#WWDC19

Creating a Great Accessible Reading Experience

Darren Minifie, Accessibility Engineering Manager

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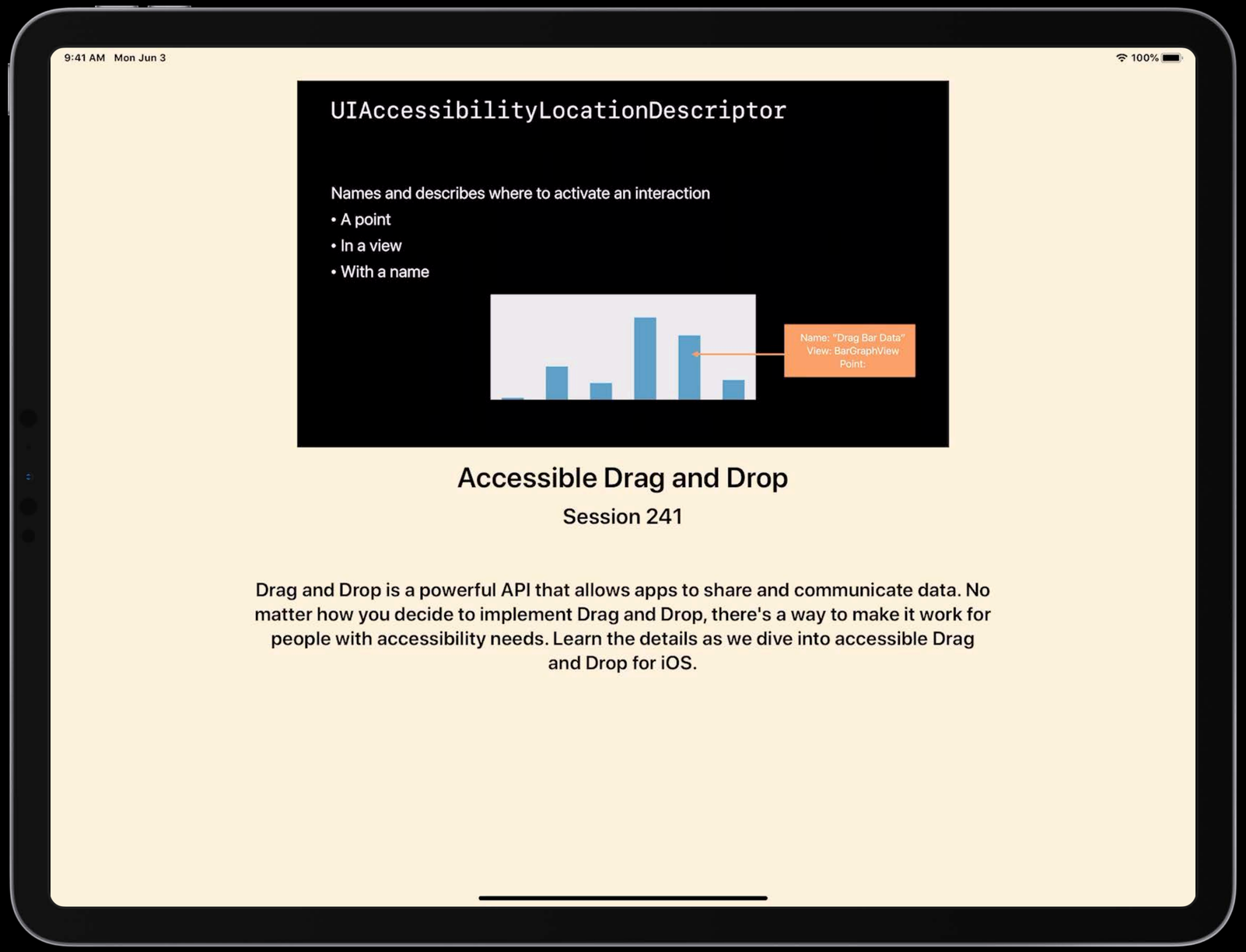
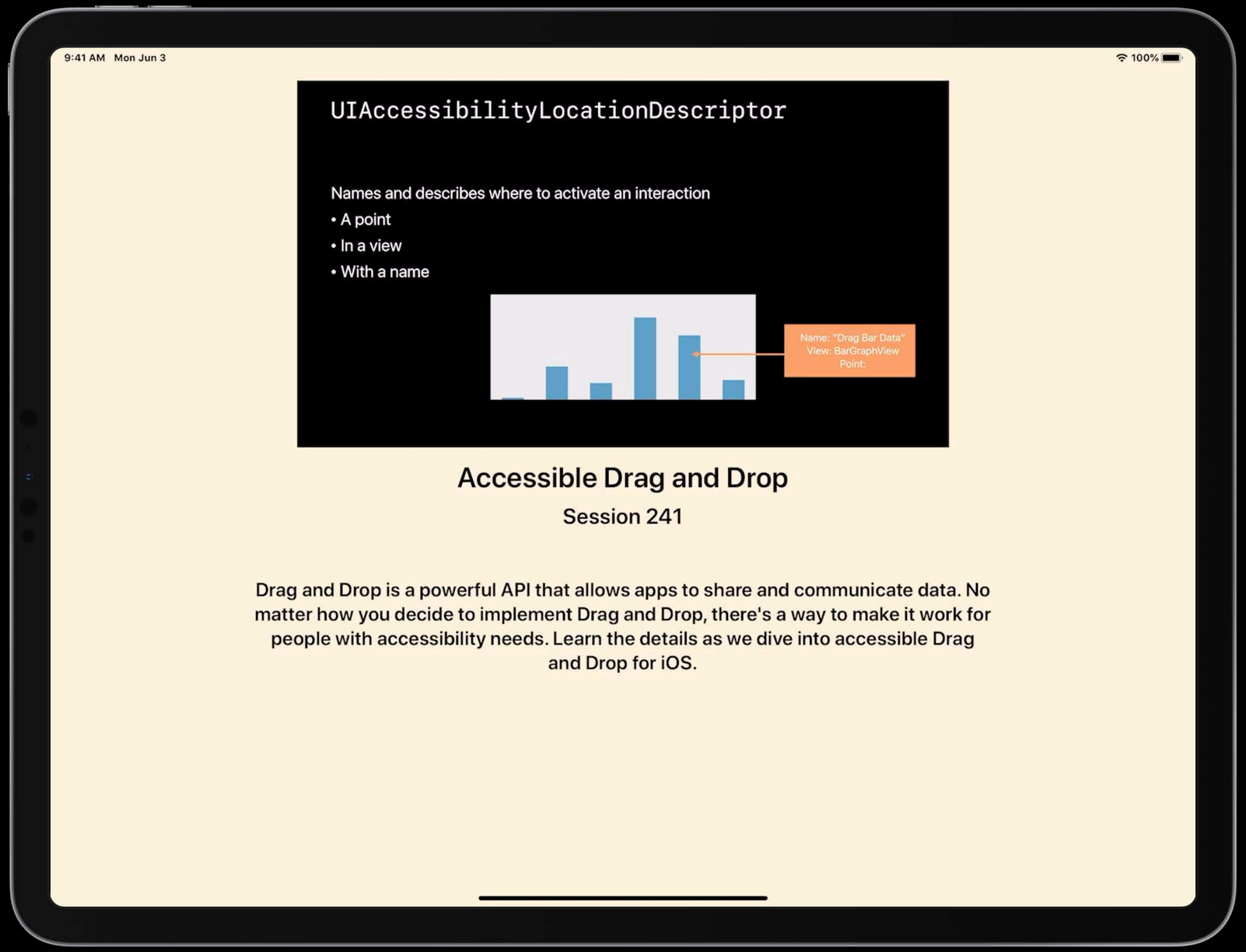
Agenda

