

KARSTEN SILZ

MAY 10, 2022

GOOGLE'S FLUTTER: MOBILE, WEB & DESKTOP FRONTENDS WITH 1 CODEBASE?

BUILD MOBILE, WEB & DESKTOP FRONTENDS WITH FLUTTER & 1 CODEBASE?

YES, WE CAN

I'LL SHOW YOU

BUT WE SHOULDN'T

MOBILE: 👍

WEB: 👎

DESKTOP: 👎

I'LL TELL YOU WHY

WHY & HOW CROSS-PLATFORM

HOW FLUTTER WORKS

MY FLUTTER EXPERIENCES

WHEN TO USE WHICH FRAMEWORK

WHO MADE ME THE EXPERT?



FLUTTER APP IN APP STORES

INFOQ JAVA EDITOR, PC QCON LONDON

JAVA DEVELOPER FOR 23 YEARS

USE JAVA, ANGULAR & FLUTTER –
NOT ASSOCIATED

I GIVE YOU OPTIONS...

. . . BUT YOU DECIDE!



SLIDES & MORE

BPF.LI/QCP

WHY & HOW CROSS-PLATFORM

HOW FLUTTER WORKS

MY FLUTTER EXPERIENCES

WHEN TO USE WHICH FRAMEWORK

WHY CROSS-PLATFORM FRONT-ENDS?

USERS ARE MULTI-PLATFORM

PC



.NET
C#



SWIFTUI
SWIFT



GTK/KDE
C++

MOBILE



SWIFTUI
SWIFT



JETPACK
COMPOSE
KOTLIN

PC

MOBILE











.NET
C#

S
S++

SWIFTUI
SWIFT

JETPACK
COMPOSE
KOTLIN

TOO EXPENSIVE!

PC







MOBILE





1 FRAMEWORK, 1 LANGUAGE
CROSS-PLATFORM

CROSS-PLATFORM FRONT-ENDS: CHEAPER & GOOD ENOUGH

GOOD ENOUGH:
ENTERPRISE & CONSUMER APPS – NOT GAMES

THAT'S WHY CROSS-PLATFORM FRONT-ENDS!

~~WHY~~ & HOW CROSS-PLATFORM

HOW FLUTTER WORKS

MY FLUTTER EXPERIENCES

WHEN TO USE WHICH FRAMEWORK

HOW CROSS-PLATFORM FRONT-ENDS?

BIGGEST SOFTWARE ECOSYSTEM EVER

MOST DEVELOPERS

REACT, ANGULAR, VUE

HARD TO LEARN

WEB

PC







MOBILE





HTML, CSS
JAVASCRIPT/TYPESCRIPT

MISSING ON IOS: PUSH NOTIFICATIONS, BACKGROUND SYNC

RESTRICTED: LOCAL STORAGE, NOT ALL NATIVE FEATURES

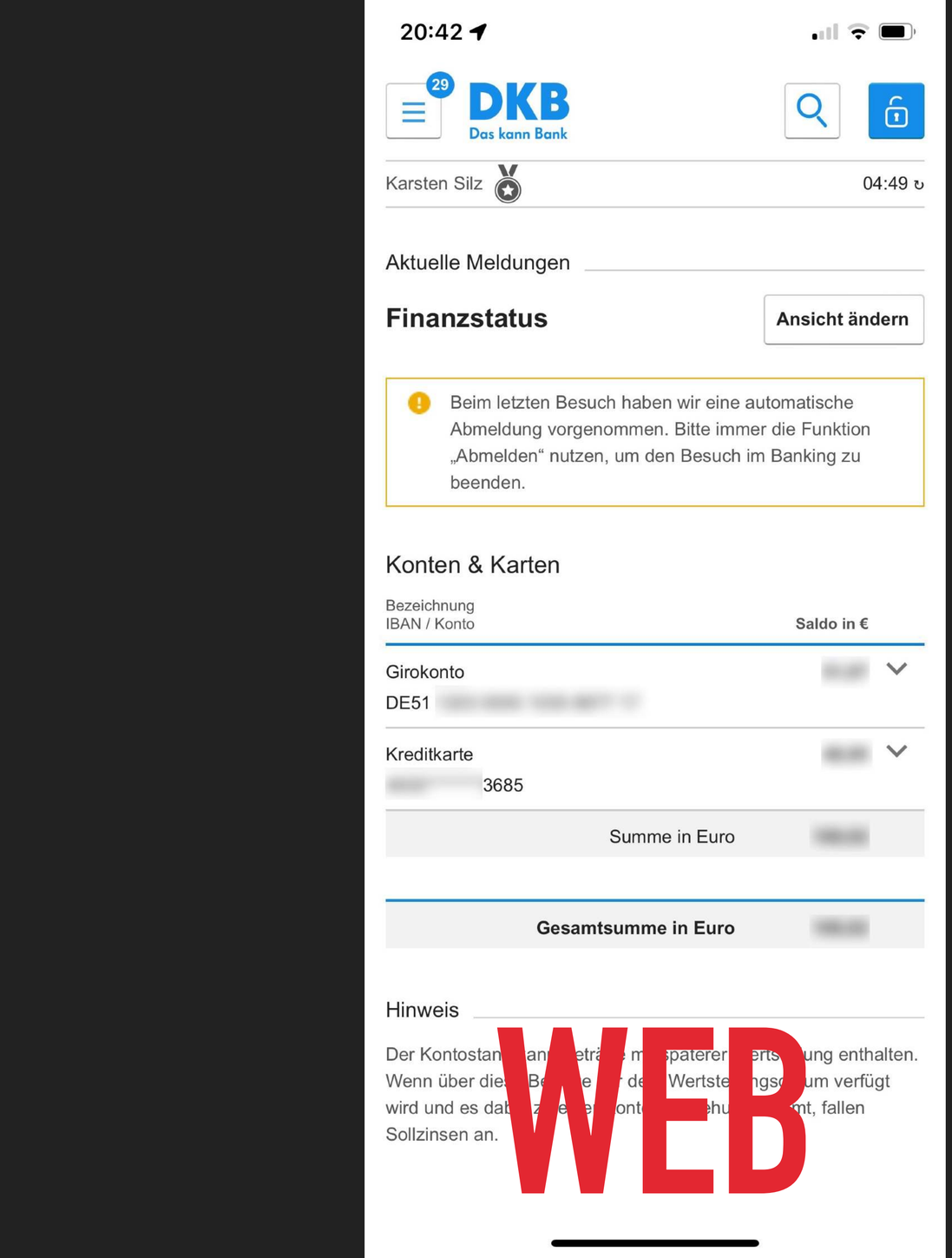
OFTEN SLOWER, LESS COMFORTABLE

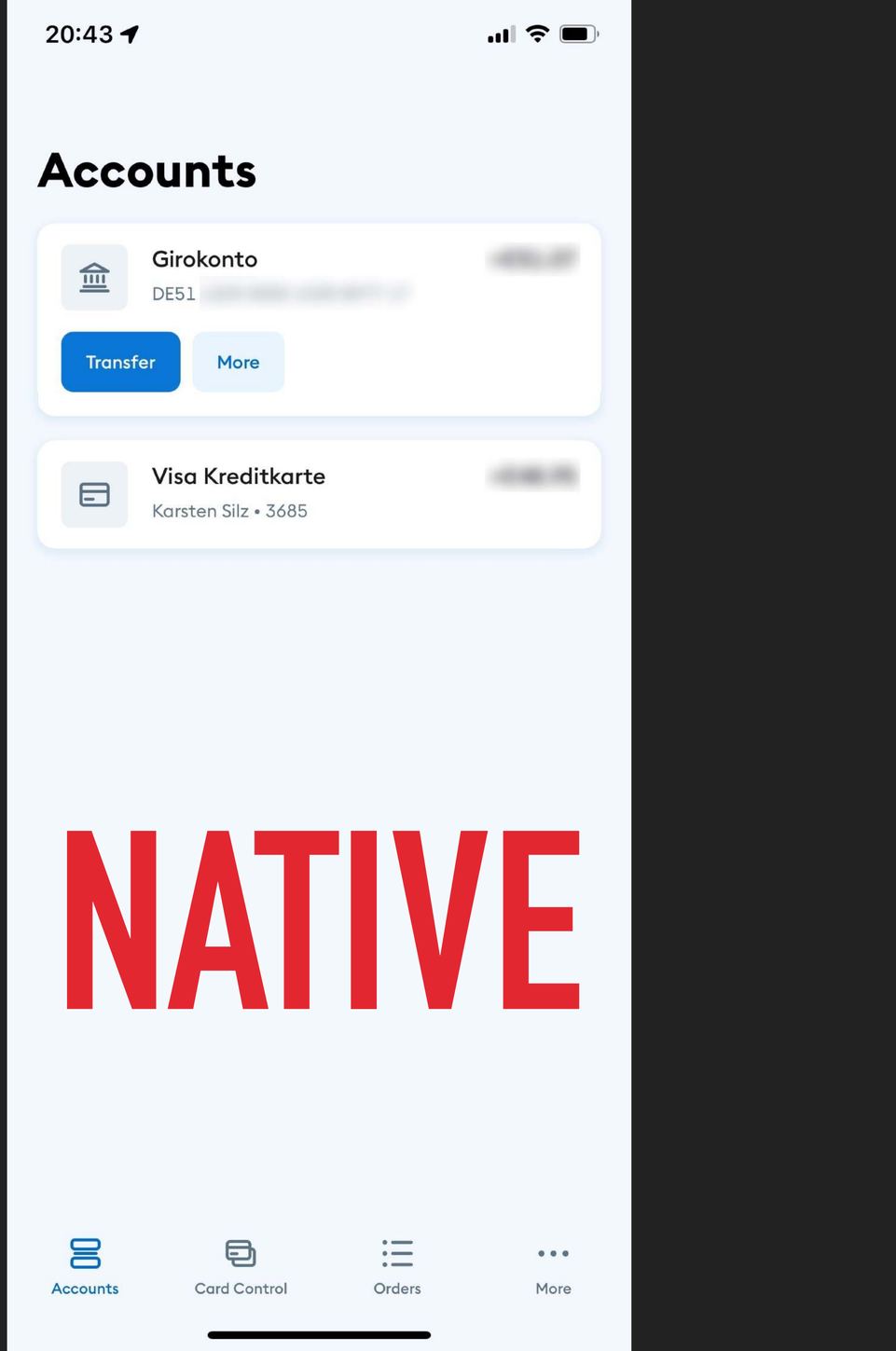
DOESN'T HAVE "PREMIUM FEEL" OF NATIVE LOOK & FEEL

