Modern Identity Management

in the era of Serverless and Microservices

VERSION 2.0


Security
Matters
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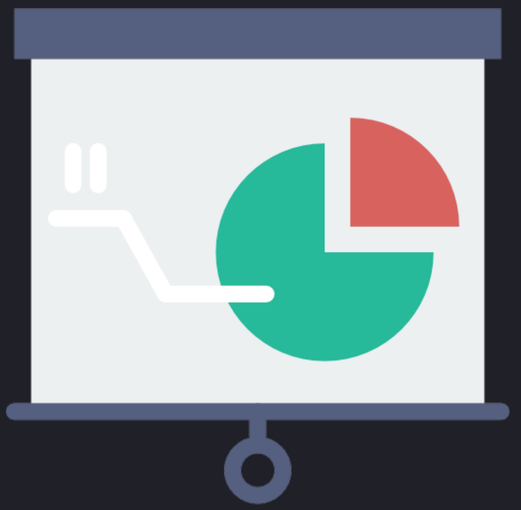
US Data Breaches Statistics

54%
Increase in the first half of 2019

3,800+
were reported



3.2 billion
Just 8 of those


EQUIFAX
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Had Been Uploaded

38,000
Driver's Licenses

3,200
Passport Details

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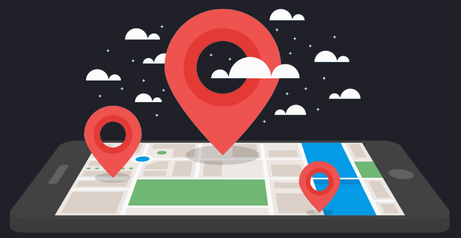
Had Stolen

146.6 million
Names and Dates of Birth

145.5 million
Social Security Numbers



99 million
Address

209,000 Payment Card Numbers and Expiration Dates

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EU General Data Protection Regulation

25 May 2018

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Security must be a goal.
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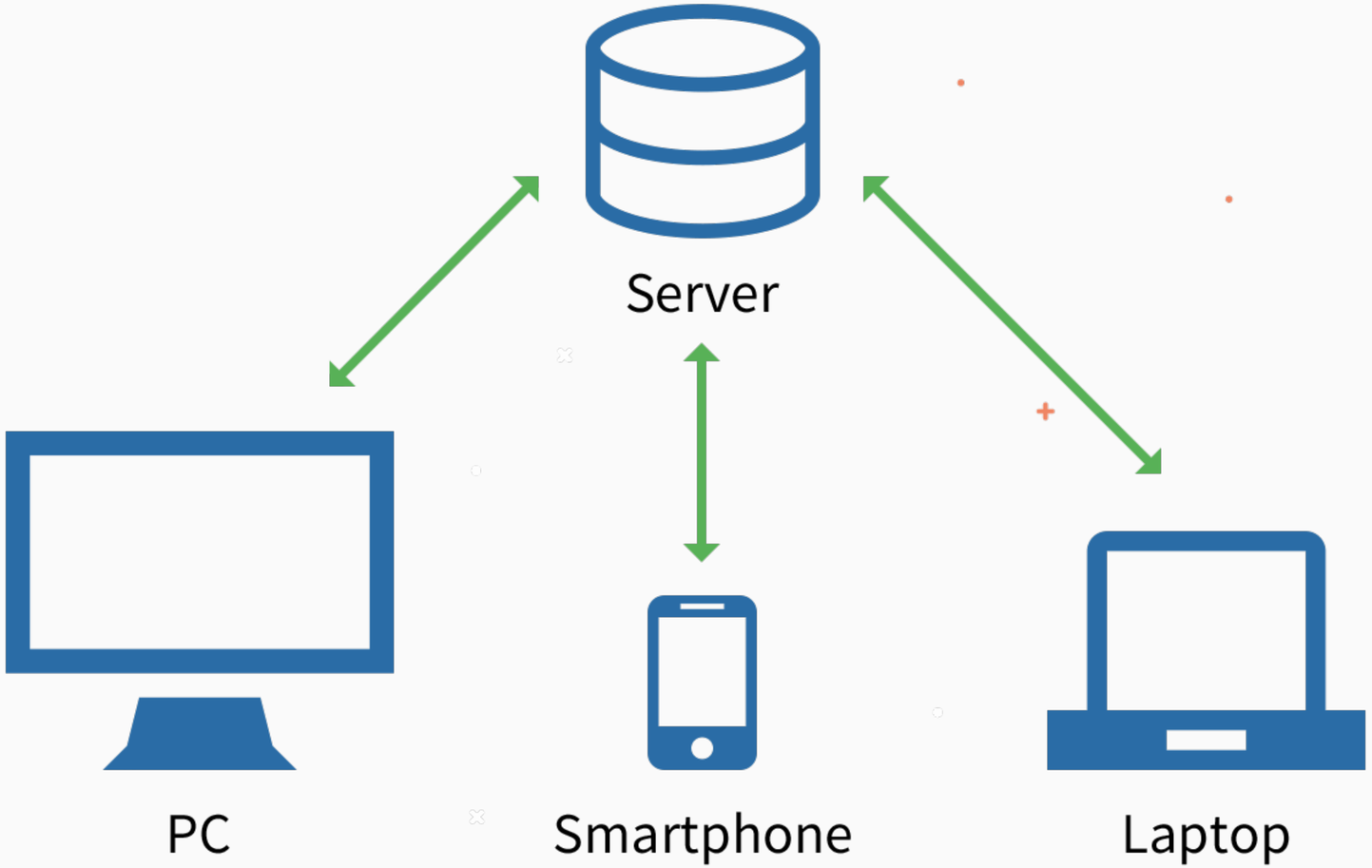
Security is a **Team Effort**



Best Practices

Identity Security

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Talk Roadmap

- Rest API Design / OAuth
- JWT
- User Credentials Problem
- Identity Management (IdM)
- Identity and Access Management (IAM)
- How to have a successful Identity Management Project
- Identity as a Service (IDaaS)
- Architecture Level

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Mercedes Wyss

@itrjwyss

Community Leader

Devs+502 & JDuchess Chapter Guatemala

Ex-JUG Member

Guatemala Java Users Group (GuateJUG)