Reading Content Protocol

Automatic Page Turning

Customizing Speech


9:41 AM Mon Jun 3
100%
UIAccessibilityLocationDescriptor
Names and describes where to activate an interaction
• A point
• In a view
• With a name
Name: "Drag Bar Data"
View: BarGraphView
Point:
Accessible Drag and Drop
Session 241
Drag and Drop is a powerful API that allows apps to share and communicate data. No matter how you decide to implement Drag and Drop, there's a way to make it work for people with accessibility needs. Learn the details as we dive into accessible Drag and Drop for iOS.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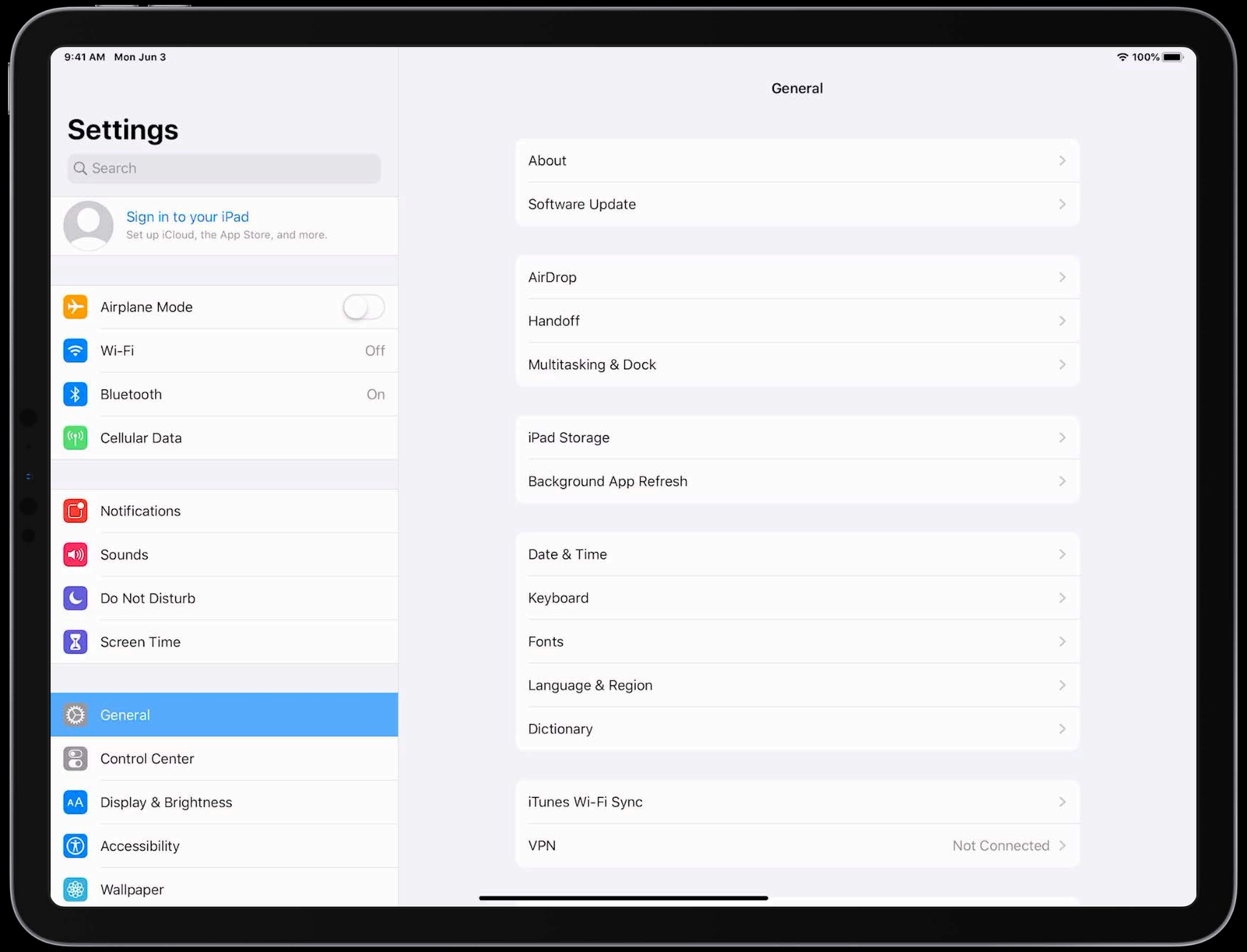
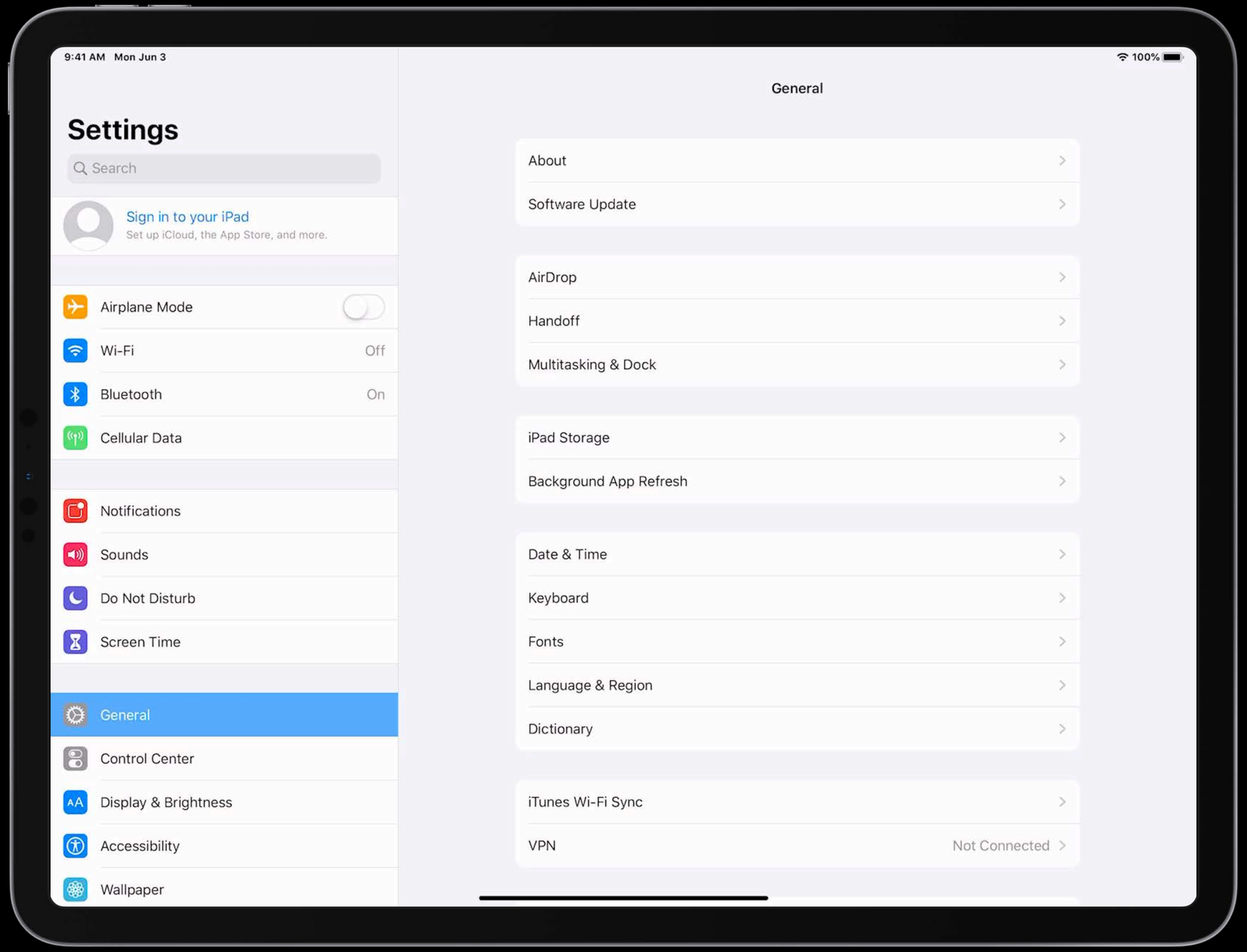