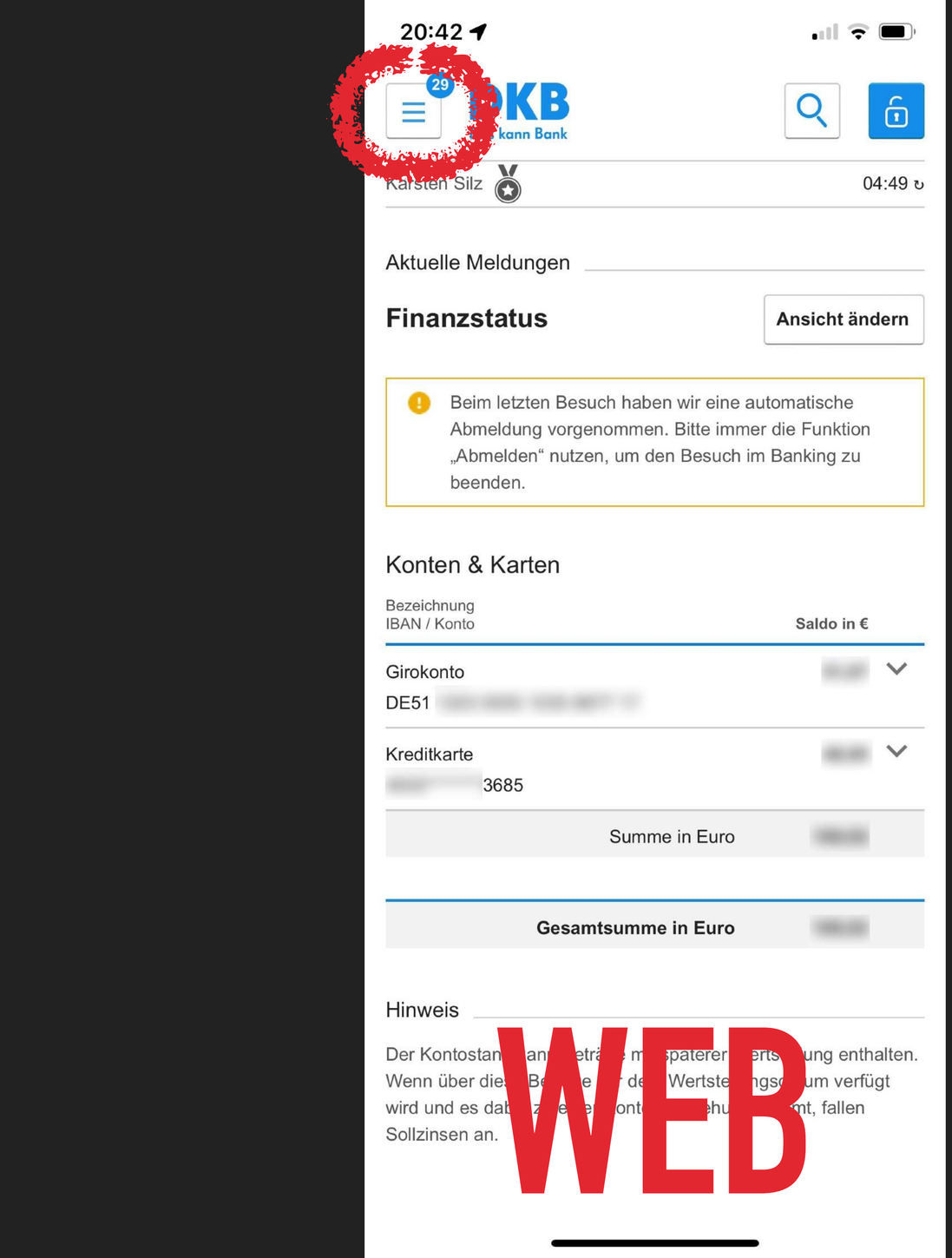
ISSUES: WEB ON MOBILE

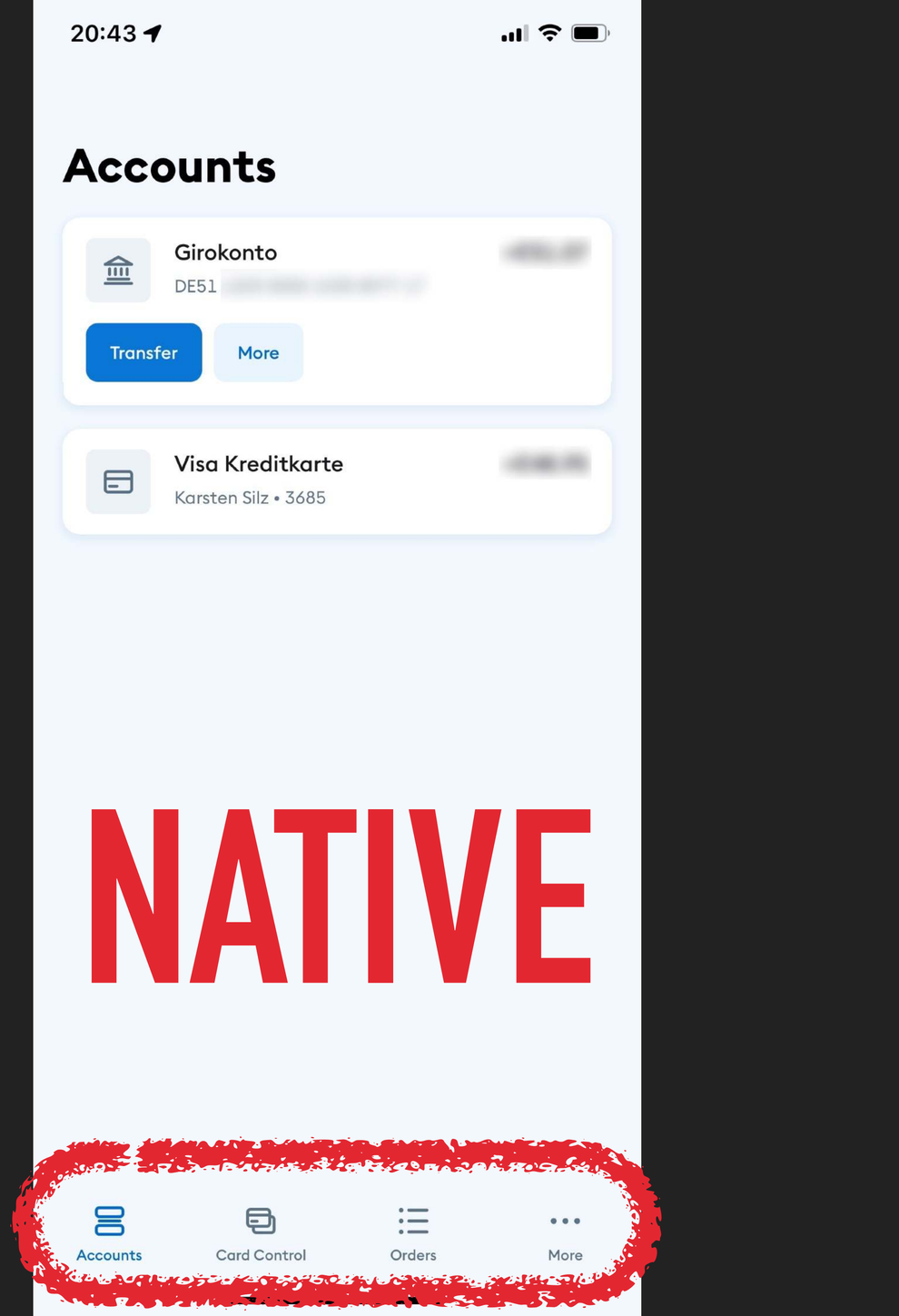
WHY NATIVE LOOK & FEEL?

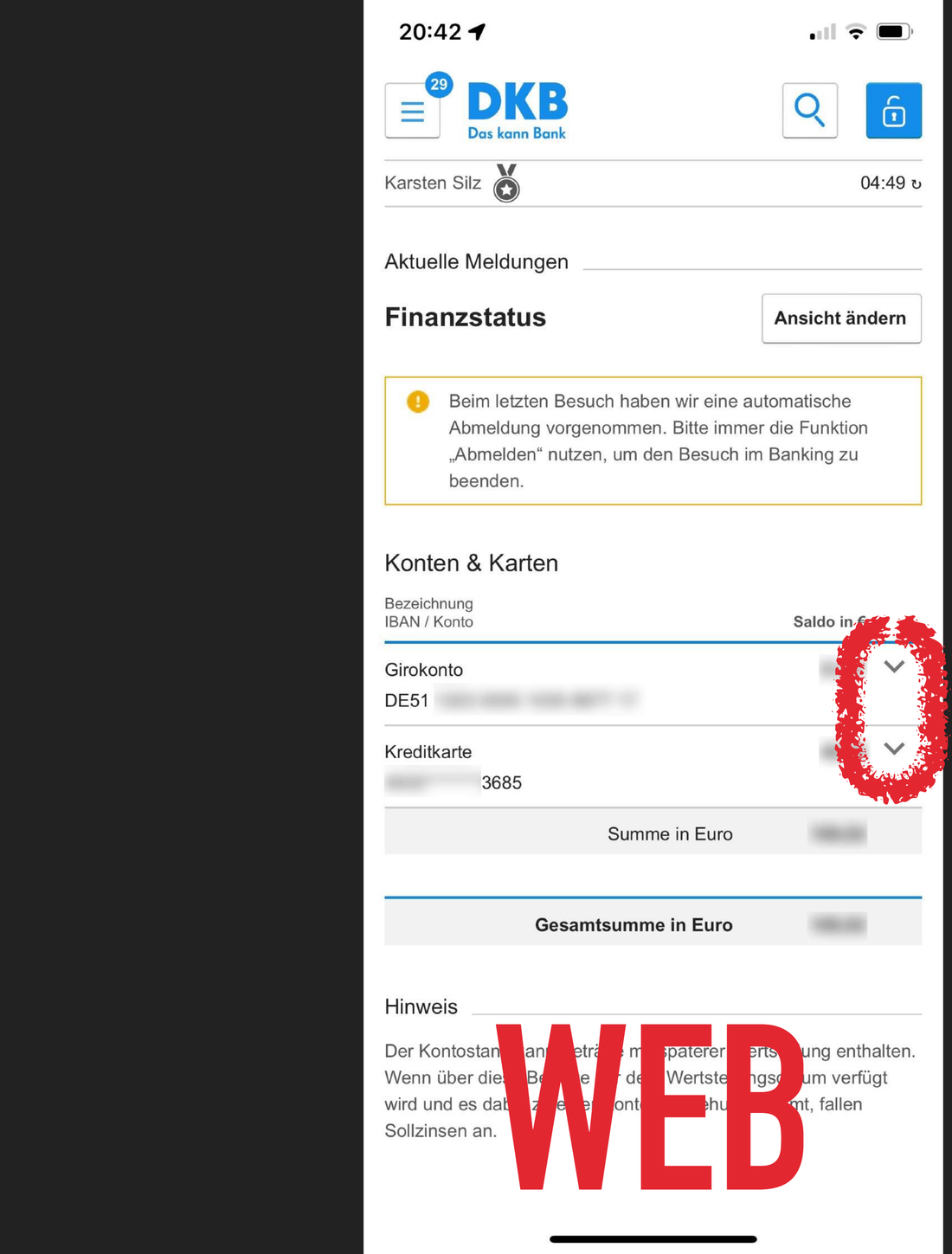
GERMAN ONLINE BANKING APP

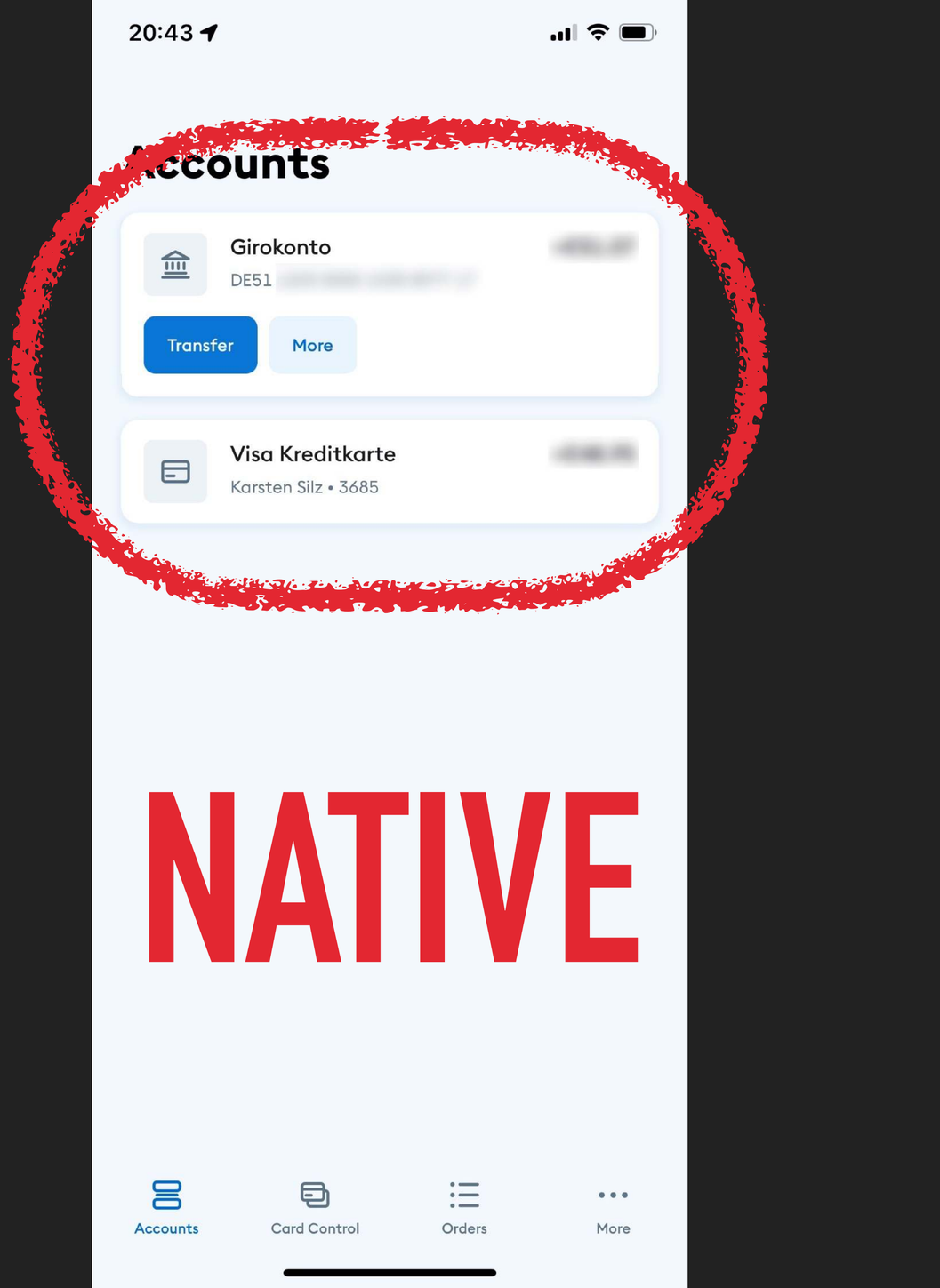

20:42
29
DKB
Das kann Bank
Karsten Silz
04:49
Aktuelle Meldungen
Finanzstatus
Ansicht ändern
Beim letzten Besuch haben wir eine automatische Abmeldung vorgenommen. Bitte immer die Funktion „Abmelden“ nutzen, um den Besuch im Banking zu beenden.
Konten & Karten
Bezeichnung
IBAN / Konto
Saldo in €
Girokonto
DE51
Kreditkarte
3685
Summe in Euro
Gesamtsumme in Euro
Hinweis
Sollzinsen an.
WEB

