jax LONDON HYBRID



KARSTEN SILZ, OCT 4, 2022

# FLUTTER FOR JAVA DEVELOPERS: MOBILE, WEB & DESKTOP WITH 1 CODEBASE?

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

YES, WE CAN...

# . . . BUT WE SHOULDN'T!

MOBILE: 👍

WEB: 👎

DESKTOP: 👎

JSF: 👎

JAVAFX: 👎

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



# SLIDES & MORE

# BPF.LI/FAR

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

MANY & CHEAP DEVELOPERS

REACT, ANGULAR, VUE

HARD TO LEARN

# WEB

STANDARD JAVA WEB FRONT-END LIBRARY

NO SINGLE PAGE APPLICATIONS (SPA)

UNPOPULAR: VERY FEW JOBS (VUE: 15X , ANGULAR: 27X, REACT: 37X)/ GOOGLE SEARCHES / STACK OVERFLOW QUESTIONS

NO NEW FEATURES FOR FIVE YEARS (UNTIL SEP 2022)

# JAKARTA SERVER FACES: 👎

# PC







# MOBILE






## HTML, CSS
## JAVASCRIPT/TYPESCRIPT

HARD RESTRICTIONS: NO PUSH NOTIFICATIONS ON IOS,
LOCAL STORAGE ABOUT 50 MB, NOT ALL NATIVE FEATURES

MOBILE POWER EASIER TO USE FROM NATIVE APPS

# ISSUES: WEB ON MOBILE


TikTok

# EDIT VIDEOS!


1:40
FORTNITE

# PLAY ONLINE MULTIPLAYER GAMES!

GIGABYTES OF LOCAL STORAGE

LOCAL SQL/NOSQL DATABASE

CPU POWER SIMILAR TO PCS

CALL BACK-ENDS WITH REST/GRPC/GRAPHQL...

# NATIVE APP POWER

MORE "DESKTOP APPLICATION", LESS "WEB APPLICATION"

HARD RESTRICTIONS: NO PUSH NOTIFICATIONS ON IOS, LOCAL STORAGE ABOUT 50 MB, NOT ALL NATIVE FEATURES

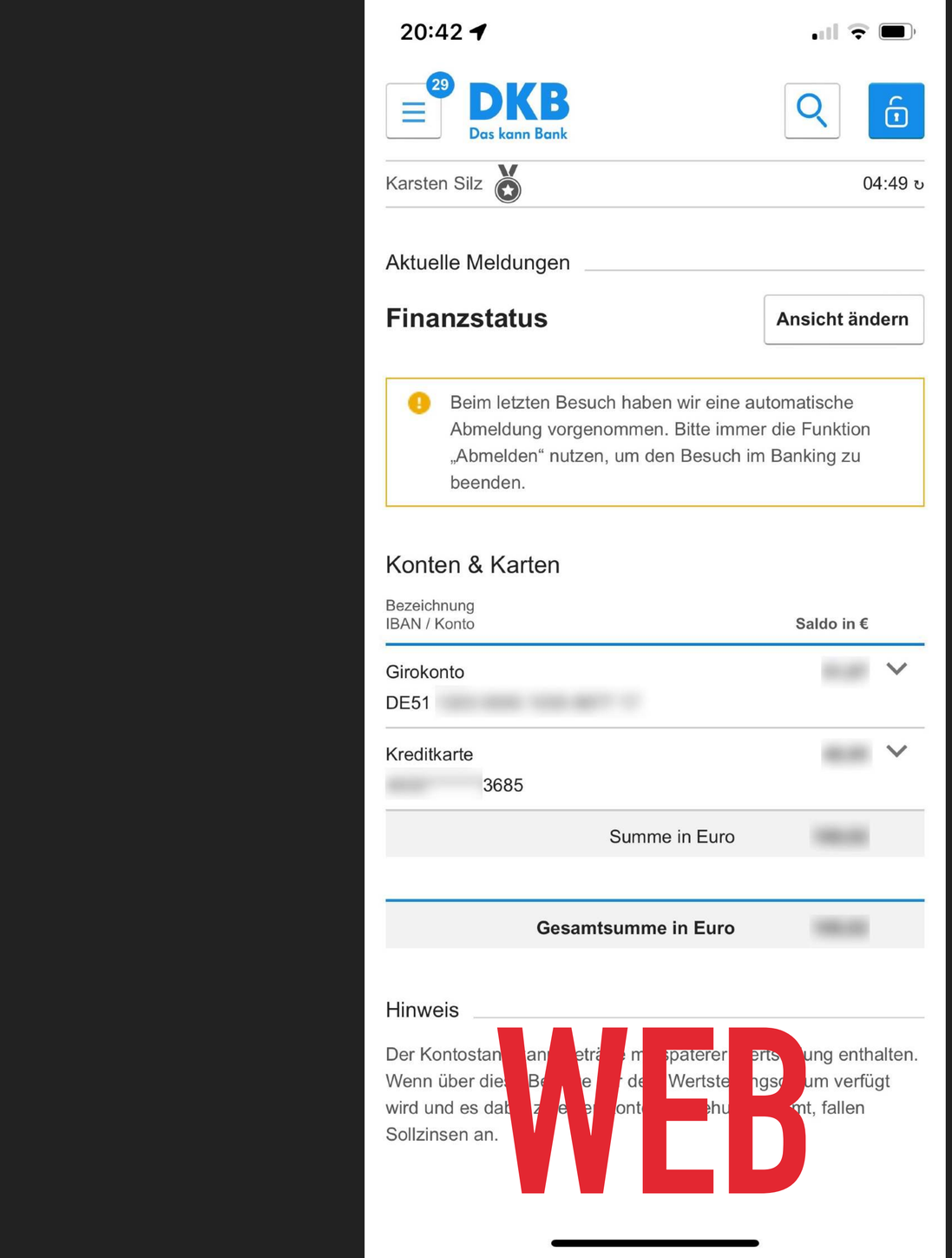
MOBILE POWER EASIER TO USE FROM NATIVE APPS

