Android WebView 101

Chrome University 2019
ntfschr@ (he/him)

(based on a previous talk by boliu@)

Bring the best of Chromium to the Android platform

Sixth platform

Blink’s intent-to-implement / intent-to-ship template:

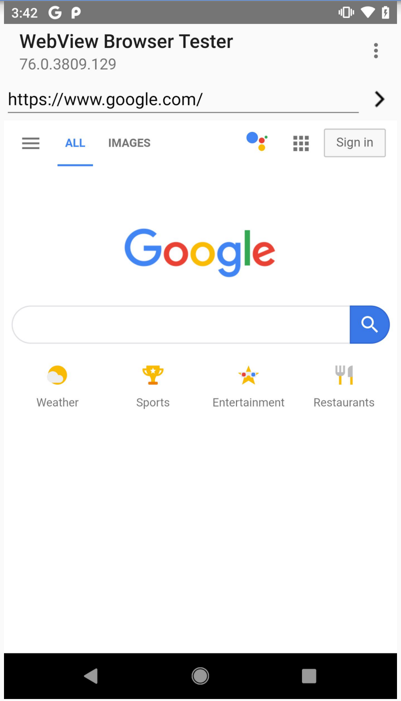
Is this feature supported on all six Blink platforms (Windows, Mac, Linux, Chrome OS, Android, and ***Android WebView****)?*

What is it?

android.webkit.WebView

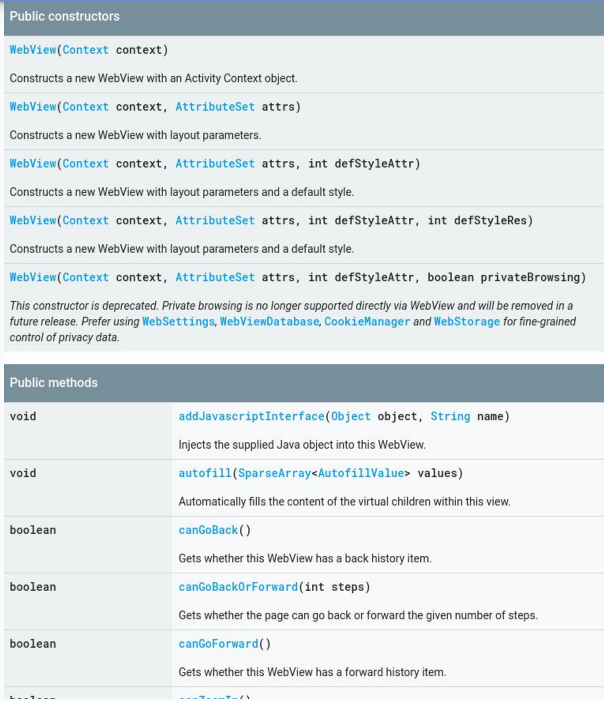
A View in Android SDK to display web contents

Hundreds of APIs



WebView Browser Tester
76.0.3809.129

https://www.google.com/



Public constructors

`WebView(Context context)`

Constructs a new WebView with an Activity Context object.

`WebView(Context context, AttributeSet attrs)`

Constructs a new WebView with layout parameters.

`WebView(Context context, AttributeSet attrs, int defStyleAttr)`

Constructs a new WebView with layout parameters and a default style.

`WebView(Context context, AttributeSet attrs, int defStyleAttr, int defStyleRes)`

Constructs a new WebView with layout parameters and a default style.

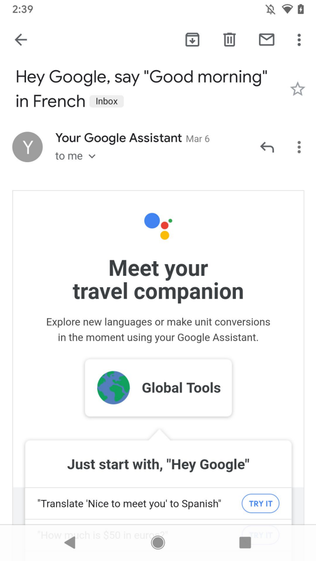
`WebView(Context context, AttributeSet attrs, int defStyleAttr, boolean privateBrowsing)`

This constructor is deprecated. Private browsing is no longer supported directly via WebView and will be removed in a future release. Prefer using `WebSettings`, `WebViewDatabase`, `CookieManager` and `WebStorage` for fine-grained control of privacy data.