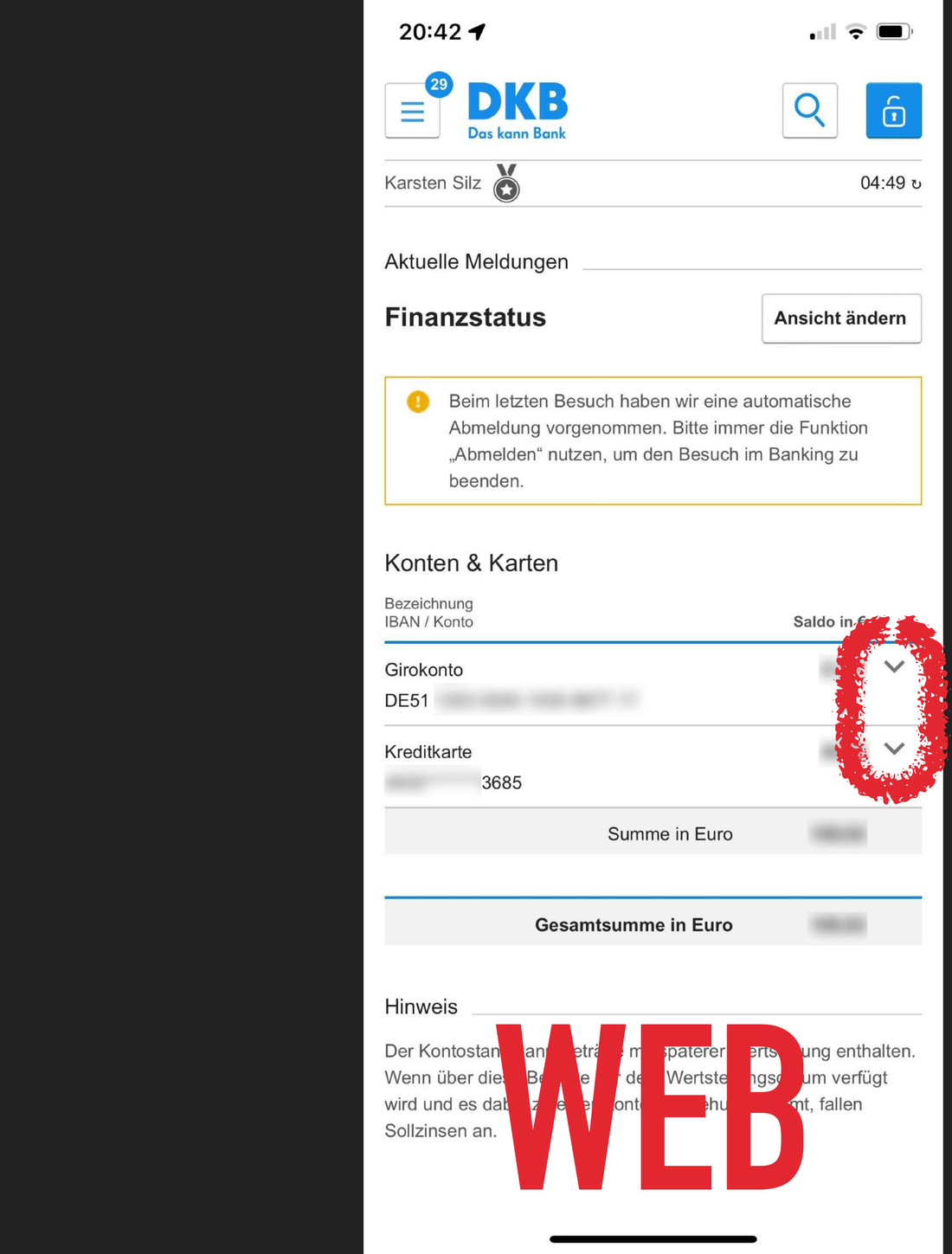

20:43
Accounts
Girokonto
DE51
Transfer
More
Visa Kreditkarte
Karsten Silz • 3685
NATIVE
Accounts
Card Control
Orders
More

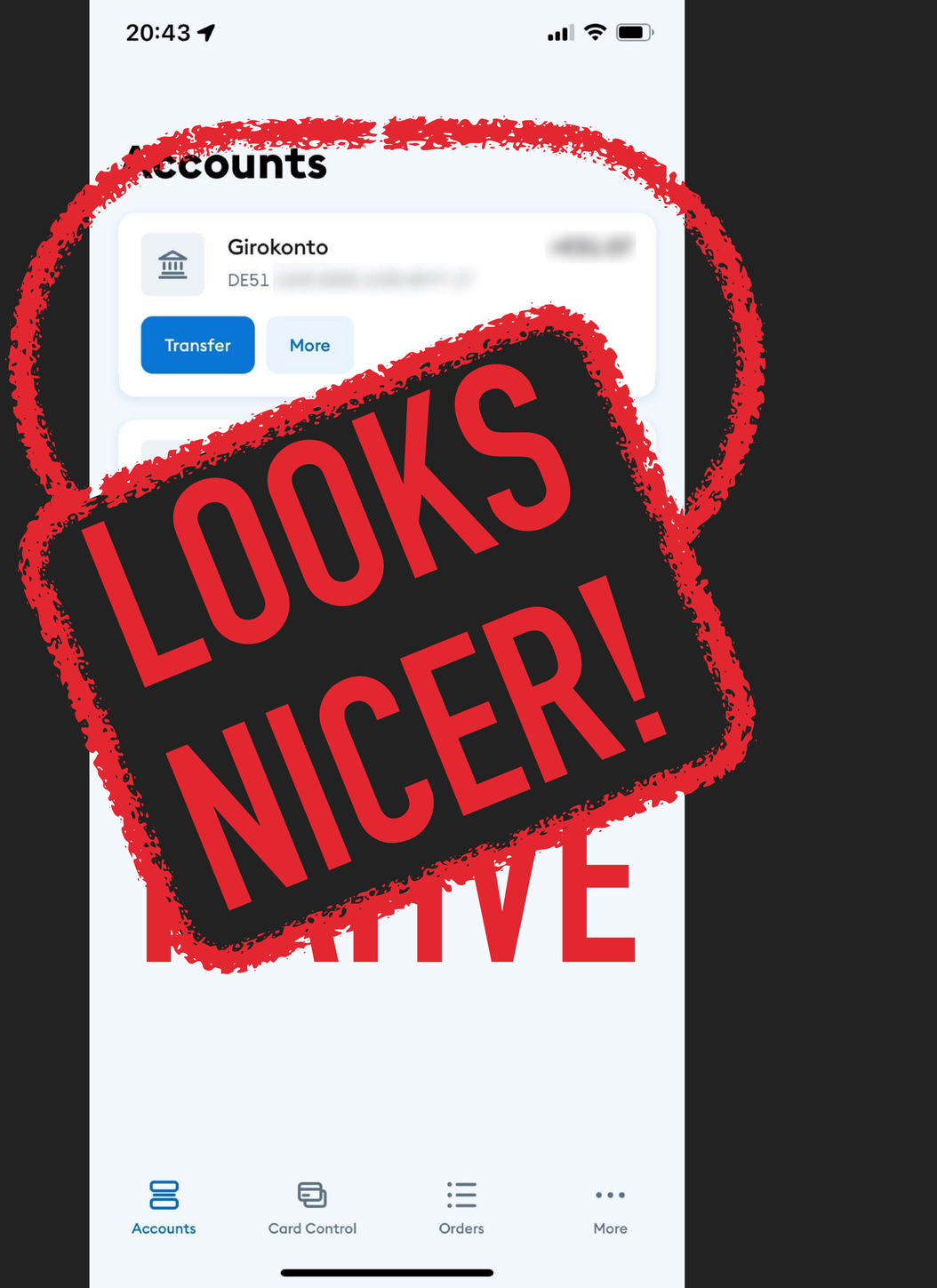

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Summe in Euro
Gesamtsumme in Euro
Hinweis
Wenn über dies
Sollzinsen an.
WEB


20:43
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Girokonto
DE51
Transfer
More
LOOKS NICER!
Accounts
Card Control
Orders
More

LOOKS NICER, EASIER TO USE ("LIKE OTHER APPS")

GOOGLE APPS ON IOS:
MATERIAL UI =>
NATIVE IOS UI

"REALLY MAKE PRODUCTS FEEL GREAT ON APPLE PLATFORMS"

JEFF VERKOEYEN, GOOGLE

CROSS-PLATFORM X 2:
WEB + NATIVE

PC





HTML, CSS
JAVASCRIPT/TYPESCRIPT

MOBILE





NATIVE CROSS-
PLATFORM

RUNS NATIVELY, IN APP STORES

NATIVE LOOK & FEEL

ACCESS TO NATIVE PLATFORM FEATURES

DEFINE: "NATIVE"

NATIVE CROSS-PLATFORM FRAMEWORKS?

FLUTTER (GOOGLE)

XAMARIN/.NET MAUI (MICROSOFT)

REACT NATIVE (META)

JAVAFX (GLUON)

OPEN-SOURCE & JAVA-LIKE

WHICH FRAMEWORK IS POPULAR?

EASIER TO LEARN & USE

EASIER TO CONVINCE TEAMMATES/BOSSES

ALL ELSE EQUAL: USE MOST POPULAR

VERY UNPOPULAR: DON'T USE IT

WHY POPULARITY?

I MEASURE TECHNOLOGY POPULARITY

EMPLOYER POPULARITY: MENTIONED IN JOB ADS @ INDEED (62 COUNTRIES)

TEAMMATES:
CAN I FIND A JOB?

BOSS:

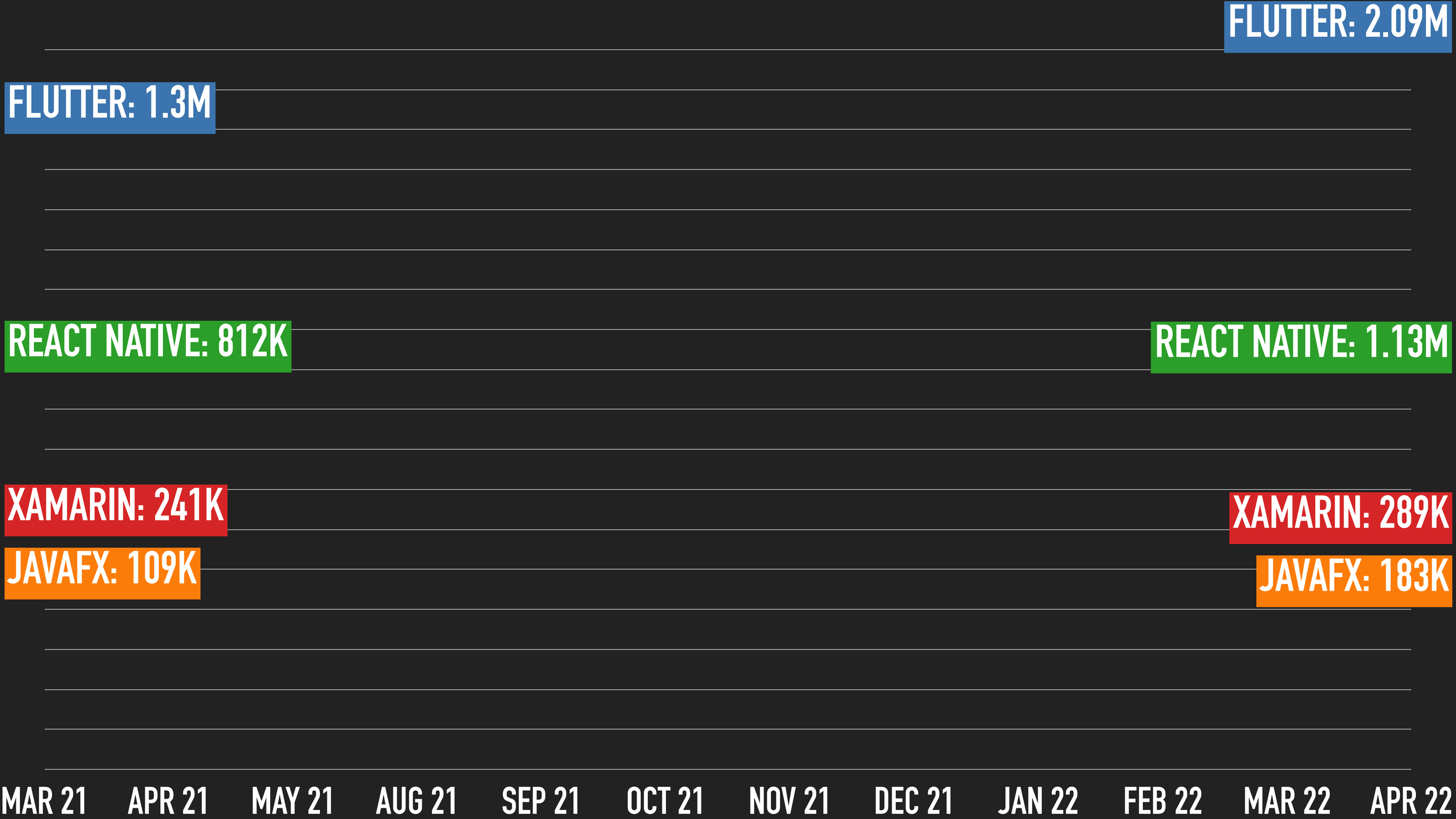
CAN I HIRE DEVELOPERS?


