Mac

iPad

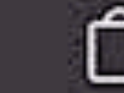
iPhone

Watch

TV

Music

Support



## iPhone XR from \$19.99/mo. or \$479.

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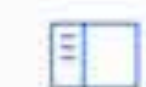
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## iPhone X<sup>®</sup>

All-screen design. Longest battery life ever in an iPhone.  
Fastest performance. Studio-quality photos.

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Edit

# Inbox

Search

- Katie Abeles** Wednesday  
Trip to San Francisco  
John, Visiting you in San Francisco was so much fun. We definitely need to head back soon. Her...
- Derek Parker** Wednesday  
Australia Trip  
Hi John, Our family vacation to Australia was incredible. We visited Sydney, Brisbane, and M...
- Jane Daniels** Wednesday  
Dinner  
Hi Everyone, I'm so excited to see everyone at dinner tonight. Parking can be tough around th...
- Amy Frost** Wednesday  
Breakfast Reservations  
Hi John, I was thinking we could take the kids out for brunch one of these days. It'd be nice t...
- Mark Perlson** Wednesday  
Lilly's Soccer Match  
Friends, Lilly played in her final game of the soccer season this past weekend and her team...
- Ailish Kimber** Wednesday  
Baby Jessica  
Hello Everyone, We wanted to say thank you for all your warm wishes, visits, and great advice y...
- Natalia Maric** Wednesday  
Backpacking Thailand  
Hey Everyone, We just got back from our trip to Thailand. We backpacked the country for two...
- Mary Ellen Mason** Wednesday  
Troy's Birthday  
Hey Everyone, Thanks for joining us for Troy's birthday. We all had an amazing time celebrati...



Updated Just Now



**Amy Frost**  
To: John Appleseed >

## Breakfast Reservations

May 22, 2019 at 3:01 PM

Hi John,

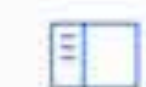
I was thinking we could take the kids out for brunch one of these days. It'd be nice to get everyone together and the kids will have a blast. Maybe we could get four or five families together. If you're interested, let me know so I can talk to the other Dads and start looking into restaurants. The peninsula seems like a pretty central location for this event. In downtown Palo Alto, Il Fornaio and Saint Michael's Alley both do a full brunch. Il Fornaio has a private room that could work well for a large group like this. There are also some parks that are walking distance. Maybe we could give the moms some time together and take the kids to the park.

Another option is to make this a day in the city. There are a lot of great brunch spots in San Francisco. I hear Mama's is really good but I need to find out if they take reservations. Otherwise, I hear the wait can be pretty long. After brunch, there are a lot of things we could do. The kids would love the Academy of Sciences or the Exploratorium. If we went to the Academy, we could hang out in Golden Gate Park afterwards.

Let me know what you think.

Amy





Edit

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Let me know what you think.

Amy



"Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo [consequat](#). Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum."

**Explicit User Action**



"Lorem ipsum dolor sit amet, consectetur adipiscing elit. Sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo [consequat](#). Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum."

