

To make the world's information universally accessible and useful

Android for Everyone

Accessibility in Mobile

...



SierraOBryan
S I E R R A O B R Y A N (S H E / H E R)

 @_sierraOBryan

If you would prefer to follow
along with a copy of the slides

As Google Slides : bit.ly/roboto-doc

As a PDF (on Github) : bit.ly/roboto-pdf

Make Tech Inclusive.
Make Inclusive Tech.

It's a team effort.

More
users!

Risk
Management

WHY?

Better for
Everyone

The right
thing to do

Accessibility is not only a
“nice” thing to do, your app
quality increases as you make
it more accessible.

Types of Disabilities

- Motor Impairments
 - May use a hardware device - Accessibility Switch - to control the app or accessibility menu
- Cognitive Impairments
 - May use Action Blocks to set up routines
- Visual Impairments
 - May use increased text size, Braille keyboard, or TalkBack
- Deaf and Hard of Hearing
 - May use Closed Captioning, Live Transcribe or Live Captioning

If you open your [accessibility settings](#), you'll find even more options that folks might use on their device

Permanent

Temporary

Situational

Touch



One arm



Arm injury



New parent

See



Blind



Cataract



Distracted driver

Hear



Deaf



Ear infection



Bartender

Speak



Non-verbal



Laryngitis



Heavy accent

Sierra

I don't want to touch my phone
when I'm trying to "cook"

I forget to blink when I'm
wearing contacts

I like to stay up too late watching TV
while everyone else is sleeping

I am a mumblor

[Learn more](#)

Inclusive
A Microsoft Design Toolkit

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What are the Web Content Accessibility Guidelines and why do they matter for mobile?

[Learn more](#)

We're going to talk about both
traditional Android UI
and Development and
Jetpack Compose.

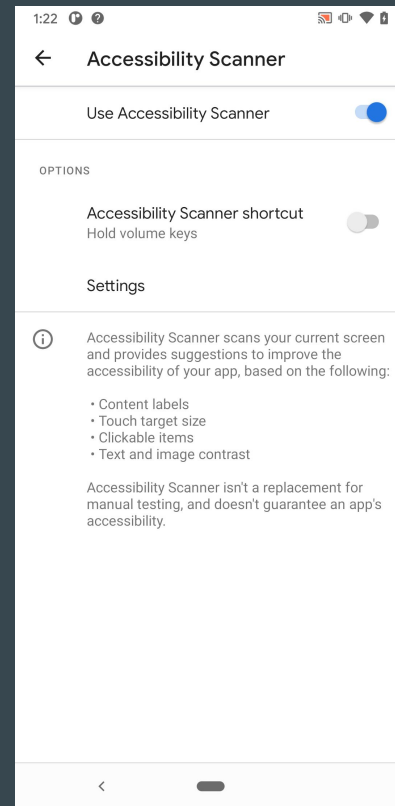
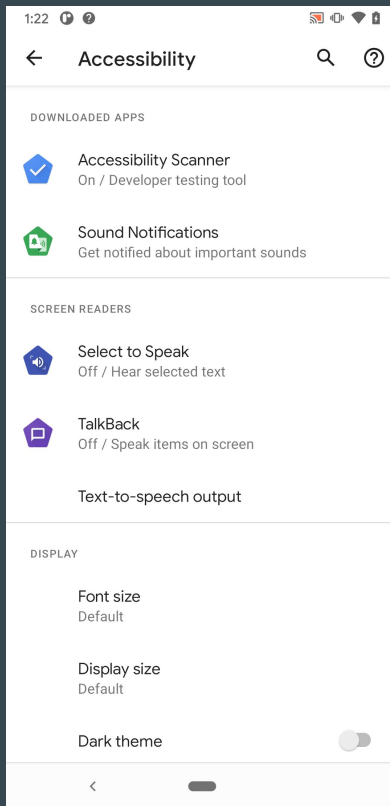
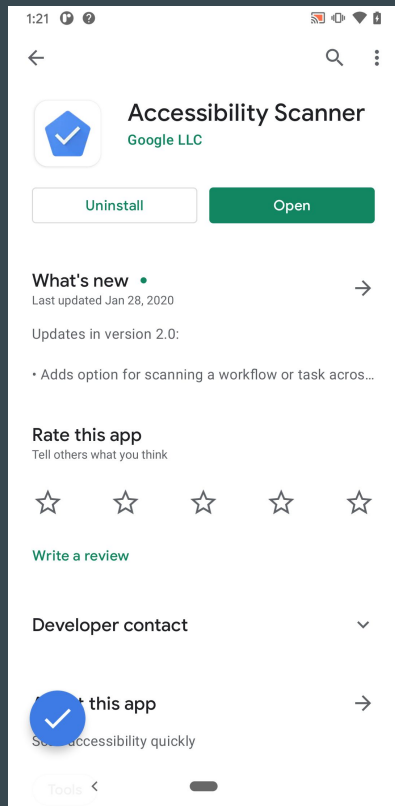
Consistency