Chief Technology Officer (CTO) at Produactivity

Full Stack Developer

Auth0 Ambassador &

Oracle Groundbreaker Ambassador

Duke's Choice Award

2016 Winner

Java™

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Devs +502

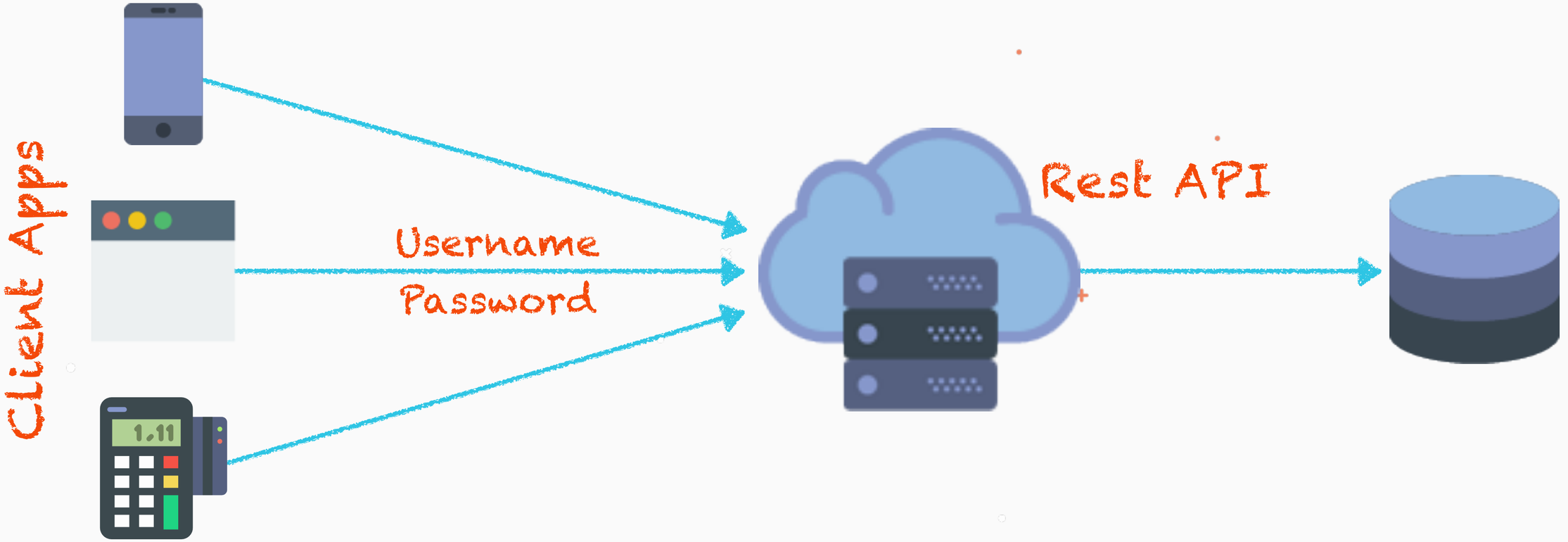
Comunidad Desarrolladores en Tecnologías