9:41 AM Mon Jun 3
100%
Settings
Search
Sign in to your iPad
Set up iCloud, the App Store, and more.
Airplane Mode
Wi-Fi
Off
Bluetooth
On
Cellular Data
Notifications
Sounds
Do Not Disturb
Screen Time
General
Control Center
Display & Brightness
Accessibility
Wallpaper
General
About
Software Update
AirDrop
Handoff
Multitasking & Dock
iPad Storage
Background App Refresh
Date & Time
Keyboard
Fonts
Language & Region
Dictionary
iTunes Wi-Fi Sync
VPN
Not Connected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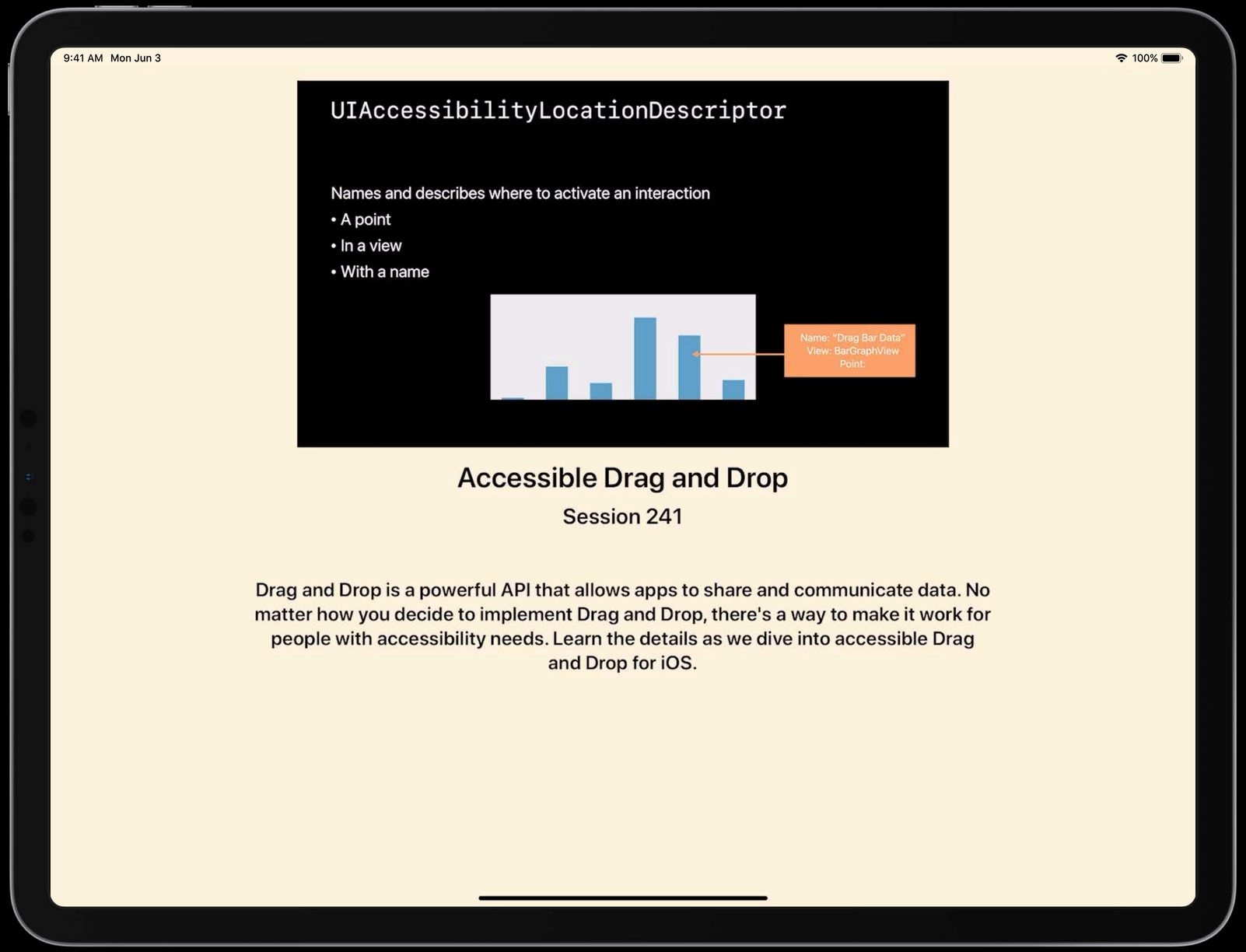
Settings
Search
Sign in to your iPad
Set up iCloud, the App Store, and more.
Airplane Mode
Wi-Fi
Off
Bluetooth
On
Cellular Data
Notifications
Sounds
Do Not Disturb
Screen Time
General
Control Center
Display & Brightness
Accessibility
Wallpaper
General
About
Software Update
AirDrop
Handoff
Multitasking & Dock
iPad Storage
Background App Refresh
