Native Accessibility Masterclass: SwiftUI & Jetpack Compose

Digital Accessibility: S10E12 — Companion Lab



Transitioning from S10E11's Web SVG/DOM engineering directly into the flattened semantic trees of native mobile operating systems.

Target Audience: Senior Mobile Engineers, UI/UX Designers, Technical PMs

Gemini Notebook



Dark Pane (Left)

UIAccessibilityElement

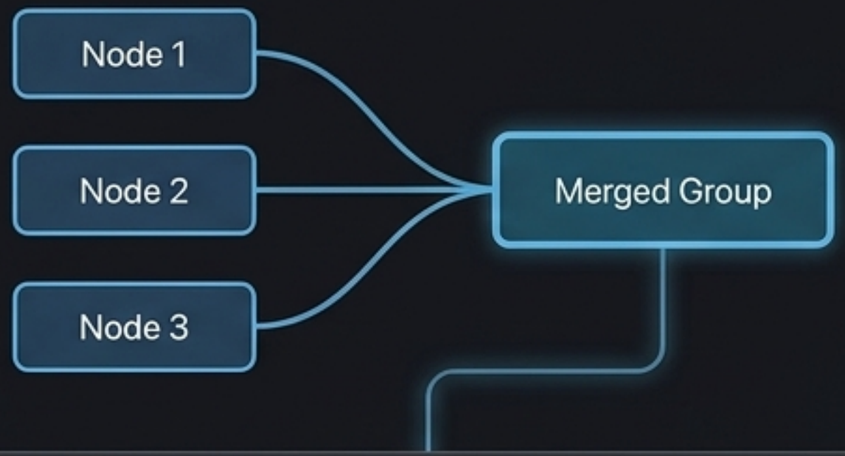
Light Pane (Right)

AccessibilityNodeInfo

Native screen readers rely on flattened leaf nodes.
Deep visual nesting must be programmatically merged to prevent assistive technology fragmentation.

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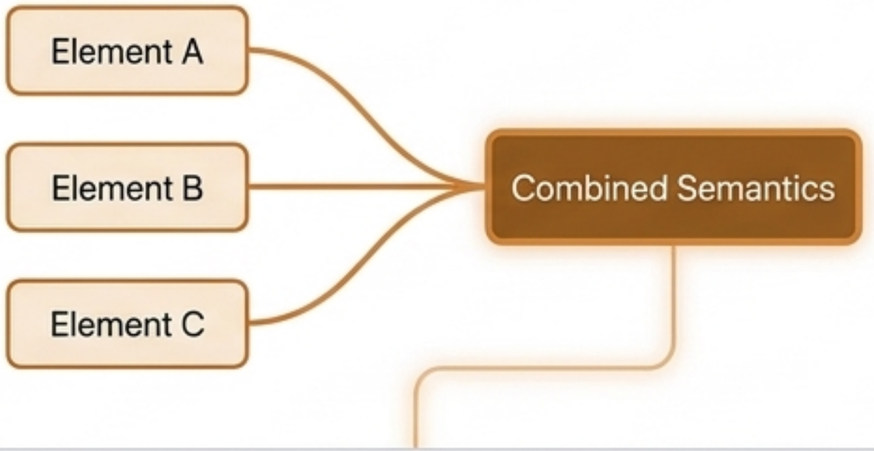
SwiftUI VoiceOver Tree




```
VStack {
    Text('Module 4')
    Text('Semantic HTML')
}
.accessibilityElement(children: .combine)
```

Use `.ignore` to completely prune decorative child nodes.