< Google > en Guatemala

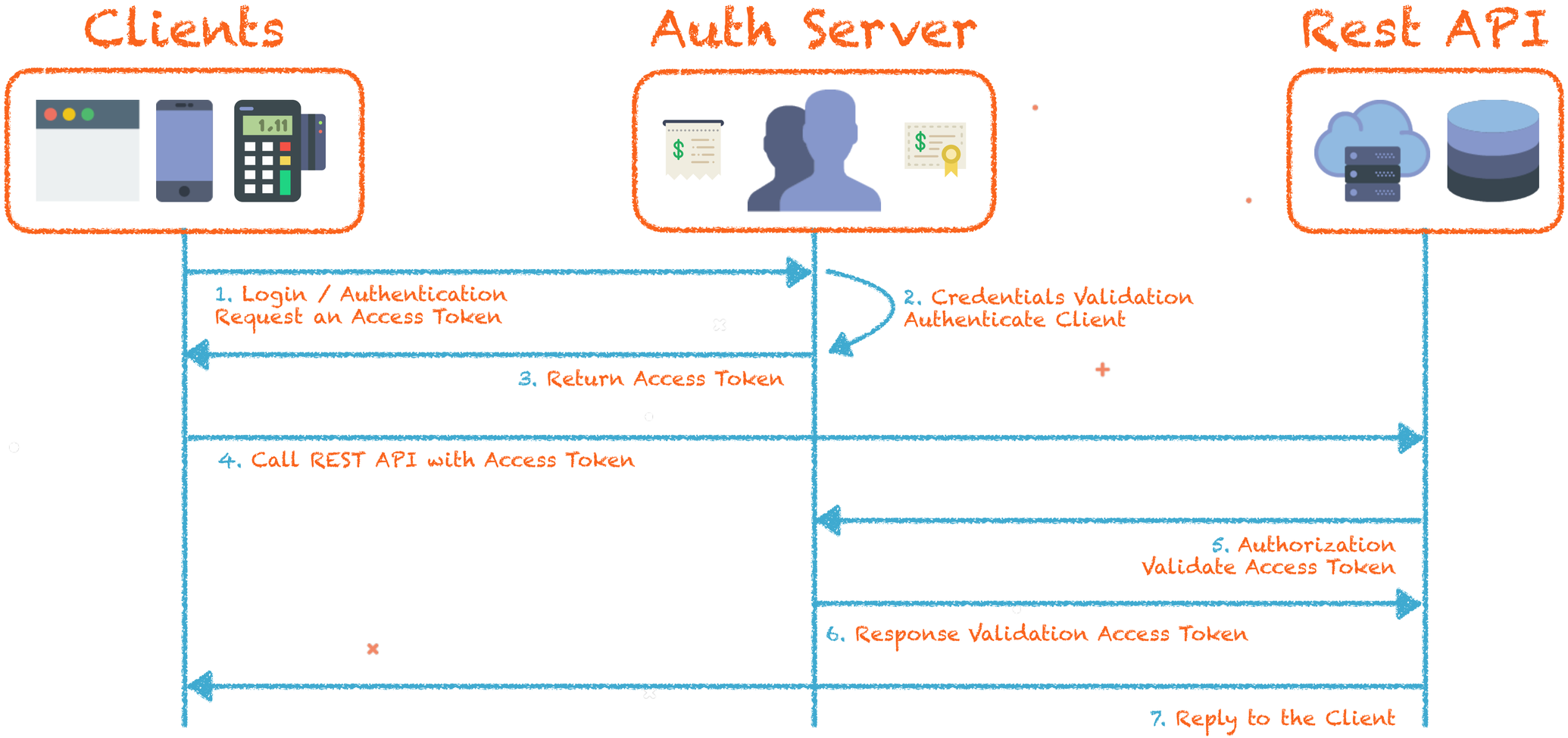
JDuchess

Guatemala

Bad API Design



OAuth



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JWT

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Is an open standard (RFC 7519) that defines a compact and self-contained way for securely transmitting information between parties as a JSON object.

Header

eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG9lIiwiYWRtaW4iOnRydWV9.

Claims

JSON Web Signature
JWT + JWS

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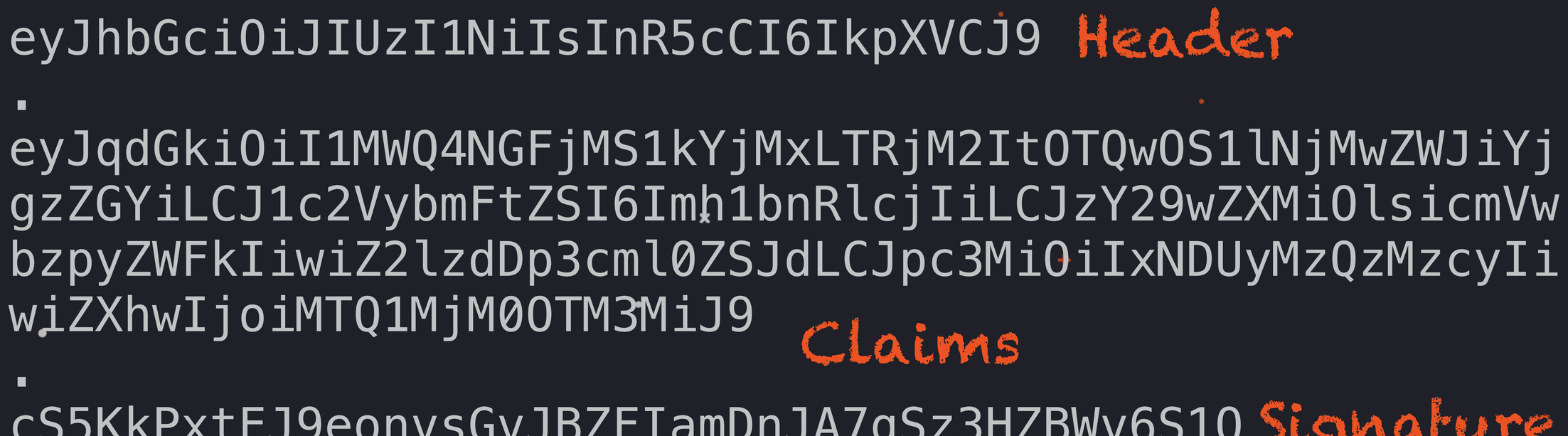
Signature Algorithms

JWS	Algorithm	Description
HS256	HMAC256	HMAC with SHA-256
HS384	HMAC384	HMAC with SHA-384
HS512	HMAC512	HMAC with SHA-512
RS256	RSA256	RSASSA-PKCS1-v1_5 with SHA-256
RS384	RSA384	RSASSA-PKCS1-v1_5 with SHA-384
RS512	RSA512	RSASSA-PKCS1-v1_5 with SHA-512
ES256	ECDSA256	ECDSA with curve P-256 and SHA-256
ES384	ECDSA384	ECDSA with curve P-384 and SHA-384
ES512	ECDSA512	ECDSA with curve P-521 and SHA-512

Exploring JWT



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Exploring JWT

```
{
  "alg": "HS256",
  "typ": "JWT"
}
.
{
  "jti": "51d84ac1-db31-4c3b-9409-e630ebbb83df",
  “sub": "hunter2",
  "scopes": ["repo:read", "gist:write"],
  "iss": "1452343372",
  "exp": "1452349372"
}
.
HMACSHA256(
  base64UrlEncode(header) + "." +
  base64UrlEncode(payload),
  secret
)
```