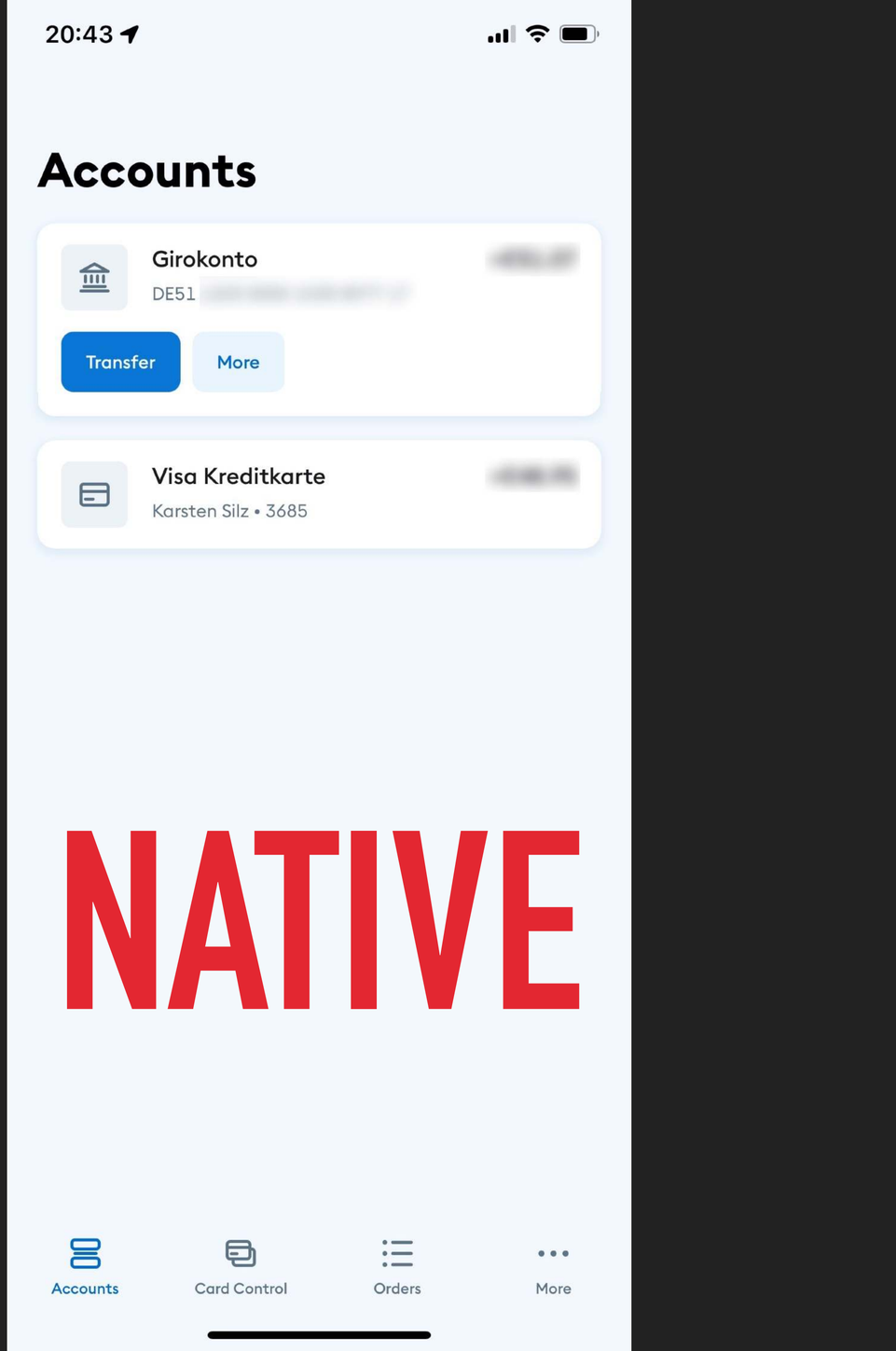
NO NATIVE LOOK & FEEL

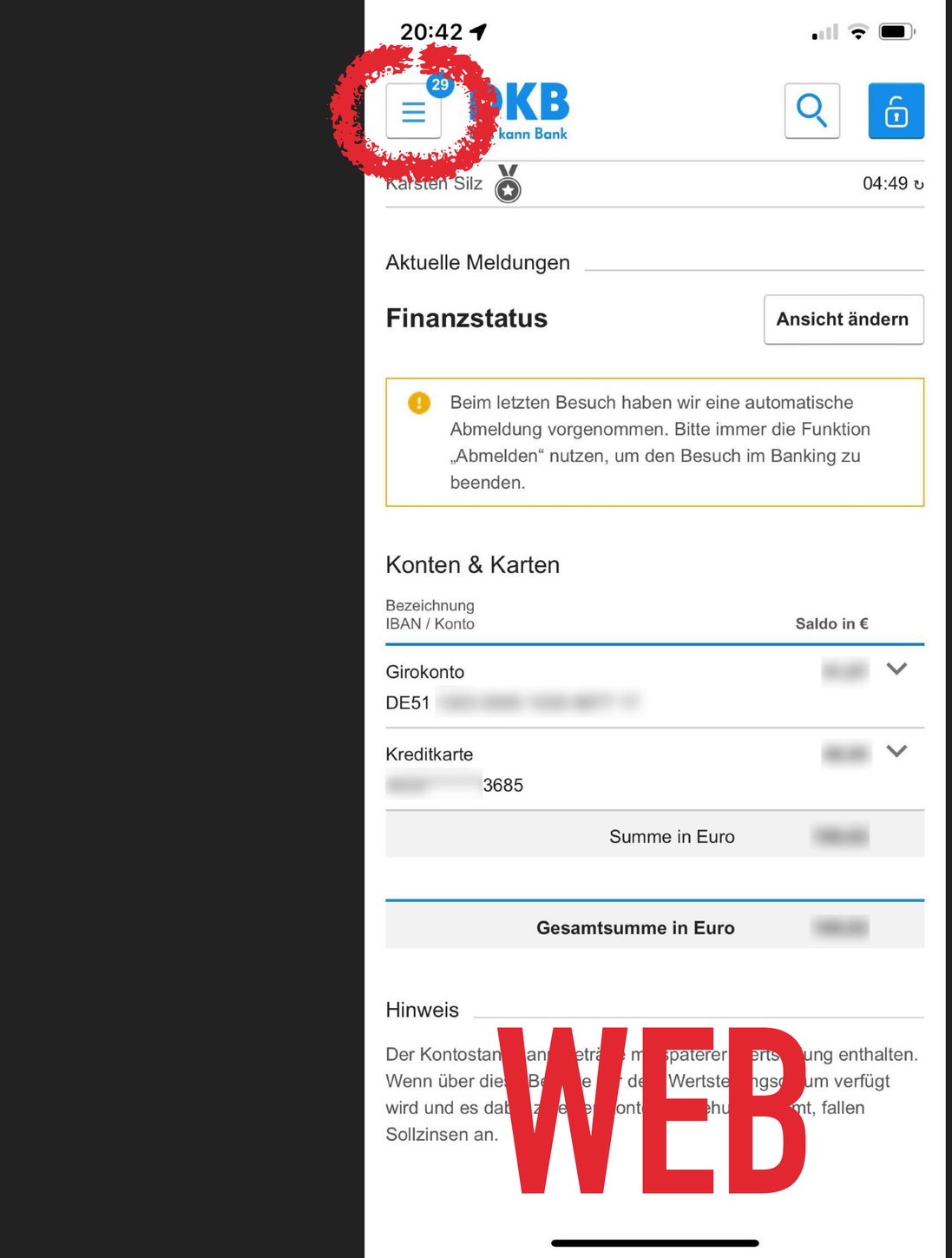
# ISSUES: WEB ON MOBILE

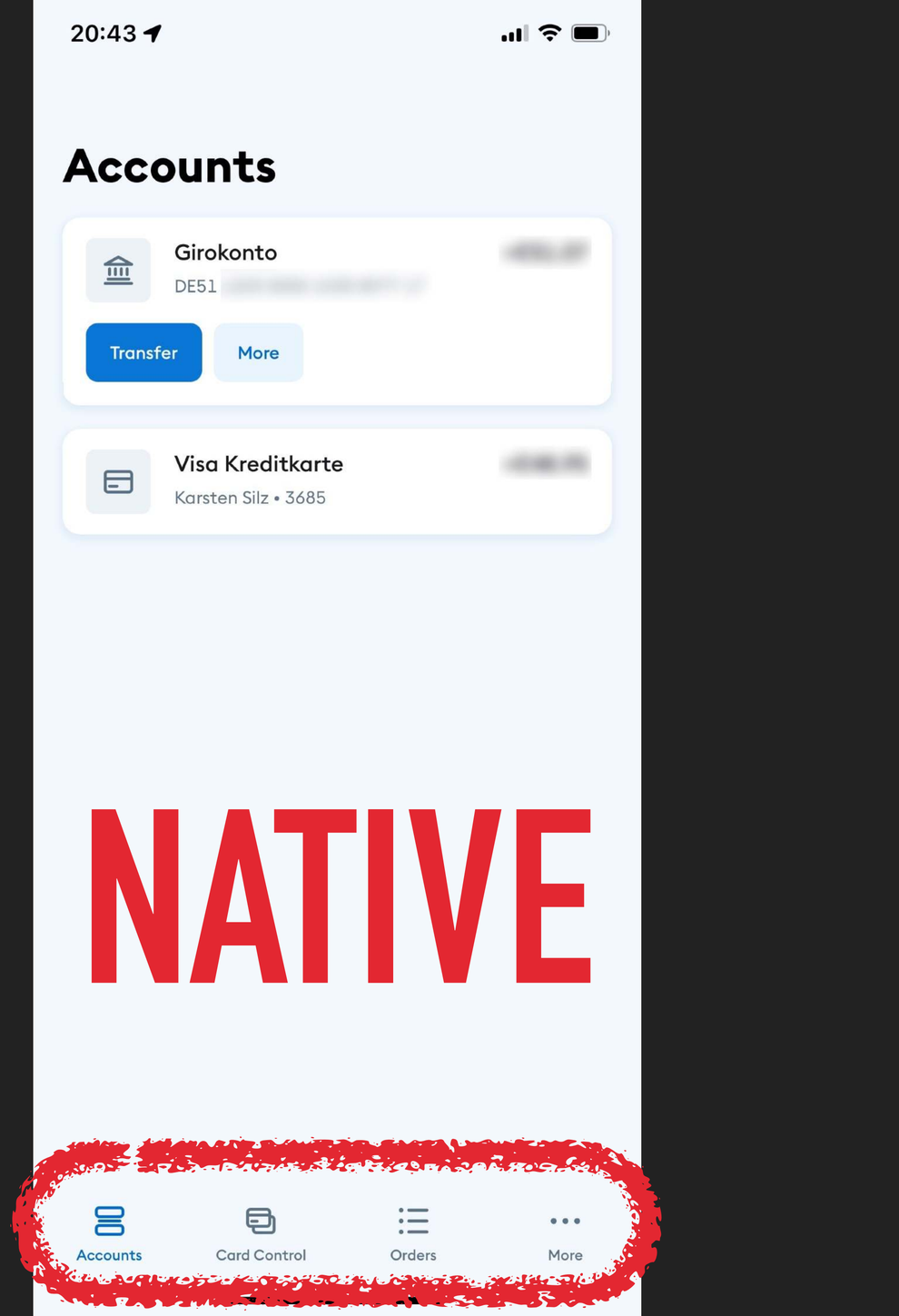
# WHY NATIVE LOOK & FEEL?