REACT NATIVE: 25.8K
REACT NATIVE: 19.2K
FLUTTER: 8.4K
FLUTTER: 10.4K
XAMARIN: 5.2K
XAMARIN: 5.8K
JAVAFX: 0.6K
JAVAFX: 2K
AUG 21
SEP 21
OCT 21
NOV 21
DEC 21
JAN 22
FEB 22
MAR 22
APR 22

REACT NATIVE: +6.6K

FLUTTER: +2K

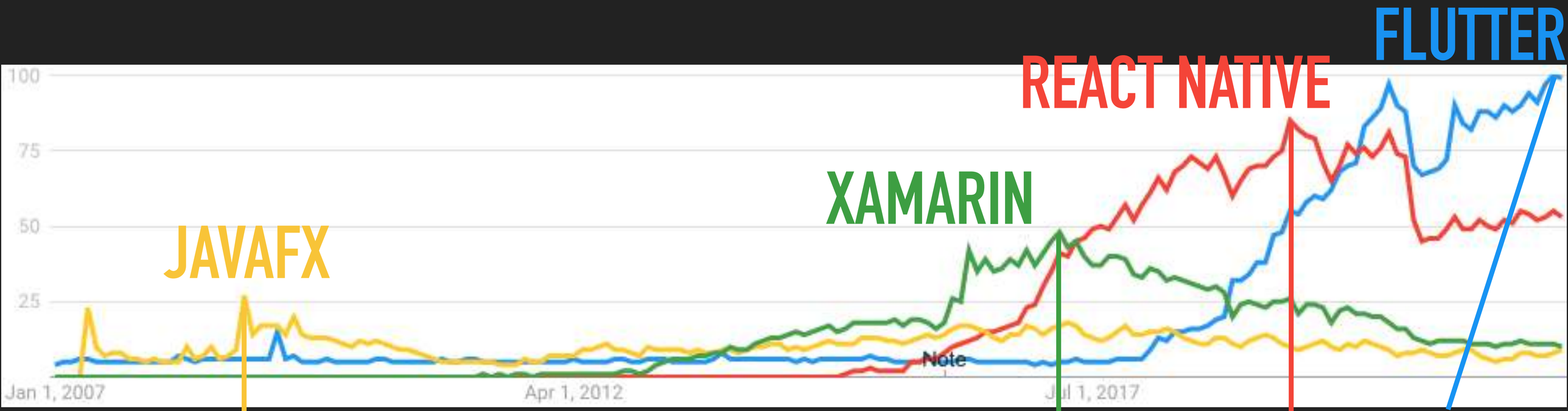
DEVELOPER POPULARITY: COURSES BOUGHT @ UDEMY


FLUTTER: 2.09M
FLUTTER: 1.3M
REACT NATIVE: 812K
REACT NATIVE: 1.13M
XAMARIN: 241K
XAMARIN: 289K
JAVAFX: 109K
JAVAFX: 183K
MAR 21
APR 21
MAY 21
AUG 21
SEP 21
OCT 21
NOV 21
DEC 21
JAN 22
FEB 22
MAR 22
APR 22

FLUTTER: +796K

REACT NATIVE: +319K

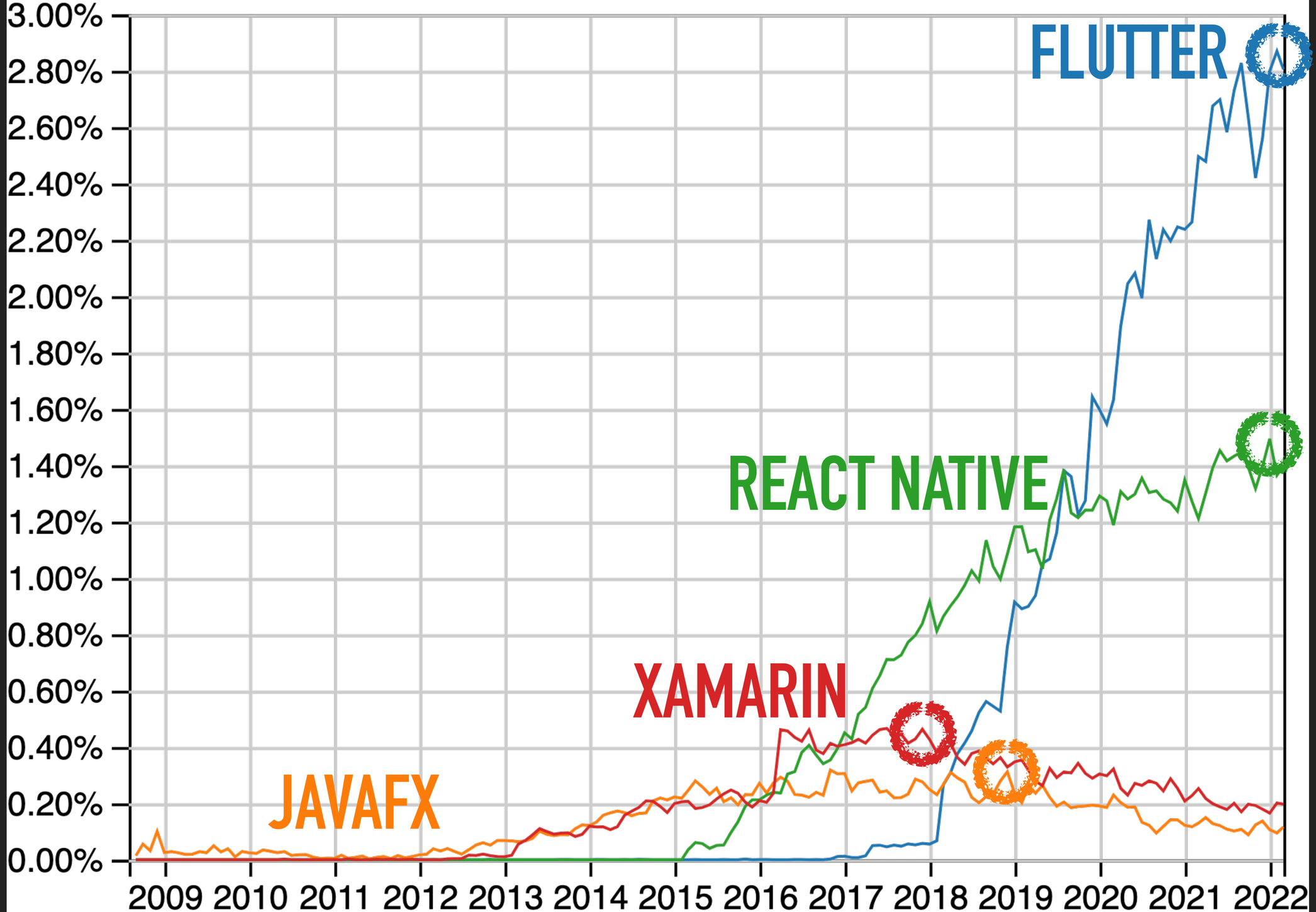
DEVELOPER POPULARITY: GOOGLE SEARCHES


FLUTTER
REACT NATIVE
XAMARIN
JAVAFX
100
75
50
25
Note
Jan 1, 2007
Apr 1, 2012
Jul 1, 2017
DEC 2008
MAR 2017
JUL 2019
MAR 2022

FLUTTER: 99

REACT NATIVE: 53

DEVELOPER POPULARITY: QUESTIONS @ STACK OVERFLOW


3.00%
2.80%
2.60%
2.40%
2.20%
2.00%
1.80%
1.60%
1.40%
1.20%
1.00%
0.80%
0.60%
0.40%
0.20%
0.00%
2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022
FLUTTER
REACT NATIVE
XAMARIN
JAVAFX

FLUTTER: 2.81

REACT NATIVE: 1.40

EMPLOYER POPULARITY: REACT NATIVE WINS BY 2.5X,
HOLDING STEADY AGAINST FLUTTER

DEVELOPER POPULARITY: FLUTTER WINS BY 2X,
PULLING AWAY FROM REACT NATIVE

POPULARITY

MY NEWSLETTER: JVM LANGUAGES & FRAMEWORKS, DATABASES, WEB FRAMEWORKS

SECTION SUMMARY

WEB: BIGGEST, MANY DEVS, HARD TO LEARN – REACT, ANGULAR, VUE

NATIVE: MOBILE – FLUTTER (DEVELOPERS), REACT NATIVE (EMPLOYERS), .NET MAUI, JAVAFX

THAT'S HOW CROSS-PLATFORM FRONT-ENDS!

~~WHY & HOW CROSS-PLATFORM~~

HOW FLUTTER WORKS

MY FLUTTER EXPERIENCES

WHEN TO USE WHICH FRAMEWORK

HOW FLUTTER WORKS

FLUTTER & DART MASCOT DASH



WILL GOOGLE KILL FLUTTER?

Killed by Google

Search

All (266)

Follow @killedbygoogle on Twitter.

March 2023

Google Currents (2019)

Floating belly up in 11 months, Google Currents was service that provided social media features similar to Google+ for Google Workspace customers. It will be almost 4 years old.

December 2022

YouTube Originals

Getting unplugged in 8 months, YouTube Originals was a variety of original content including scripted series, educational videos, and music and celebrity programming. It will be over 6 years old.

December 2022

Google OnHub

To be turned off in 8 months, Google OnHub was a series of residential wireless routers manufactured by Asus and TP-Link that were powered by Google software, managed by Google apps, and offered enhanced special features like Google Assistant. It will be

June 2022

Google Chrome Apps

To be exterminated in 2 months, Google Chrome Apps were hosted or packaged web applications that ran on the Google Chrome browser. It will be over 11 years old.

May 2022

G Suite (Legacy Free Edition)

Off to the glue factory in 7 days, G Suite (Legacy Free Edition) was a free tier offering some of the services included in Google's productivity suite. It will be over 15 years old.

- IN-HOUSE COMPETITION: ANGULAR, JETPACK COMPOSE
- EXTERNAL COMMITMENT: TOYOTA, UBUNTU
- POPULAR: WINS WITH DEVS, 2ND PLACE IN JOBS

WE DON'T KNOW!

WHICH PLATFORM
STABLE SINCE WHEN?

PC







FEB
2022

2022?