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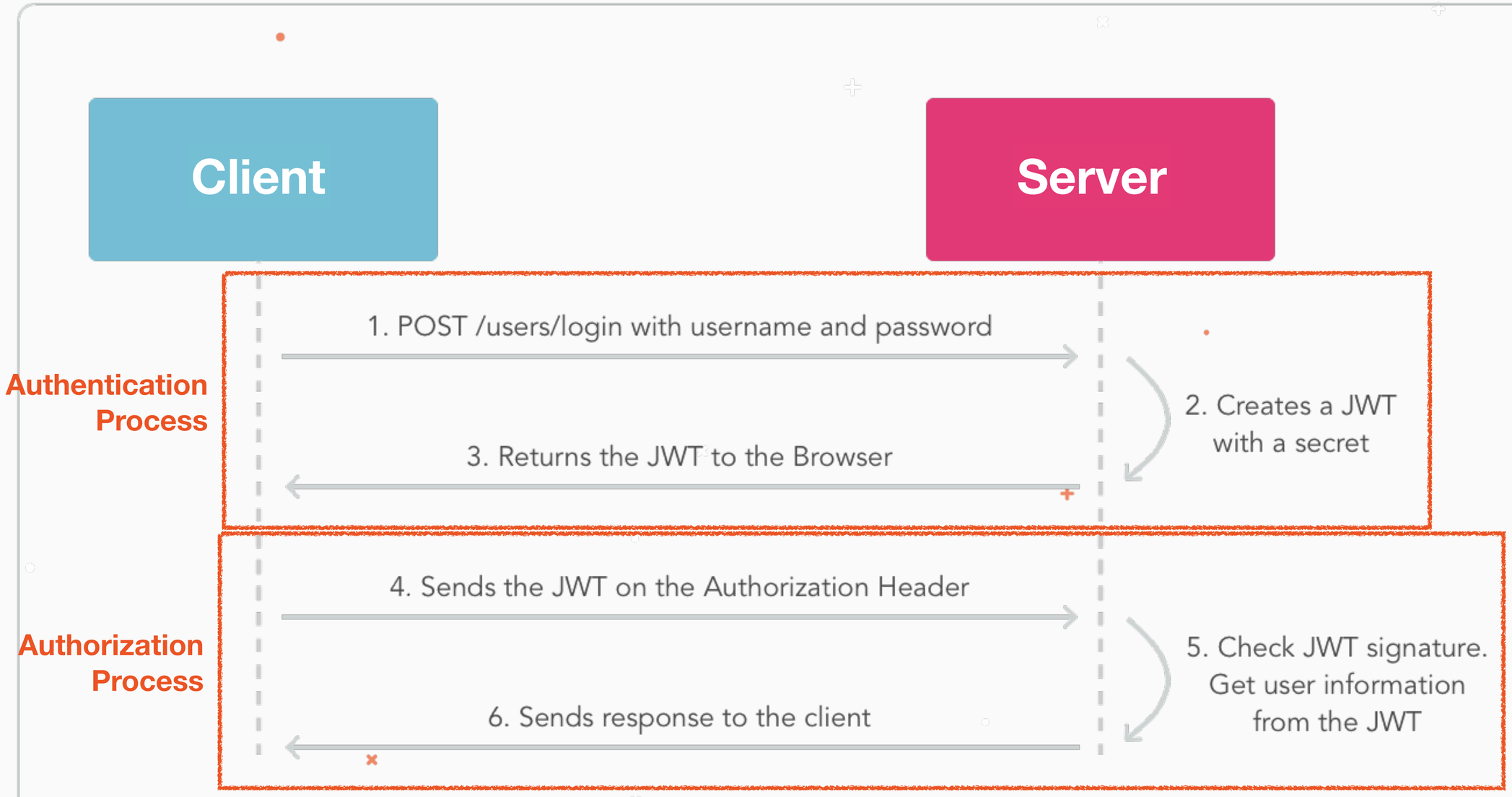
Registered Claims

iss	The issuer of the token
sub	The subject of the token
aud	The audience of the token
exp	The expiration in NumericDate value
nbf	sbt configuration files
iat	The time the JWT was issued
jti	Unique identifier for the JWT

What problems does JWT solve?

- Authentication
- Authorization
- Federated Identity
- Information Exchange
- Client-side Sessions (“stateless” sessions)
- Client-side Secrets



Auth0 (June 2017) https://cdn.auth0.com/content/jwt/jwt-diagram.png

Seguro | https://jwt.io

JWT

Debugger Libraries Introduction Ask Get a T-shirt!

Crafted by Auth0

Debugger

ALGORITHM HS256

Encoded PASTE A TOKEN HERE

```
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJzdWIiOiIxMjM0NTY3ODkwIiwibmFtZSI6IkpvaG4gRG9lIiwiYWRtaW4iOnRydWV9.TJVA95OrM7E2cBab30RMHrHDcEfxjoYZgeFONFh7HgQ
```

Decoded EDIT THE PAYLOAD AND SECRET (ONLY HS256 SUPPORTED)

HEADER: ALGORITHM & TOKEN TYPE

```
{
  "alg": "HS256",
  "typ": "JWT"
}
```

PAYLOAD: DATA

```
{
  "sub": "1234567890",
```

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Learn everything you wanted to know, but were afraid to ask about JSON Web Tokens

auth0.com/e-books/jwt-handbook

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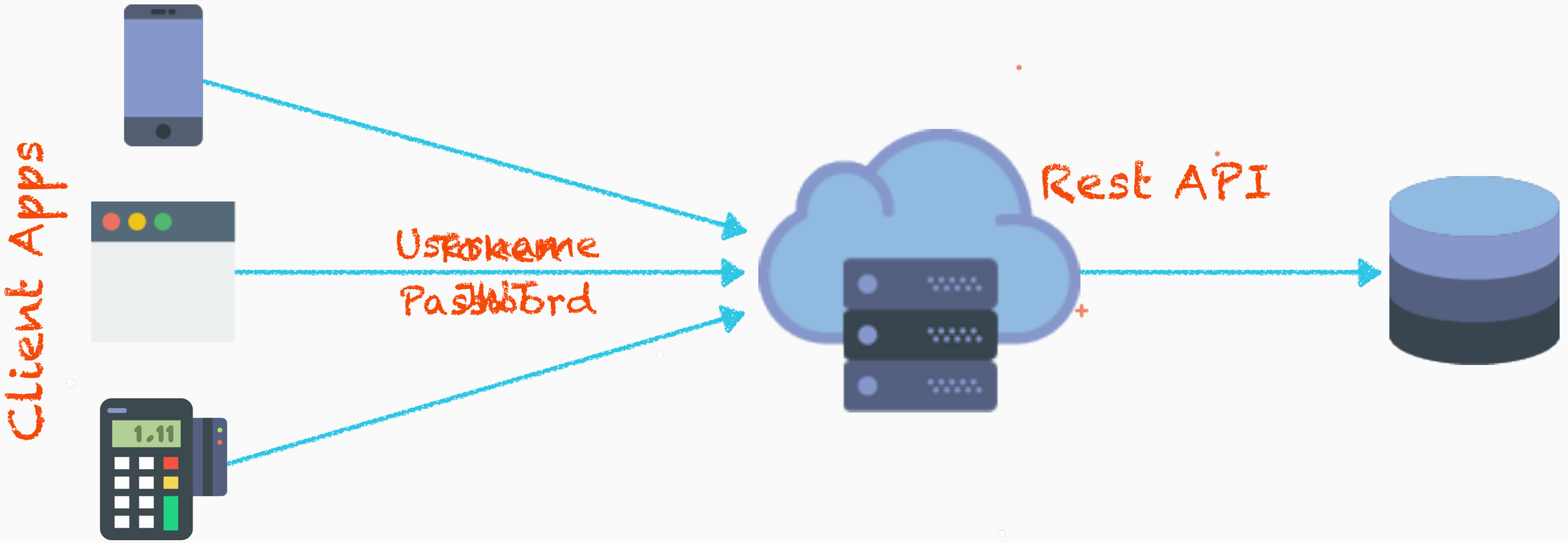
Improve API Design



User Credentials Problem

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SSO

Single Sign On

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PASSWORD
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Sorry, but your password must contain an uppercase letter, a number, a hieroglyph, a feather from a hawk and the blood of a unicorn.