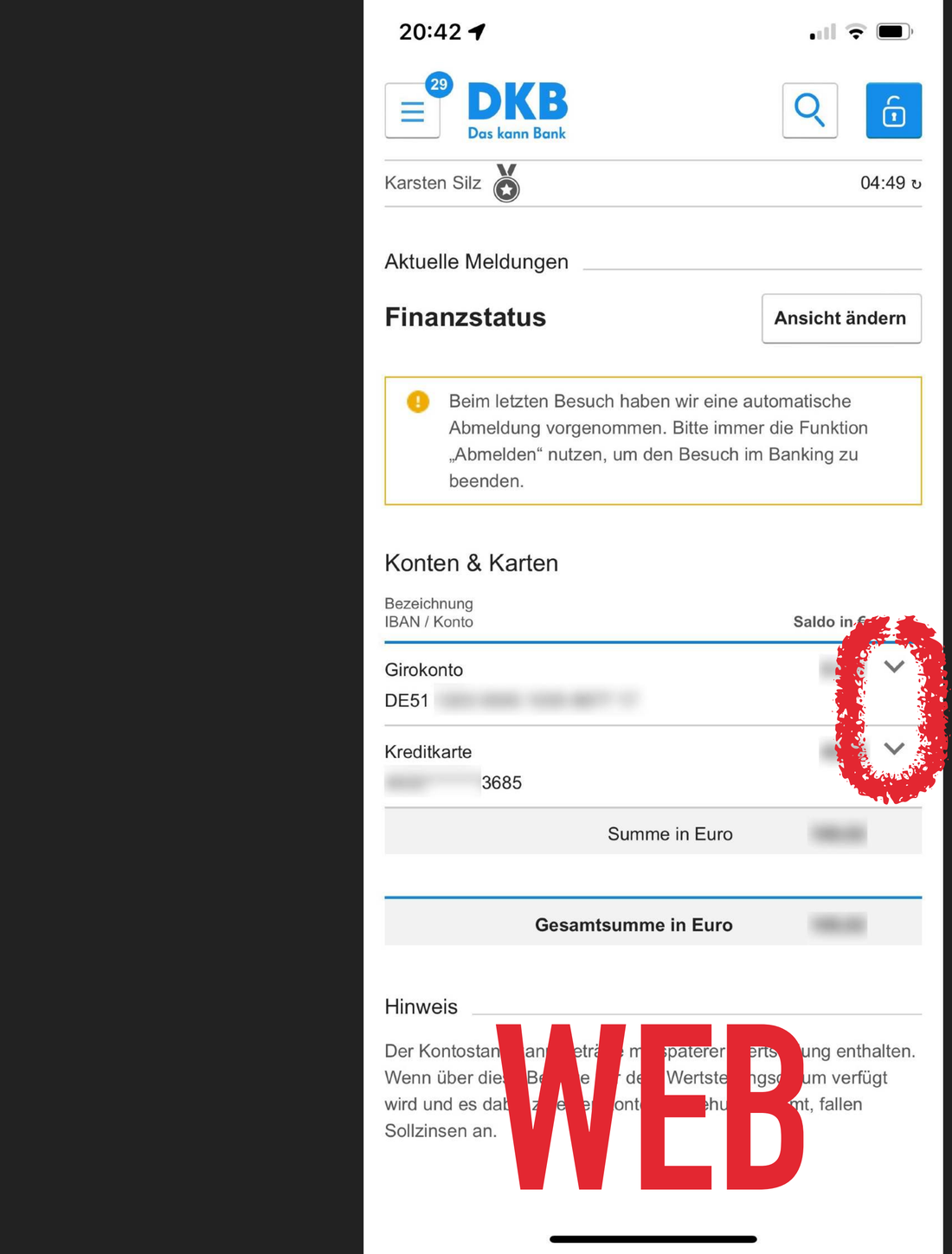
# GERMAN ONLINE BANKING APP

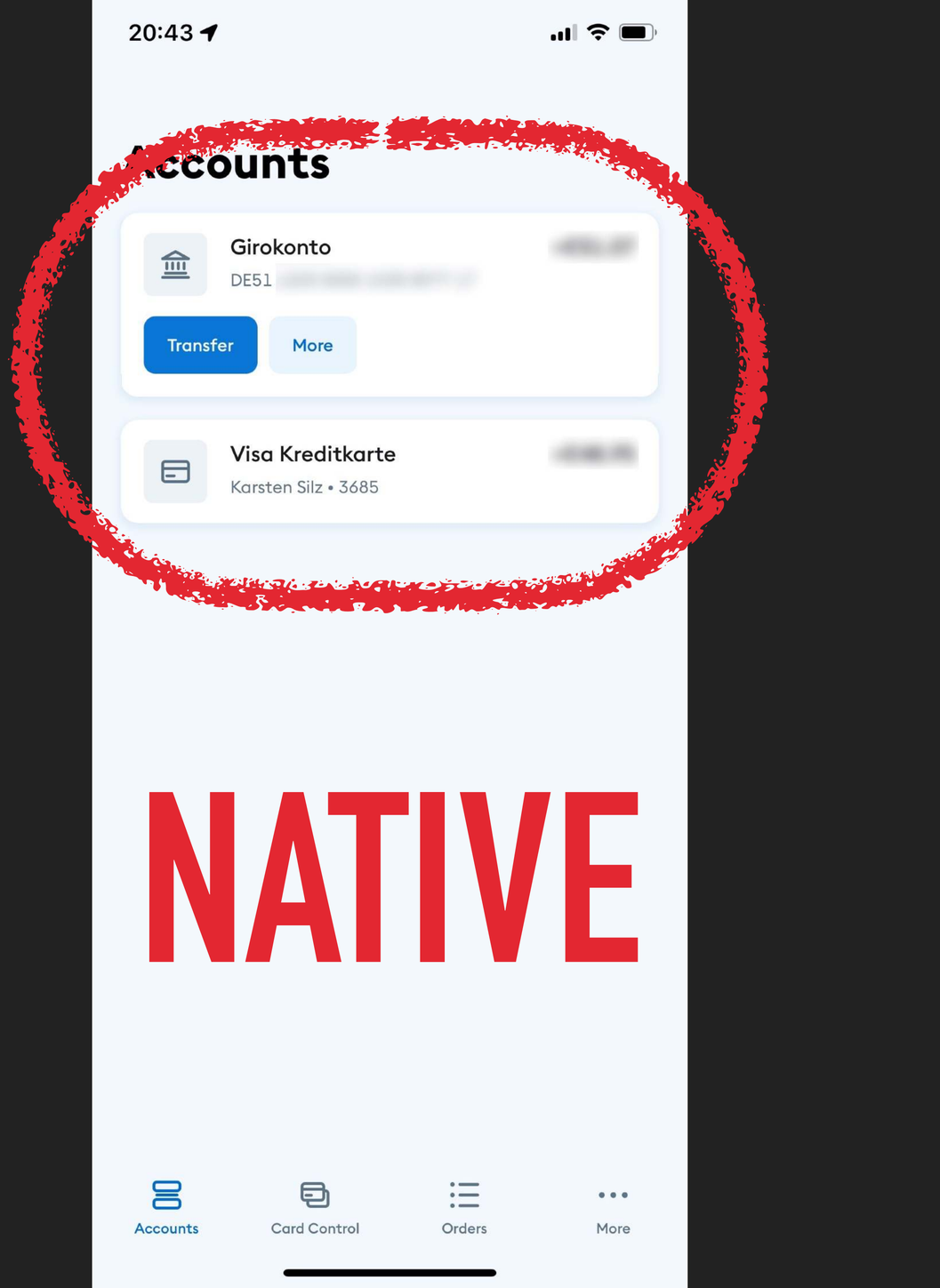

20:42
29
DKB
Das kann Bank
Karsten Silz
04:49
Aktuelle Meldungen
Finanzstatus
Ansicht ändern
Beim letzten Besuch haben wir eine automatische Abmeldung vorgenommen. Bitte immer die Funktion „Abmelden“ nutzen, um den Besuch im Banking zu beenden.
Konten & Karten
Bezeichnung
IBAN / Konto
Saldo in €
Girokonto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

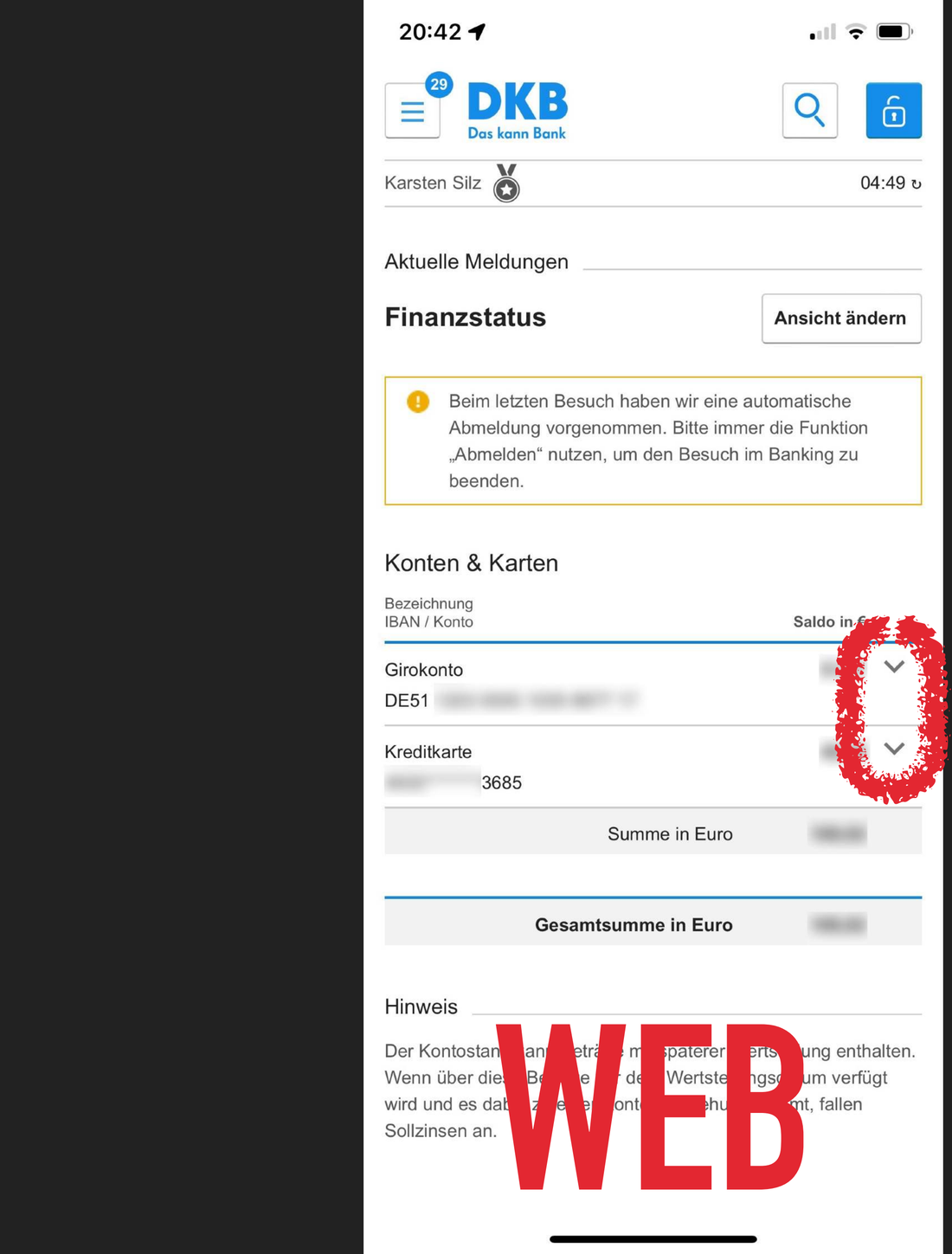

20:43
Accounts
Girokonto
DE51
Transfer
More
Visa Kreditkarte
Karsten Silz • 3685
NATIVE
Accounts
Card Control
Orders
More