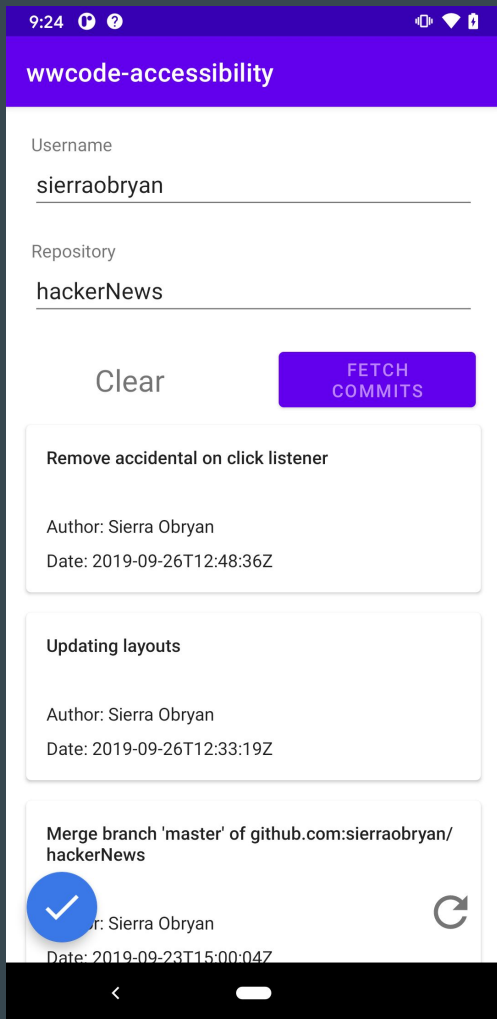
How to test your app for accessibility [Learn More](#)

- User and Manual testing
- Analysis Tools
 - Accessibility Scanner
 - UI Automator Viewer
 - Lint
- Automated Testing
 - Espresso and Robolectric



Using the Accessibility Scanner [Get the app](#)