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ENTER PASSWORD
CLICK CLACK
WRONG PASSWORD
WRONG PASSWORD
WRONG PASSWORD
RESET YOUR PASSWORD
WRONG PASSWORD
ENTER YOUR NEW PASSWORD
ENTER YOUR NEW PASSWORD
YOUR NEW PASSWORD CANNOT BE YOUR OLD PASSWORD
CHARLOTTE GOMEZ/BUZZFEED

AMBASSADOR


ENTER PASSWORD
CLICK CLACK
WRONG PASSWORD
WRONG PASSWORD
WRONG PASSWORD
RESET YOUR PASSWORD
WRONG PASSWORD
ENTER YOUR NEW PASSWORD
ENTER YOUR NEW PASSWORD
YOUR NEW PASSWORD CANNOT BE YOUR OLD PASSWORD

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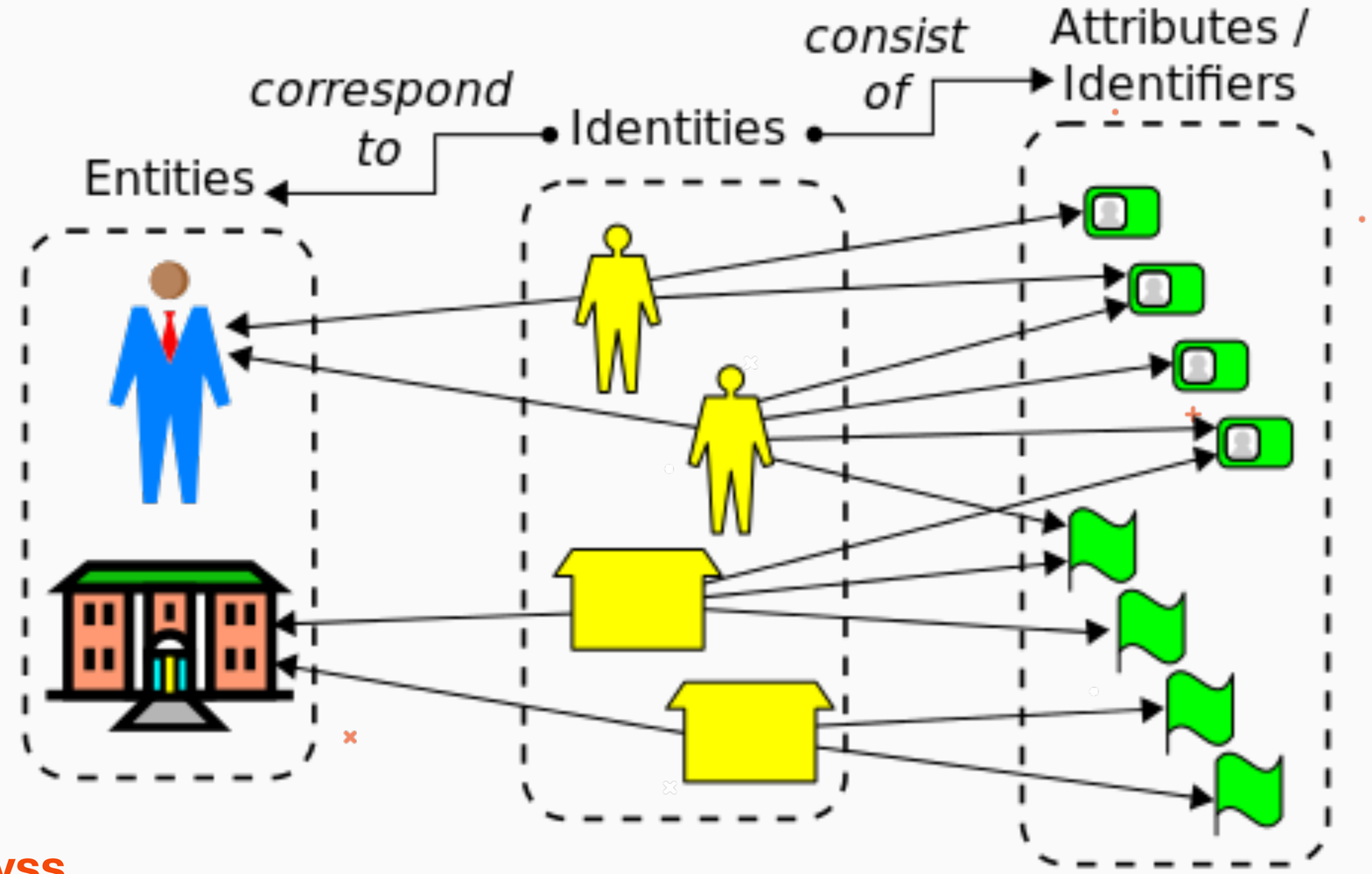
What we can do to improve this process?
Making it **easier** and **safer**.