Compose TalkBack Tree



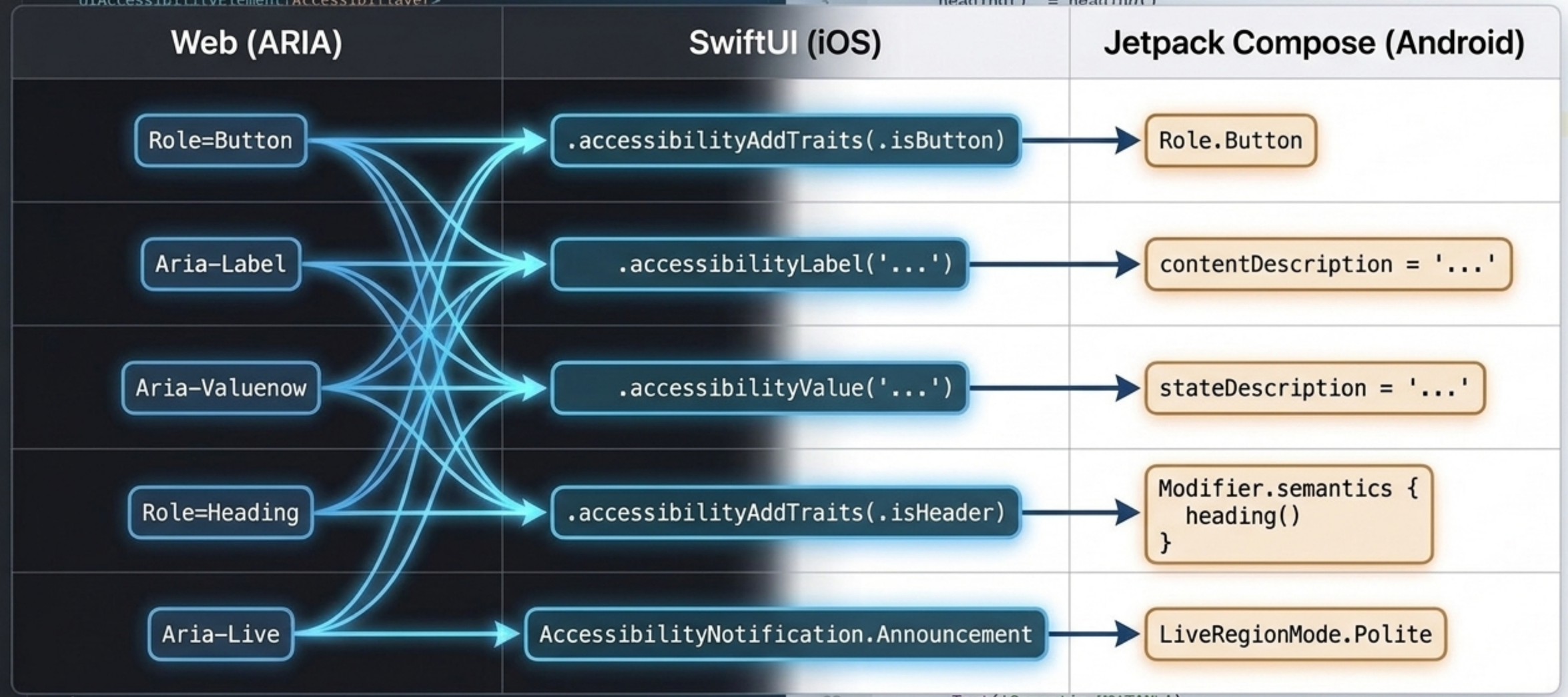

```
Column(
    modifier = Modifier.semantics(mergeDescendants = true)
) {
    Text('Module 4')
    Text('Semantic HTML')
}
```

Parent `Modifier.toggleable` automatically merges state for switch elements.

`clearAndSetSemantics` obliterates hidden children.

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The Rosetta Stone of Roles & Traits (WCAG 2.5.1)



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Obliterating Hidden Gestures



Invisible to Screen Readers & Motor-Impaired Users

VoiceOver Rotor UI




```
.accessibilityAction(named: 'Reset Progress') {
   ...
}
```

TalkBack Local Context Menu




```
customActions = listOf(CustomAccessibilityAction
   (label = 'Reset') { ...
})
```

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The Death of Hardcoded Sizes