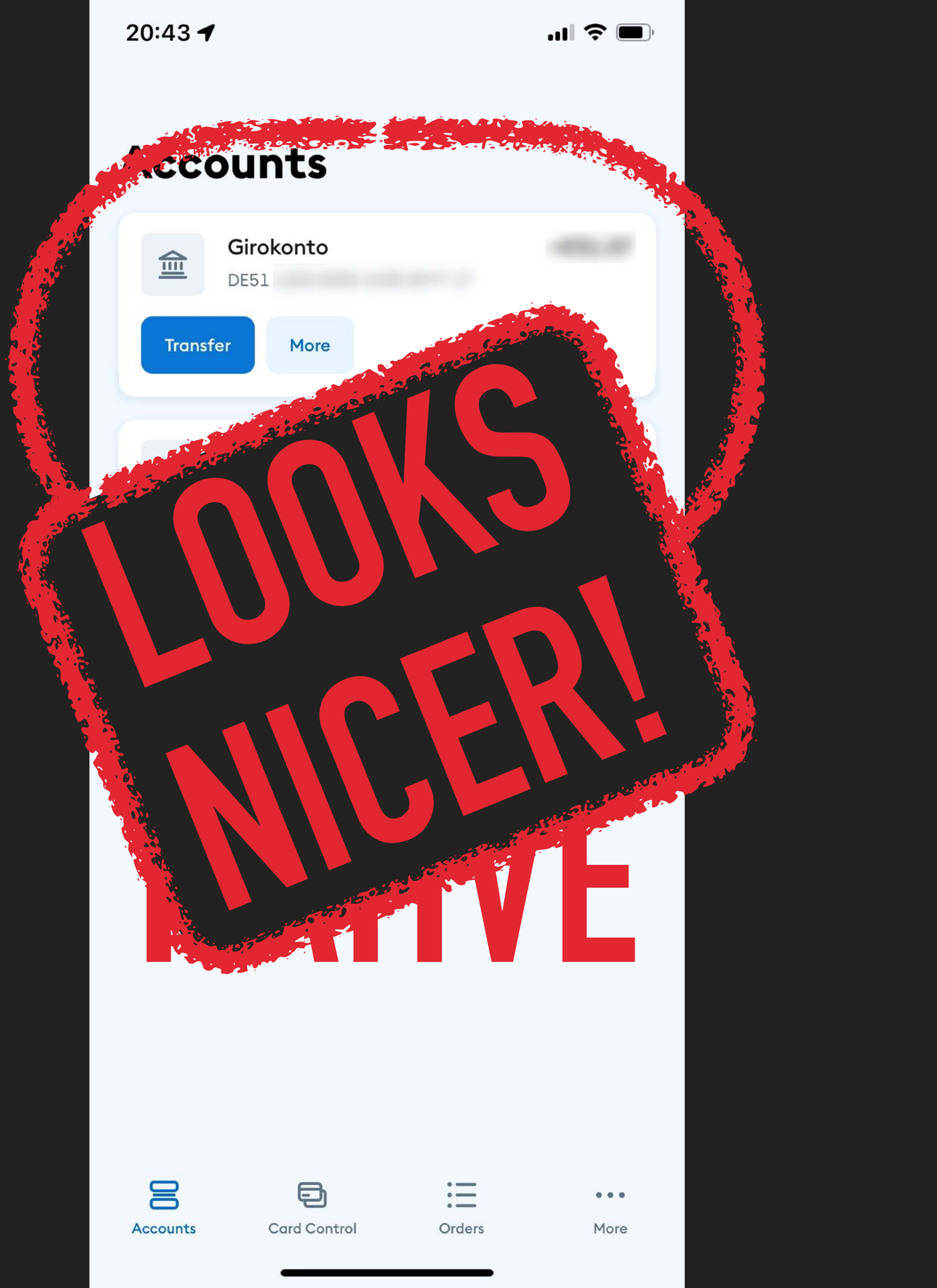

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More
LOOKS NICER!
Accounts
Card Control
Orders
More

NATIVE LOOK & FEEL:
EASIER TO USE ("LIKE OTHER APPS"), LOOKS NICER

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

"REALLY MAKE PRODUCTS FEEL GREAT ON APPLE PLATFORMS"

JEFF VERKOEYEN, GOOGLE

# CROSS-PLATFORM X2:
# 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?

MANY FRAMEWORKS & TOOLS: "1 APP FOR IOS & ANDROID"!

FLUTTER (GOOGLE)

XAMARIN/.NET MAUI (MICROSOFT)

REACT NATIVE (META)

JAVAFX (GLUON)

# OPEN-SOURCE & JAVA-LIKE

# WHICH FRAMEWORK IS POPULAR?

EASIER TO USE & LEARN

EASIER TO CONVINCE TEAMMATES/BOSSES

ALL ELSE EQUAL: USE MOST POPULAR

VERY UNPOPULAR: DON'T USE IT

# WHY POPULARITY?

# I MEASURE POPULARITY WITH 6 DATA POINTS

APPLE & GOOGLE APP STORE ANALYSIS (APPFIGURES, SINCE MAY 2022)

EMPLOYER POPULARITY: MENTIONED IN JOB ADS (INDEED IN 62 COUNTRIES, SINCE AUG 2021)

# POPULARITY

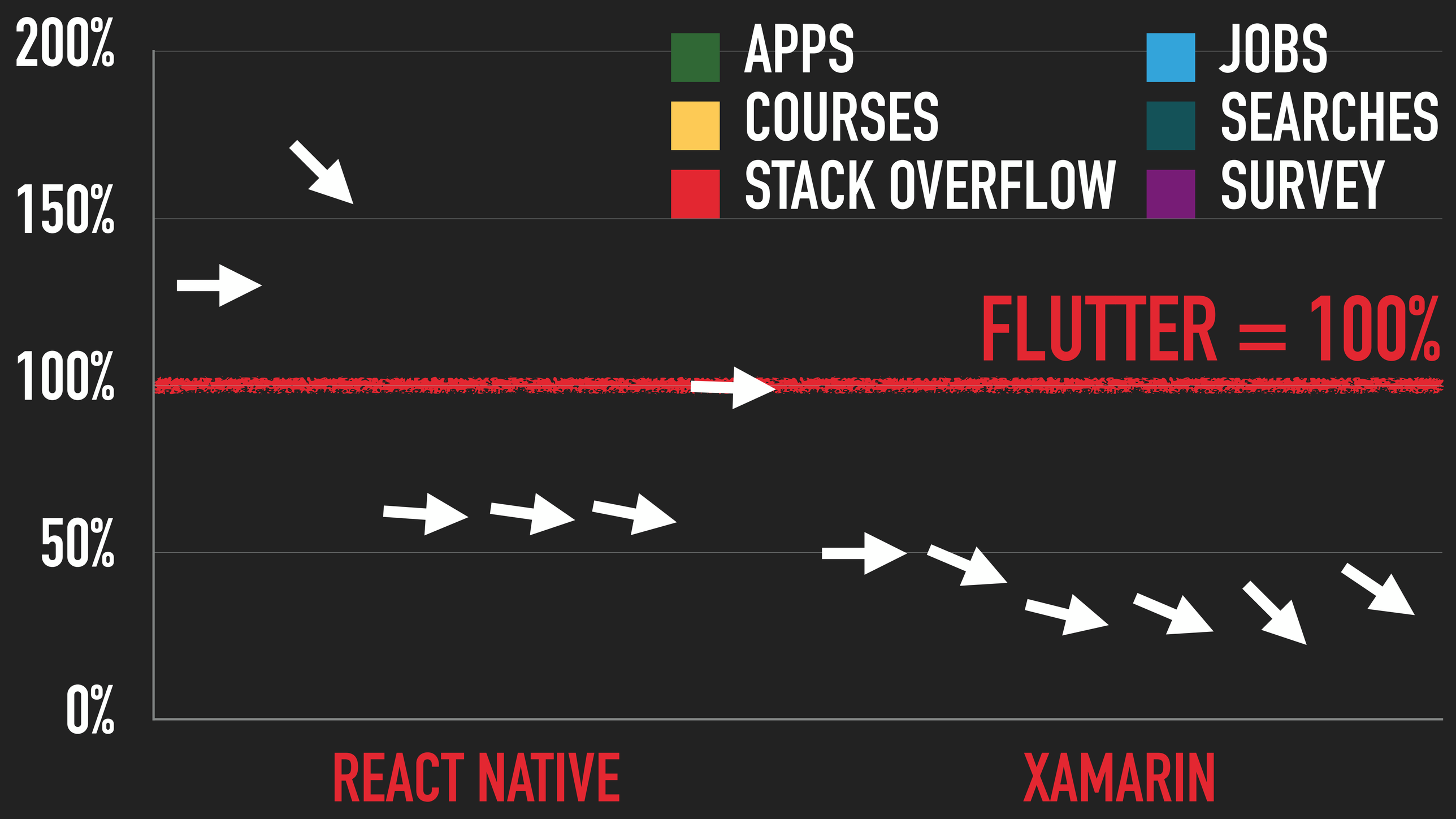
ONLINE TRAINING COURSES BOUGHT (UDEMY, MAR 2021)

GOOGLE SEARCHES

QUESTIONS AT STACK OVERFLOW

DEVELOPER SURVEY (32K RESPONSES, JETBRAINS, JUL 2021)

# DEVELOPER POPULARITY


200%
150%
100%
50%
0%
APPS
COURSES
STACK OVERFLOW
JOBS
SEARCHES
SURVEY
FLUTTER = 100%
REACT NATIVE
XAMARIN

EMPLOYER POPULARITY: REACT NATIVE WINS 1.5X, SLIPPING AGAINST FLUTTER

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

# POPULARITY

# SAME POPULARITY MEASUREMENTS IN MY NEWSLETTER:

# IDE, BUILD TOOLS, JVM LANGUAGES & JAVA FRAMEWORKS, DATABASES, WEB FRAMEWORKS

# SECTION SUMMARY

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

**NATIVE:** RUN/LOOK & FEEL/ACCESS ON MOBILE – FLUTTER (DEVELOPERS), REACT NATIVE (EMPLOYERS), XAMARIN/.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

# MASCOT DASH



# WILL GOOGLE KILL FLUTTER?

# Killed by Google

Search

All (274)

August 2023
Service

## Google Cloud IoT Core

Turning to ashes in 11 months, Google Cloud IoT Core was a managed service designed to let customers securely connect, manage, and ingest data from globally dispersed devices. It will be over 5 years old.