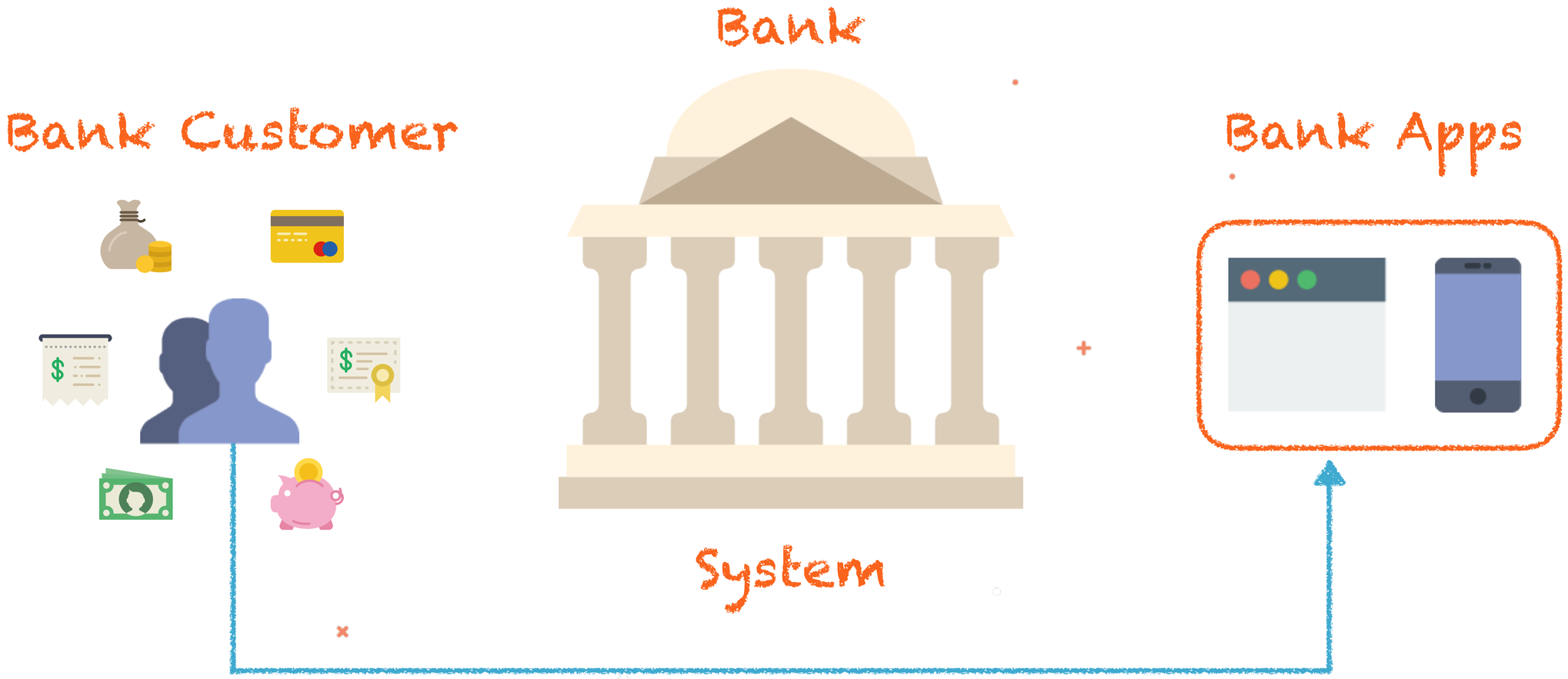
Identity Management (IdM)

- Is an umbrella term for all of the core logic around identity in a corporate environment.
    - Provisioning
    - Account management
    - Identity governance

IdM: Provisioning



Actor = User

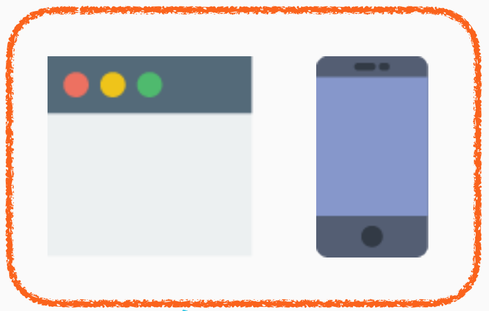


Actor ≠ User

Bank

Bank Customer

Bank Apps

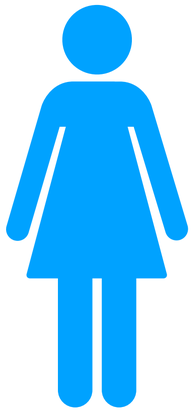
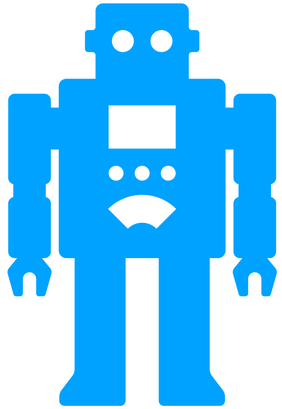
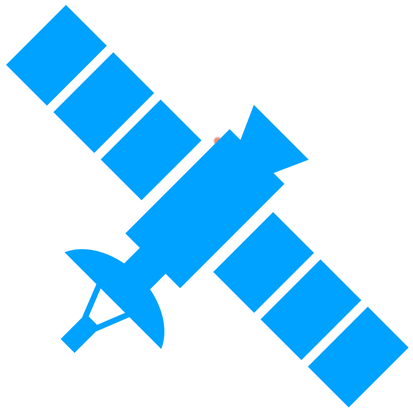
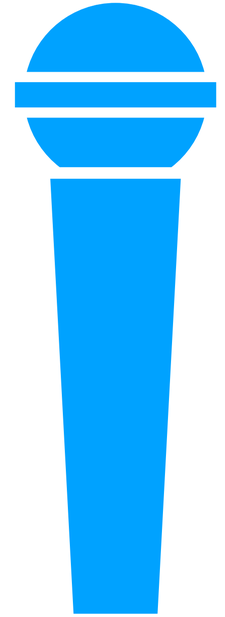


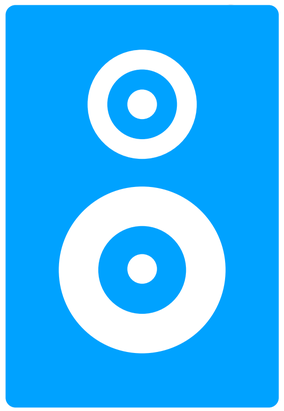
System

(company) Customer

Counter

IdM: Provisioning

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IdM: Account Management

- Maintain those identities
- How safe those data?
- Encryption, Which one, which keys?
- What happens when an Entity erase their account?
- What happens when an Entity is longer inactive?