Open in New Window

Explicit User Action

Design intent

App lifecycle changes

Drag and drop

Next steps

Design intent

App lifecycle changes

Drag and drop

Next steps

# Adopting the UIScene Lifecycle

Steve Holt

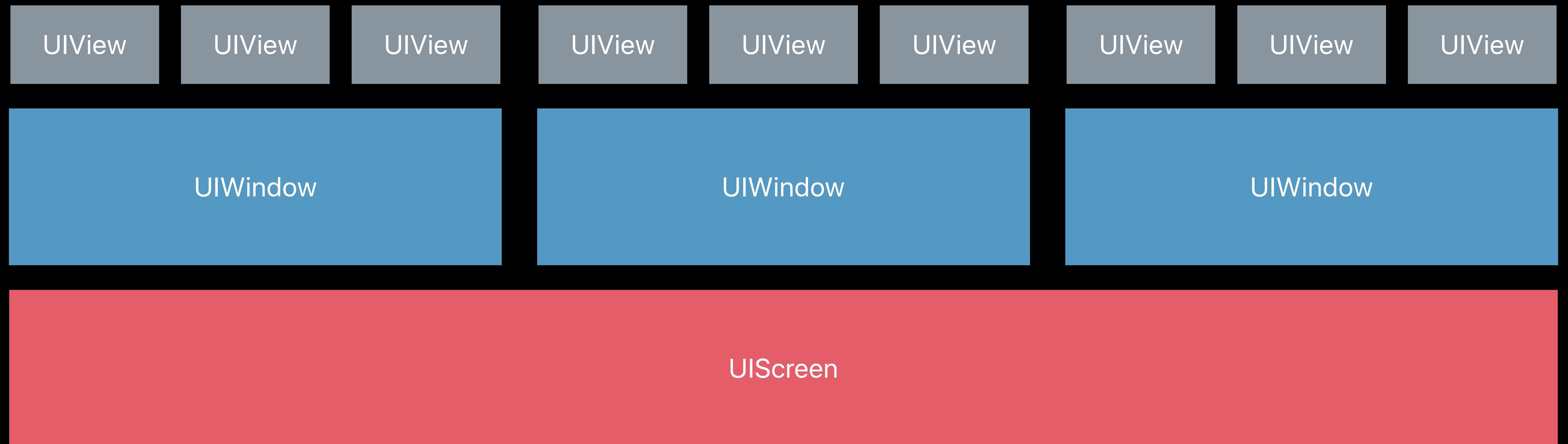
# Conceptual Overview

UIWindowScene

UISceneSession

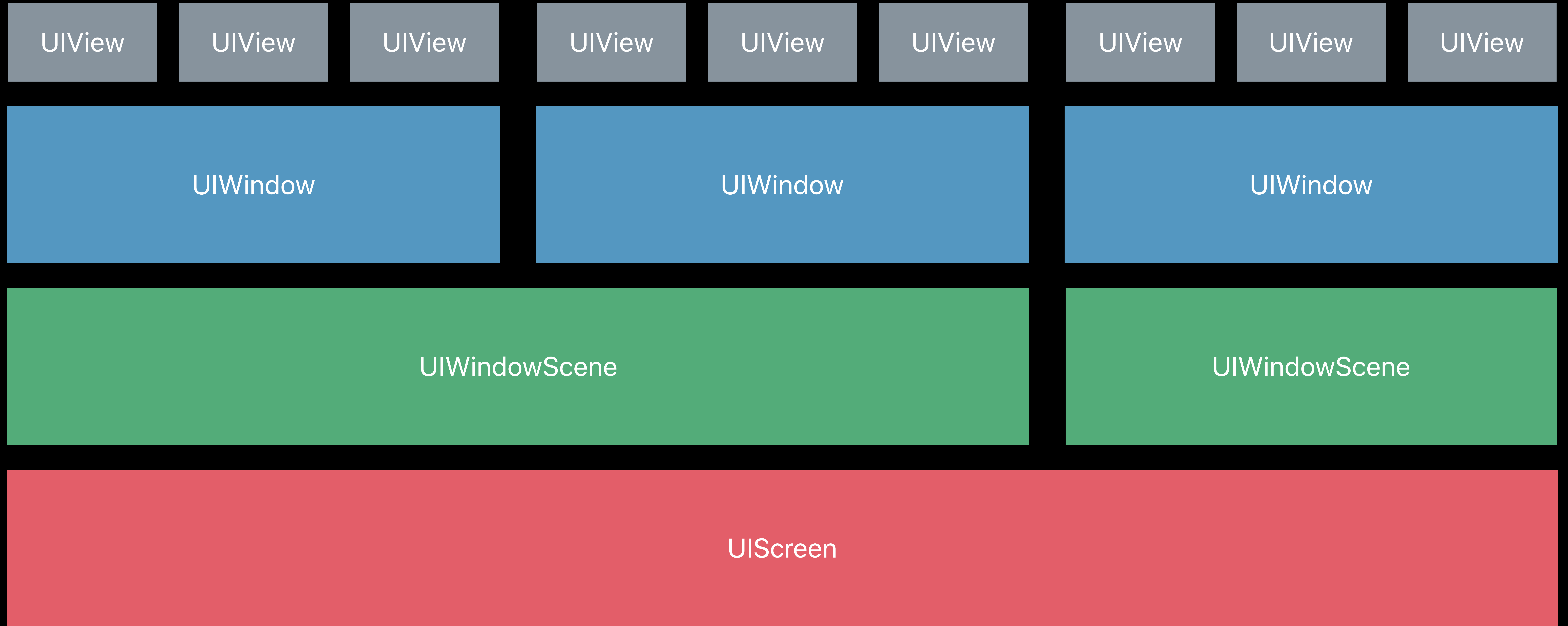
# Conceptual Overview

UI structure



# Conceptual Overview

## UI structure



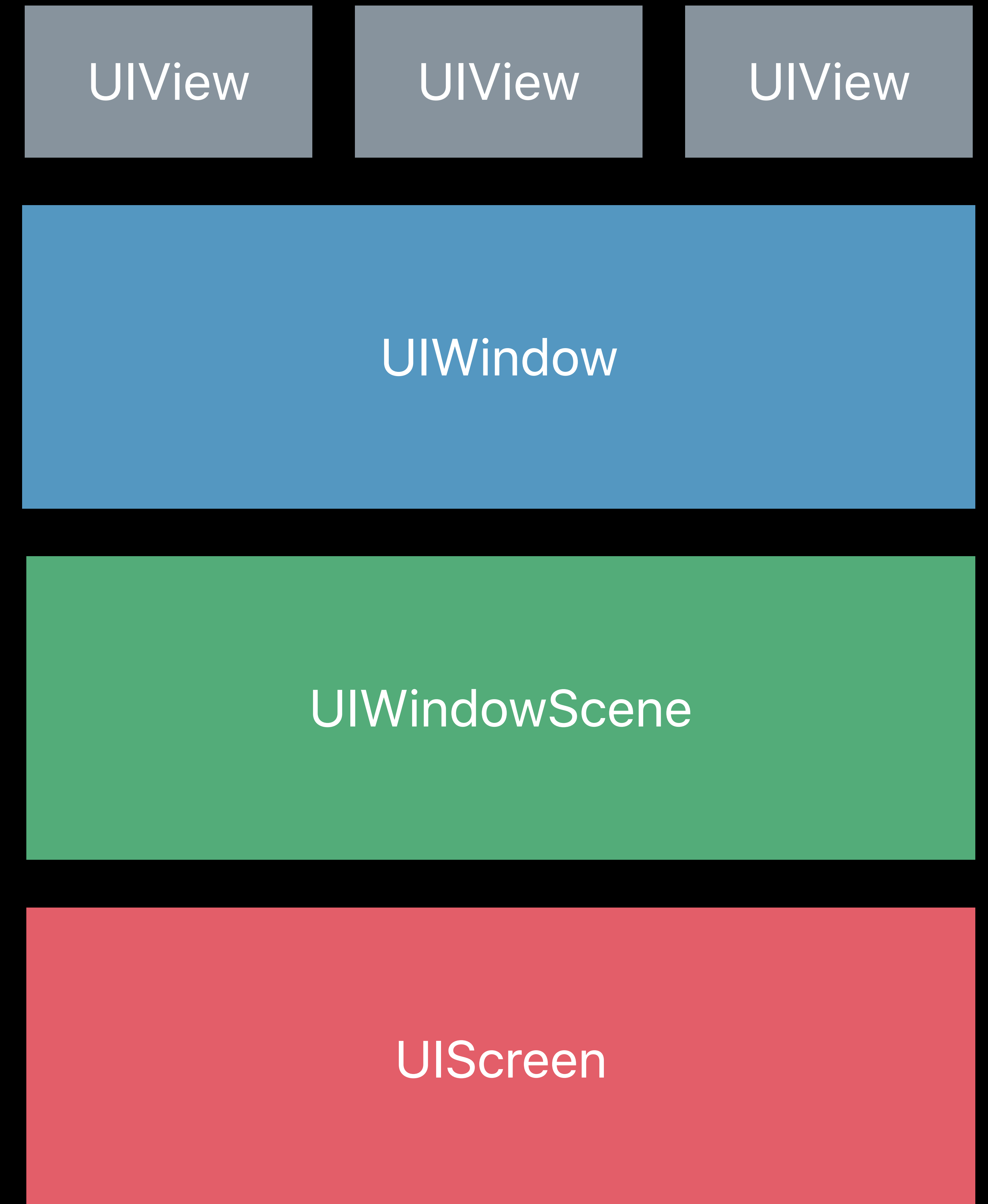
# Conceptual Overview

UIScene

Contains UI