June 2023
Service

## Conversational Actions

Fading into darkness in 8 months, Conversational Actions extended the functionality of Google Assistant by allowing 3rd party developers to create custom experiences, or conversations, for users of Google Assistant. It will be over 6 years old.

March 2023
Service

## Google Currents (2019)

Running out of juice in 6 months, Google Currents was a service that provided social media features similar to Google+ for Google Workspace customers. It will be almost 4 years old.

January 2023
Service

## Google Stadia

ust in 4 months, Google Stadia was a cloud gaming service combining a WiFi gaming controller and allowed users to stream gameplay through web browsers, TV, mobile apps, and Chromecast. It will be about 3 years old.

December 2022
Service

## YouTube Originals

Scheduled to be killed in 3 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.

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

# WE DON'T KNOW!

# WHICH PLATFORM
# STABLE SINCE WHEN?

# PC







FEB
2022

MAY
2022

# WEB




MAR
2021

# MOBILE






DEC
2018

# PROGRAMMING LANGUAGE: DART



# CAN'T WE USE 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 {
  String firstName = "Karsten";
  int yearsOfJava = 23;
  List<String> myList = new LinkedList<>();

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

# THIS IS JAVA

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class MyClass extends AnotherClass {
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  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 (LIBRARIES) & ASYNC/AWAIT