IdM: Identity Governance

- Assigning them to groups and roles and adjusting permissions as needed

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Identity and Access Management (IAM)

- Is most often used to refer not just to identification, but to the whole suite of practices that a corporation needs to manage their users and data:
  - Authentication
  - Authorization
  - Identity Federation

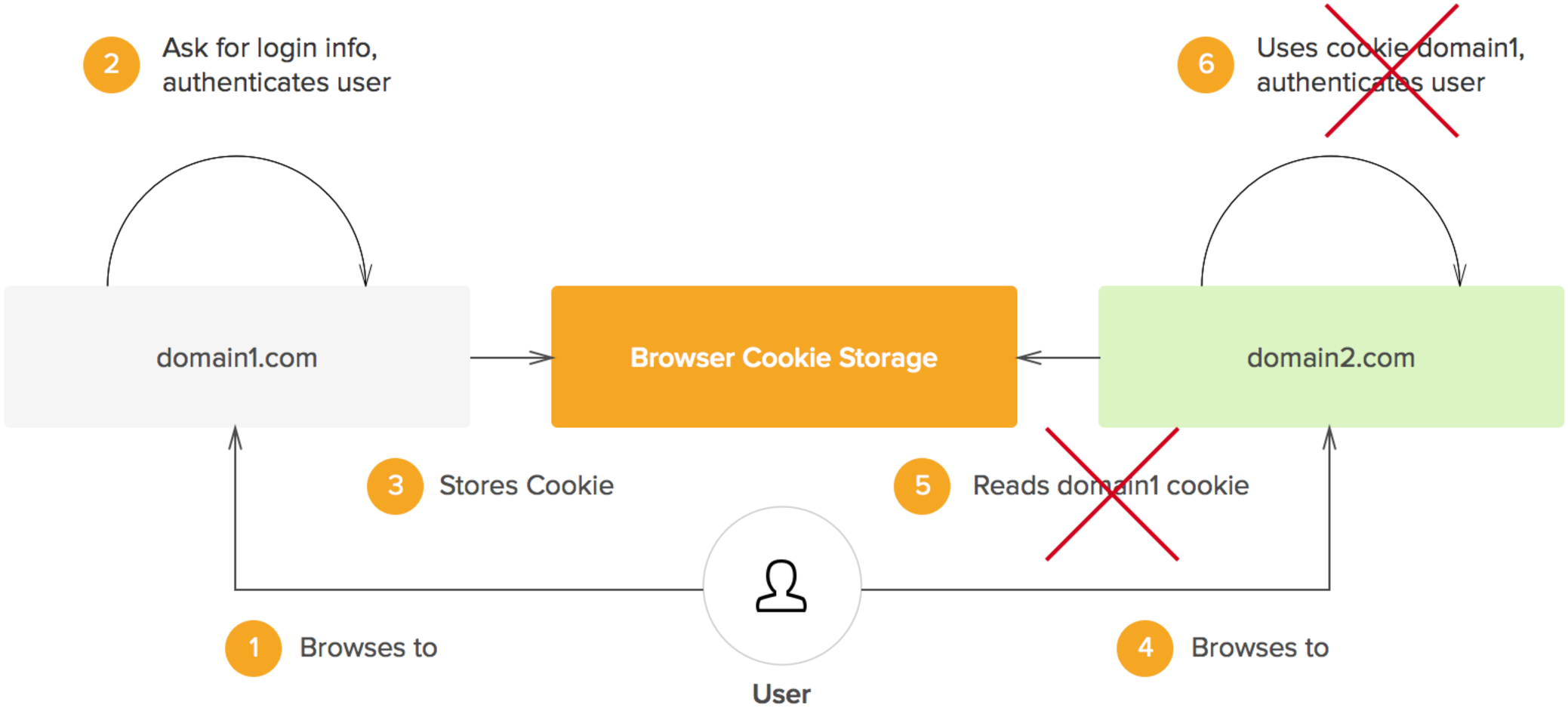
IAM: Authorization

- Ensuring the given user has the proper ***permissions to access*** a certain piece of data.

IAM: Identity Federation

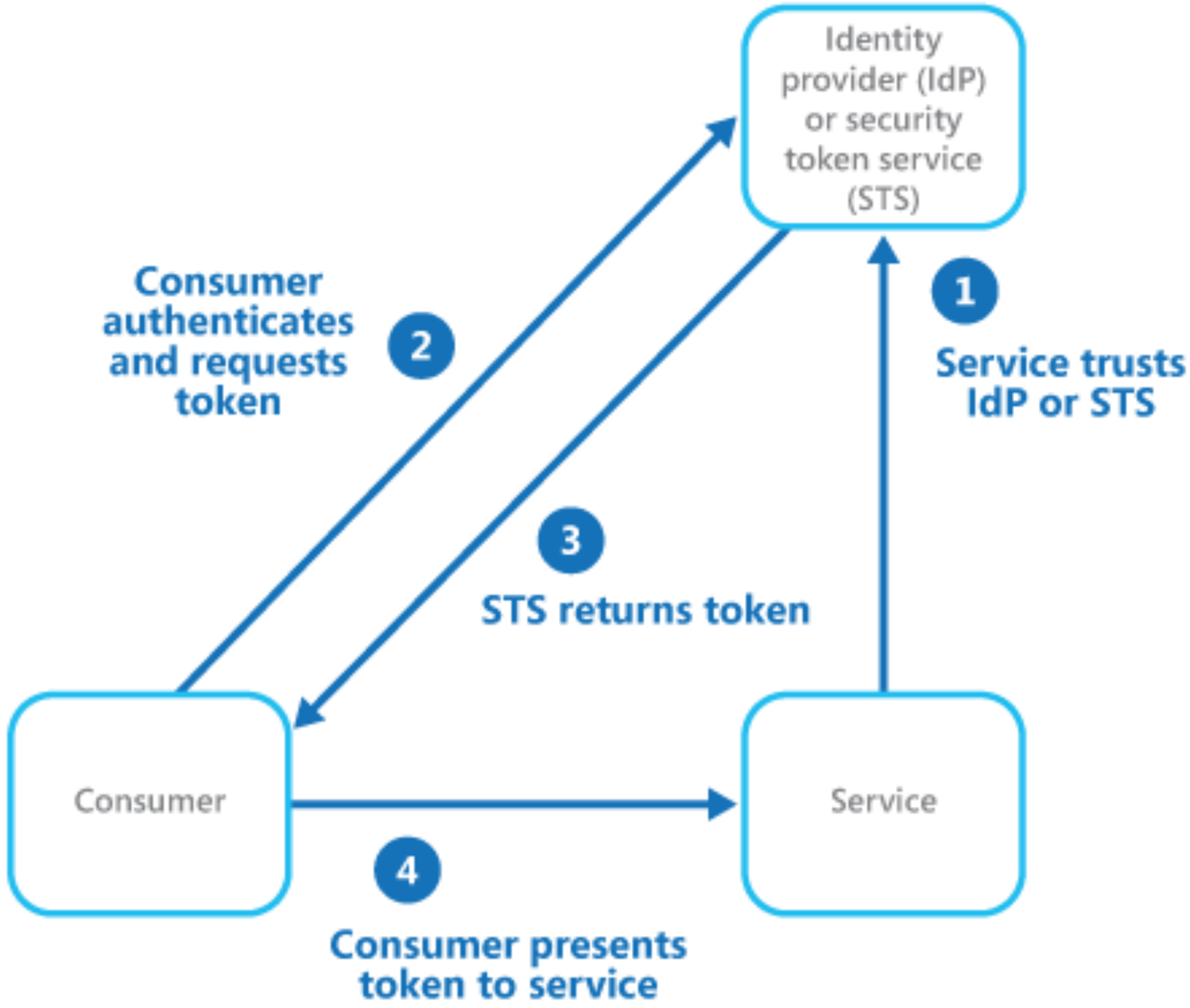
- Ensuring users can use the same identification data to access resources on related domains.