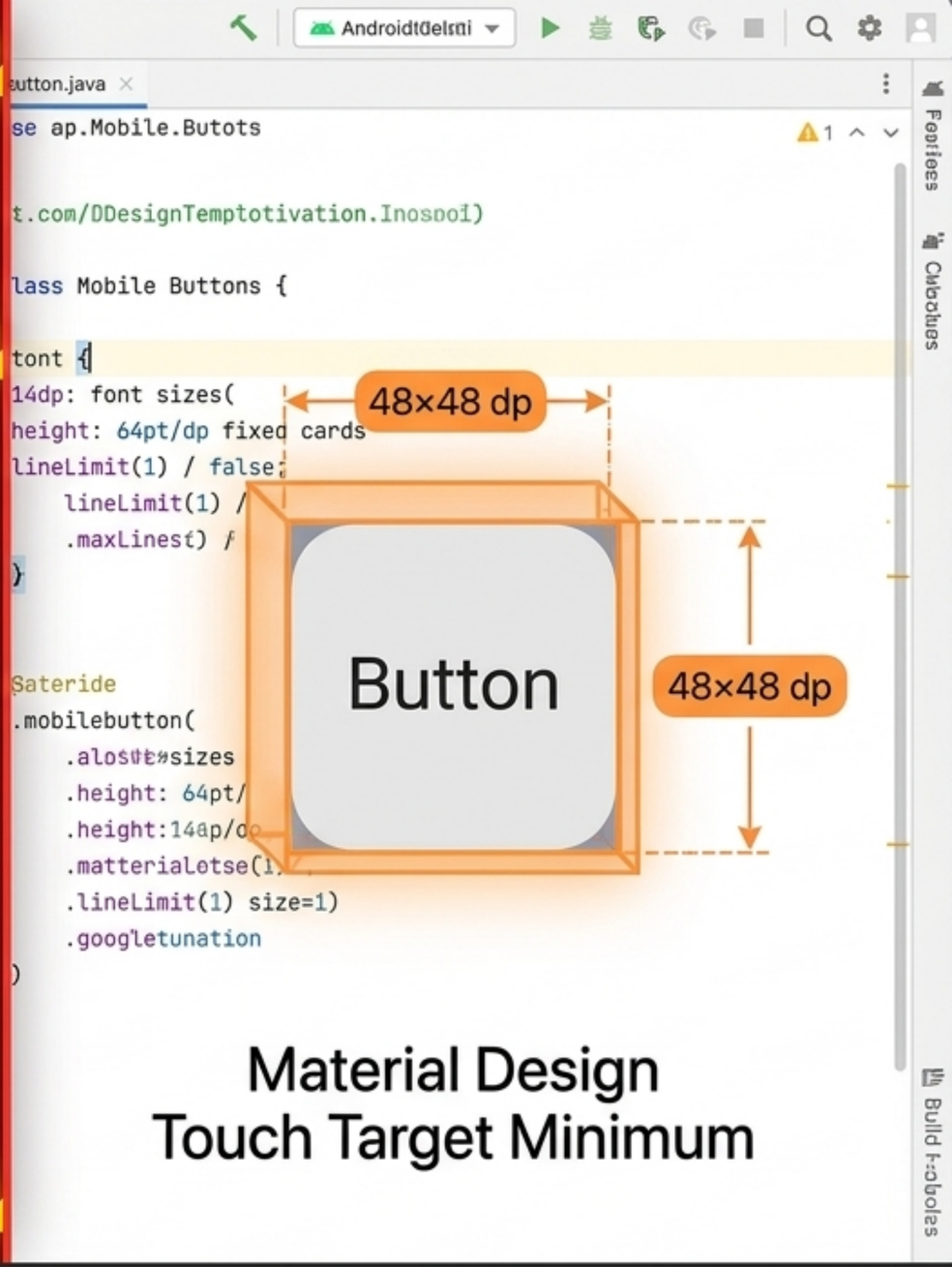
~~14pt / 14dp~~
font sizes

~~height: 64pt/dp~~
fixed cards

~~lineLimit(1) /~~
maxLines =1
truncation



Apple HIG
Touch Target Minimum



Material Design
Touch Target Minimum

Padding and spacing must be dynamic, not fixed, to absorb non-linear text scaling

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Fluid Native Typography & Adaptive Reflow

HStack to VStack

```
}

private static void Mobilteman() {
    public HStack() {
        ViewNHStek(
            .buttions: "Short Tex
```

Action | Short Text

Action / Short Text

@ScaledMetric

ViewThatFits(in: .horizontal)

```
@Environment(
    \.dynamicTypeSize.isAccessibilitySize)
)
```

Row to Column

```
public static SckeHouter BriefnsierColumn() {
    class Modeek = Button.gosonat;

    public static Row RowiEeen() {
        rsgn final sprief = 200% nonl  scaling
            LocalDensity.current.f  >= 1.5f
    }
}
```

Submit | Brief Description

Submit / Brief Description

sp typography

Android 14
200% nonlinear scaling

LocalDensity.current.fontScale >= 1.5f

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5-Modality Diagnostic: Visual & Hardware Keyboard

Visual

Broken

Seman...