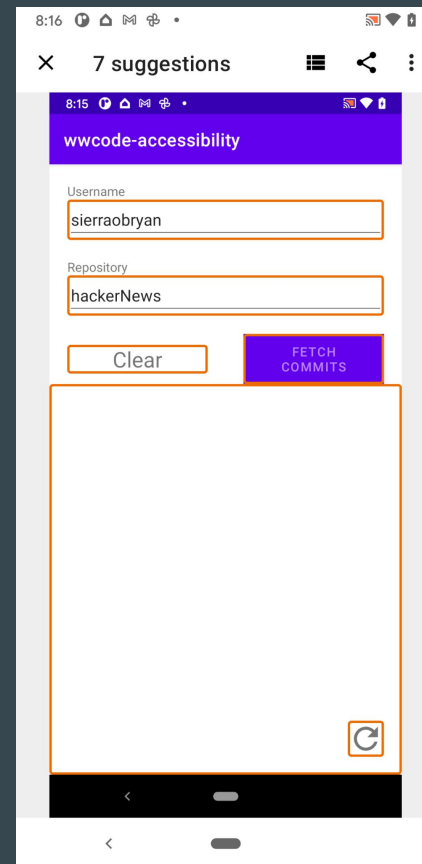
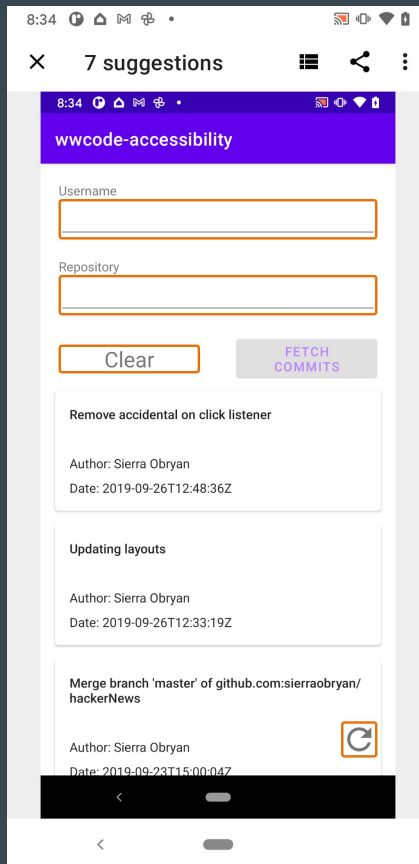
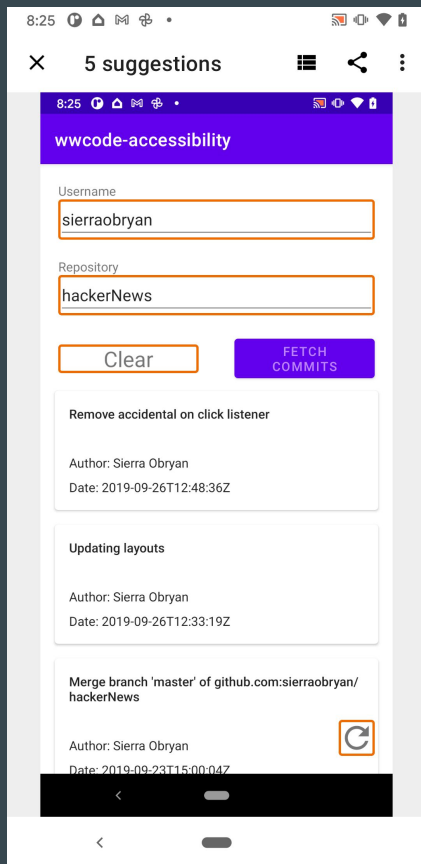




Let's see how
it works for a
simple app

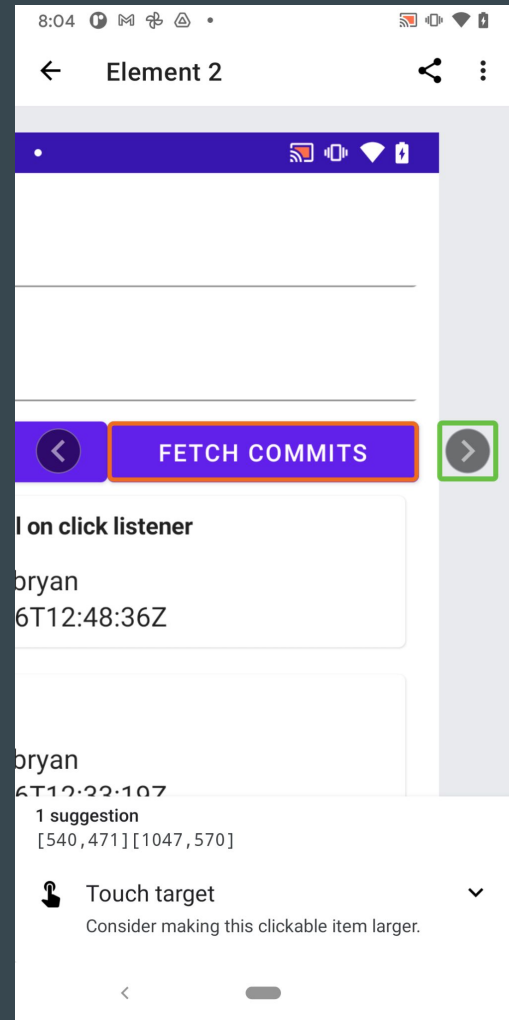
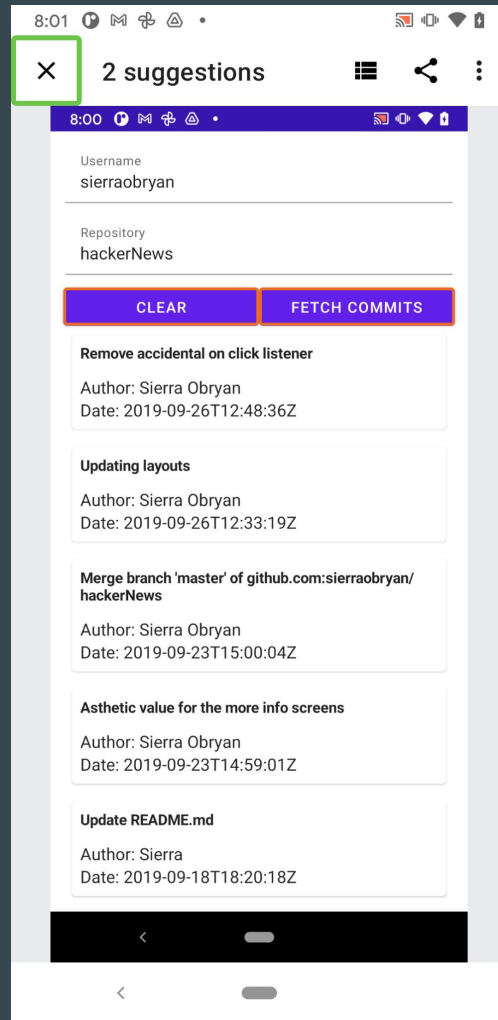