1 MAIN THREAD, CREATE THREADS (ISOLATES)

# DART

MAJOR RELEASE EVERY 2–3 MONTHS

3–5 MINOR RELEASES IN-BETWEEN

MAJOR FLUTTER RELEASES INCLUDE NEW DART RELEASE

# RELEASES

# LIBRARIES: PLUGINS

29K 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

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  ],
)
```

# UI AS CODE

IOS & MACOS: SWIFT UI (SEP 2019)

ANDROID: JETPACK COMPOSE (JUL 2021)

WINDOWS, MACOS, IOS, ANDROID:
.NET MAUI (AUG 2022)

# DECLARATIVE PROGRAMMING

UI AS CODE – NO GRAPHICAL UI BUILDER, NO CSS

CONFIGURE BUILT-IN WIDGETS, CREATE YOUR OWN

EMULATED – 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

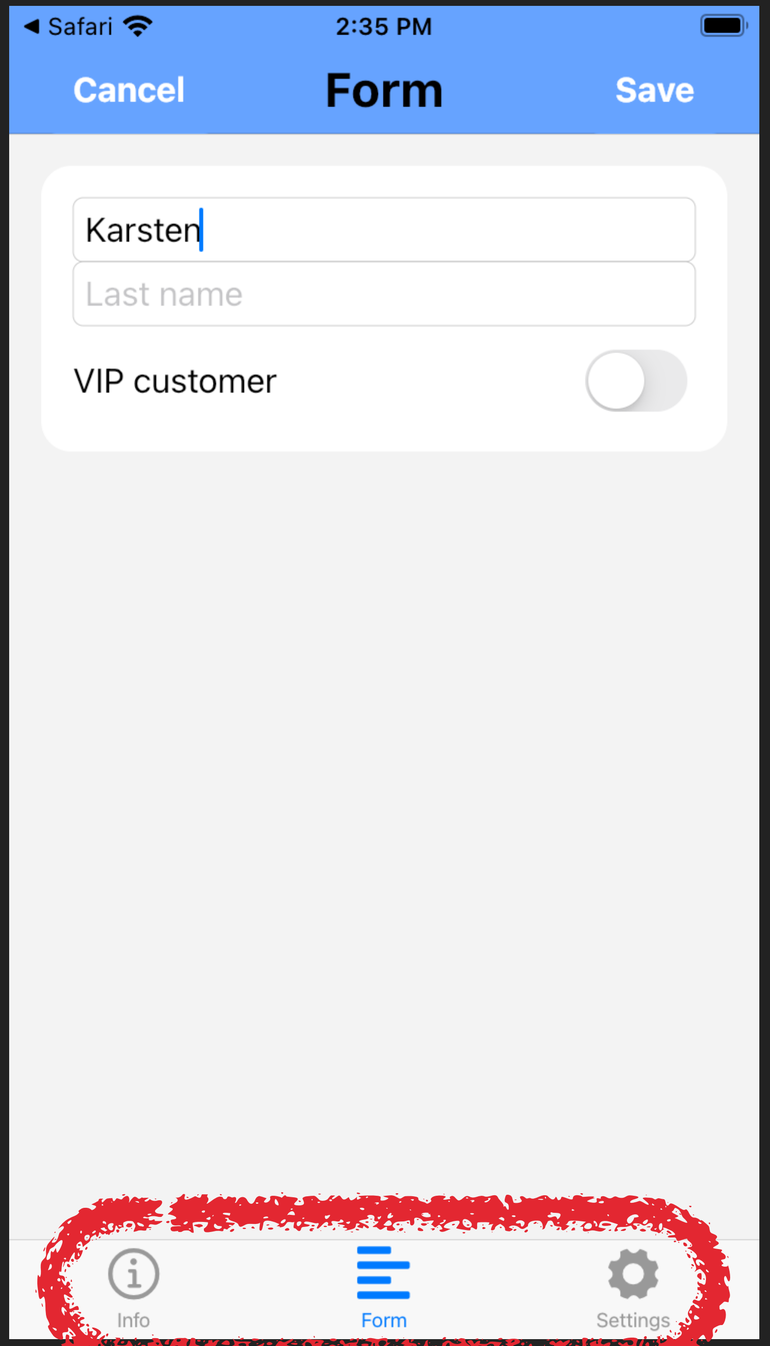
# SAMPLE APP ON GITHUB

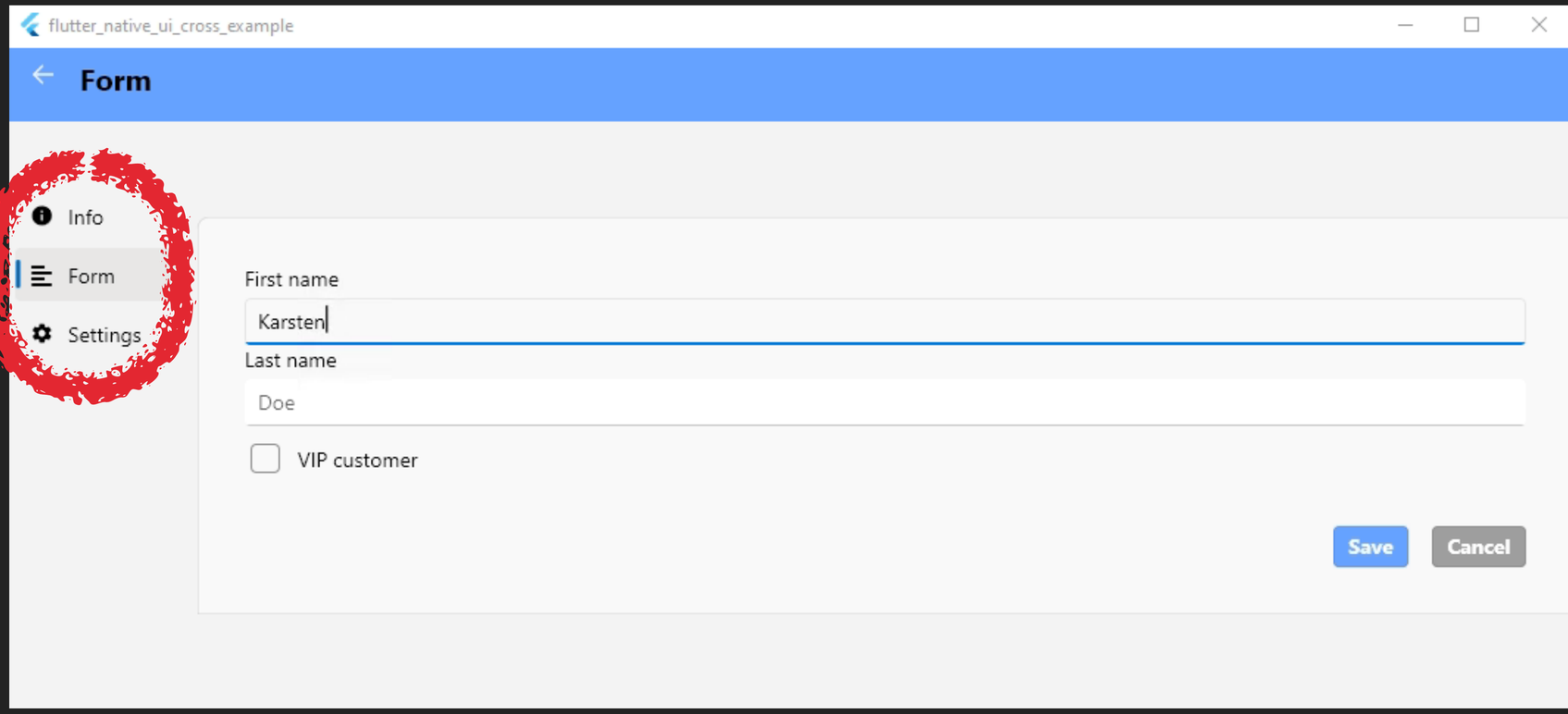
CREATED MY OWN WIDGETS

WIDGETS HAVE SWITCH STATEMENT =>
CREATES  WIDGET FOR CURRENT PLATFORM

# HOW DOES SWITCH WORK?

# 1 CODEBASE != 1 UI


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


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

GLOBAL STATE MANAGEMENT: "PROVIDER"

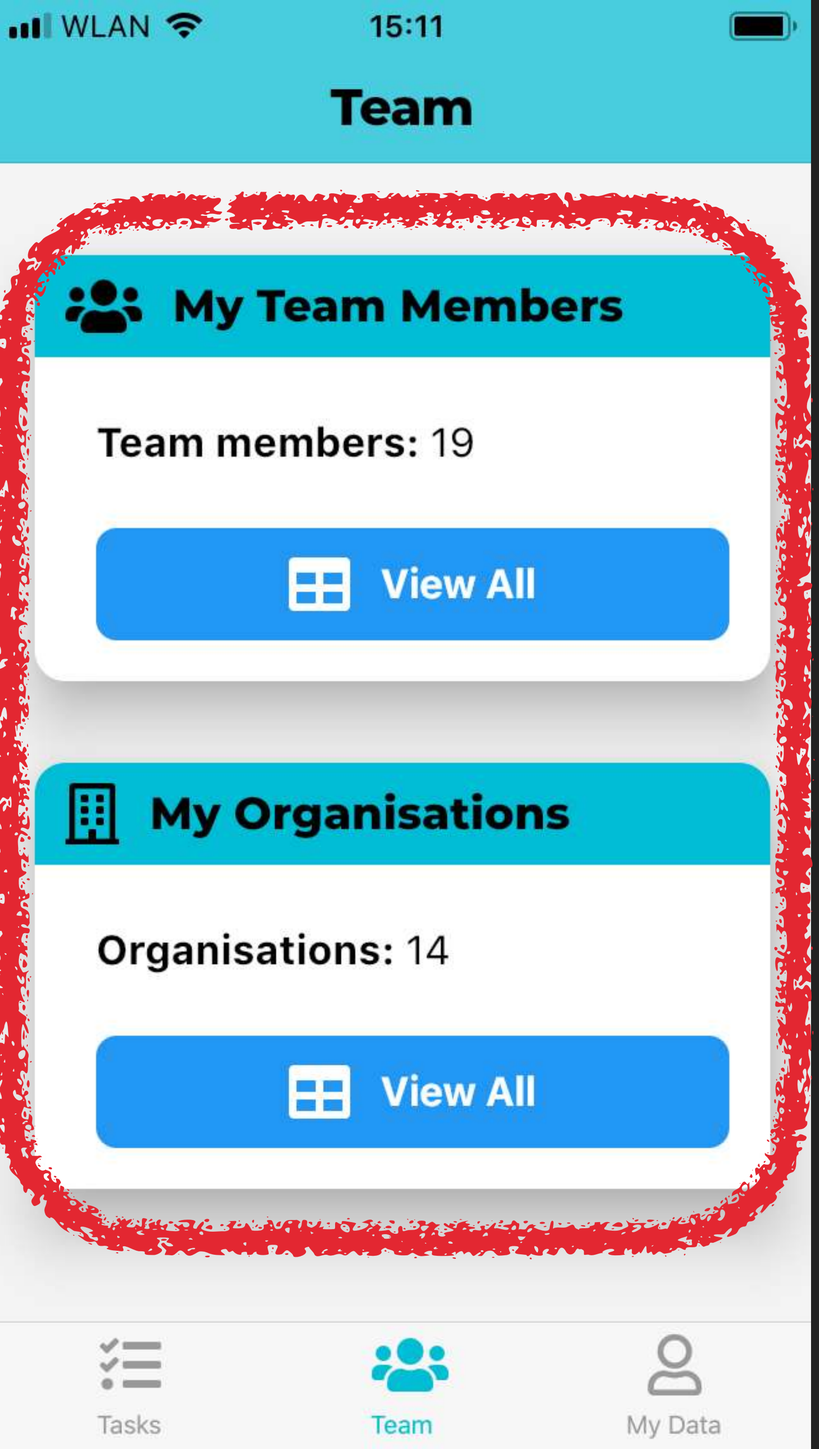
WIDGET SET: MATERIAL/NATIVE/CUSTOM

RESPONSIVE LAYOUT: ADAPT TO SCREEN SIZES
& ORIENTATION: NO DEFAULT, 3RD PARTY PLUGIN

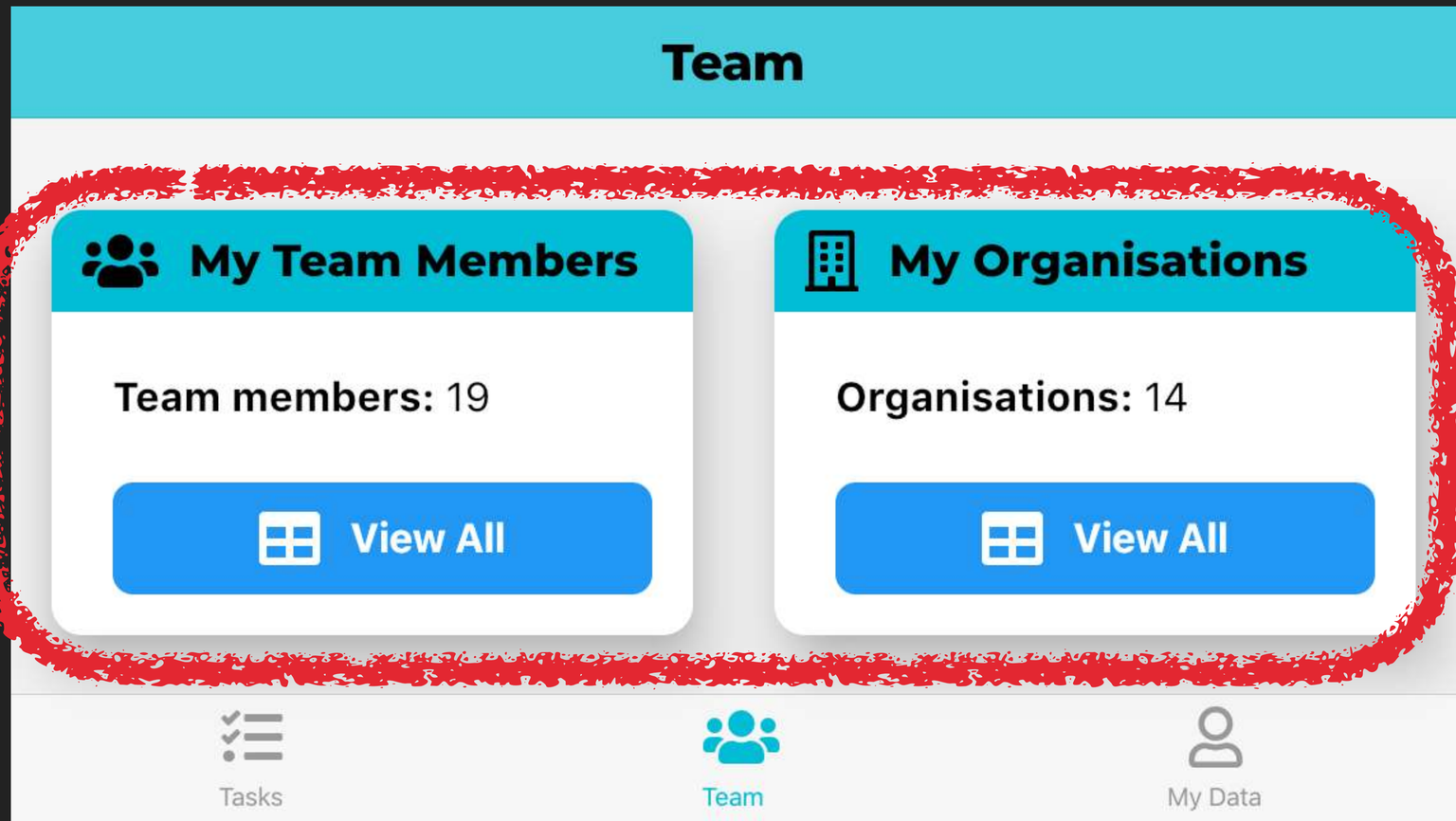