Visual: Fixed

Semantic HTML

Adaptive Typography + 44pt/48dp Targets

Hardware

Broken

Dead onTapGesture

Hardware: Fixed

Tab+Z

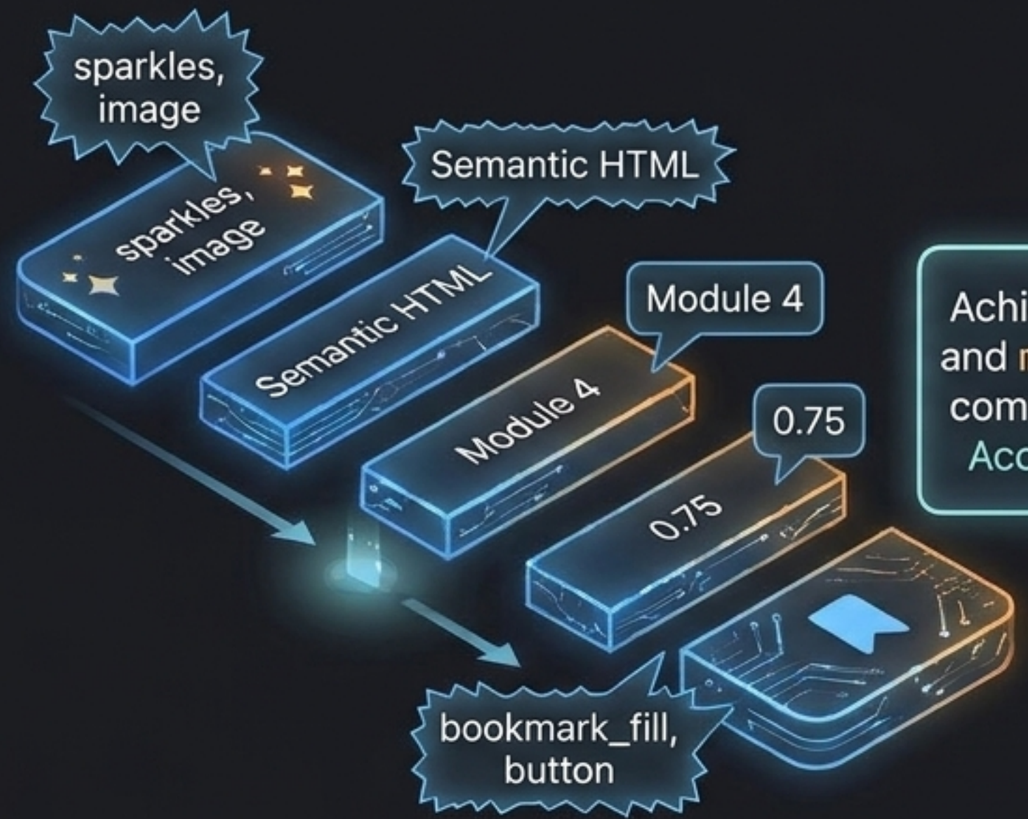
iOS

Android

Gemini Notebook

Verbatim Speech Synthesis: Broken vs. Fixed

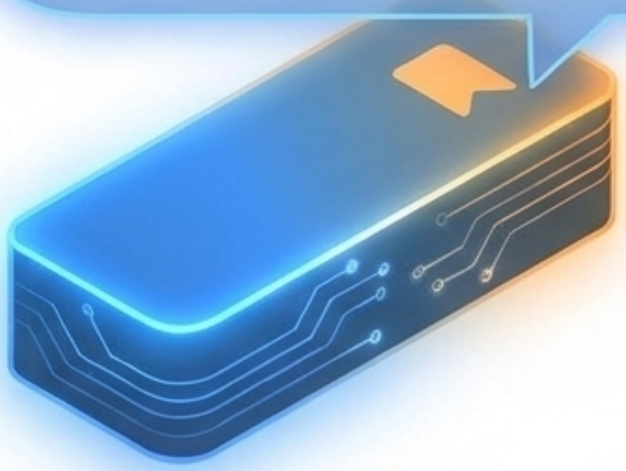
Fragmented Multiple Swipes



Achieved via `.combine` and `mergeDescendants` combined with Custom Accessibility Actions.

Consolidated Semantic Merging

Semantic HTML, Module 4, 75 percent complete, Bookmarked, button. Actions available: Toggle bookmark, Reset lesson progress, Download offline.



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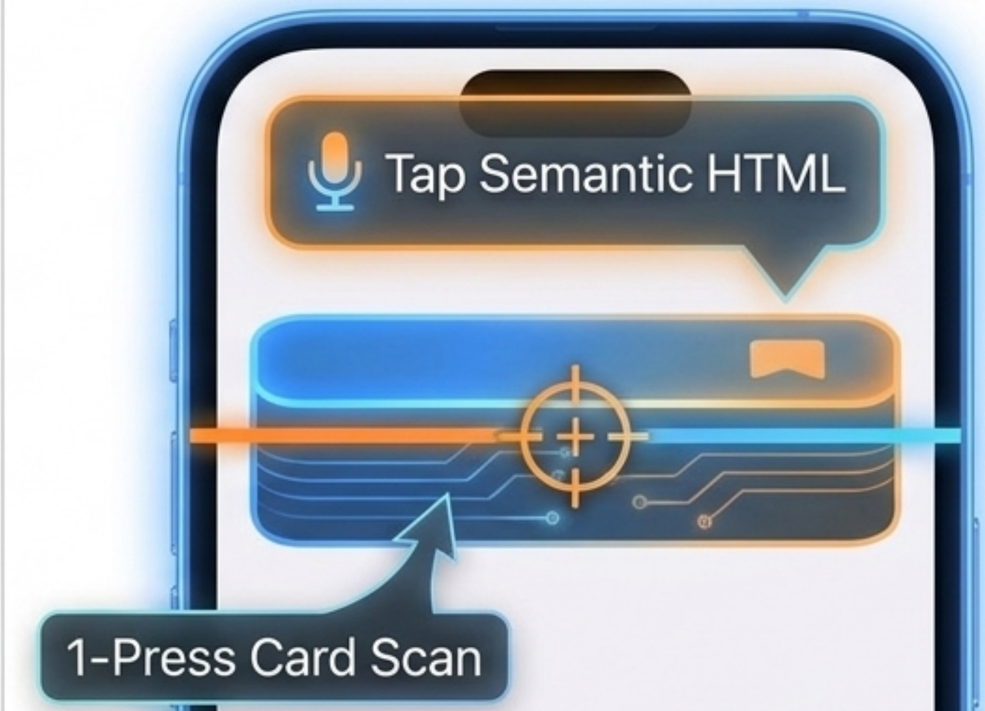
Extreme Scaling & Switch Control Constraints

AX5 / 200% sp Reflow

Broken

Semant ic HTML Module 4

Voice & Switch Control



Because the card is a single merged semantic element with custom actions, a Switch Control user scans and presses once to interact, rather than navigating 5 distinct touch targets.