Date & Time
Keyboard
Fonts
Language & Region
Dictionary
iTunes Wi-Fi Sync
VPN
Not Connected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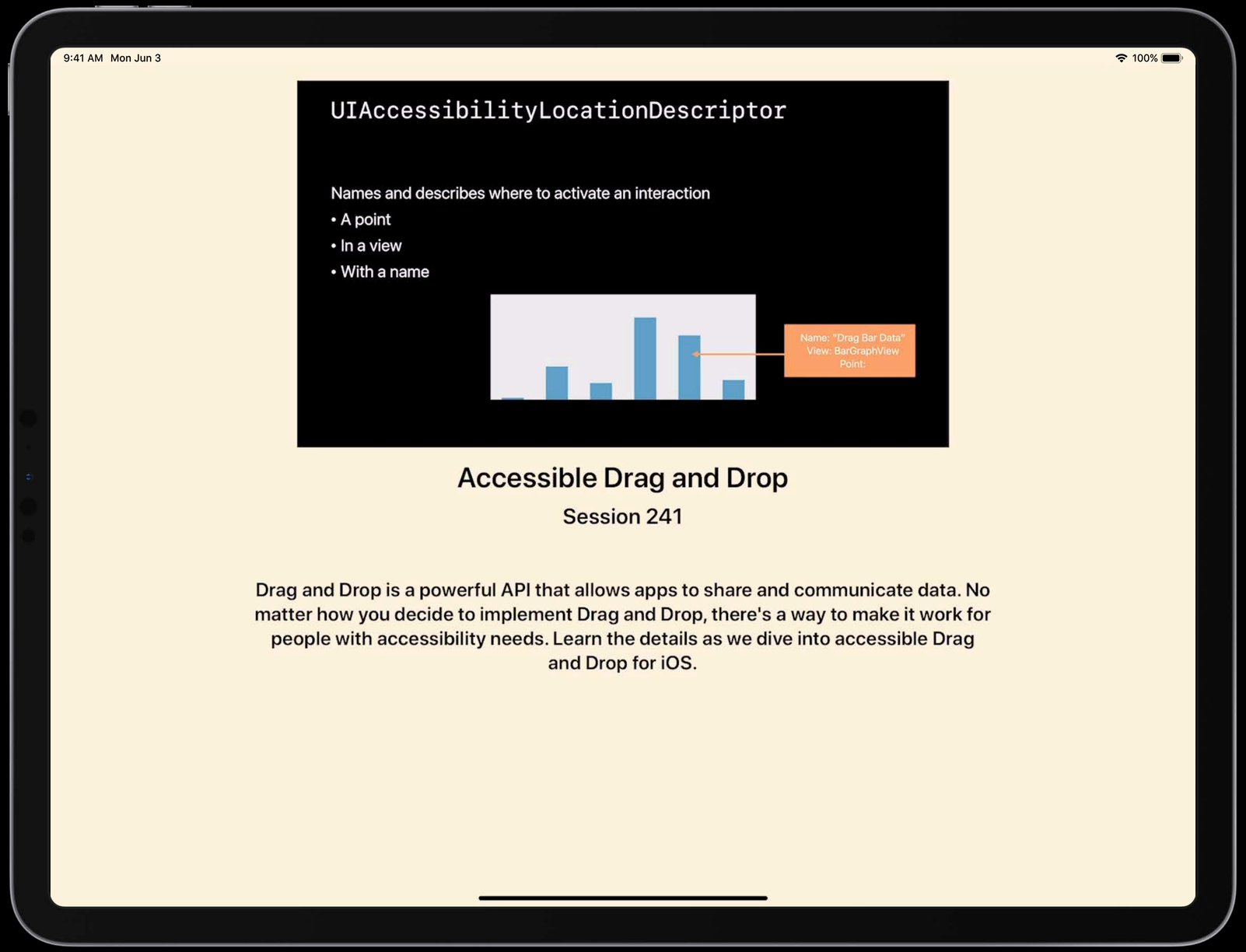
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UIAccessibility Reading Content

```
public protocol UIAccessibilityReadingContent {

    func accessibilityLineNumber(for point: CGPoint) -> Int

    func accessibilityContent(forLineNumber lineNumber: Int) -> String?

    func accessibilityFrame(forLineNumber lineNumber: Int) -> CGRect

    func accessibilityPageContent() -> String?

}
```

```
class SessionItemView: UIView {

    var imageView: UIImageView
    var titleLabel: UILabel
    var identifierLabel: UILabel
    var detailsTextView: UITextView

    enum Layout: Int {
        case image = 0
        case title = 1
        case identifier = 2
        case details = 3
    }
}
```