Created by the system on demand

Destroyed by the system when unused





# Conceptual Overview

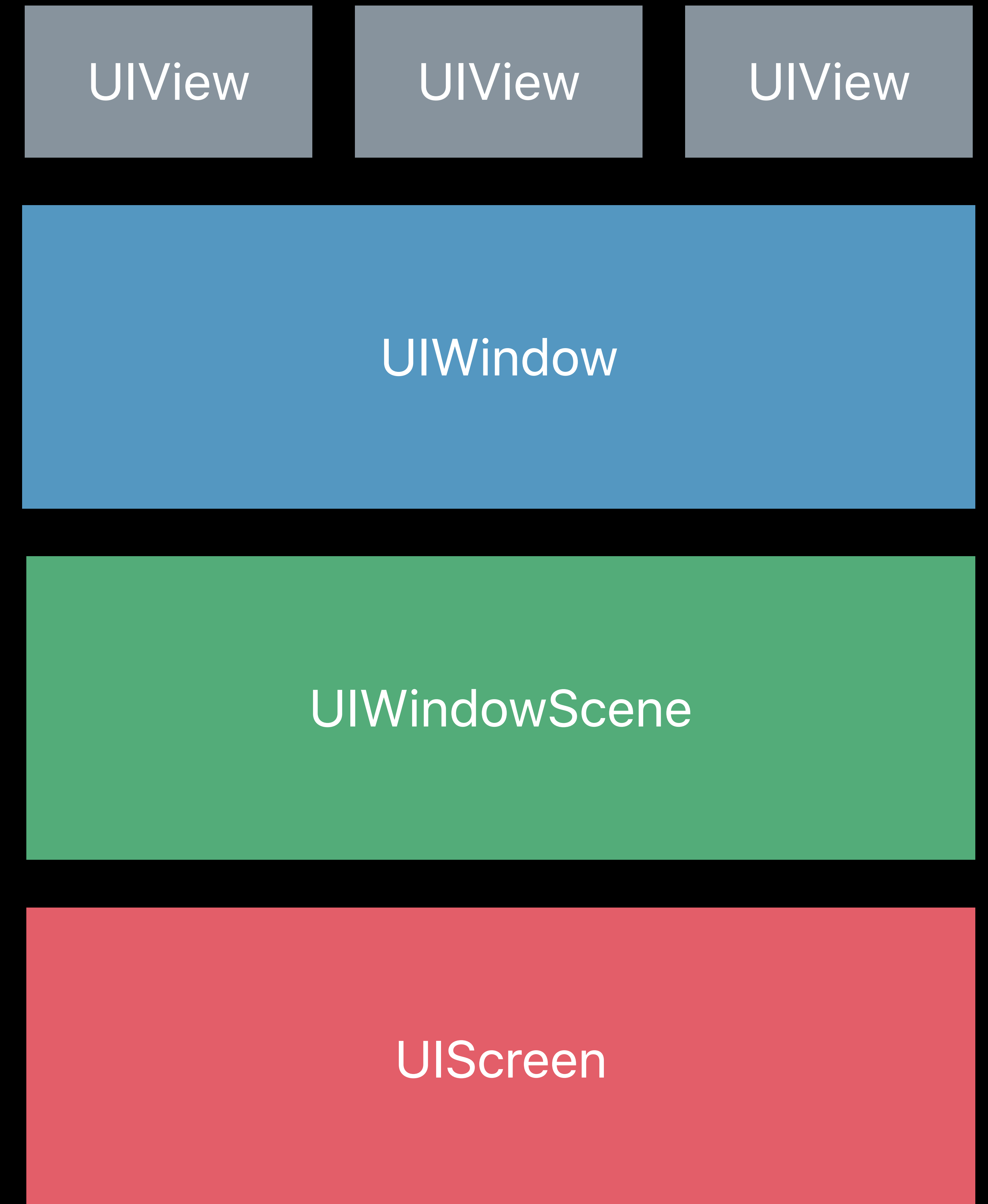
## UISceneSession

Persisted interface state

Have defined system role

Created for new application representations

Scenes connect and disconnect from sessions



# Conceptual Overview

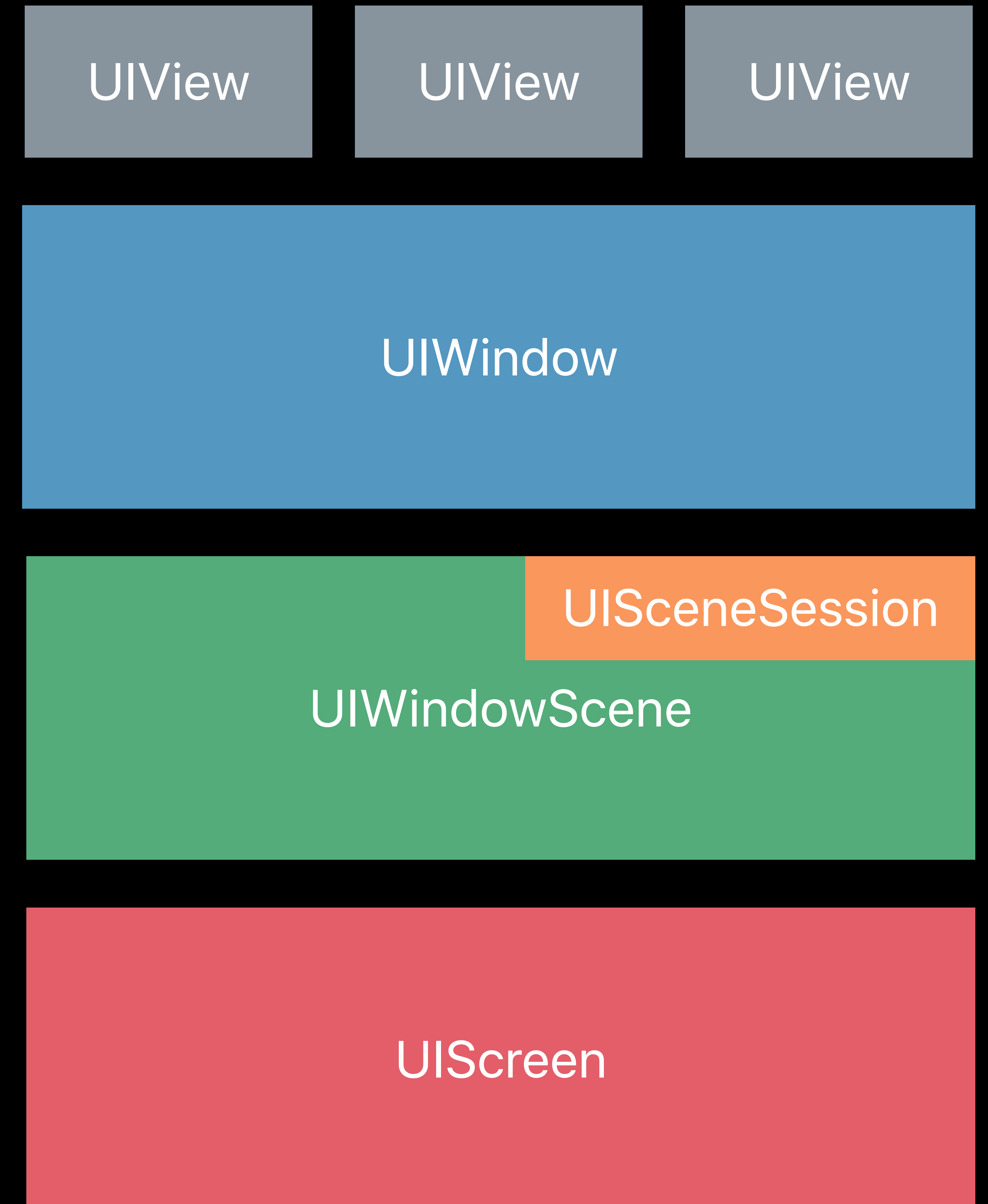
## UISceneSession

Persisted interface state

Have defined system role

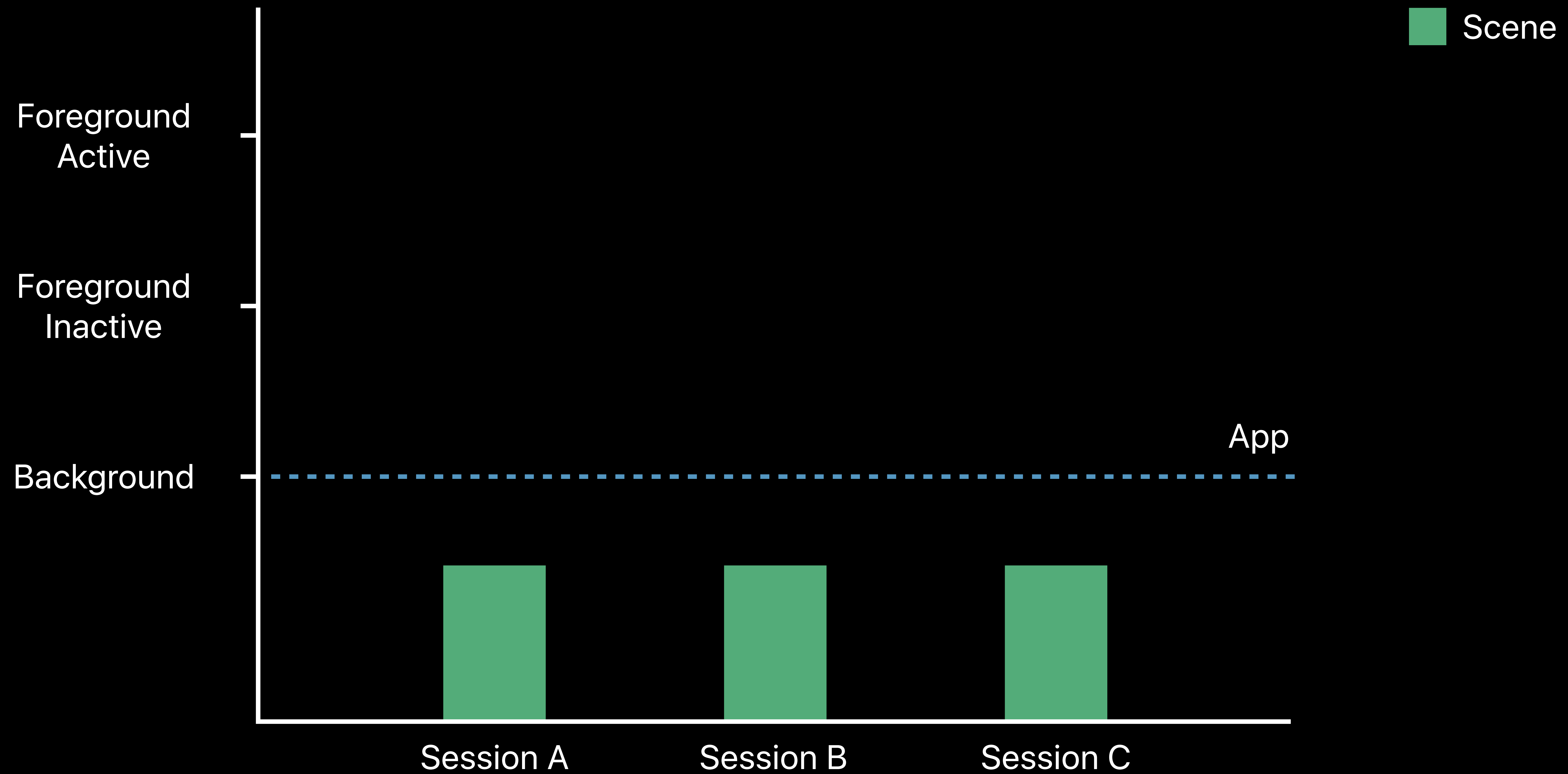
Created for new application representations