WEB



MAR
2021

MOBILE





DEC
2018

PROGRAMMING LANGUAGE: DART

```
class MyClass extends AnotherClass {
  String firstName = "Karsten";
  int yearsOfJava = 23;
  List<String> myList = new LinkedList<>();

  String sayHello(String name) {
    var feedback = "Hello, " + name;
    return feedback;
  }
}
```

THIS IS JAVA

```
class MyClass extends AnotherClass {
  String firstName = "Karsten";
  int yearsOfJava = 23;
  List<String> myList = List.empty();

  String sayHello(String name) {
    var feedback = "Hello, " + name;
    return feedback;
  }
}
```

THIS IS DART

```
class MyClass extends AnotherClass {
  var firstName = "Karsten";
  var yearsOfJava = 23;
  var myList = <String>[];

  sayHello(String name) => "Hello, $name";
}
```

CONCISE DART

```
class MyClass extends AnotherClass {
  String firstName = "Karsten";
  int yearsOfJava = 23;
  List<String> myList = new LinkedList<>();

  String sayHello(String name) {
    var feedback = "Hello, " + name;
    return feedback;
  }
}
```

THIS IS JAVA

ORIGINALLY FOR BROWSER

"SIMPLIFIED JAVA FOR UI DEVELOPMENT"

SOUND NULL SAFETY & ASYNC/AWAIT

1 MAIN THREAD, CREATE THREADS (ISOLATES)

DART

GOOGLE TUNES
DART FOR FLUTTER

```
return Column(
  children: [
    Text("First name: $firstName"),
    Text("Last name: $lastName"),
    if (isAdmin) Text("Password: $password"),
  ],
);
```

SYNTACTIC SUGAR

```
return Column(
  children: [
    Text("First name: $firstName"),
    Text("Last name: $lastName"),
    if (isAdmin) Text("Password: $password"),
  ],
);
```

INSTEAD OF SEPARATE ARRAY

WITH IF STATEMENT

SYNTACTIC SUGAR

LIBRARIES: PLUGINS

23K PLUGINS, NOT ALL FOR WEB/DESKTOP

MOST ARE OPEN-SOURCE

GOOD "PLUGIN SURVIVAL RATIO"

FORKING PLUGINS IS EASY

PLUGINS

UI ELEMENTS: WIDGETS

```
Column(
  mainAxisAlignment:
    MainAxisAlignment.center,
  children: <Widget>[
    Text('Pushed $_counter times'),
    ElevatedButton(
      onPressed: () ⇒
        setState(() ⇒ _counter++),
      child: Icon(Icons.add),
    )
  ],
)
```

UI AS CODE

CONFIGURE BUILT-IN WIDGETS, CREATE YOUR OWN

EMULATED WITH GRAPHIC ENGINE SKIA (CHROME, FIREFOX)

NO NATIVE SDK UI ELEMENTS: "FLUTTER PAINTS PIXELS"

WIDGETS

LOOK & FEEL:
WIDGET SETS

BASE: CONTAINER, ROW, COLUMN, TEXT, IMAGES, SHAPES, . . .

BUILT-IN LOOK & FEEL: MATERIAL DESIGN, IOS

3RD-PARTY LOOK & FEEL: MACOS, WINDOWS, LINUX

WIDGETS SETS

SAMPLE FLUTTER APP:
5 NATIVE LOOK & FEEL
WITH 1 CODEBASE

LIVE DEMO

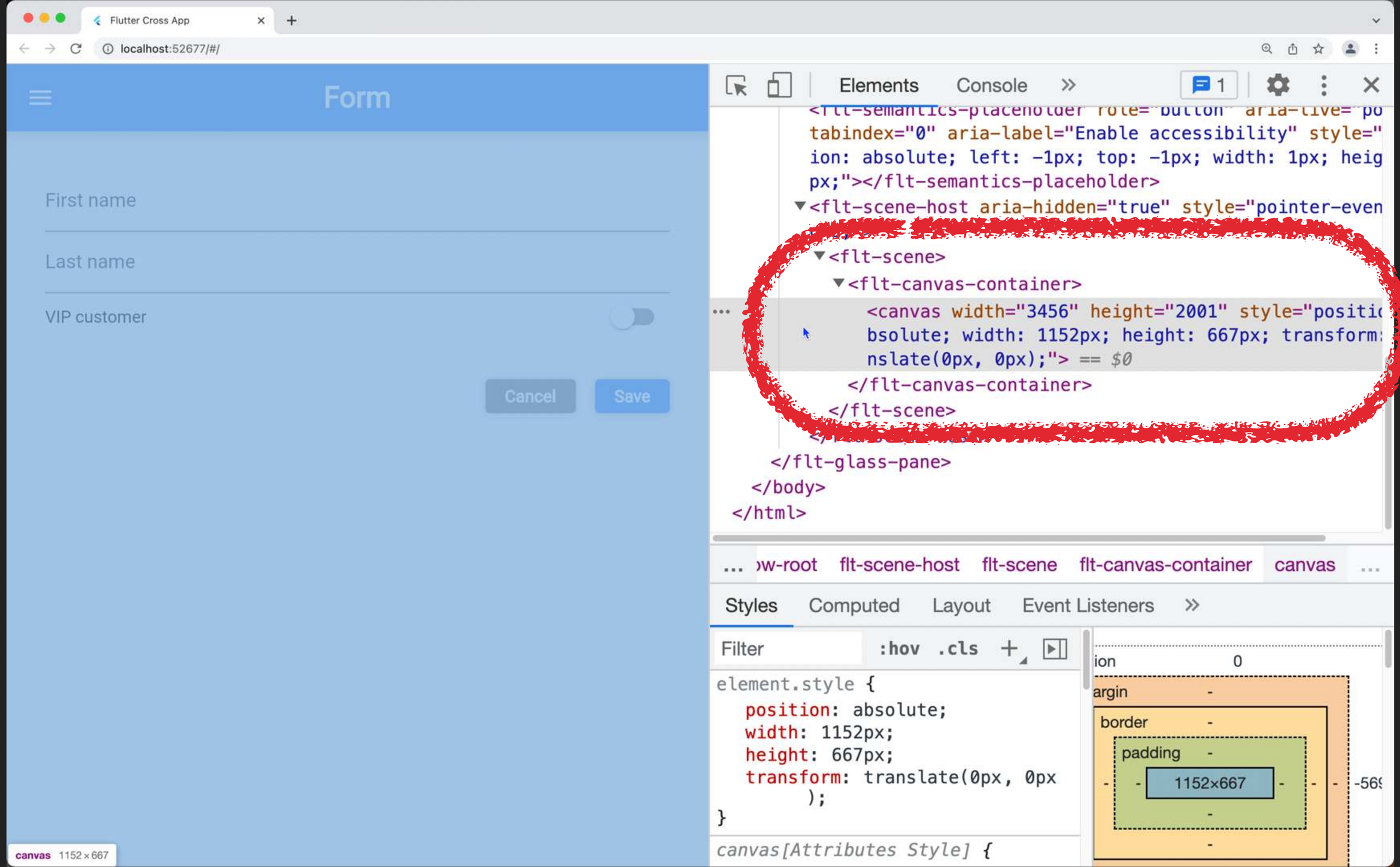
SAMPLE FLUTTER APP

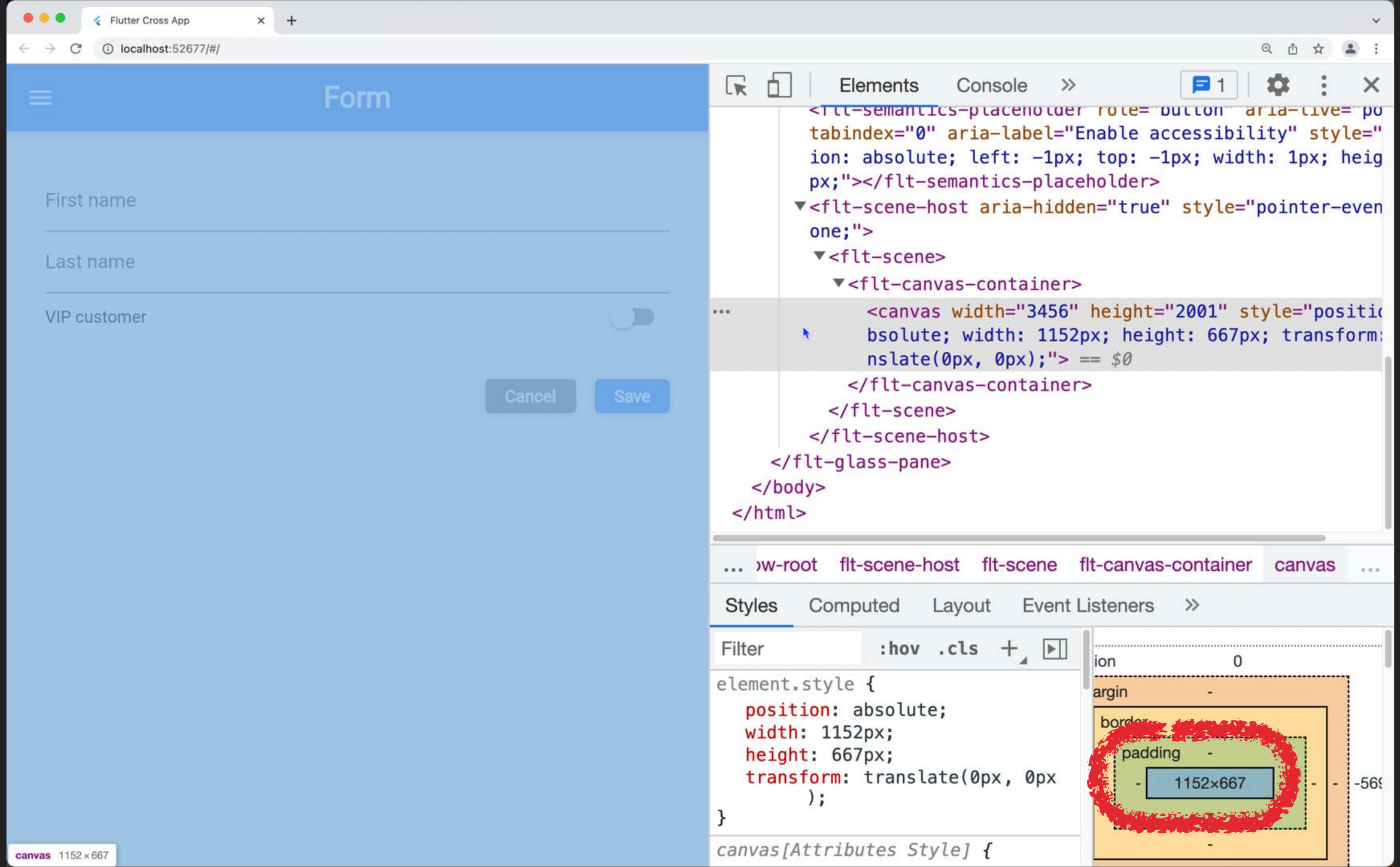


5 NATIVE LOOK & FEEL

SWITCH LOOK & FEEL

SWITCH LOOK & FEEL BECAUSE "FLUTTER PAINTS PIXELS"


Flutter Cross App
localhost:52677/#/
Form
First name
Last name
VIP customer
Cancel
Save
canvas 1152 × 667
Elements
Console
1
<flt-semantics-placeholder tabindex="0" aria-label="Enable accessibility" style="
ion: absolute; left: -1px; top: -1px; width: 1px; heig
px;"></flt-semantics-placeholder>
<flt-scene-host aria-hidden="true" style="pointer-even
<flt-scene>
<flt-canvas-container>
<canvas width="3456" height="2001" style="positi
bsolute; width: 1152px; height: 667px; transform:
nslate(0px, 0px);"> == $0
</flt-canvas-container>
</flt-scene>
</flt-glass-pane>
</body>
</html>
flt-scene-host
flt-scene
flt-canvas-container
canvas
Styles
Computed
Layout
Event Listeners
Filter
:hov .cls
element.style {
position: absolute;
width: 1152px;
height: 667px;
transform: translate(0px, 0px
);
}
canvas[Attributes Style] {
ion 0
argin -
border -
padding -
1152×667


Flutter Cross App
localhost:52677/#/
Form
First name
Last name
VIP customer
Cancel
Save
canvas 1152 × 667
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<flt-semantics-placeholder role="button" aria-live="po
tabindex="0" aria-label="Enable accessibility" style="
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transform: translate(0px, 0px
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}
canvas[Attributes Style] {
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border
padding -
1152×667

SAMPLE APP ON GITHUB

CREATED MY OWN WIDGETS

WIDGETS HAVE SWITCH STATEMENT =>
CREATES WIDGET FOR CURRENT PLATFORM

HOW DOES SWITCH WORK?

GLOBAL STATE MANAGEMENT: "PROVIDER"

WIDGET SET: MATERIAL/NATIVE/CUSTOM

ROUTING: SIMPLE ("NAVIGATOR")/COMPLEX ("ROUTER")

LAYOUT: NO DEFAULT – 3RD PARTY PLUGIN

ARCHITECTURAL CHOICES

NATIVE INTEGRATION

IOS/ANDROID: STABLE

WEB/DESKTOP: UNDER CONSTRUCTION?

FLUTTER IN NATIVE APPS

PLUGINS: CAMERA, PICTURES, LOCATION, . . .