Accessibility Scanner is a good tool but it is NOT perfect - it can only check what's on the screen



Does the scanner
work for apps written
with Compose?

Yes!



Let's jump in and talk about
solving some of are
accessibility suggestions!

Touch Targets [Learn More](#)

The recommended size for each interactive UI element's focusable area, or **touch target size**, is at least 48px by 48px.

This does **not** mean the UI element's visible area must be at least 48px by 48px.

This can be achieved with padding and height / width or minHeight / minWidth.

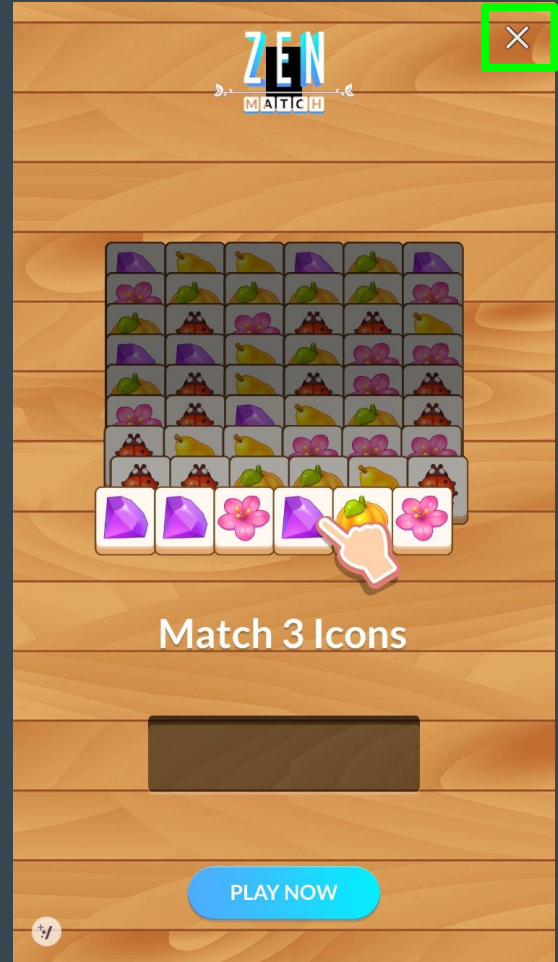
$$\text{paddingTop} + \text{height/minHeight} + \text{paddingBottom} \geq 48\text{dp}$$
$$\text{paddingStart} + \text{width/minWidth} + \text{paddingEnd} \geq 48\text{dp}$$

PS - what does minHeight do? Just adds padding to meet the required height

Why do I care about touch target size?