# ARCHITECTURAL CHOICES




# SIZE DIFFERENCES




# ORIENTATION CHANGES



# NATIVE INTEGRATION

PUT SOME FLUTTER SCREENS INTO NATIVE APPS

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 + C++ (WEB), C++ (ELSE)

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 PRICE OF 1"
- NATIVE LOOK & FEEL
- ACCESS TO NATIVE OS LIBRARIES
- FAST BUILD & DEPLOY

# MOBILE: 

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

# WEB: 👎

- ⊖ WHY NOT WEB?
- ○ WINDOWS STABLE, MAC & LINUX JUST GOT STABLE
- ⊕ ACCESS TO NATIVE OS LIBRARIES
- ○ WINDOWS & MACOS UI: INCOMPLETE, MAINTAINED?

# DESKTOP: 👎

# SECTION SUMMARY

DART

PLUGINS

WIDGETS

WIDGETS SETS

NATIVE ACCESS

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

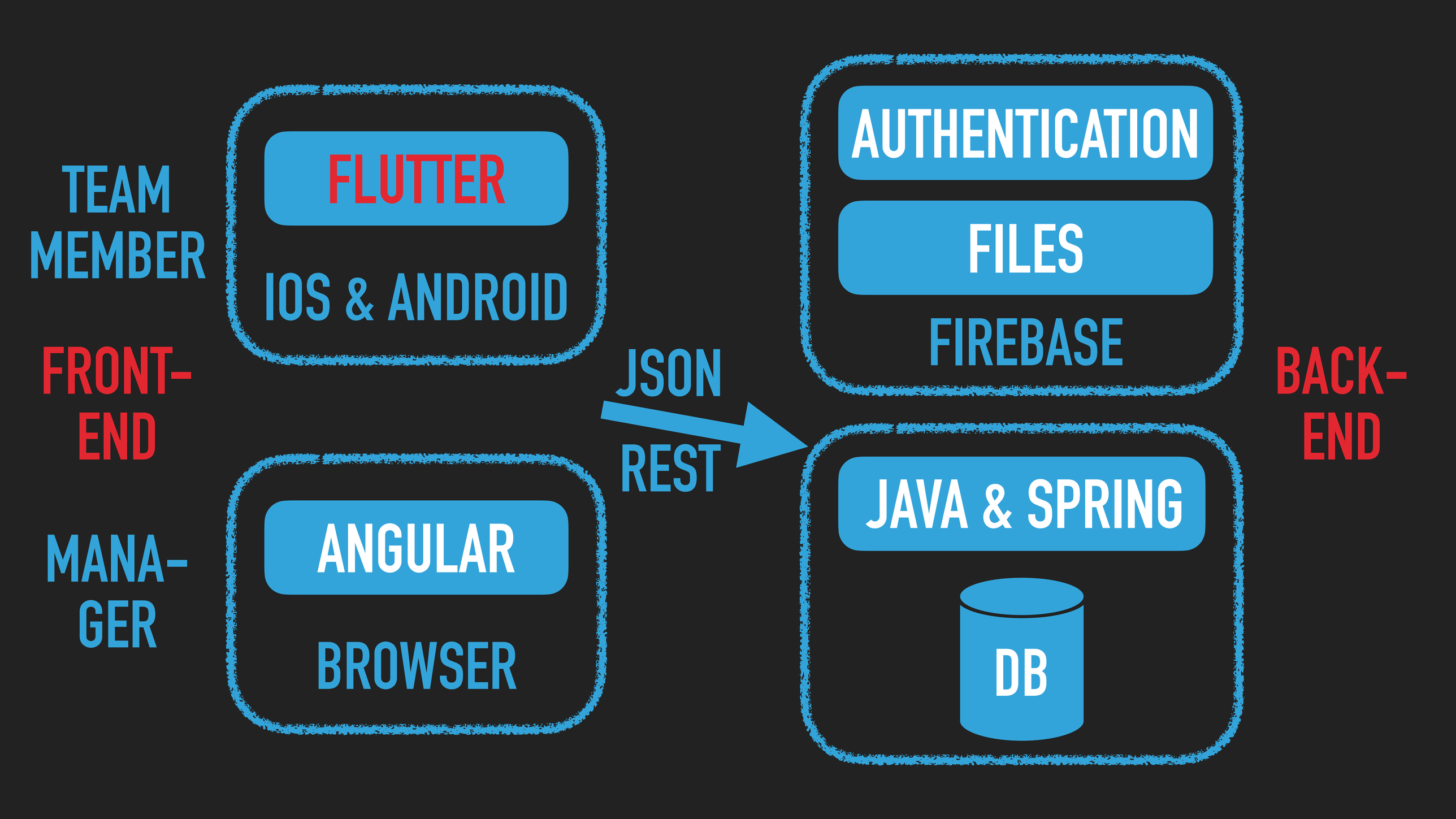
# MY FLUTTER EXPERIENCES

B2B SAAS FOR UK COMPANIES
THAT EMPLOY CAT-SITTERS

REMOVE FRICTION & SAVE TIME

I WROTE THE CODE

# MY TINY START-UP


TEAM MEMBER
FRONT-END
MANA-GER
FLUTTER
IOS & ANDROID
ANGULAR
BROWSER
JSON
REST
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

FLUTTER 👍

NATIVE 👍

FIREBASE 👍

POWER

1 SOURCE

CONSISTENT

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 MOBILE NATIVE CROSS-PLATFORM FRAMEWORK?