MOBILE: SHOW NATIVE SCREENS + WEB VIEWS

MOBILE: CHANNELS (PUBLISH & SUBSCRIBE) TO NATIVE CODE & C-API

NATIVE CODE IN FLUTTER

RUN NATIVELY

ANDROID: ANDROID STUDIO, IOS/MACOS: MACOS + XCODE,
WINDOWS: WINDOWS + VISUAL STUDIO

FLUTTER ENGINE: JAVASCRIPT (WEB), C/C++

FLUTTER APP: NATIVE ARM LIBRARY (MOBILE), JAVASCRIPT (WEB), C++ (WINDOWS, LINUX), OBJECTIVE-C (MACOS)

PLATFORM TOOL CHAINS

CODE, BUILD & DEPLOY

"EXCELLENT DEVELOPER EXPERIENCE"

IDE: INTELLIJ/ANDROID STUDIO & VISUAL STUDIO CODE

DEV TOOLS: INSPECTOR, PROFILER FOR MEMORY, CPU & NETWORK, "JANK" DIAGNOSIS, WORK IN TERMINAL

CODE

MONOREPO: CODE FOR ALL PLATFORMS IN 1 GIT PROJECT

1 FOLDER FOR DART, 1 FOLDER PER PLATFORM (SOME PROJECTS – XCODE, ANDROID STUDIO)

PLATFORM: NATIVE SHELLS (`APPDELEGATE.SWIFT`, `MAINACTIVITY.KT`)

PROJECT STRUCTURE

SLOW IOS/ANDROID BUILDS

DART VM DURING DEVELOPMENT

HOT RESTART: APP STARTS OVER IN 3 SECONDS

HOT RELOAD: 1 SECOND FROM "SAVED" TO "RUNNING"

FAST BUILD & DEPLOY

FLUTTER
PLATFORM CHECK

- "2 APPS FOR THE PRICE OF 1"
- NATIVE LOOK & FEEL
- ACCESS TO NATIVE LIBRARIES
- FASTER BUILD & DEPLOY

MOBILE: 

- ONLY MATERIAL UI
- NO ACCESS TO JAVASCRIPT LIBRARIES
- TINY AMOUNT OF LIBRARIES VS. JAVASCRIPT

WEB: 👎

⊖ WHY NOT WEB?

⊖ ONLY WINDOWS STABLE, MAC & LINUX NOT

⊕ ACCESS TO NATIVE LIBRARIES

◯ WINDOWS & MACOS UI: INCOMPLETE, MAINTAINED?

DESKTOP: 👎

SECTION SUMMARY

DART

PLUGINS

WIDGETS

WIDGET SETS

NATIVE INTEGRATION

RUNS NATIVELY

CODE, BUILD & DEPLOY

PLATFORM CHECK

THAT'S HOW FLUTTER WORKS

~~WHY & HOW CROSS-PLATFORM~~

~~HOW FLUTTER WORKS~~

MY FLUTTER EXPERIENCES

WHEN TO USE WHICH FRAMEWORK

MY FLUTTER EXPERIENCES

B2B SAAS FOR CAT-SITTERS

REMOVE FRICTION & SAVE TIME

I WROTE ALL CODE

MY START-UP

CAT-
SITTER

FRONT-
END

MANA-
GER

FLUTTER

IOS & ANDROID

ANGULAR

BROWSER

AUTHENTICATION

FILES

FIREBASE

JAVA & SPRING

DB

BACK-
END

UNLIMITED STORAGE, PUSH NOTIFICATIONS

AS FAST & EASY TO USE AS POSSIBLE => NATIVE UI

PRODUCTIVITY: DART + FAST CODE, BUILD & DEPLOY

FLUTTER BUSINESS CASE

WORKS AS DESIGNED: "2 APPS FOR PRICE OF 1"

MINOR QUIBBLES (E.G. SIMULATOR DOESN'T STOP)

APPLE TROUBLE (E.G., NO PASTE INTO SIMULATOR)

FLUTTER LISTENS (BUG FIXES, DEV SURVEYS)

FLUTTER ON MOBILE 👍🏻

WORKS WELL ON IOS & ANDROID

IOS QUIBBLES (NO LIST TILE)

FLUTTER TEAM: DON'T USE NATIVE
LOOK & FEEL, "CUSTOMIZE MATERIAL"

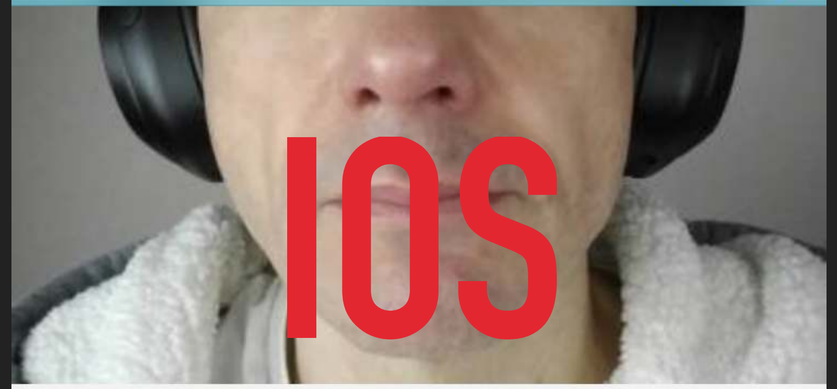
FLUTTER PAINTS PIXELS 👍

NATIVE LOOK & FEEL: IOS VS. ANDROID

Network Provider 4:25 PM

My Data

Edit



Help, Settings & About

- Known Issues
- Help
- What's New?
- What's Planned?
- Settings
- About 2022.2.1

Tasks Team My Data

4:28

My Data



Help, Settings & About

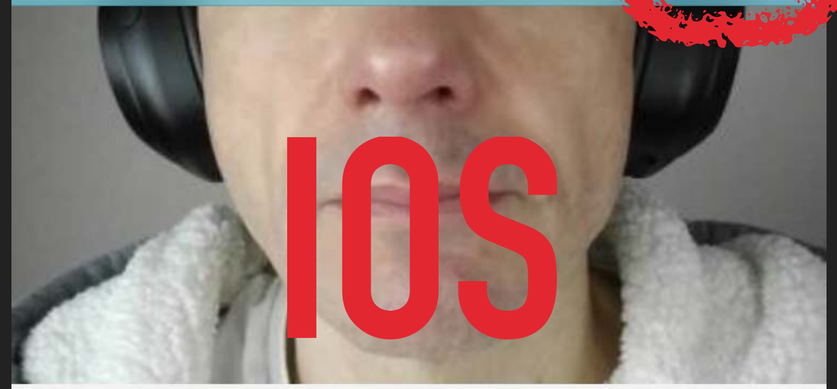
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  2022.2.0

Tasks Team My Data

Network Provider 4:25 PM

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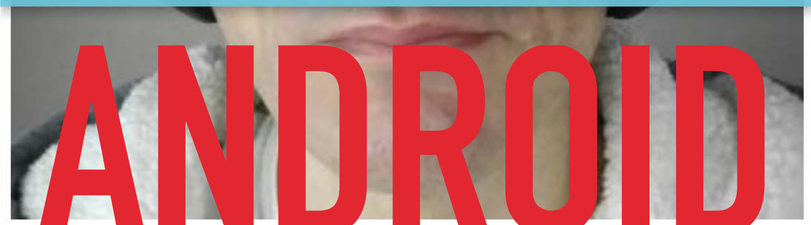
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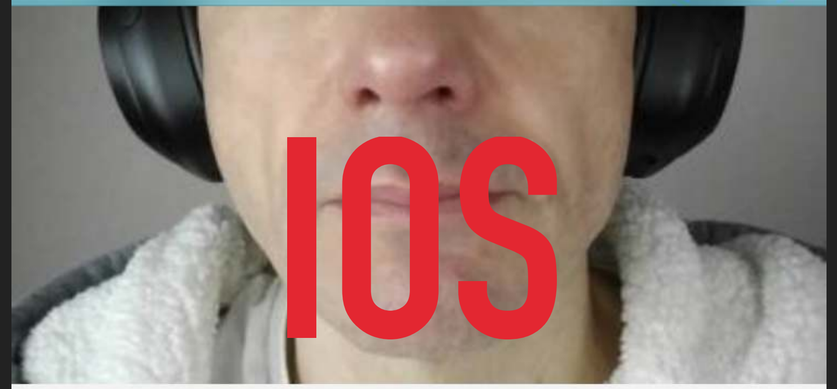
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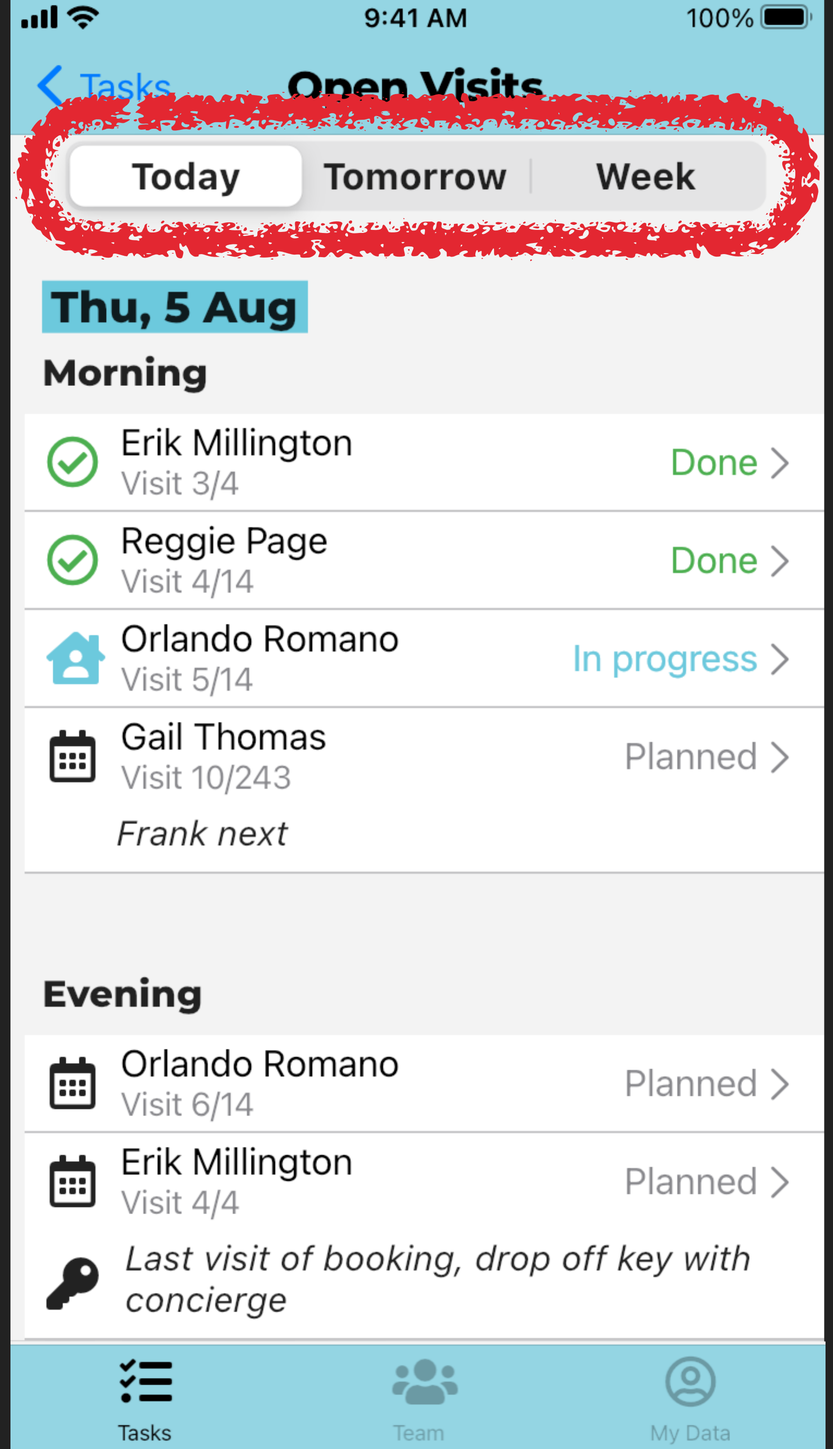