Have you ever played an free mobile game...

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How do I decide
when to set a size or
set a min?

How do we do this in XML?

```
<TextView/EditText
    android:id="@+id/element_id"
    android:layout_width="0dp"
    android:layout_height="wrap_content"
    android:minHeight="48dp"
    ...
/>
```

For dynamic text, consider using minHeight.

Remember :

Localization == Dynamic

Combine width + height and padding to keep the same UI but increase touch target

```
<ImageView
    android:layout_width="40dp"
    android:layout_height="40dp"
    ...
/>
```



```
<ImageView
    android:layout_width="48dp"
    android:layout_height="48dp"
    android:padding="8dp"
    ...
/>
```

```
TextField(  
    value = value,  
    onChange = onChange,  
    modifier = modifier  
        .fillMaxWidth()  
        .heightIn(min = 48.dp)  
        .clip(shape = shapes.medium),  
)
```

Use heightIn to set min (and max!)
height and width

```
Icon(  
    imageVector = icon,  
    contentDescription = contentDescription,  
    modifier = Modifier  
        .clickable { ... }  
        .size(40.dp)  
)
```



What about
Jetpack Compose?

Use modifiers to set size
and padding

```
Icon(  
    imageVector = icon,  
    contentDescription = contentDescription,  
    modifier = Modifier  
        .clickable { ... }  
        .padding(8.dp)  
        .size(40.dp)  
)
```

Color Contrast [Learn more](#)

AA Compliance requires at least a requires **4.5 : 1** for regular text and **3 : 1** for large text

Slides: 5.88 : 1

7.62 : 1

3.92 : 1

2.38 : 1

How do I meet these requirements and stick to my theme?

Use [Material Color Palettes](#)!

How do I check my colors? There are lots of [tools](#) online!

WCAG 3 will use a new color contrast method called the Advanced Perceptual Contrast Algorithm.

[Learn More](#)

Labels (and hints) [Learn more](#)

The basics of adding labels is that each UI element in your app should include a description that describes the element's purpose.

We do this using `contentDescription` although we get some for free - we do not need to provide a description for `TextView` because Android Accessibility automatically announces the text as the description.

Some best practices: Use the right UI element, don't include the UI element in the description, descriptions should be unique, skip over decorative effects

Localized, Concise, descriptive

Why do I care about content descriptions?

You might be already using them without thinking about it!

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There's a lot to think about with Labels

Does it need a label? It depends but generally...

TextView: No

Text Button: No

EditText: Include a hint

ImageButton: Yes

ImageView: Maybe

Can it be skipped?

Is it a decorator?

Should it be grouped?

Do they make
more sense
together?

How will it be read?

Does it include
numbers or
abbreviations?

Use the right UI Element

If you're adding an onClick action to one of these...

Consider using these...

I want to add an onClick to a TextView



Use a Button

I want to add an onClick to a ImageView



Use an ImageButton

I want to make a Text Composable clickable



Use a Button Composable

I want to make a Icon Composable clickable



Use a IconButton Composable

EditText [Learn more](#)

```
<TextView
    android:id="@+id/name"
    android:text="@string/username"
    android:labelFor="@id/username_input"
    ...
/>

<EditText
    android:id="@+id/username_input"
    android:layout width="0dp"
    android:minHeight="48dp"
    android:layout_height="wrap_content"
    ...
/>
```

Pairs of elements where one describes the other

```
<TextView
    android:id="@+id/repo"
    android:text="@string/repository"
    ...
/>

<EditText
    android:id="@+id/repo_input"
    android:layout width="0dp"
    android:layout height="wrap_content"
    android:minHeight="48dp"
    android:hint="@string/repository"
    ...
/>
```

Hint is example of valid input and available to the screen reader

Grouping Labels [Learn more](#)

- Out of the box, TalkBack will read each RecyclerView as one continuous label and include the position in the list

```
<androidx.constraintlayout.widget.ConstraintLayout
    android:id="@+id/container_a"
    android:layout_width="match parent"
    android:layout_height="wrap content"
    android:screenReaderFocusable="true" (3)
>

</androidx.constraintlayout.widget.ConstraintLayout>

<androidx.constraintlayout.widget.ConstraintLayout
    android:id="@+id/container_b"
    android:layout_width="match parent"
    android:layout_height="wrap content"
    android:screenReaderFocusable="true" (3)
>

</androidx.constraintlayout.widget.ConstraintLayout>
```


1. If I add `screenReaderFocusable` to one of the UI elements, it will read it separately
2. If this were not a `recyclerView`, I can use view attributes to make it read as natural group - this can make finding information on your screen more efficient
3. Sometimes you may want to read the container itself

What about Jetpack Compose?