Public methods

`void`	`addJavascriptInterface(Object object, String name)` Injects the supplied Java object into this WebView.
`void`	`autofill(SparseArray<AutofillValue> values)` Automatically fills the content of the virtual children within this view.
`boolean`	`canGoBack()` Gets whether this WebView has a back history item.
`boolean`	`canGoBackOrForward(int steps)` Gets whether the page can go back or forward the given number of steps.
`boolean`	`canGoForward()` Gets whether this WebView has a forward history item.
`boolean`	`canZoomIn()`

Primary use cases



Hey Google, say "Good morning" in French

Your Google Assistant Mar 6
to me

Meet your travel companion

Explore new languages or make unit conversions in the moment using your Google Assistant.

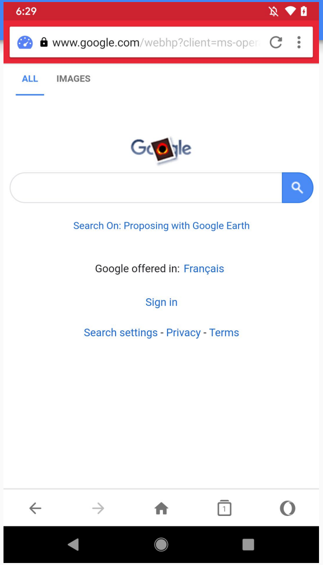
Global Tools

Just start with, "Hey Google"

"Translate 'Nice to meet you' to Spanish"

"How much is $50 in euros"

Embedded into app



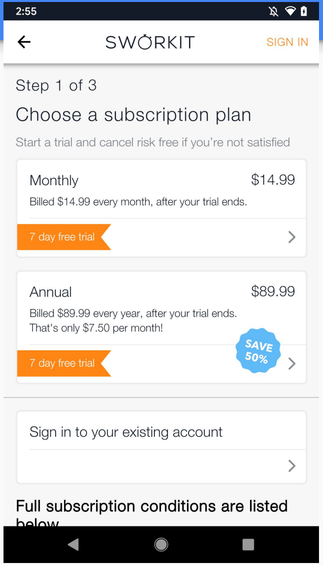
Search On: Proposing with Google Earth

Google offered in: Français

Sign in

Search settings - Privacy - Terms

Browsers



Step 1 of 3

Choose a subscription plan

Start a trial and cancel risk free if you're not satisfied

Monthly $14.99
Billed $14.99 every month, after your trial ends.
7 day free trial

Annual $89.99
Billed $89.99 every year, after your trial ends. That's only $7.50 per month!
7 day free trial

Sign in to your existing account

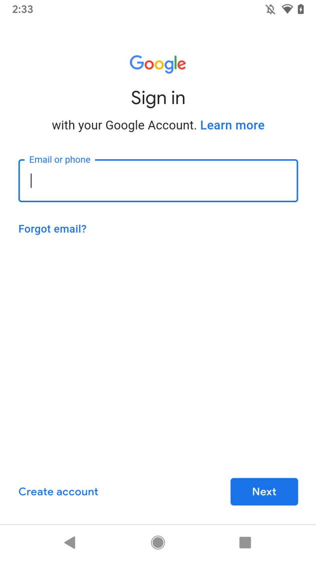
Full subscription conditions are listed below

Cordova

Screenshot missing intentionally

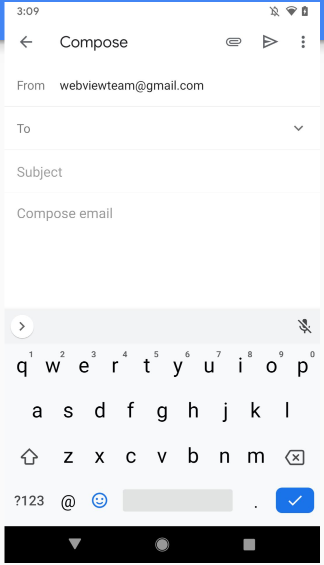
Ads

WebView or not?