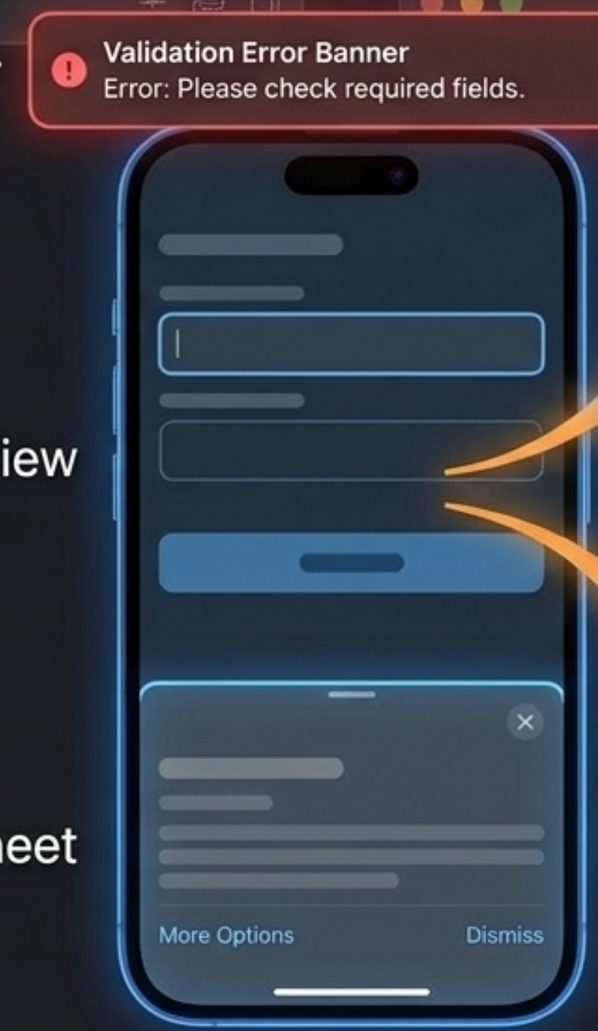
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Steering the Assistive Focus

AX5 / 200% sp Reflow

Validation Error Banner

Voice Bottom Sheet



Base Form View

Active Bottom Sheet

Programmatic Focus Route

Programmatic Focus Route

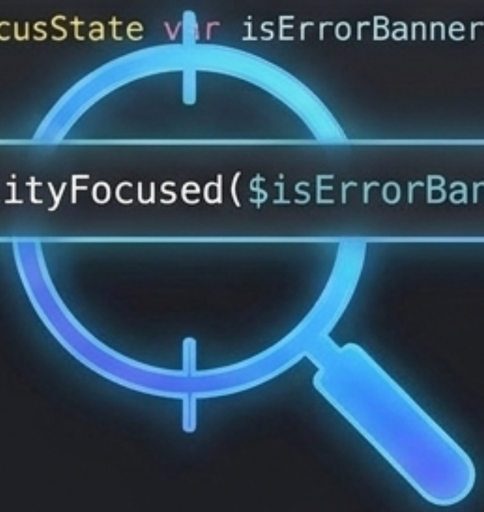
Assistive focus must be explicitly routed. When validation fails or sheets appear, do not leave the screen reader stranded in the background UI.

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Programmatic Focus Implementation

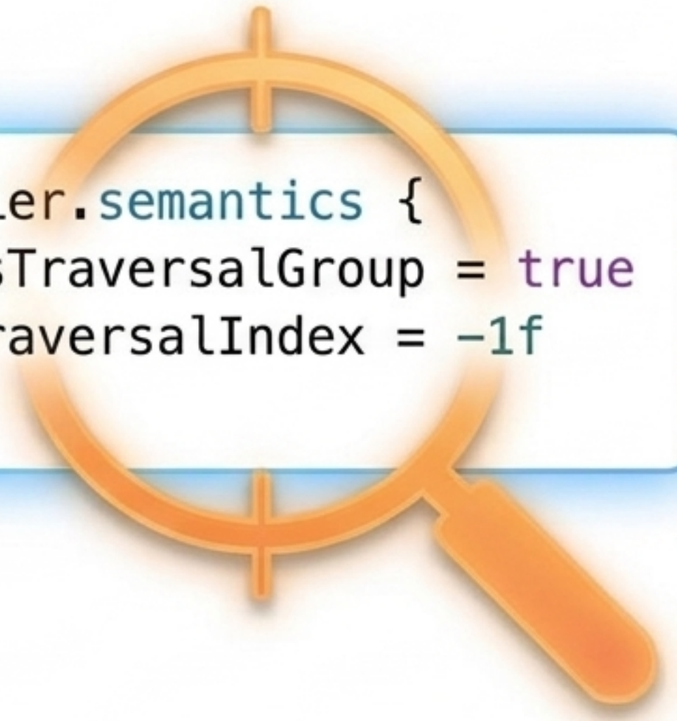
Swift Accessibility Focus

```
@AccessibilityFocusState var isErrorBannerFocused: Bool
...
    .accessibilityFocused($isErrorBannerFocused)
```