Help, Settings & About

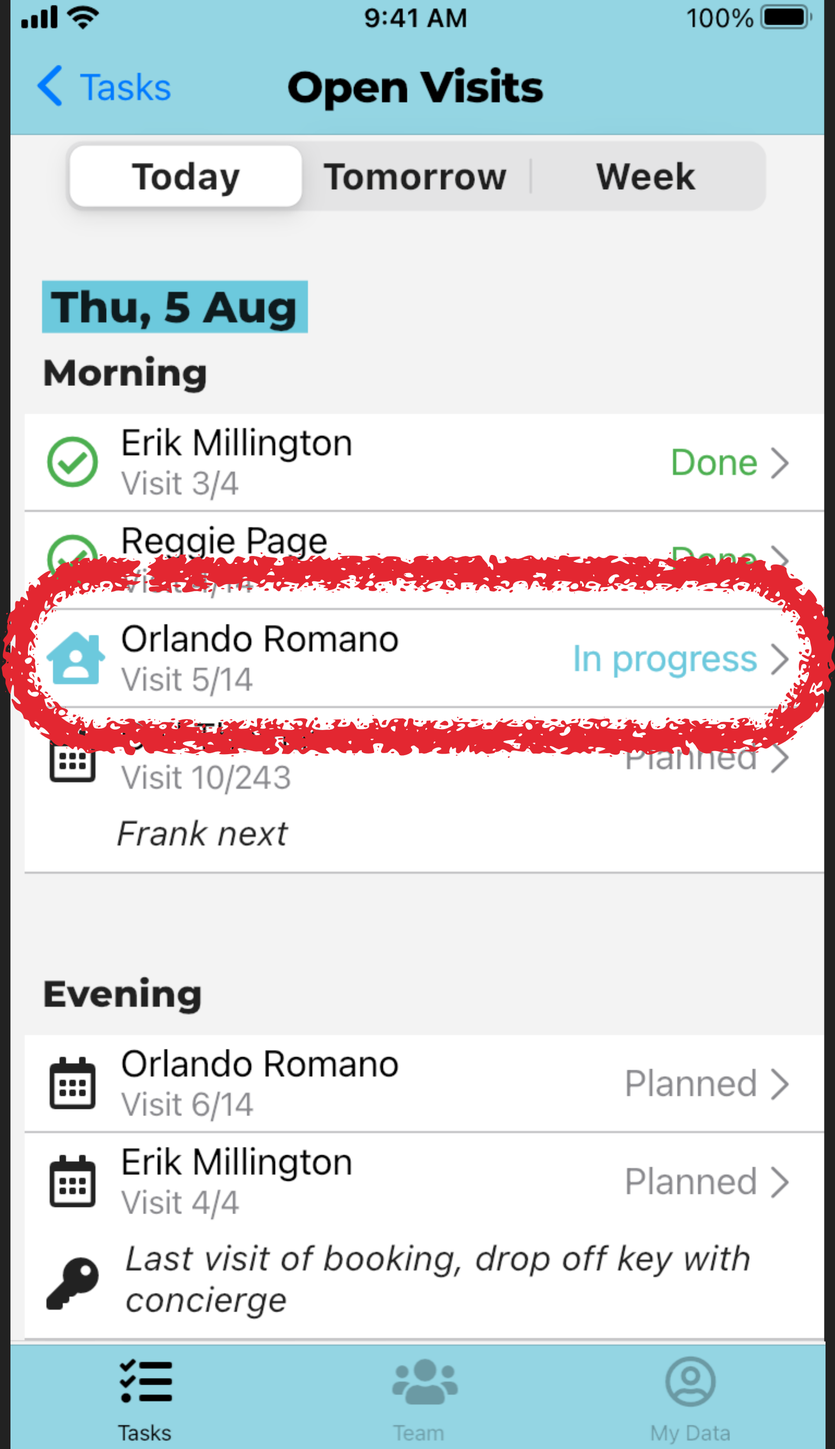
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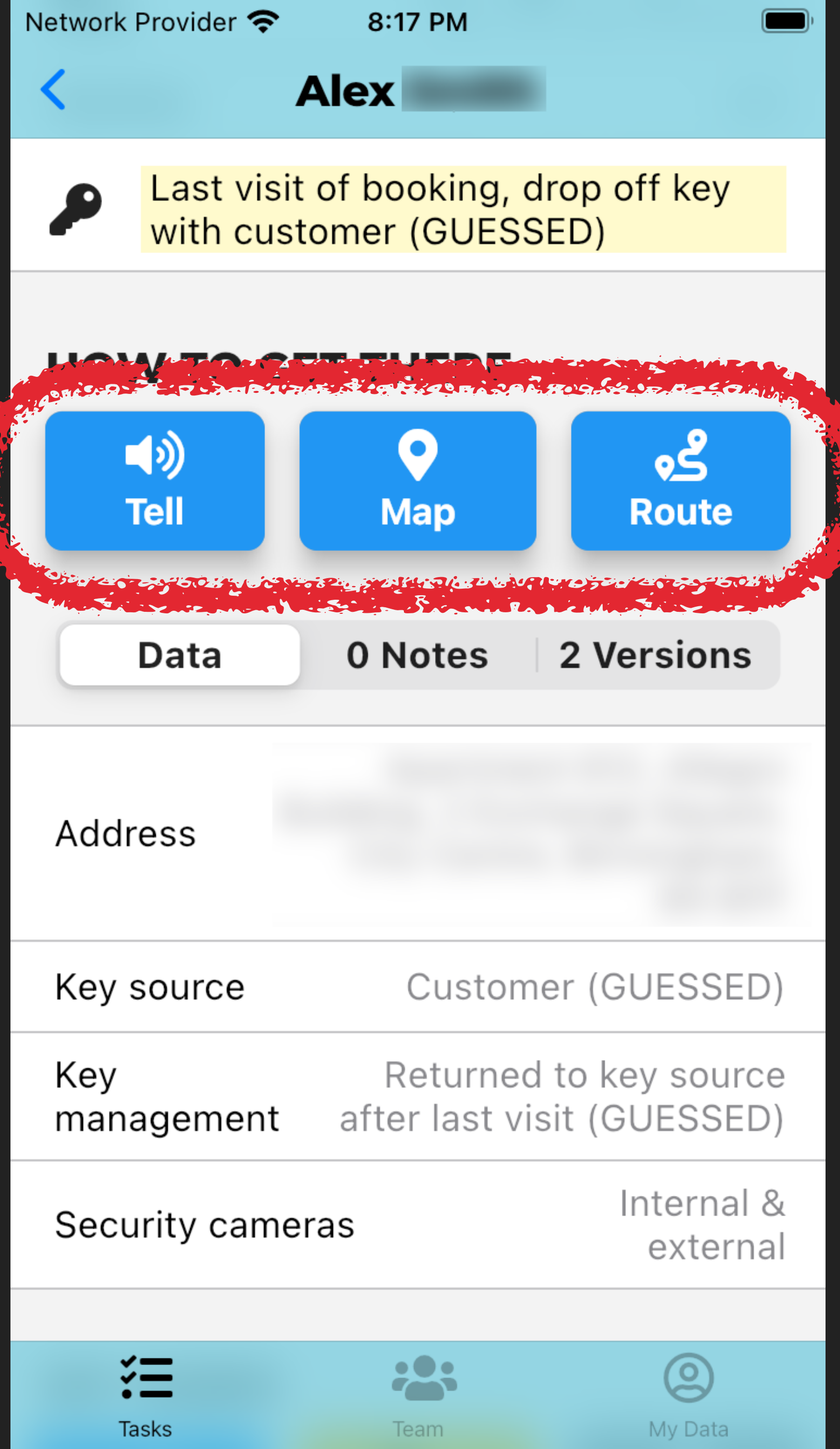
NATIVE LOOK & FEEL: IOS DETAILS



RECENTLY ADDED IOS UI ELEMENT



CUSTOM UI ELEMENT



SAME ON ANDROID

GOOGLE'S "BACK-END AS A SERVICE": MOBILE, WEB, SERVER

MOSTLY FREE SERVICES (AUTHENTICATION, ANALYTICS),
SOME PAID (DATABASE, FILE STORAGE)

1 SERVICE INSTEAD OF 2 (IOS + ANDROID): CRASH LOGGING,
TEST VERSION DISTRIBUTION

FIREBASE 👍🏻

MOBILE POWER

1 SOURCE OF UI TRUTH

BE CONSISTENT

BACK TO BASICS

MORE ON TALK PAGE

MY FLUTTER EXPERIENCES

~~WHY & HOW~~ CROSS-PLATFORM

~~HOW FLUTTER~~ WORKS

MY FLUTTER ~~EXPERIENCES~~

WHEN TO USE WHICH FRAMEWORK

WHEN TO USE WHICH NATIVE CROSS-PLATFORM FRAMEWORK?

SUMMARY SO FAR

WHY CROSS-PLATFORM FRONT-ENDS?

CROSS-PLATFORM FRONT-ENDS: CHEAPER & GOOD ENOUGH

HOW CROSS-PLATFORM FRONT-ENDS?

WEB: BIGGEST, MANY DEVS, HARD TO LEARN – REACT, ANGULAR, VUE

NATIVE: MOBILE – FLUTTER (DEVELOPERS), REACT NATIVE (EMPLOYERS), .NET MAUI, JAVAFX

HOW FLUTTER WORKS

DART

PLUGINS

WIDGETS

WIDGET SETS

NATIVE INTEGRATION

RUNS NATIVELY

CODE, BUILD & DEPLOY

PLATFORM CHECK

MY FLUTTER EXPERIENCES

BUSINESS CASE

FLUTTER 👍

FLUTTER PAINTS PIXELS 👍

FIREBASE 👍

FLUTTER VS. WORLD

JAVASCRIPT	DART
SLOWER	FASTER
NATIVE UI ELEMENTS	PAINTS PIXEL
SEPARATE PROJECTS	MONOREPO
(WINDOWS & MACOS)	WINDOWS, MAC, LINUX

REACT NATIVE VS. FLUTTER

MUCH MORE POPULAR & MATURE THAN JAVAFX

DART = SIMPLER JAVA

UI AS CODE WITH CLASSES

USE 2 OF THE 3 TOP JAVA IDES

FLUTTER FITS JAVA

WHEN TO USE WHICH NATIVE CROSS-PLATFORM FRAMEWORK?