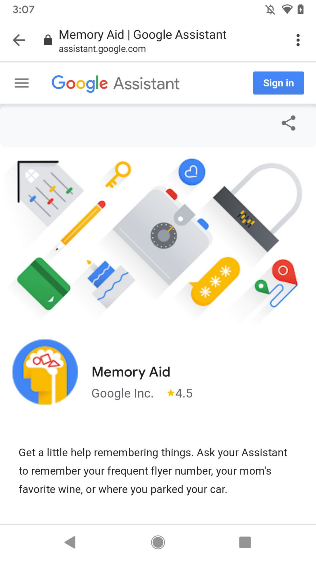
with your Google Account. Learn more

Add Google account on Android



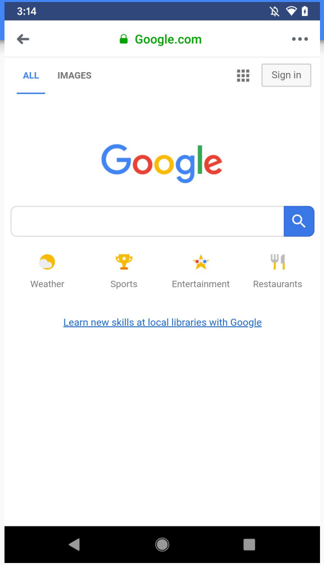
From webviewteam@gmail.com

Gmail email compose



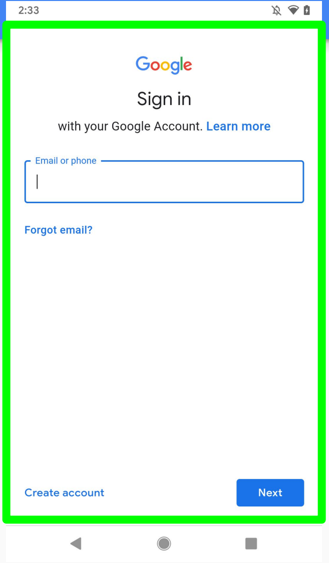
Get a little help remembering things. Ask your Assistant to remember your frequent flyer number, your mom's favorite wine, or where you parked your car.

Clicking on a link in Gmail



Clicking on a link in Facebook app

WebView or not?


2:33

Google

Sign in

with your Google Account. Learn more

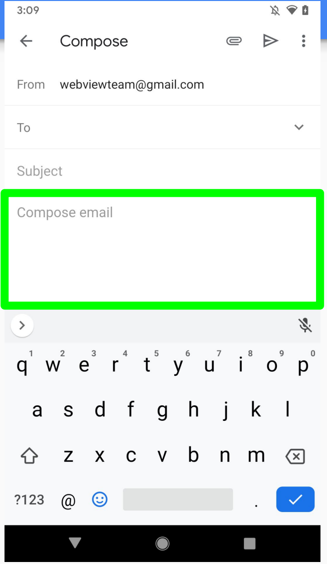
Email or phone

Forgot email?

Create account

Next

Add Google account on Android


3:09

Compose

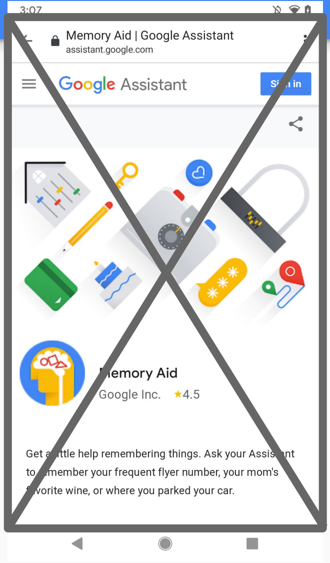
From webviewteam@gmail.com

To

Subject

Compose email

Gmail email compose


3:07

Memory Aid | Google Assistant
assistant.google.com

Google Assistant

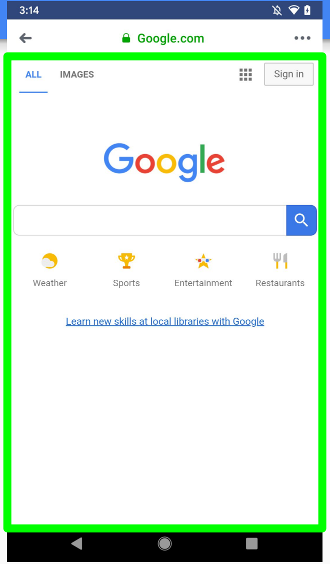
Sign in

Memory Aid

Google Inc. ★4.5

Get a little help remembering things. Ask your Assistant to remember your frequent flyer number, your mom's favorite wine, or where you parked your car.