Kotlin Traversal Groups

```
Modifier.semantics {
    isTraversalGroup = true
    traversalIndex = -1f
}
```



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Polite Announcements & OS Sensory Preferences

Polite Announcements

Download complete

```
AccessibilityNotification.Announcement(
    'Download complete').post()
```

OS Sensory Toggles



Reduce Motion



Reduce Transparency

```
@Environment(\.accessibilityReduceMotion)
```

Live Regions

Live region update:
New message received

```
Modifier.semantics {
    liveRegion = LiveRegionMode.Polite
}
```

System Accessibility Flags



Differentiate Without Color

```
LocalContext.current
```

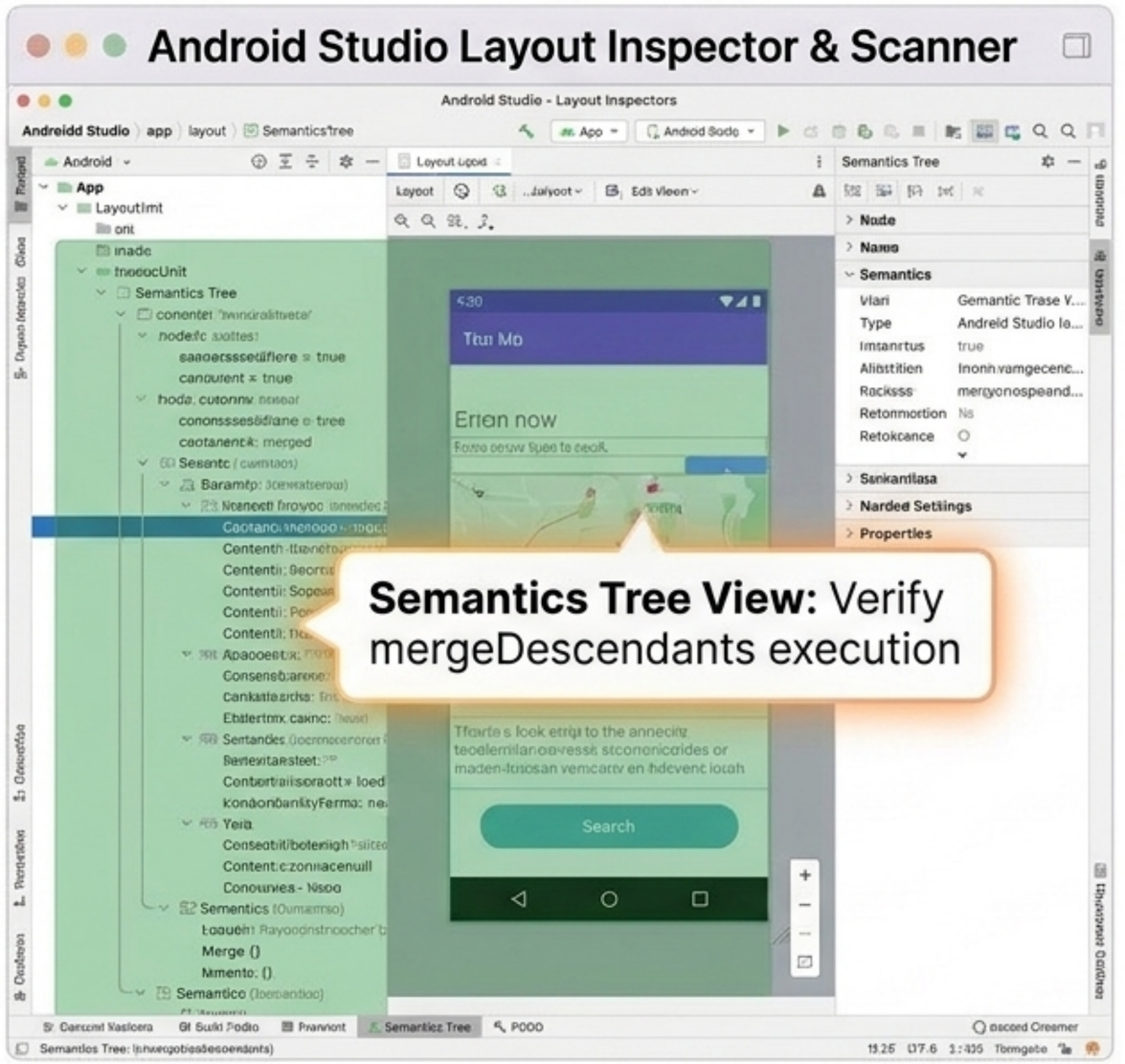
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Native Inspection Tooling Ecosystem