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class SessionItemView: UIView {

    var imageView: UIImageView
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    enum Layout: Int {
        case image = 0
        case title = 1
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        case details = 3
    }
}
```

```
class SessionItemView: UIView {
    override init(frame: CGRect) {
        super.init(frame: frame)
        isAccessibilityElement = true
    }
}
```

```
class SessionItemView: UIView {
    override init(frame: CGRect) {
        super.init(frame: frame)
        isAccessibilityElement = true
    }
}
```

```
extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityLineNumber(for point: CGPoint) -> Int {
        guard let view = hitTest(point, with: nil) else { return NSNotFound }
        switch view {
        case imageView:
            return Layout.image.rawValue
        case titleLabel:
            return Layout.title.rawValue
        case identifierLabel:
            return Layout.identifier.rawValue
        case detailsTextView:
            if let line = detailsTextView.lineForTouch(atScreenPoint: point) {
                return Layout.details.rawValue + line
            }
        …
    }
}
```

```
extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityLineNumber(for point: CGPoint) -> Int {
        guard let view = hitTest(point, with: nil) else { return NSNotFound }
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            if let line = detailsTextView.lineForTouch(atScreenPoint: point) {
                return Layout.details.rawValue + line
            }
        …
    }
}
```

```
extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityContent(forLineNumber lineNumber: Int) -> String? {
        switch Layout(rawValue: lineNumber)! {
        case .image:
            return imageView.accessibilityLabel
        case .title:
            return titleLabel.accessibilityLabel
        case .identifier:
            return identifierLabel.accessibilityLabel
        case .details:
            return detailsTextView.contentFor(line:lineNumber - Layout.details.rawValue)
        }
    }
}
```

```
extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityContent(forLineNumber lineNumber: Int) -> String? {
        switch Layout(rawValue: lineNumber)! {
        case .image:
            return imageView.accessibilityLabel
        case .title:
            return titleLabel.accessibilityLabel
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        switch Layout(rawValue: lineNumber)! {
        case .image:
            return imageView.accessibilityLabel
        case .title:
            return titleLabel.accessibilityLabel
        case .identifier:
            return identifierLabel.accessibilityLabel
        case .details:
            return detailsTextView.contentFor(line:lineNumber - Layout.details.rawValue)
        }
    }
}
```

```
extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityFrame(forLineNumber lineNumber: Int) -> CGRect {
        switch Layout(rawValue: lineNumber)!  {
        case .image:
            return imageView.accessibilityFrame
        case .title:
            return titleLabel.accessibilityFrame
        case .identifier:
            return identifierLabel.accessibilityFrame
        case .details:
            return detailsTextView.screenFrameFor(line:lineNumber - Layout.details.rawValue)
        }
    }
}
```

```
extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityFrame(forLineNumber lineNumber: Int) -> CGRect {
        switch Layout(rawValue: lineNumber)!  {
        case .image:
            return imageView.accessibilityFrame
        case .title:
            return titleLabel.accessibilityFrame
        case .identifier:
            return identifierLabel.accessibilityFrame
        case .details:
            return detailsTextView.screenFrameFor(line:lineNumber - Layout.details.rawValue)
        }
    }
}
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            return titleLabel.accessibilityFrame
        case .identifier:
            return identifierLabel.accessibilityFrame
        case .details:
            return detailsTextView.screenFrameFor(line:lineNumber - Layout.details.rawValue)
        }
    }
}
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extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityFrame(forLineNumber lineNumber: Int) -> CGRect {
        switch Layout(rawValue: lineNumber)!  {
        case .image:
            return imageView.accessibilityFrame
        case .title:
            return titleLabel.accessibilityFrame
        case .identifier:
            return identifierLabel.accessibilityFrame
        case .details:
            return detailsTextView.screenFrameFor(line:lineNumber - Layout.details.rawValue)
        }
    }
}
```