@Composable

```
fun Image(  
    painter: Painter,  
    contentDescription: String?,  
    modifier: Modifier = Modifier,  
    alignment: Alignment = Alignment.Center,  
    contentScale: ContentScale = ContentScale.Fit,  
    alpha: Float = DefaultAlpha,  
    colorFilter: ColorFilter? = null  
)
```

For some composables,
we have access to the
content description in
function parameters



Now let's look at our TextField

```
TextField(  
  ...  
  placeholder = { Text(text = "Placeholder") },  
  ...  
)
```

The placeholder text is like a hint - it will show in our TextField when there is no input.

```
TextField(  
  ...  
  label = { Text(text = "Label") },  
  ...  
)
```

A label will act like both like the placeholder and as a label above the TextField

Semantics add context to your UI elements.

Content Description
State Description
Progress Bar Range Info
Heading
Pane Title
Disabled
Live Region
Focused
Invisible to User
Scroll Axis Range
Pop up
Dialog
Role
Password
Selectable Group
Custom Actions
onClick
onLongClick

We can also combine our views

In this example, our all three Texts will be read as a group

```
Column(  
    modifier = Modifier.weight(1f)  
        .semantics(mergeDescendants = true) {}  
) {  
    Text(text = commit.commitMessage)  
    Text(text = "Author: ${commit.author}")  
    Text(text = "Date: ${commit.date}")  
}
```

In this example, our Column, Text, and TextField will be each be read separately.

```
Column(modifier = Modifier  
    .fillMaxWidth()  
    .semantics {  
        contentDescription = "Container"  
    }) {  
    Text(text = "Text")  
    TextField(label = { Text(text = "Label") })  
}
```

There are a lot of tools to help

And so there are many UI attributes to help build an accessible UI ([learn more](#))

labelFor
screenReaderFocusable
accessibilityHeading

All of our
Semantics Properties!

A [TtsSpan](#) is a special type of span that can pass in metadata to give contextual information about the string. This information can help Text to Speech correctly pronounce a text element

123456789 TYPE_DIGIT

“1 hundred 23 million 4 hundred 56 thousand 7 hundred 89” vs
“1 2 3 4 5 6 7 8 9 ”

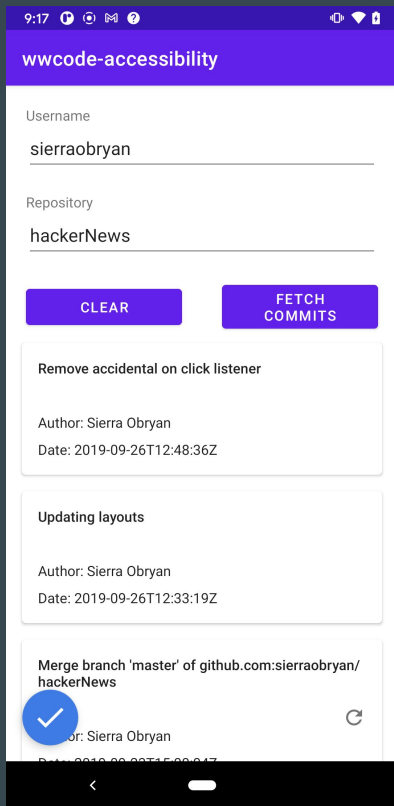
What else?