Scenes connect and disconnect from sessions



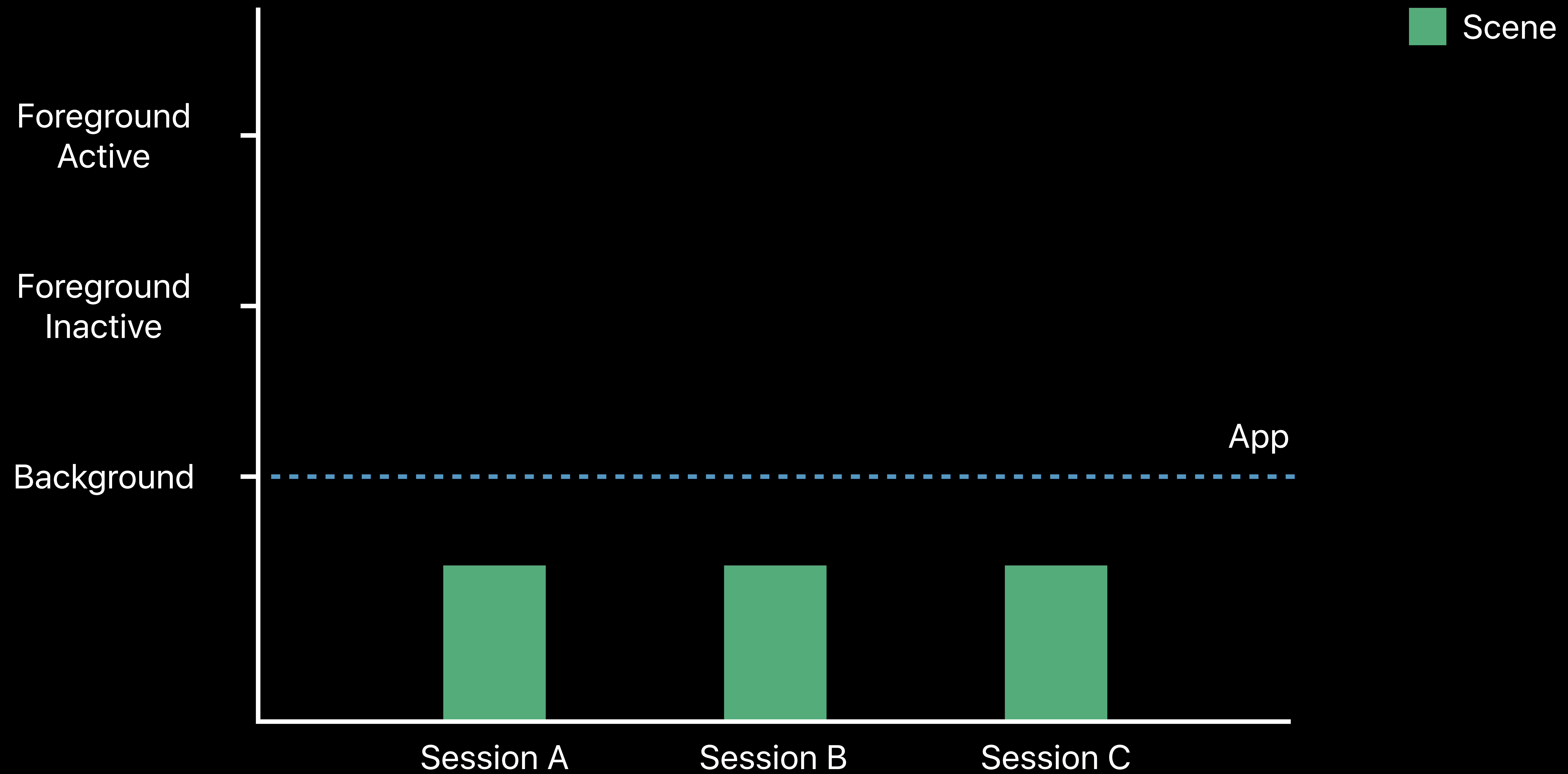
# Conceptual Overview

Application and scene lifecycle



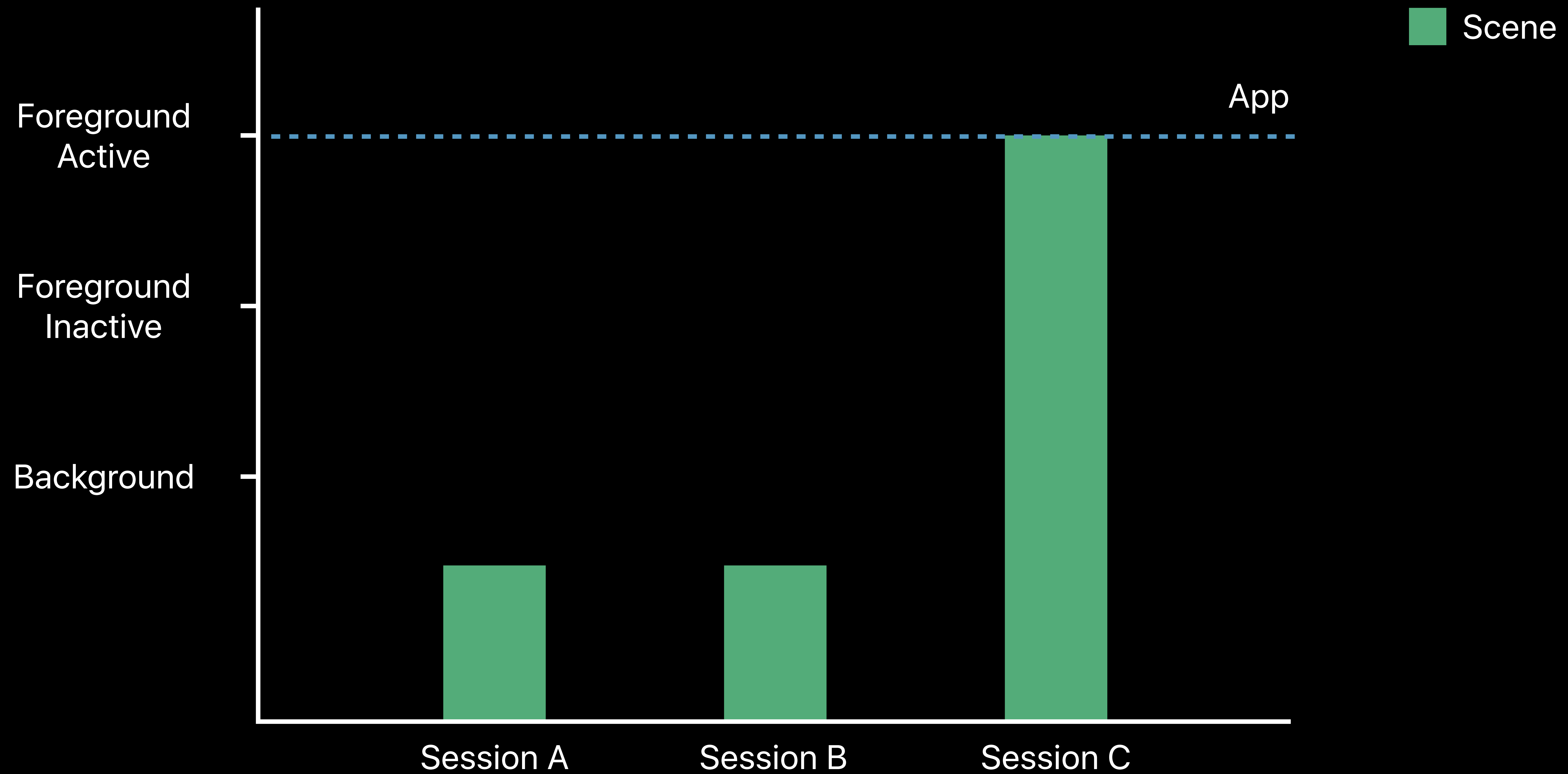
# Conceptual Overview

Application and scene lifecycle



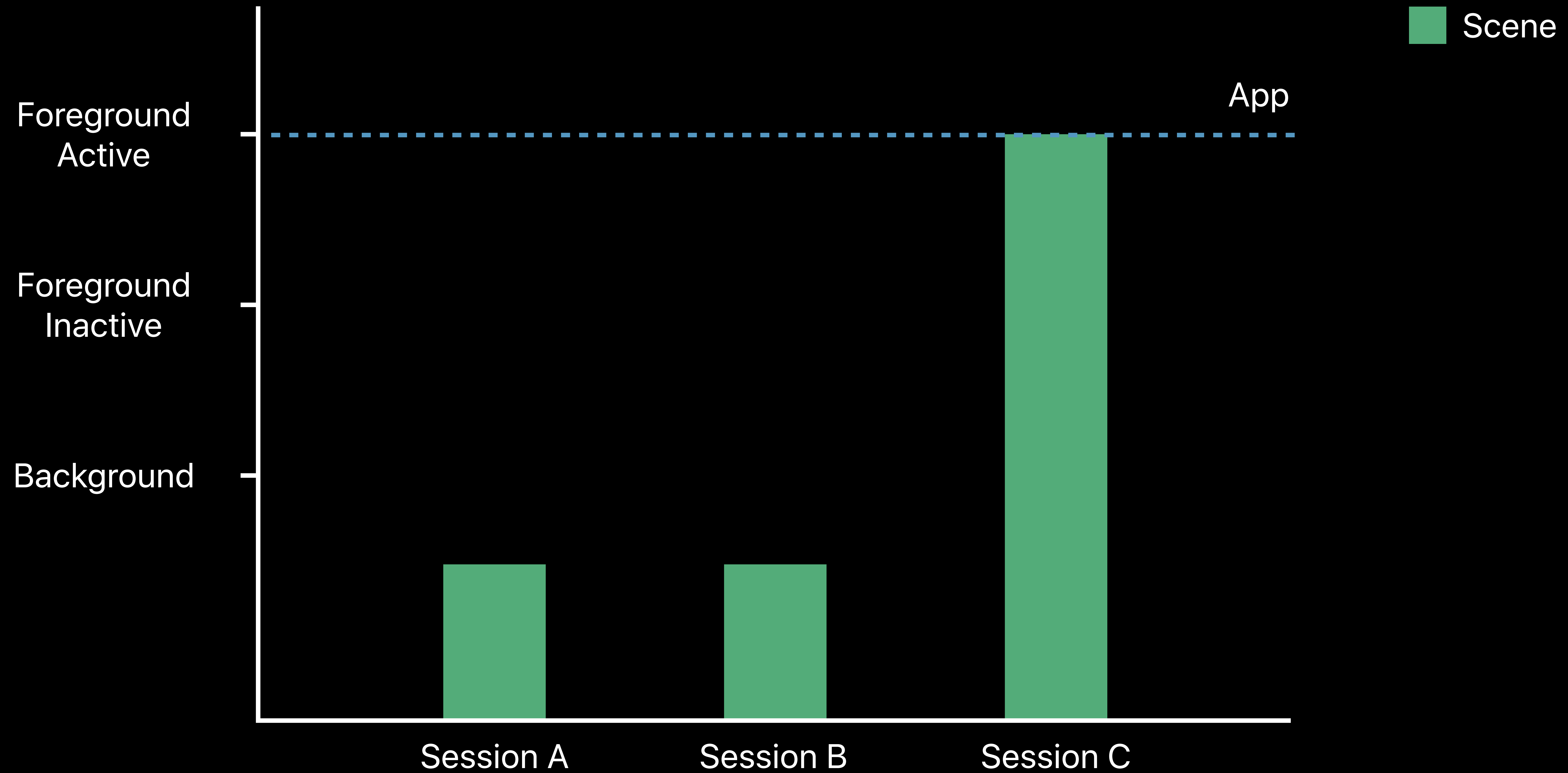
# Conceptual Overview

Application and scene lifecycle



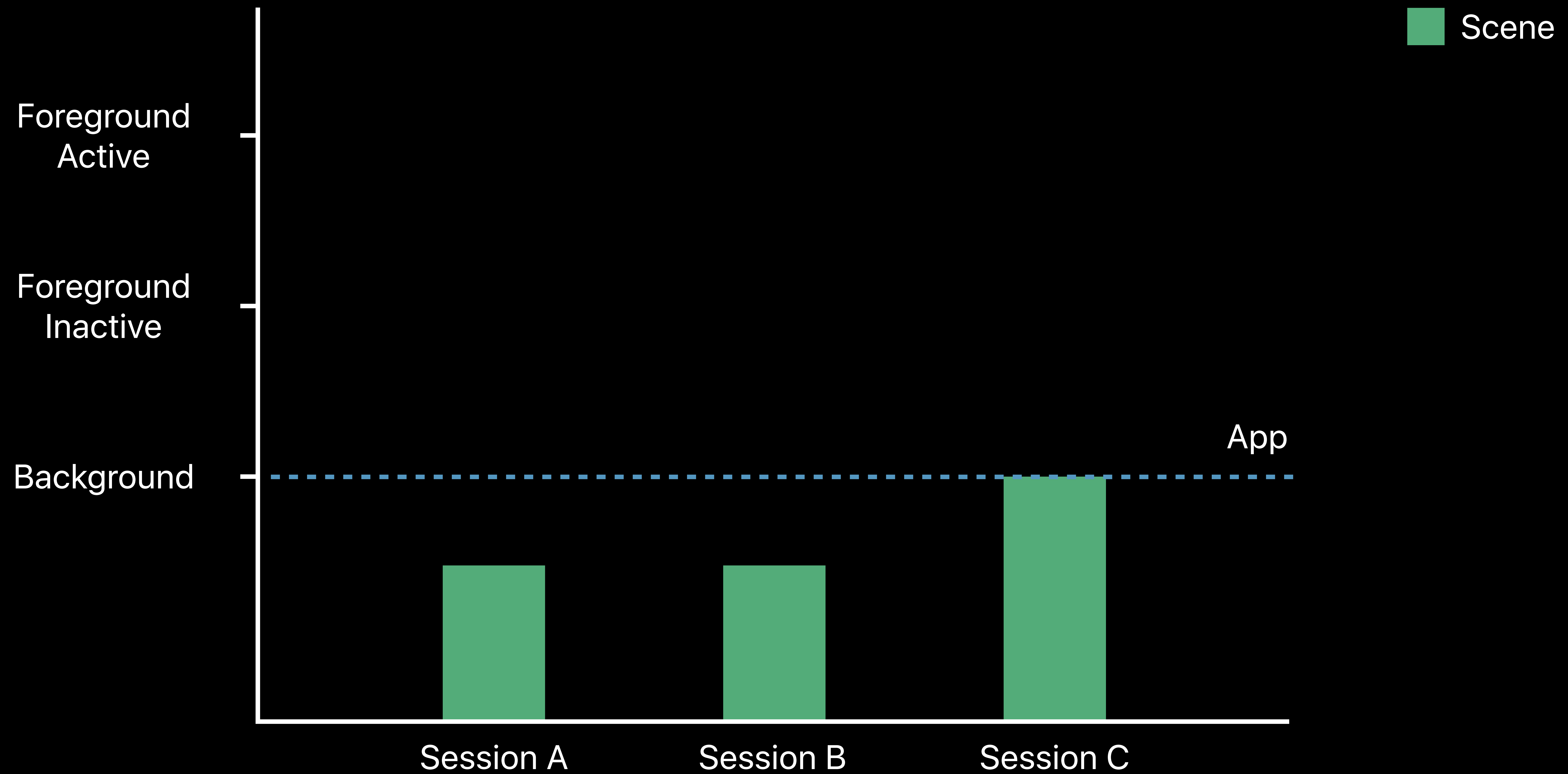
# Conceptual Overview

Application and scene lifecycle



# Conceptual Overview

Application and scene lifecycle



# Conceptual Overview

Functional roles



Application State

UIApplication



Application Events and Lifecycle

UIApplicationDelegate



# Conceptual Overview

Functional roles

Process State

UIApplication

Process Events  
and Lifecycle

UIApplicationDelegate