```
extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityPageContent() -> String? {
        let sessionTitle = titleLabel.accessibilityLabel ?? ""
        let sessionIdentifier = identifierLabel.accessibilityLabel ?? ""
        let detailText = detailsTextView.accessibilityValue ?? ""
        return "\(sessionTitle), \(sessionIdentifier), \(detailText)"
    }
}
```

```swift
extension SessionItemView: UIAccessibilityReadingContent {
    func accessibilityPageContent() -> String? {
        let sessionTitle = titleLabel.accessibilityLabel ?? ""
        let sessionIdentifier = identifierLabel.accessibilityLabel ?? ""
        let detailText = detailsTextView.accessibilityValue ?? ""
        return "\(sessionTitle), \(sessionIdentifier), \(detailText)"
    }
}
```

```swift
extension SessionItemView: UIAccessibilityReadingContent {
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        return "\(sessionTitle), \(sessionIdentifier), \(detailText)"
    }
}
```

Accessible Drag and Drop

Session 241

Drag and Drop is a powerful API that allows apps to share and communicate data. No matter how you decide to implement Drag and Drop, there's a way to make it work for people with accessibility needs. Learn the details as we dive into accessible Drag and Drop for iOS.

Accessible Drag and Drop

Session 241

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Automatic Page Turning

```
UIAccessibilityTraits.causesPageTurn
```

```
func accessibilityScroll(_ direction: UIAccessibilityScrollDirection) -> Bool
```

```
class SessionItemView: UIView {
    override init(frame: CGRect) {
        super.init(frame: frame)
        isAccessibilityElement = true
        accessibilityTraits = .causesPageTurn
    }

}
```

```
class SessionItemView: UIView {
    override init(frame: CGRect) {
        super.init(frame: frame)
        isAccessibilityElement = true
        accessibilityTraits = .causesPageTurn
    }

}
```

```
class SessionItemView: UIView {
    override func accessibilityScroll(_ direction: UIAccessibilityScrollDirection) -> Bool {
        var didScroll: Bool?
        switch direction {
        case .previous, .left:
            didScroll = delegate?.turnPreviousPage(self) { didChangePage in
                if didChangePage {
                    UIAccessibility.post(notification: .pageScrolled, argument: nil)
                }
            }
        ...
    }
}
```

```swift
class SessionItemView: UIView {
    override func accessibilityScroll(_ direction: UIAccessibilityScrollDirection) -> Bool {
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                }
            }
        ...
    }
}
```

```
class SessionItemView: UIView {
    override func accessibilityScroll(_ direction: UIAccessibilityScrollDirection) -> Bool {
        …
        case .next, .right:
            didScroll = delegate?.turnNextPage(self) { didChangePage in
                if didChangePage {
                    UIAccessibility.post(notification: .pageScrolled, argument: nil)
                }
            }
        default:
            break
        }
        return didScroll ?? false
    }
}
```

```
class SessionItemView: UIView {
    override func accessibilityScroll(_ direction: UIAccessibilityScrollDirection) -> Bool {
        …
        case .next, .right:
            didScroll = delegate?.turnNextPage(self) { didChangePage in
                if didChangePage {
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Customizing Speech

```
public protocol UIAccessibilityReadingContent {

    func accessibilityAttributedContent(forLineNumber lineNumber: Int) -> NSAttributedString?

    func accessibilityAttributedPageContent() -> NSAttributedString?

}
```

Customizing Speech

```
NSAttributedString(string: "Arc de Triomphe", attributes: [.accessibilitySpeechLanguage: “fr-FR”])
```

Customizing Speech

```
NSAttributedString(string: "Arc de Triomphe", attributes: [.accessibilitySpeechLanguage: “fr-FR”])
```

Customizing Speech

```
let label = NSMutableAttributedString(string: "Yosemite National Park")
let range = label.string.range(of: "Yosemite")!
label.addAttributes([.accessibilitySpeechIPANotation: "joʊˈsɛmɪti"], range:NSRange(range, in:
label.string))
```

Customizing Speech

```
let label = NSMutableAttributedString(string: "Yosemite National Park")
let range = label.string.range(of: "Yosemite")!
label.addAttributes([.accessibilitySpeechIPANotation: "joʊˈsɛmɪti"], range:NSRange(range, in:
label.string))
```

Summary

Reading Content Protocol

Automatic Page Turning

Customizing Speech

More Information

developer.apple.com/wwdc19/248


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