Clicking on a link in Gmail


3:14

Google.com

ALL IMAGES Sign in

Google

Learn new skills at local libraries with Google

Clicking on a link in Facebook app

WebView is used by apps on every Android device worldwide

What can it do?

loadUrl() ~ navigate in omnibox

onPageStarted/onPageFinished() callbacks ~ update omnibox while navigating

onReceivedError()/onReceivedHttpError() callbacks ~ error page

What can it do?

evaluateJavascript()/@JavascriptInterface ~ interact with web content

setCookie()/getCookie() ~ interact directly with cookie database

shouldInterceptRequest() ~ modify or intercept arbitrary network requests

Technical guts

Trust model

Browser process is the app process

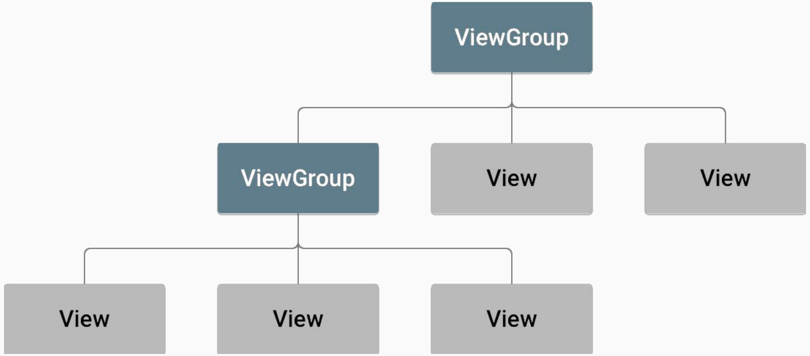
- Shares code, address space, etc. in the same process
- App is “trusted” and has total control over web contents

Each app is ~equivalent to a different installation of chrome (different data dir)

- Does not share cookies or any other profile data with chrome

Each webview is ~equivalent to a tab in chrome

WebView is an Android View



Draws synchronously into View system (lots of blocking graphics operations)

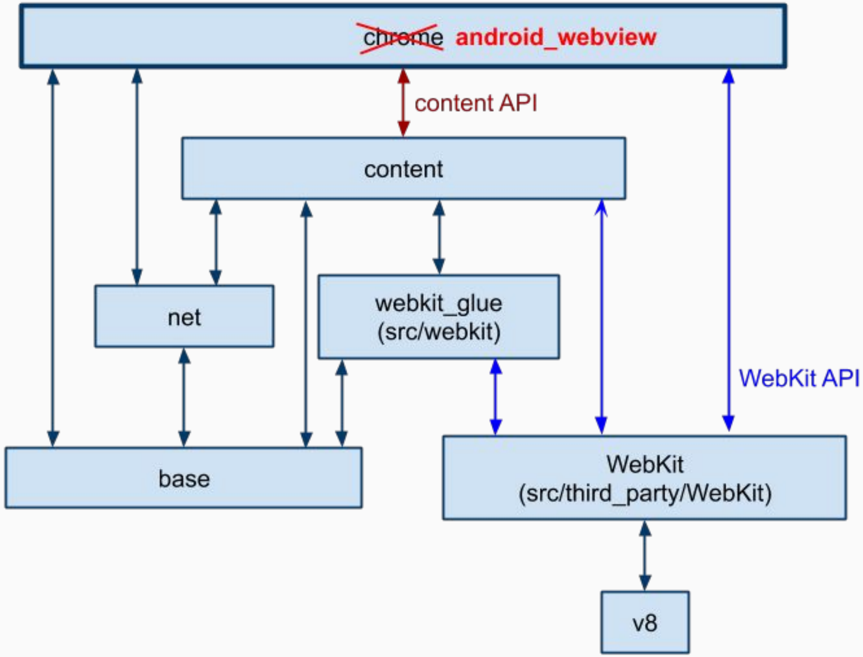
Supports Android platform features (smart text selection, autofill)

APIs to control web platform (ex. ServiceWorkerController)