Xcode Accessibility Inspector

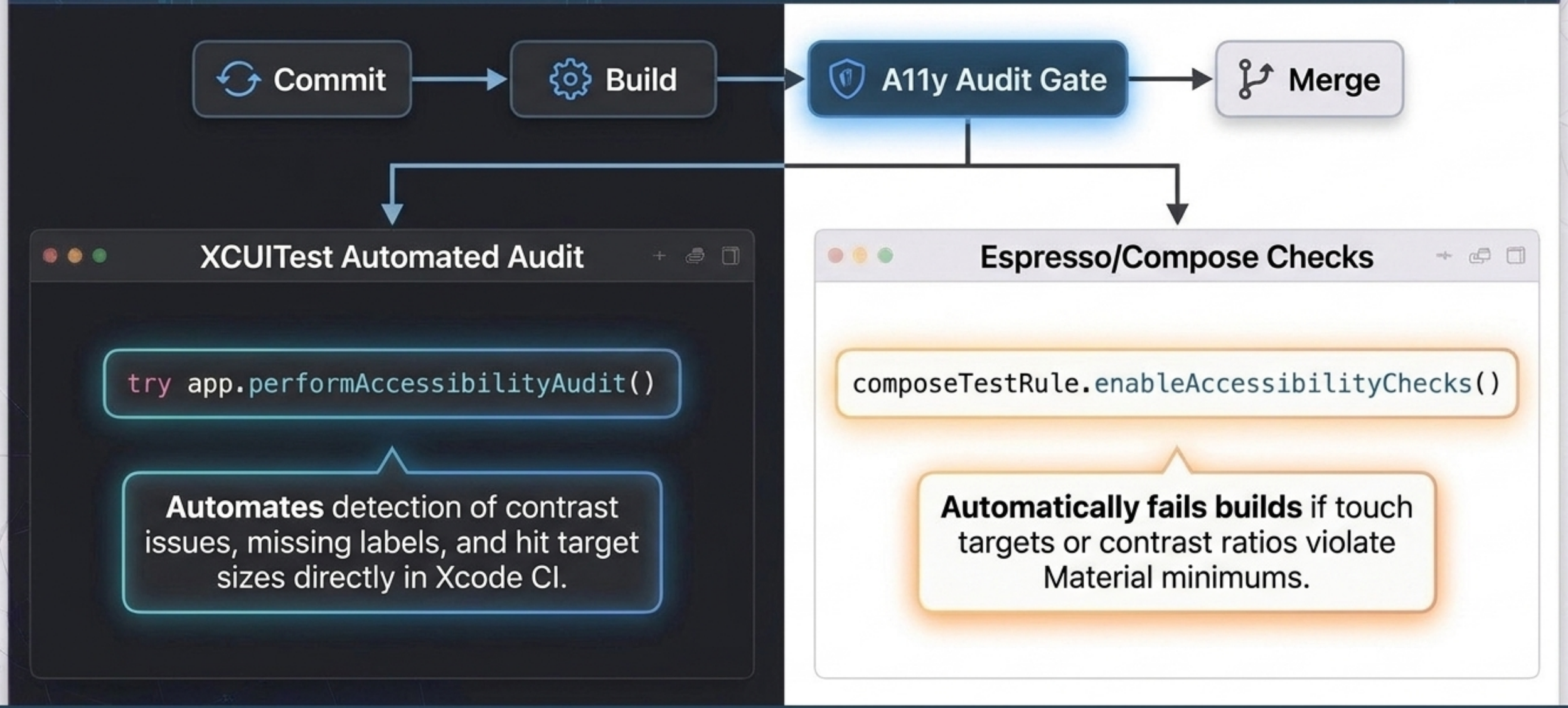


Android Studio Layout Inspector & Scanner



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Automated CI/CD Accessibility Regression Gates



Automated tests are smoke checks; they do not replace real-device VoiceOver/TalkBack human testing.