- Different Displays
- Custom Views and Accessibility APIs
 - Swipe to delete
 - Actions
 - Spans with link
 - Custom Alerts
- Other Media



Think about (different) Displays [Learn more](#)

Normal



9:17

wwwcode-accessibility

Username
sierraobryan

Repository
hackerNews

CLEAR FETCH COMMITS

Remove accidental on click listener

Author: Sierra Obryan
Date: 2019-09-26T12:48:36Z

Updating layouts

Author: Sierra Obryan
Date: 2019-09-26T12:33:19Z

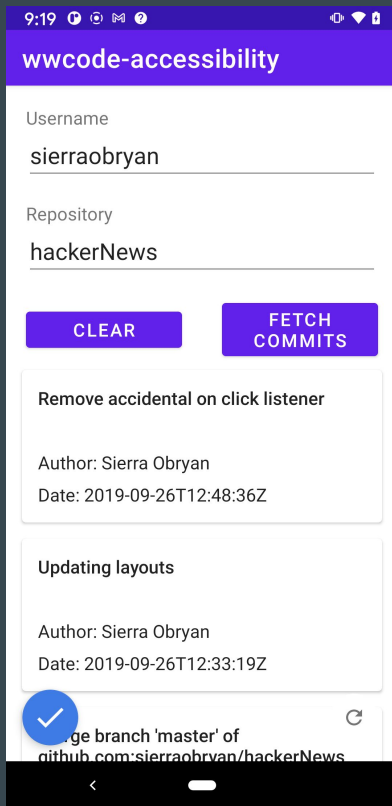
Merge branch 'master' of github.com:sierraobryan/hackerNews

✓

Author: Sierra Obryan
Date: 2019-09-26T12:33:19Z

<

Large Text



9:19

wwwcode-accessibility

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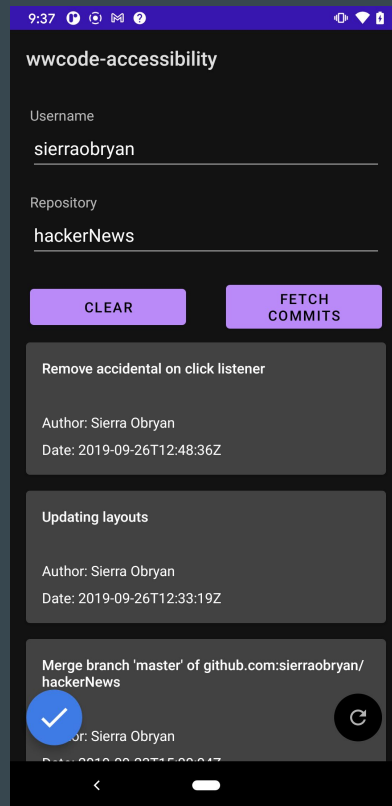
Merge branch 'master' of github.com:sierraobryan/hackerNews

✓

Author: Sierra Obryan
Date: 2019-09-26T12:33:19Z

<

Dark Mode



9:37

wwwcode-accessibility

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sierraobryan

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✓

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<

Swipe to delete

```
ViewCompat.addAction(mailCell, R.string.remove, (v,b) ->  
    mailCell.delete());
```

Spans with links

```
ViewCompat.enableAccessibleClickableSpanSupport(hamsterInfoView);
```

Custom view

```
ViewCompat.setAccessibilityPaneTitle(alertView, R.string.alertTitle);
```



```
Column(  
    modifier = Modifier  
        .semantics { paneTitle = "Alert Title" }  
) { ... }
```

Accessibility-friendly
title for a screen's
pane

Adding a custom
action

```
Column(  
    modifier = Modifier  
        .semantics {  
            customActions = listOf(  
                CustomAccessibilityAction(  
                    label = "Delete",  
                    action = { delete(); true }  
                )  
            )  
        }  
) { ... }
```

Other Media

(remember that cat video?)

UI Testing!

What's next?

The Web Content Accessibility Guidelines v3 are set to be published in 2023

what does that mean for mobile?

Draft 1 was published in late Jan 2021 and continues to have updates

where do I learn more?

Android Accessibility by Tutorials! by Victoria Gonda

I'm just getting started with Accessibility + Compose

what should I do next?

Jetpack Compose: Accessibility and the new Code Lab

To make the world's information universally accessible and useful



Thank you!

...

Where to find me?



@_sierraObryan

sierraobryan.dev