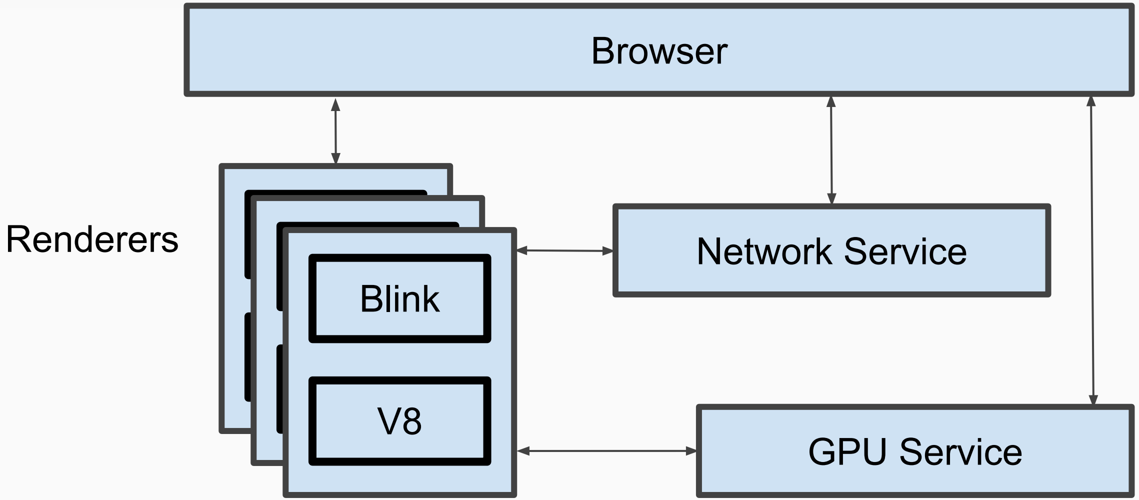
WebView is a Chromium embedder

Embeds content layer, affected by all changes in lower layers

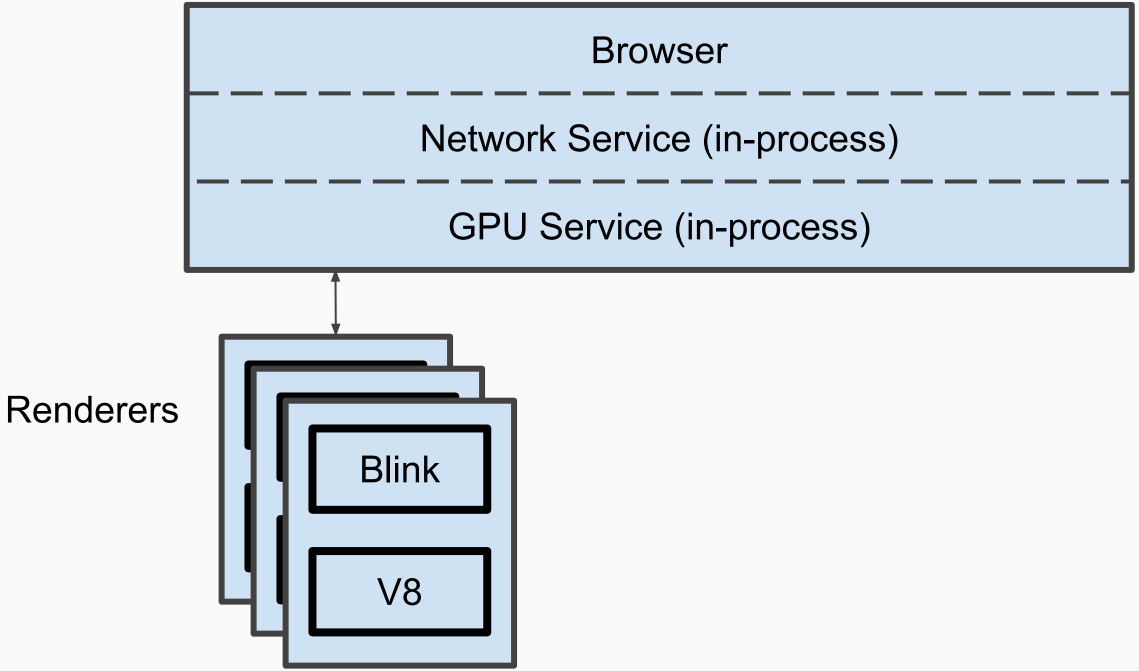
Must support architectural changes (ex. Network Servicification, crashpad)