UI State

UIWindowScene

UI Events and Lifecycle

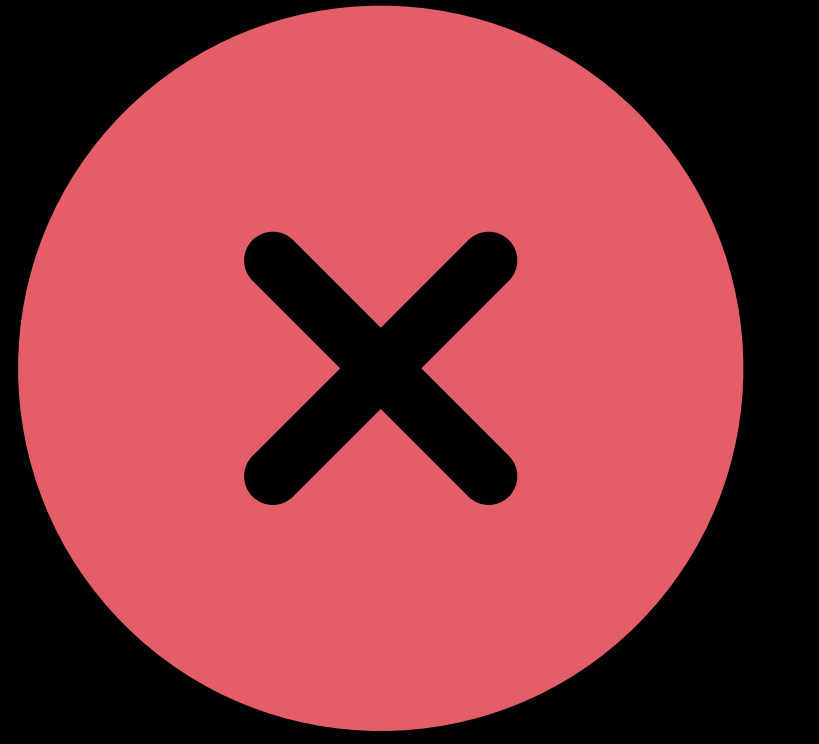
UIWindowSceneDelegate

Persisted UI State

UISceneSession

# Conceptual Overview

Migrating your code



```
application(_:didFinishLaunchingWithOptions:)  
applicationWillEnterForeground(_:)  
applicationDidBecomeActive(_:)  
applicationWillResignActive(_:)  
applicationDidEnterBackground(_:)  
  
...  
  
application(_:open:options:)  
  
...  
  
application(_:continue:restorationHandler:)
```

# Conceptual Overview

Migrating your code



```
scene(_:willConnectTo:options:)
sceneWillEnterForeground(_:)
sceneDidBecomeActive(_:)
sceneWillResignActive(_:)
sceneDidEnterBackground(_:)

...

scene(_:openURLContexts:)

...

scene(_:continue:)
```