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The Pathway LessonCardView Lab

Target: Accessible Operation Desk Row

Semantic HTML

Module 4

75% Complete

SwiftUI Final Composition

```
SwiftUI Final Composition {
    @ScaledMetric (asseiskjoestoty, ScaledMetric)
    @ScsisdMetric Views: Viewvow {
        VStack {
            HStack {
                ViewThatFits {
                .NStan: Modifier(
                    .Modifier.sendifies {
                        Text(rtextionei.Text)
                        Text("Semantic HTML is the Toansyle of acontent of Nodales",
                            arogosy.coontentrioese()
                    }
                }

                .accessibilityElement(children: .combine)
                .accessibilityAetion(named:
                        "accessibilityAction",
                        accessibilityActionname: ...",
                    )
        }
    }
}
```

ScaledMetric

ViewThatFits

accessibilityElement
(children: .combine)

accessibilityAction(named:)

Compose Final Composition

```
Column {
    Column(
        Modifier.sp( sp: autexic(sp),
                ontScale = LocalDensity.current.fontScale)
            Row(
                Text("TextLievel", sements, semevv.CHTNL)
                semantics(
                   Modifier.semantics = {
                       mergeDescendants = true
                   }
                })
                CustomAccessibilityAction(
                    "ustomAccessibity",
                    CustomAccessibilityAction,
                ),
        }
    }
}
```

sp sizing

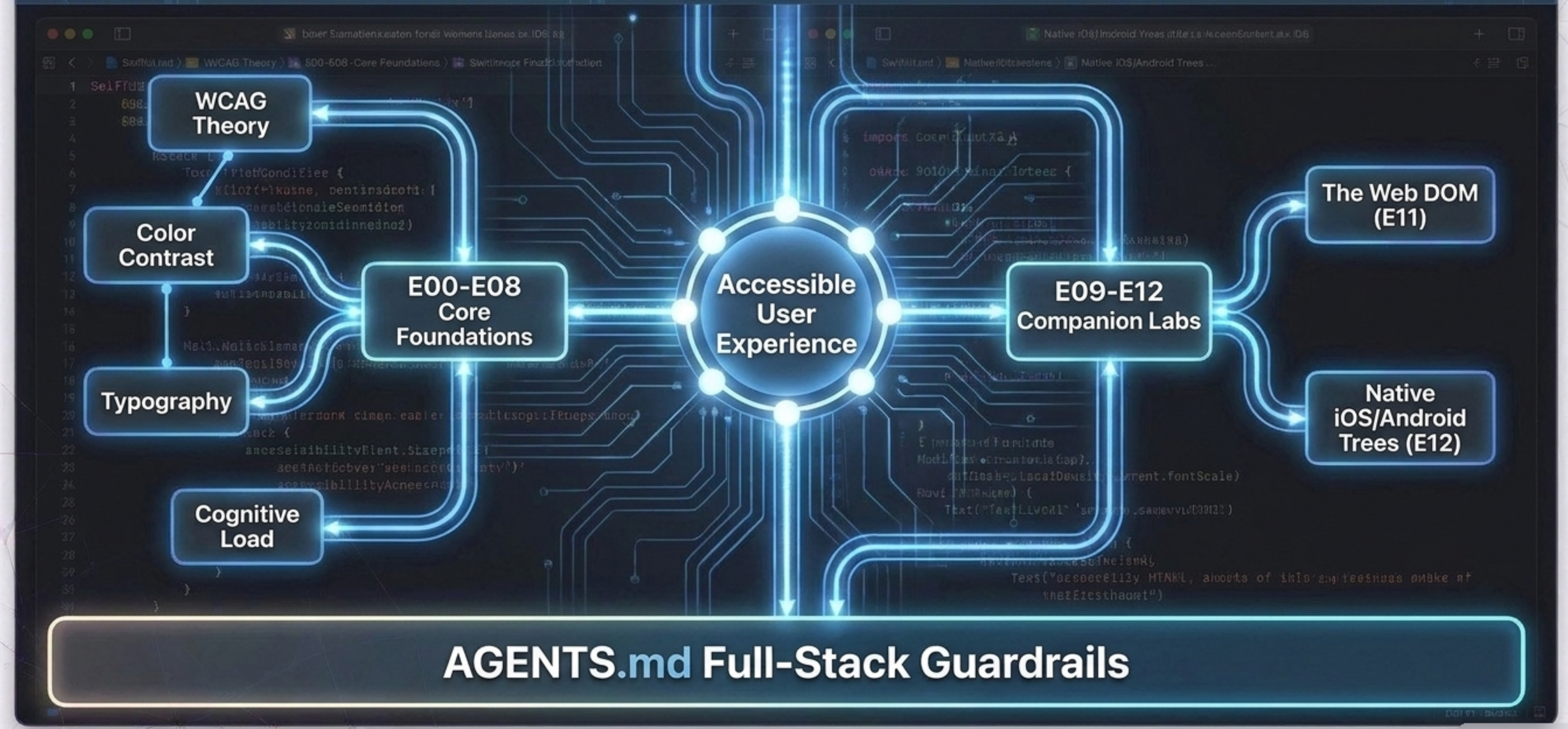
LocalDensity
fontScale checks

mergeDescendants = true

CustomAccessibilityAction

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S10 Curriculum Master Synthesis



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Experience the Dual-Platform Masterclass



Access the complete interactive lab, run the CI/CD tests, and explore the PathwayLessonCard codebase.

/content/labs/accessibility/

Digital Accessibility S10 Series Complete. Build for everyone.

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