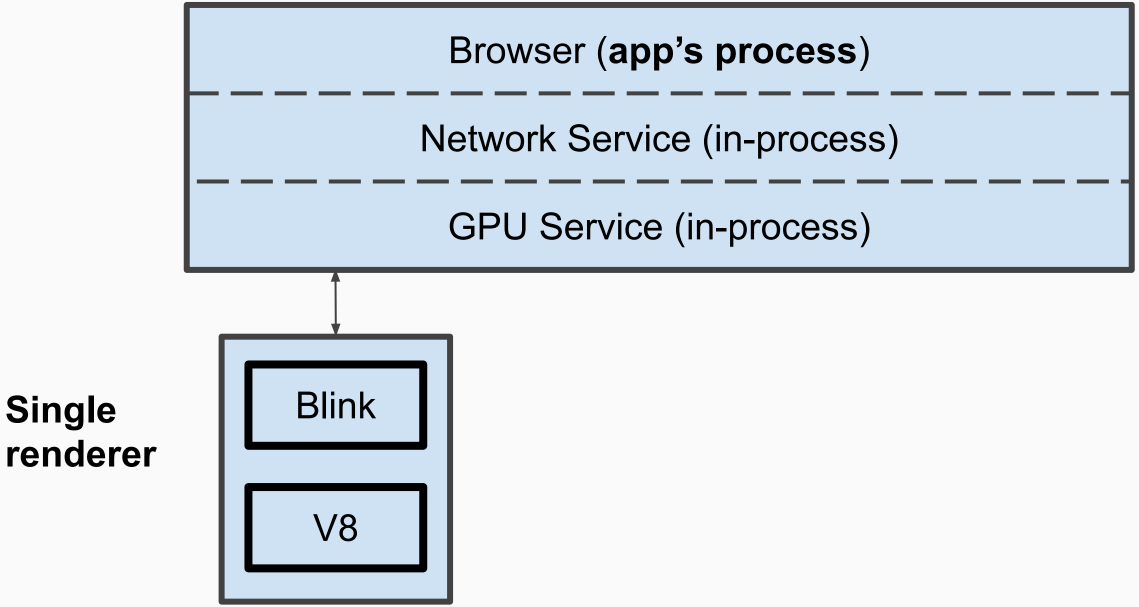
Chrome's architecture (simplified)



Chrome's *low-memory* architecture



WebView’s architecture (Android O+)



Browser (**app’s process**)

Network Service (in-process)

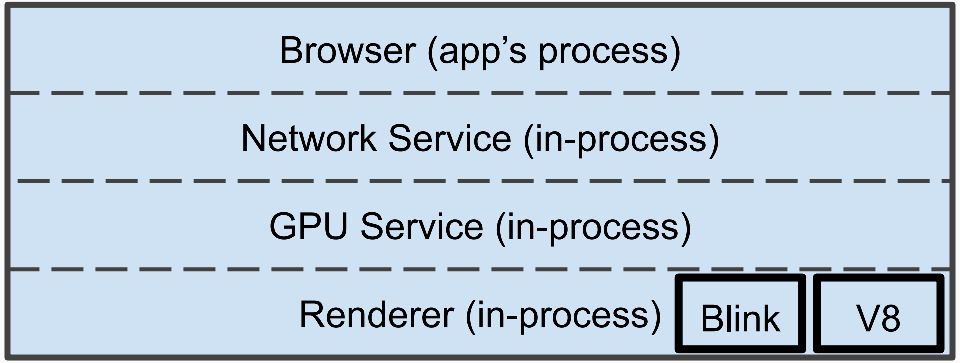
GPU Service (in-process)

Single renderer

Blink

V8

WebView’s architecture (Android L-N)



Browser (app’s process)

Network Service (in-process)

GPU Service (in-process)

Renderer (in-process)

Working with WebView

Developer workflow

Workflow *almost* as easy as Chrome for Android

- Just need an emulator or a userdebug device
- go/webview-docs/quick-start.md (or, //android_webview/docs/)