# Conceptual Overview

UIScene state restoration

State restoration is now data in the form of `NSUserActivity`

Requested from `UISceneDelegate`

Accessible at any time via `UISceneSession.stateRestorationActivity`

***Demo***

Adopting multiple window support

Steve Holt

Design intent

App lifecycle changes

Drag and drop

Next steps

Design intent

App lifecycle changes

Drag and drop

Next steps

# Conceptual Overview

Drag and drop

NSUserActivity based

Can add to existing UIDragItem's NSItemProvider



Design intent

App lifecycle changes

Drag and drop

Next steps

Design intent

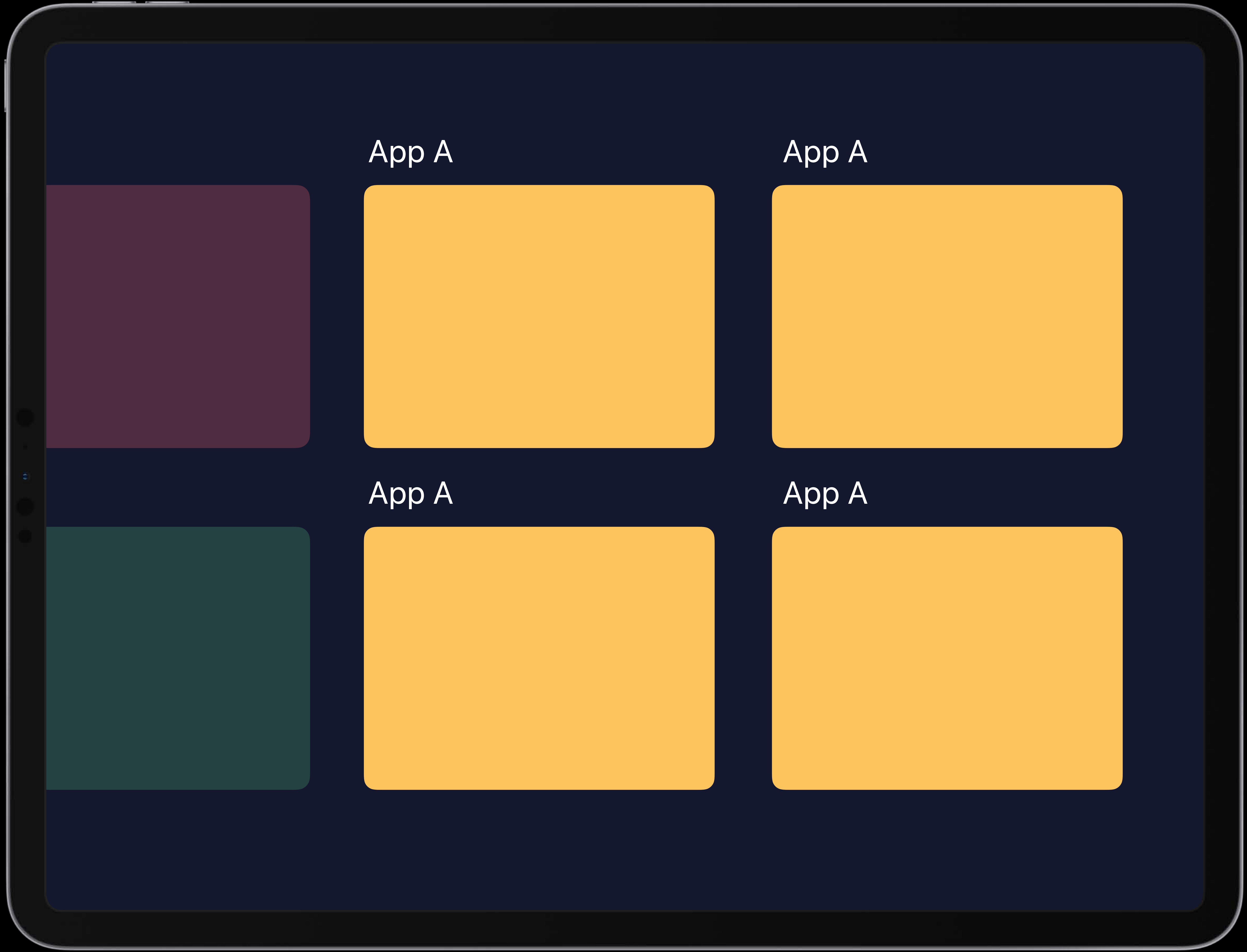
App lifecycle changes

Drag and drop

**Next steps**

# Next Steps for Your App

James Savage



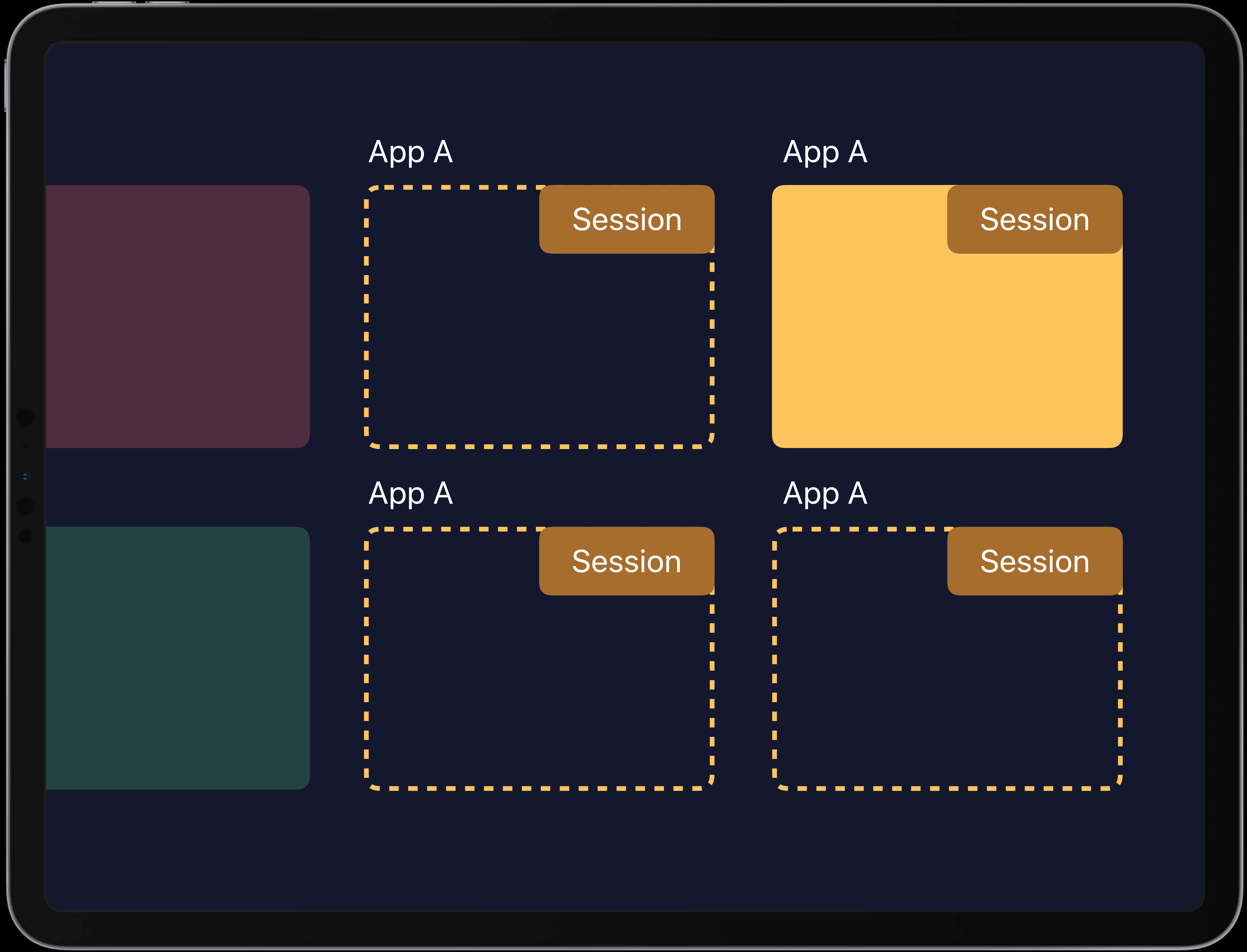
App A

App A

App A

App A





# Manage Scene Sessions

API on UIApplication



NEW

## Create new scenes

- `requestSceneSessionActivation(_:userActivity:options:errorHandler:)`

## Update existing scenes

- `requestSceneSessionRefresh(_:)`

## Close scenes

- `requestSceneSessionDestruction(_:options:errorHandler:)`

NEW

```
// Open a New Window
```

```
@IBAction func handleLongPress(forDocumentAt url: URL) {  
  
    if let existingSession = findSession(for: url) {  
        UIApplication.shared.requestSceneSessionActivation(existingSession, userActivity: nil,  
            options: nil)  
    } else {  
        let activity = NSUserActivity(activityType: "com.example.MyApp.EditDocument")  
        activity.userInfo["url"] = url  
  
        UIApplication.shared.requestSceneSessionActivation(nil, userActivity: activity,  
            options: nil)  
    }  
  
}
```