# FLUTTER VS. WORLD

| | |
|---|---|
| JAVASCRIPT | DART |
| SLOWER | FASTER |
| NATIVE UI ELEMENTS | EMULATED UI ELEMENTS |
| SEPARATE PROJECTS | MONOREPO |
| DESKTOP: UNOFFICIAL | DESKTOP: OFFICIAL |

# REACT NATIVE VS. FLUTTER

JOB AD MENTIONS UK: 10X

COURSES BOUGHT: 12X

GOOGLE SEARCHES: 24X

STACK OVERFLOW QUESTIONS: 34X

# POPULAR: FLUTTER VS. JAVAFX

JAVA

UI BUILDER

NO NATIVE L&F

LIMITED FEATURES

WEB IMMATURE

DART

UI AS CODE

NATIVE L&F

FULL FEATURES

DESKTOP IMMATURE

# JAVAFX VS. FLUTTER

# WHEN TO USE WHICH MOBILE NATIVE CROSS-PLATFORM FRAMEWORK?

WEB: REACT NATIVE

.NET: .NET MAUI

JAVA + LEGACY JAVA LIBRARY: JAVAFX

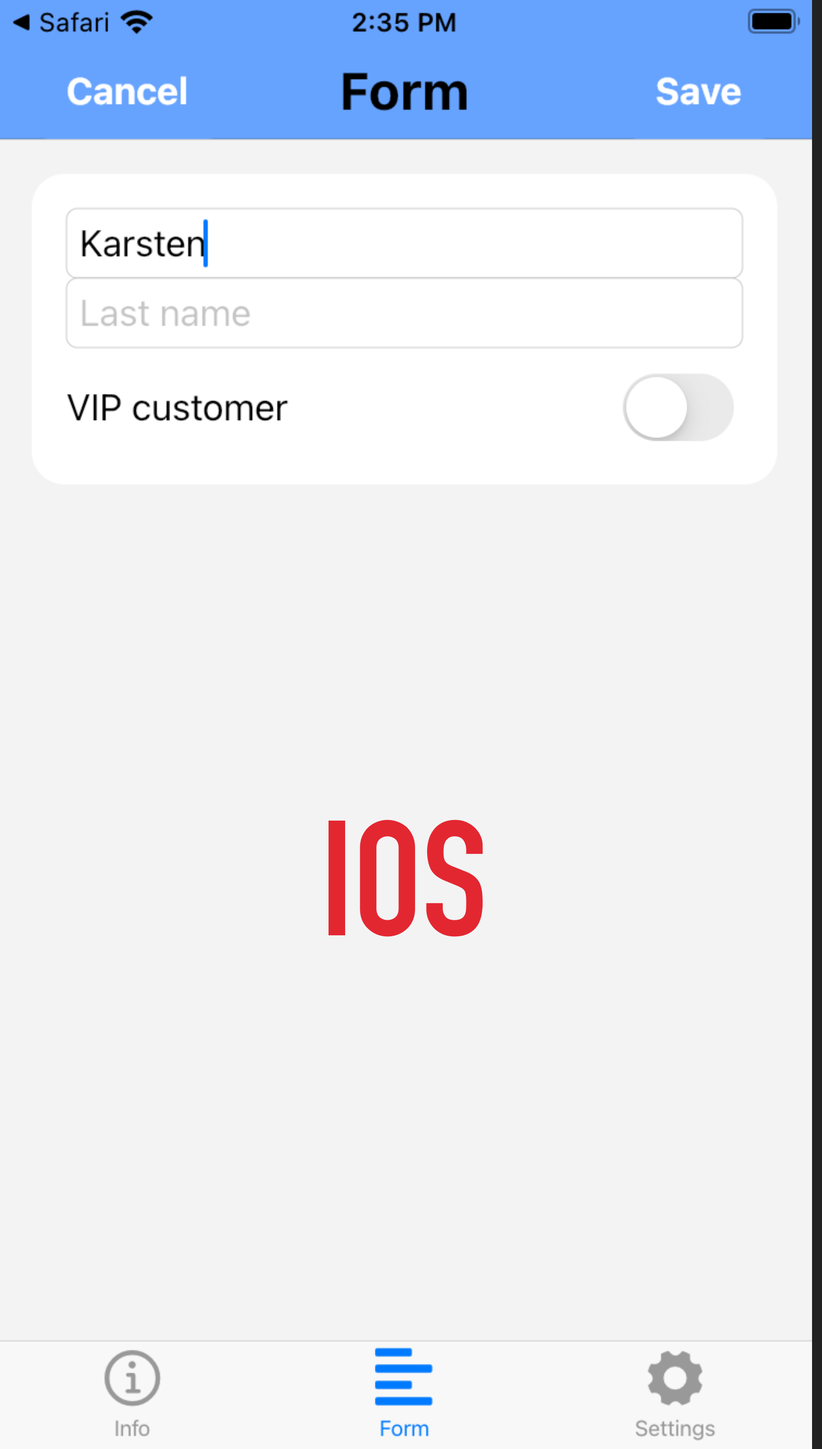
OTHERWISE: FLUTTER

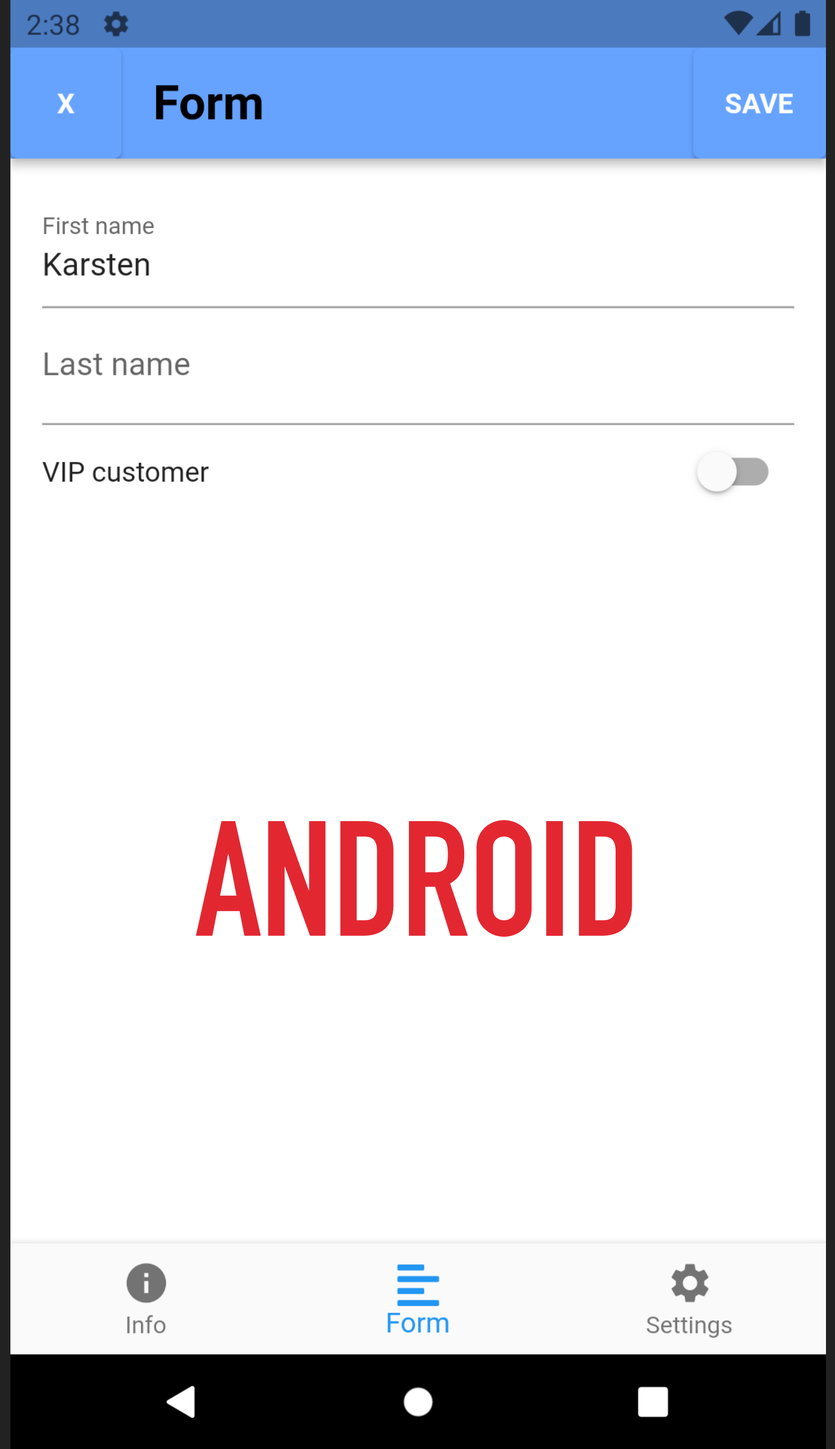
# DEVELOPER EXPERIENCE

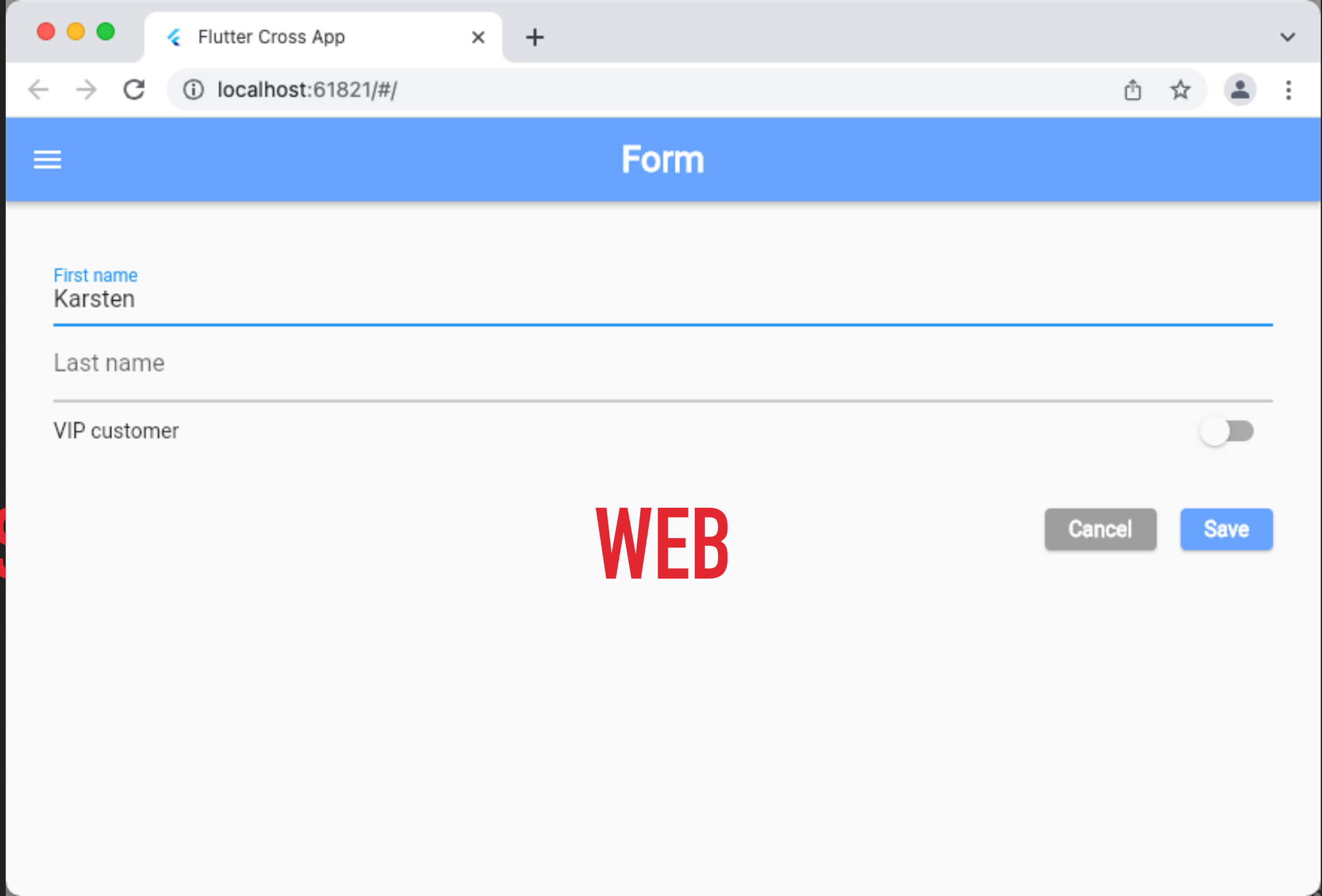
# BACK TO THE BIG QUESTION

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

YES, WE CAN

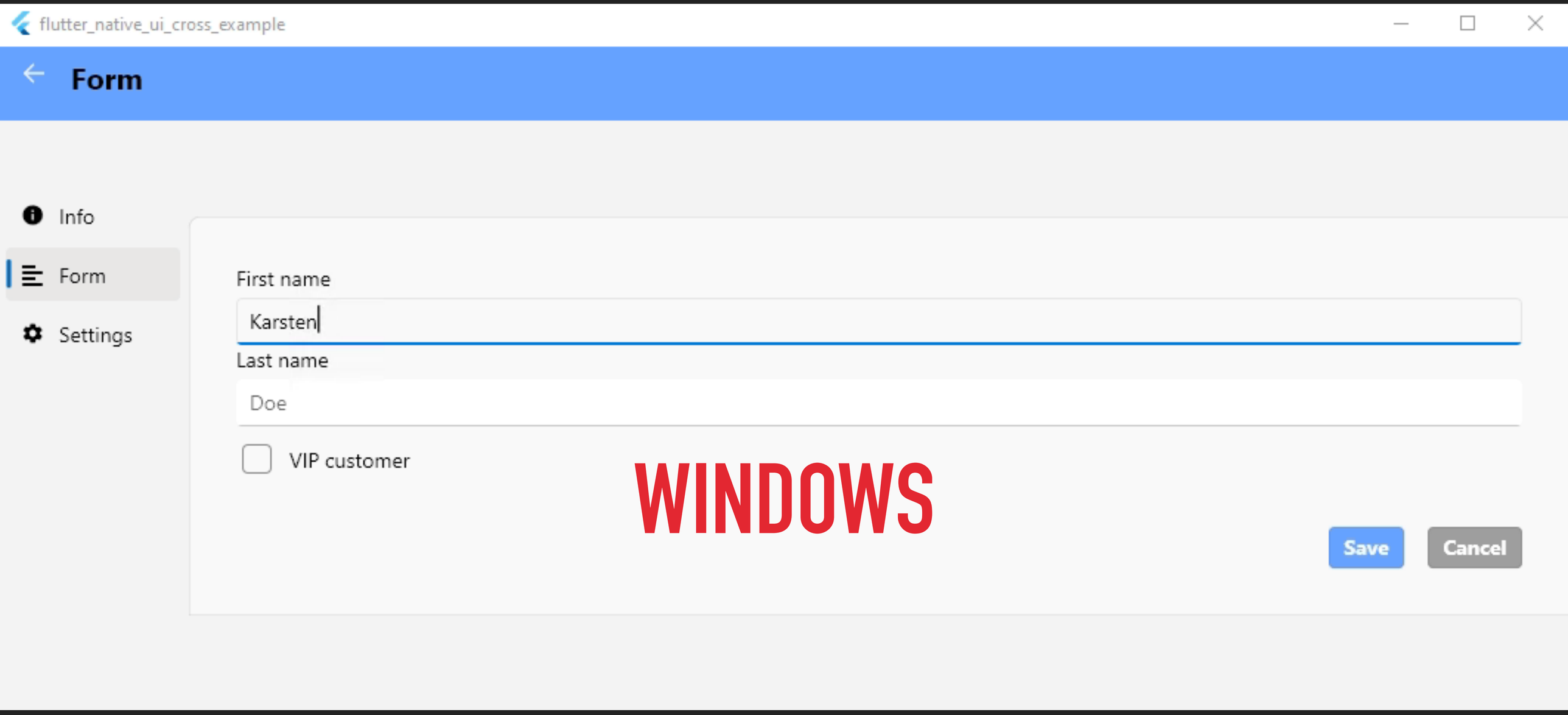

Safari
2:35 PM
Cancel
Form
Save
Karsten
Last name
VIP customer
IOS
Info
Form
Settings


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: 👎

JSF: 👎

JAVAFX: 👎

# 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/FAR

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# IMAGE SOURCES