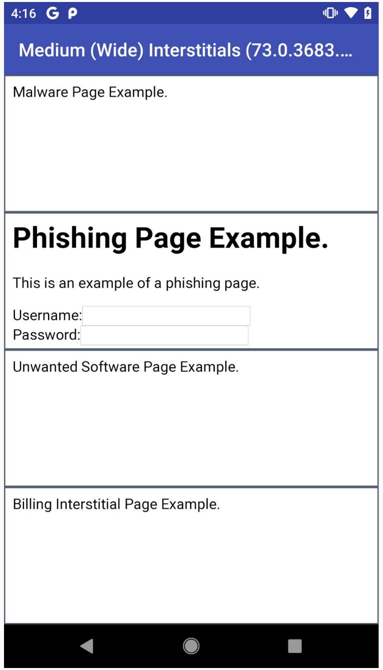
WebView APK only implements WebView APIs

- Also need an embedding app to test
- go/webview-docs/webview-shell.md

Design Challenges

Weird sizes: small, giant

Weird restrictions: no internet, can’t create popups



Medium (Wide) Interstitials (73.0.3683....

Malware Page Example.

Phishing Page Example.

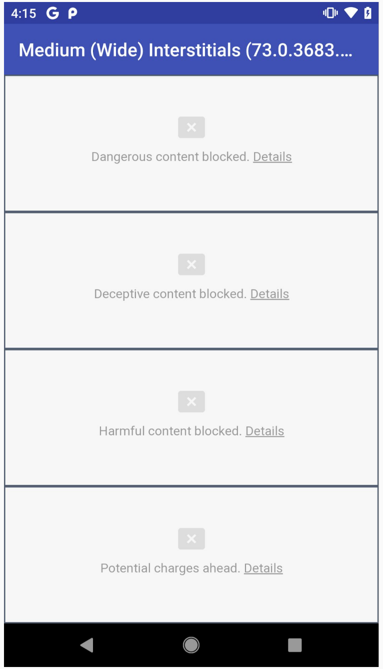
This is an example of a phishing page.

Username:

Password:

Unwanted Software Page Example.

Billing Interstitial Page Example.



Medium (Wide) Interstitials (73.0.3683....

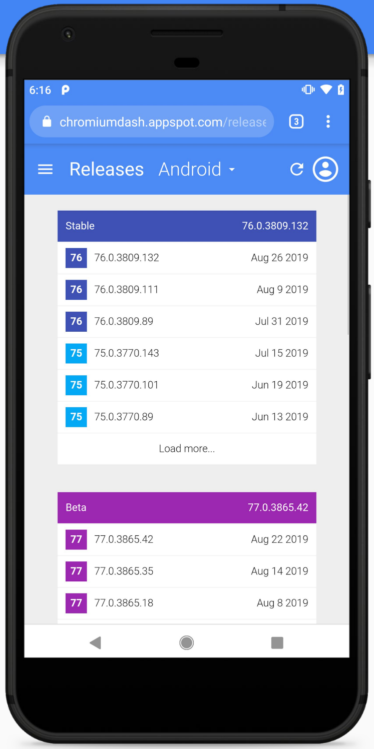
Dangerous content blocked. Details

Deceptive content blocked. Details

Harmful content blocked. Details

Potential charges ahead. Details

Release



6:16

chromiumdash.appspot.com/release

Releases Android

Stable		76.0.3809.132
76	76.0.3809.132	Aug 26 2019
76	76.0.3809.111	Aug 9 2019
76	76.0.3809.89	Jul 31 2019
75	75.0.3770.143	Jul 15 2019
75	75.0.3770.101	Jun 19 2019
75	75.0.3770.89	Jun 13 2019

Load more...

Beta		77.0.3865.42
77	77.0.3865.42	Aug 22 2019
77	77.0.3865.35	Aug 14 2019
77	77.0.3865.18	Aug 8 2019

Identical release as Chrome on Android

Same version pushed to play store at same time. Same version bundled in Android OS system image.

- Respins for one requires respinning both

Supports the same canary, dev, beta, stable channels

Experiments & metrics

Supports metrics (platform == Android WebView)

Supports field trials (platform == ANDROID_WEBVIEW)

Knows about base::Features and flags in blink, content, etc.

Please remember WebView for your features :)