NEW

```
// Open a New Window
```

```
@IBAction func handleLongPress(forDocumentAt url: URL) {  
  
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            options: nil)  
    }  
  
}
```

NEW

```
// Open a New Window
```

```
@IBAction func handleLongPress(forDocumentAt url: URL) {  
  
    if let existingSession = findSession(for: url) {  
        UIApplication.shared.requestSceneSessionActivation(existingSession, userActivity: nil,  
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    } else {  
        let activity = NSUserActivity(activityType: "com.example.MyApp.EditDocument")  
        activity.userInfo["url"] = url  
  
        UIApplication.shared.requestSceneSessionActivation(nil, userActivity: activity,  
            options: nil)  
    }  
  
}
```



NEW

```
// Update App Switcher Snapshot
```

```
func application(_ application: UIApplication,  
    didReceiveRemoteNotification userInfo: [AnyHashable:Any],  
    fetchCompletionHandler completionHandler: @escaping (UIBackgroundFetchResult) -> Void) {  
  
    let session = findSession(for: userInfo)  
    application.requestSceneSessionRefresh(session)  
  
}
```



NEW

```
// Update App Switcher Snapshot
```

```
func application(_ application: UIApplication,  
    didReceiveRemoteNotification userInfo: [AnyHashable:Any],  
    fetchCompletionHandler completionHandler: @escaping (UIBackgroundFetchResult) -> Void) {  
  
    let session = findSession(for: userInfo)  
    application.requestSceneSessionRefresh(session)  
  
}
```



NEW

```
// Close a Window
```

```
func closeWindow(and action: DraftAction) {  
  
    let options = UIWindowScene.DestructionRequestOptions()  
  
    switch action {  
    case .send:    options.windowDismissalAnimation = .commit  
    case .save:    options.windowDismissalAnimation = .decline  
    case .delete:  options.windowDismissalAnimation = .standard  
    }  
  
    let session = view.window!.windowScene!.session  
    UIApplication.shared.requestSceneSessionDestruction(session, options: options)  
  
}
```

NEW

```
// Close a Window
```

```
func closeWindow(and action: DraftAction) {  
  
    let options = UIWindowScene.DestructionRequestOptions()  
  
    switch action {  
    case .send:    options.windowDismissalAnimation = .commit  
    case .save:   options.windowDismissalAnimation = .decline  
    case .delete: options.windowDismissalAnimation = .standard  
    }  
  
    let session = view.window!.windowScene!.session  
    UIApplication.shared.requestSceneSessionDestruction(session, options: options)  
  
}
```

NEW

```
// Close a Window
```

```
func closeWindow(and action: DraftAction) {
```

```
    let options = UIWindowScene.DestructionRequestOptions()
```

```
    switch action {
```

```
    case .send:    options.windowDismissalAnimation = .commit
```

```
    case .save:    options.windowDismissalAnimation = .decline
```

```
    case .delete: options.windowDismissalAnimation = .standard
```

```
    }
```

```
    let session = view.window!.windowScene!.session
```

```
    UIApplication.shared.requestSceneSessionDestruction(session, options: options)
```

```
}
```

```
// State Restoration
```

```
class UISceneSession {
```

```
    var stateRestorationUserActivity: NSUserActivity
```

```
}
```



NEW



```
// State Restoration
```

```
class UISceneSession {
```

```
    var stateRestorationUserActivity: NSUserActivity
```

```
}
```



NEW

```
// State Restoration
```

```
class UISceneSession {
```

```
    var stateRestorationUserActivity: NSUserActivity
```

```
    var persistentIdentifier: String { get }
```

```
}
```



NEW



NEW

```
// State Restoration
```

```
class UISceneSession {
```

```
    var stateRestorationUserActivity: NSUserActivity
```

```
    var persistentIdentifier: String { get }
```

```
}
```



NEW

```
// State Restoration

class UISceneSession {

    var stateRestorationUserActivity: NSUserActivity

    var persistentIdentifier: String { get }

    // Values must be property list type
    var userInfo: [String:AnyHashable]

}
```



NEW

```
// State Restoration

class UISceneSession {

    var stateRestorationUserActivity: NSUserActivity

    var persistentIdentifier: String { get }

    // Values must be property list type
    var userInfo: [String:AnyHashable]

}
```

# Debugging Tips

# Debugging Tips

Every app has unique challenges

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Every app has unique challenges

Expect to make changes



# Debugging Tips

Every app has unique challenges

Expect to make changes

Test, test, and test more

# Debugging Tips

Every app has unique challenges

Expect to make changes

Test, test, and test more

Focus on multiple scenes

`UIDevice.current`

`UserDefaults.standard`

`NotificationCenter.default`

`UIScreen.main`

`UIApplication.shared`

`FileManager.default`

MyFancySingleton.shared

AppData.shared

UIDevice.current

UserDefaults.standard

NotificationCenter.default

UIScreen.main

UIApplication.shared

FileManager.default

MyFancySingleton.shared

AppData.shared

UIDevice.current

UserDefaults.standard

NotificationCenter.default

UIScreen.main

UIApplication.shared

FileManager.default

globalVar

MyFancySingleton.shared

AppData.shared

UIDevice.current

UserDefaults.standard

NotificationCenter.default

UIScreen.main

UIApplication.shared

FileManager.default

globalVar

(UIApplication.shared.delegate as! AppDelegate)

MyFancySingleton.shared

AppData.shared

UIDevice.current

UserDefaults.standard

NotificationCenter.default

UIScreen.main

UIApplication.shared

FileManager.default

"~/Library/MyApp/Draft"

globalVar

(UIApplication.shared.delegate as! AppDelegate)

# Case Study

## State restoration





## Here's to the crazy ones.

The misfits. The rebels. The troublemakers. The round pegs in the square holes. The ones who see things differently. They're not fond of rules. And they have no respect for the status quo. You can quote them, disagree with them, glorify or vilify them. About the only thing you can't do is ignore them. Because they change things. They push the human race forward. And while some may see them as the crazy ones, we see genius. Because the people who are crazy enough to think they can change the world, are the ones who do.



## Shopping List

- 12 eggs
- Butter
- Sugar
- Milk
- Orange juice
- Lettuce
- Tomatos
- Avocado
- Toast



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## Shopping List

- 12 eggs
- Butter
- Sugar
- Milk
- Orange juice
- Lettuce
- Tomatos
- Avocado
- Toast

# Case Study

## State restoration

```
title: "Chocolate Chip Cookie Recipe"  
body: "Milk, Eggs, Flour, ..."
```

# Case Study

## State restoration

```
title: "Chocolate Chip Cookie Recipe"  
body: "Milk, Eggs, Flour, ..."
```

# Case Study

## State restoration

```
title: "Chocolate Chip Cookie Recipe"  
body: "Milk, Eggs, Flour, ..."  
id: 09AD3F-983DB1-12005F
```

```
title: "Here's to the crazy ones."  
body: "The misfits. The rebels..."  
id: A763D79-489F2B-BC3192
```

# Case Study

## State restoration

```
title: "Chocolate Chip Cookie Recipe"  
body: "Milk, Eggs, Flour, ..."  
id: 09AD3F-983DB1-12005F
```

```
title: "Here's to the crazy ones."  
body: "The misfits. The rebels..."  
id: A763D79-489F2B-BC3192
```

# Case Study

## State restoration

```
title: "Chocolate Chip Cookie Recipe"  
body: "Milk, Eggs, Flour, ..."  
id: 09AD3F-983DB1-12005F
```

# Case Study

## State restoration

NEW

Called immediately if app is running

Otherwise, called shortly after next launch

```
protocol UIApplicationDelegate {  
  
    func application(_ application: UIApplication,  
                    didDiscardSceneSessions sceneSessions: Set<UISceneSession>)  
  
}
```



# Case Study

UserDefaults



## Here's to the crazy ones.

The misfits. The rebels. The troublemakers. The round pegs in the square holes. The ones who see things differently. They're not fond of rules. And they have no respect for the status quo. You can quote them, disagree with them, glorify or vilify them. things crazy can ch