WEB: REACT NATIVE

.NET: .NET MAUI

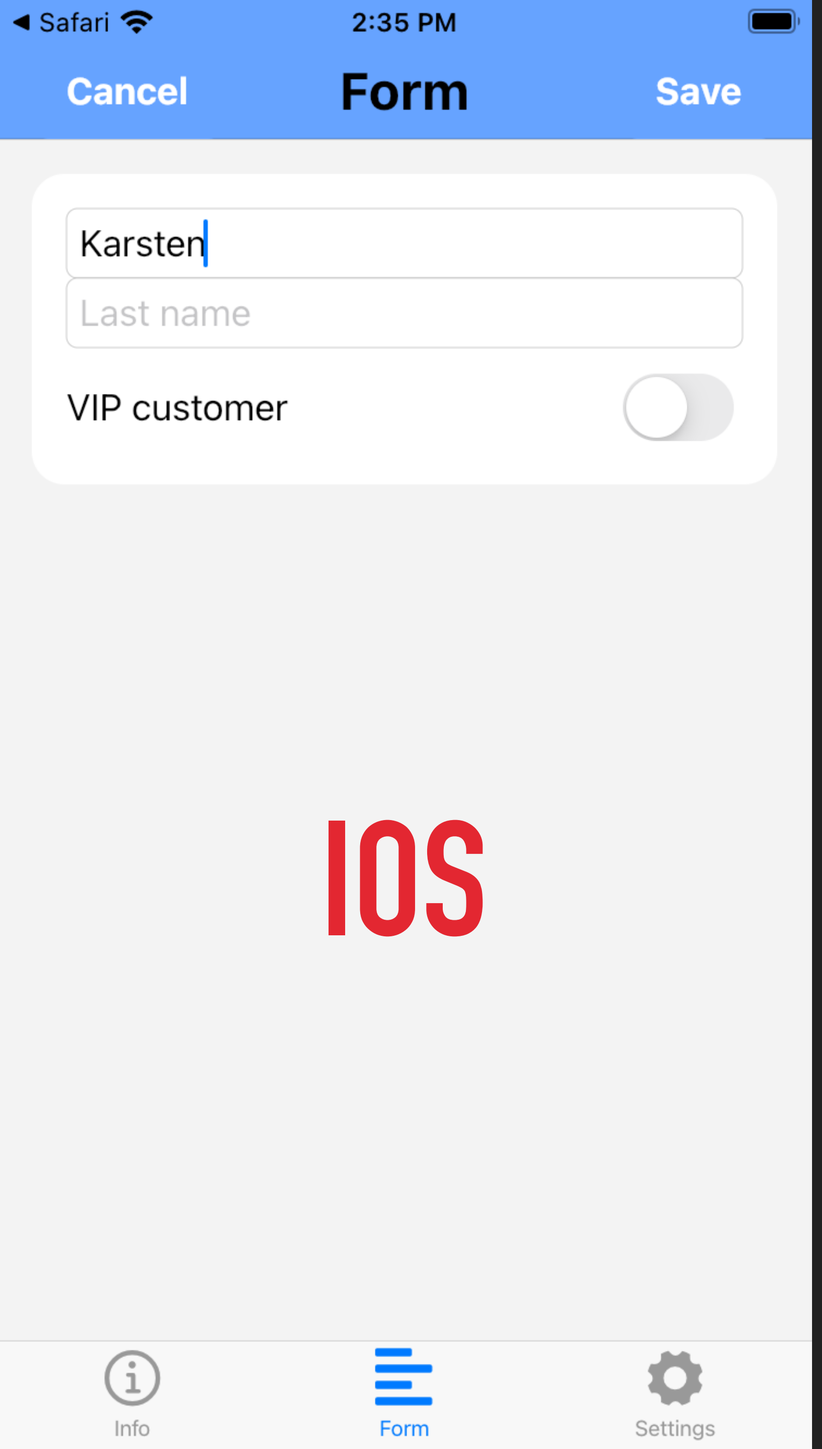
ELSE: FLUTTER

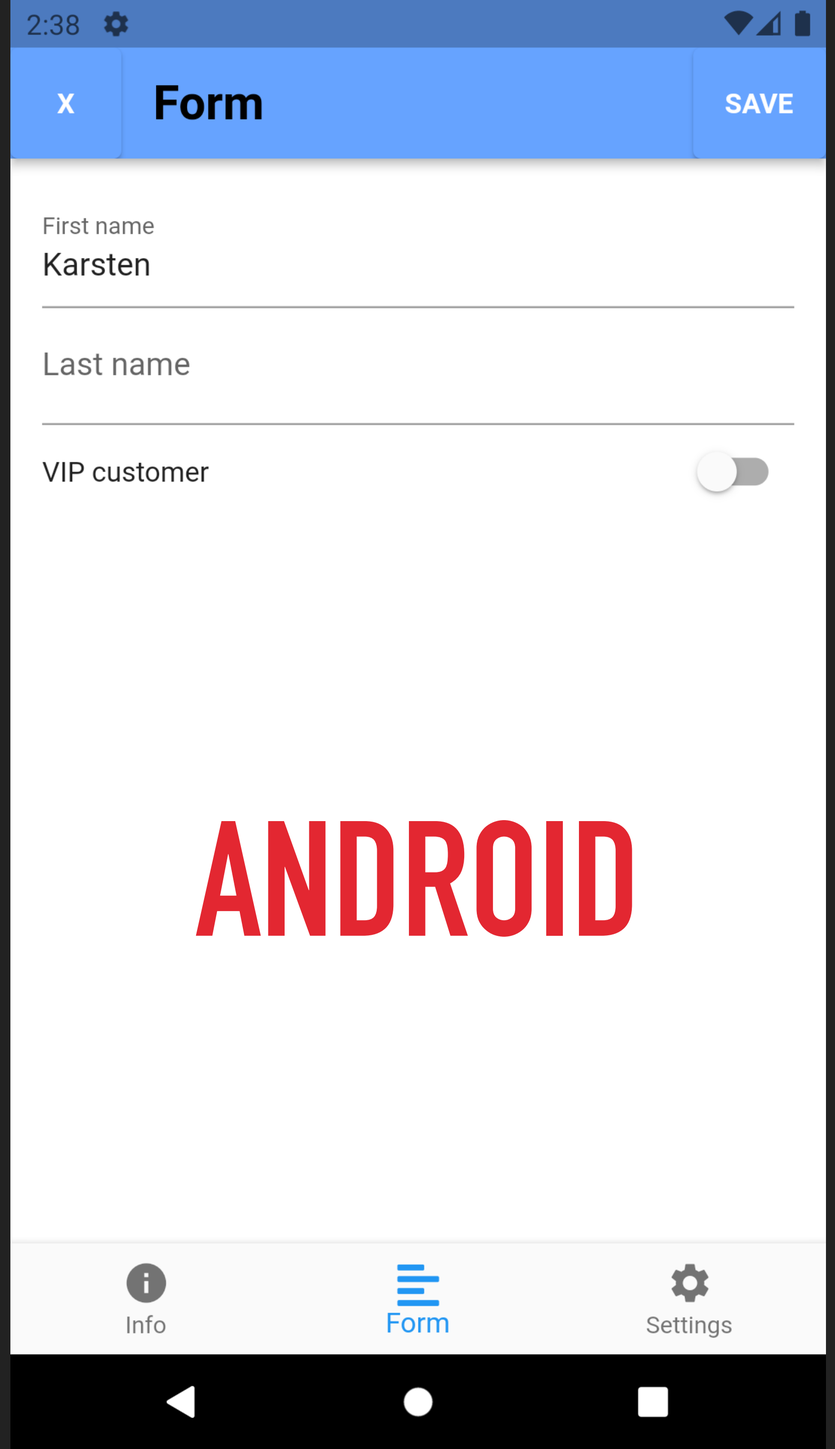
DEVELOPER EXPERIENCE

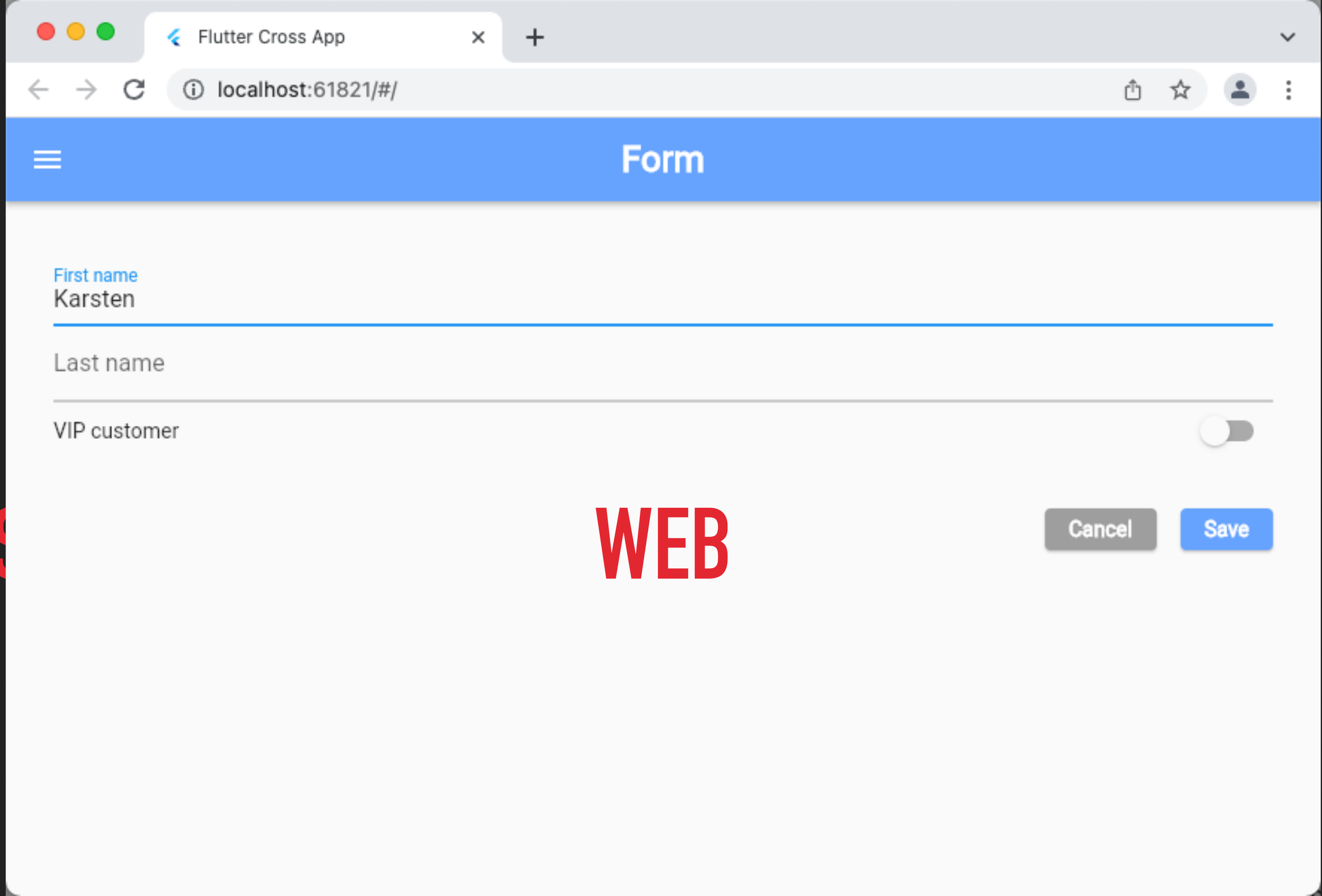
BACK TO THE BIG QUESTION

BUILD MOBILE, WEB & DESKTOP FRONTENDS WITH FLUTTER & 1 CODEBASE?

YES, WE CAN

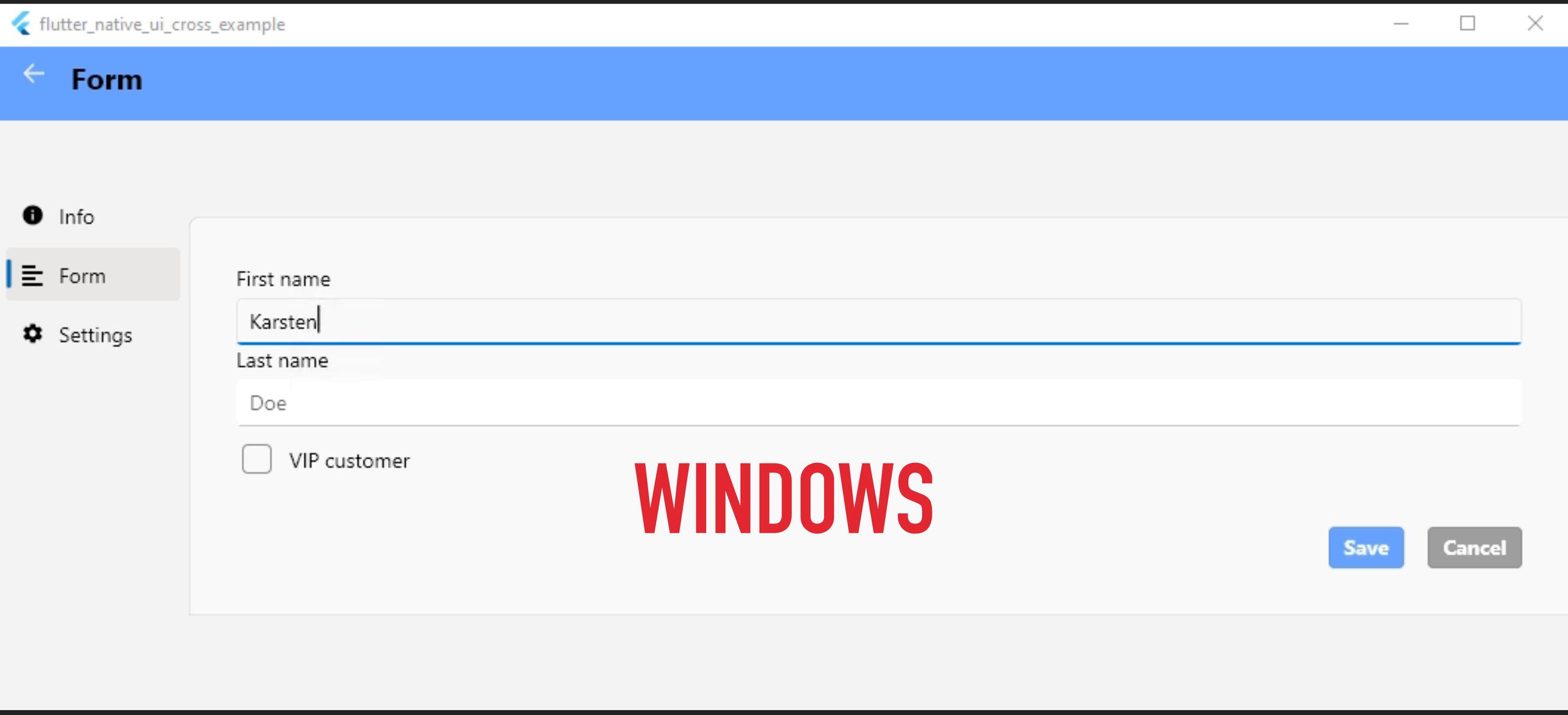

Safari
2:35 PM
Cancel
Form
Save
Karsten
Last name
VIP customer
IOS
Info
Form
Settings


2:38
X
Form
SAVE
First name
Karsten
Last name
VIP customer
ANDROID
Info
Form
Settings


Flutter Cross App
localhost:61821/#/
Form
First name
Karsten
Last name
VIP customer
Cancel
Save

IOS

WEB


flutter_native_ui_cross_example
Form
Info
Form
Settings
First name
Karsten
Last name
Doe
VIP customer
WINDOWS
Save
Cancel


flutter_native_ui_cross_example
Form
Info
Form
Settings
Karsten
Last name
VIP customer
Cancel
Save
MACOS

BUT WE SHOULDN'T

MOBILE: 👍

WEB: 👎

DESKTOP: 👎

MOBILE: "2 APPS FOR THE PRICE OF 1", FASTER BUILD & DEPLOY

WEB: ONLY MATERIAL UI, VERY FEW LIBRARIES

DESKTOP: WHY NOT WEB, ONLY WINDOWS STABLE

WHEN TO USE WHICH NATIVE CROSS-PLATFORM FRAMEWORK?

WHY & HOW CROSS-PLATFORM

HOW FLUTTER WORKS

MY FLUTTER EXPERIENCES

WHEN TO USE WHICH FRAMEWORK


The End

MY TALK DOESN'T STOP WHEN I STOP TALKING!™



SLIDES & VIDEOS

ADDITIONAL INFORMATION

NATIVE UI SAMPLE APP

GET STARTED WITH FLUTTER

FEEDBACK & NEWSLETTER

BPF.LI/QCP