**Settings** Done

Word Count



## Shopping List

- 12 eggs
- Butter
- Sugar
- Milk
- Orange juice
- Lettuce
- Tomatos
- Avocado
- Toast



## Here's to the crazy ones.

The misfits. The rebels. The troublemakers. The round pegs in the square holes. The ones who see things differently. They're not fond of rules. And they have no respect for the status quo. You can quote them, disagree with them, glorify or vilify them. things crazy can ch

**Settings** Done

Word Count

101 Words



## Shopping List

- 12 eggs
- Butter
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- Lettuce
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Settings Done

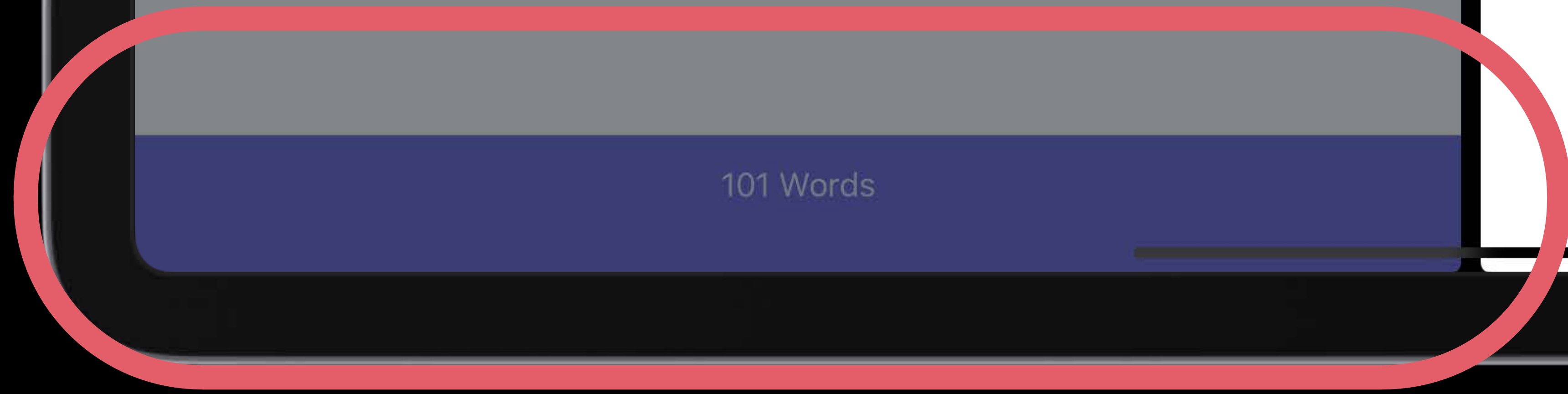
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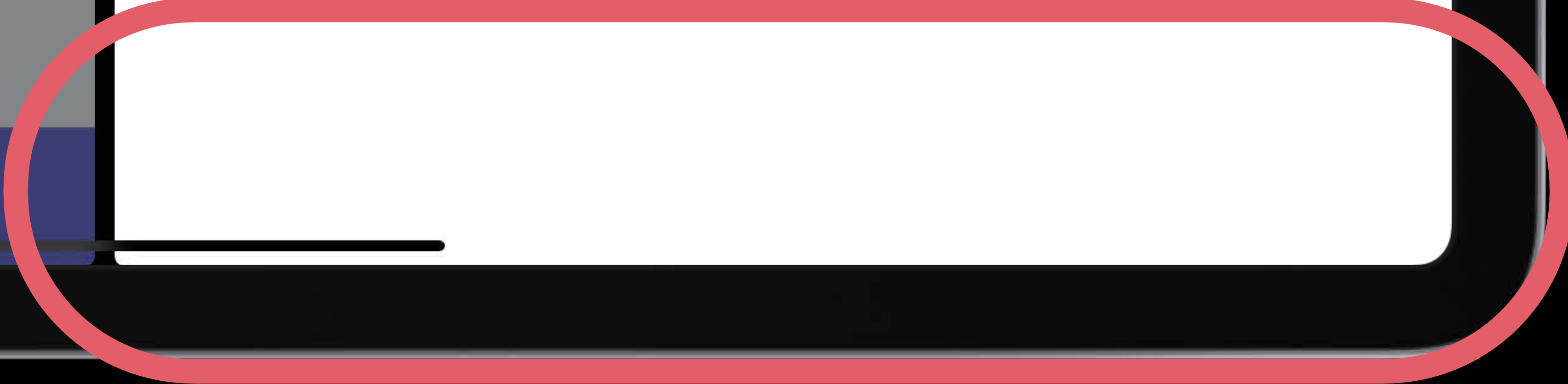
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```
// Add a Key-Value Observable Property to UserDefaults

extension UserDefaults {

    private static let isInfoBarHiddenKey = "IsInfoBarHidden"

    @objc dynamic var isInfoBarHidden: Bool {
        get { return bool(forKey: UserDefaults.isInfoBarHiddenKey) }
        set { set(newValue, forKey: UserDefaults.isInfoBarHiddenKey) }
    }

}
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```

```
    }
```

```
}
```

```
// Observe Changes in the View Controller

class DocumentViewController: UIViewController {

    // Must retain observation for it to remain active.
    private var observer: NSKeyValueObservation?

    override func viewDidLoad() {
        observer = UserDefaults.standard.observe(\UserDefaults.isInfoBarHidden,
            options: .initial, changeHandler: { [weak self](_, _) in
                let controller = self?.navigationController?
                controller?.isToolbarHidden = UserDefaults.standard.isInfoBarHidden
            })
    }
}
```



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class DocumentViewController: UIViewController {
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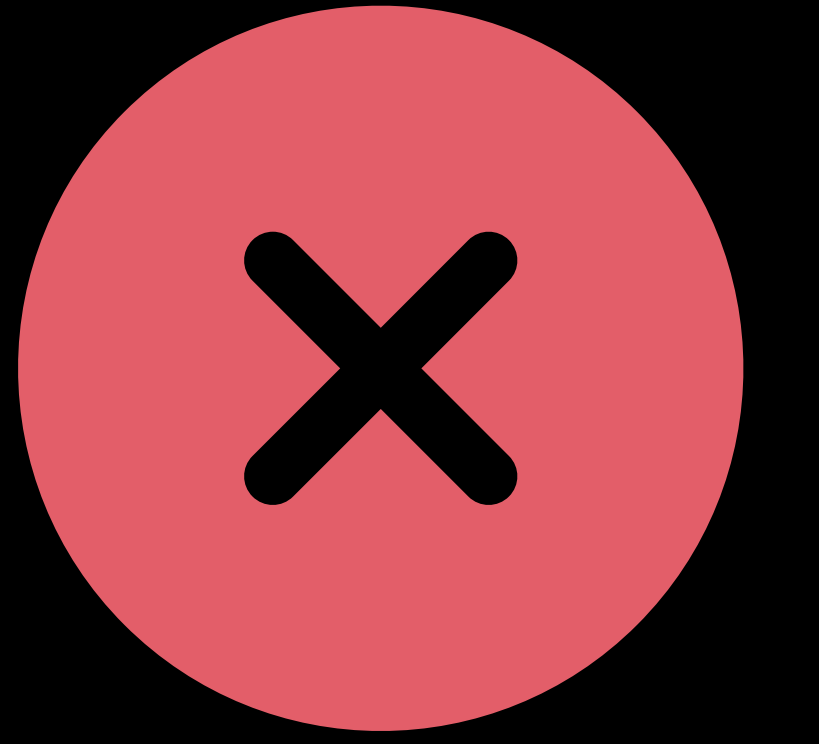
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# UIApplication Deprecations



## Status bar appearance and layout

- `statusBarStyle`
- `statusBarHidden`
- `statusBarOrientation`

## Opening URLs

- `open(_:options:completionHandler:)`

## Windows

- `keyWindow`

# Replacement API



NEW

## Status bar appearance and layout

- `UIWindowScene.statusBarManager`
- `UIWindowScene.interfaceOrientation`

## Opening URLs

- `UIWindowScene.open(_:options:completionHandler:)`

## Key Windows

- Track windows manually

# Summary

# Summary

Many powerful new features in multitasking

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Users will expect these new behaviors



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Easy to adopt in existing or new apps

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Most problems have simple solutions

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Many powerful new features in multitasking

Users will expect these new behaviors

Easy to adopt in existing or new apps

Most problems have simple solutions

Use UIWindowScene to replace deprecated UIApplication methods

# More Information

[developer.apple.com/wwdc19/212](https://developer.apple.com/wwdc19/212)

---

UIKit and Dark Mode Lab

Wednesday, 11:00

---

UIKit and Multitasking

Thursday, 2:00

---

UIKit Lab

Friday, 11:00

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