SAME-ORIGIN-POLICY FORBIDS THIS



Federated Identity

- In some way, are methods of transferring data without violating the same origin policy.
- This way, if domain X and Y are related, and their owners want users to move freely between the two, they can simply triangulate around an external authorization server.



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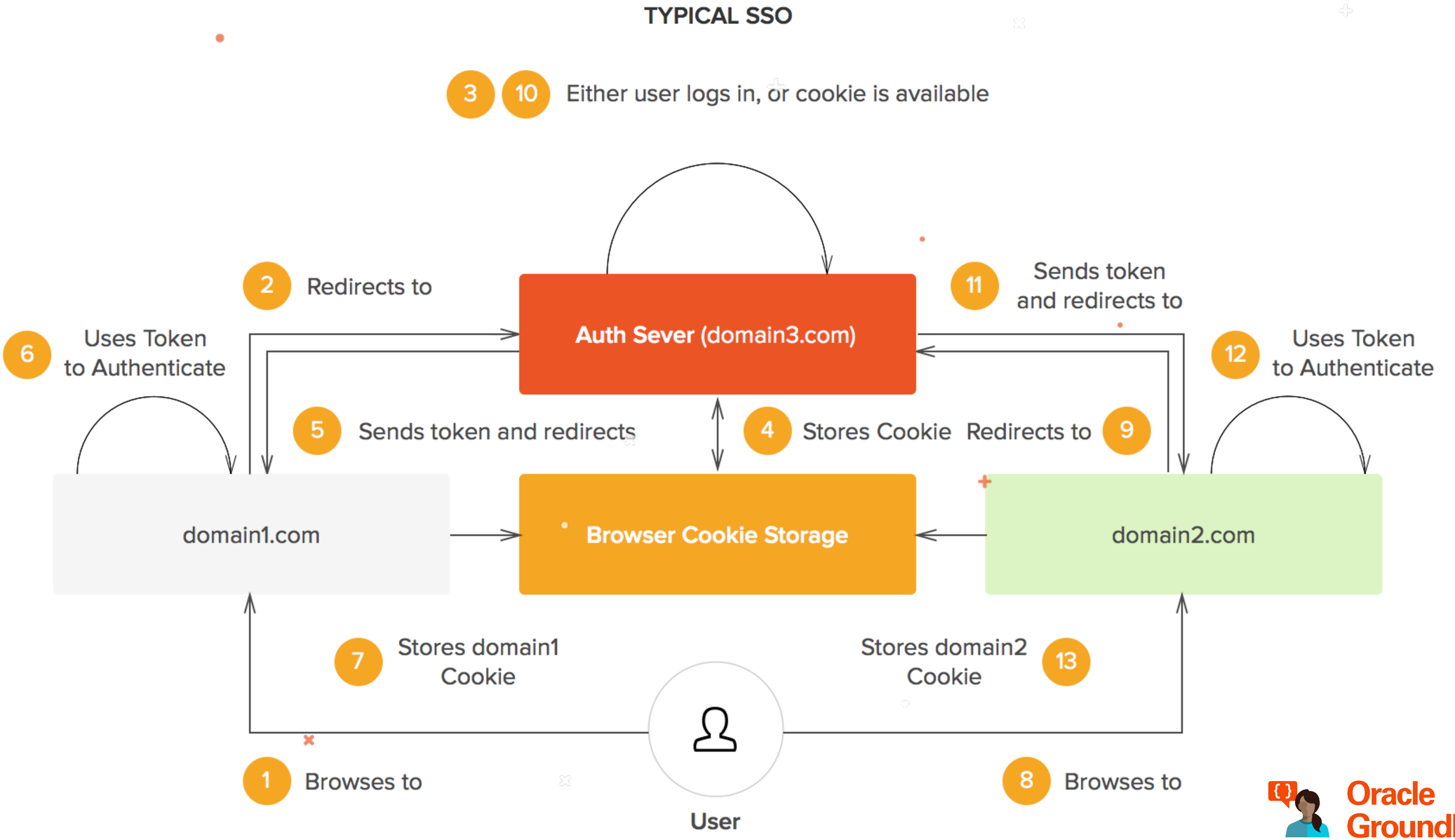

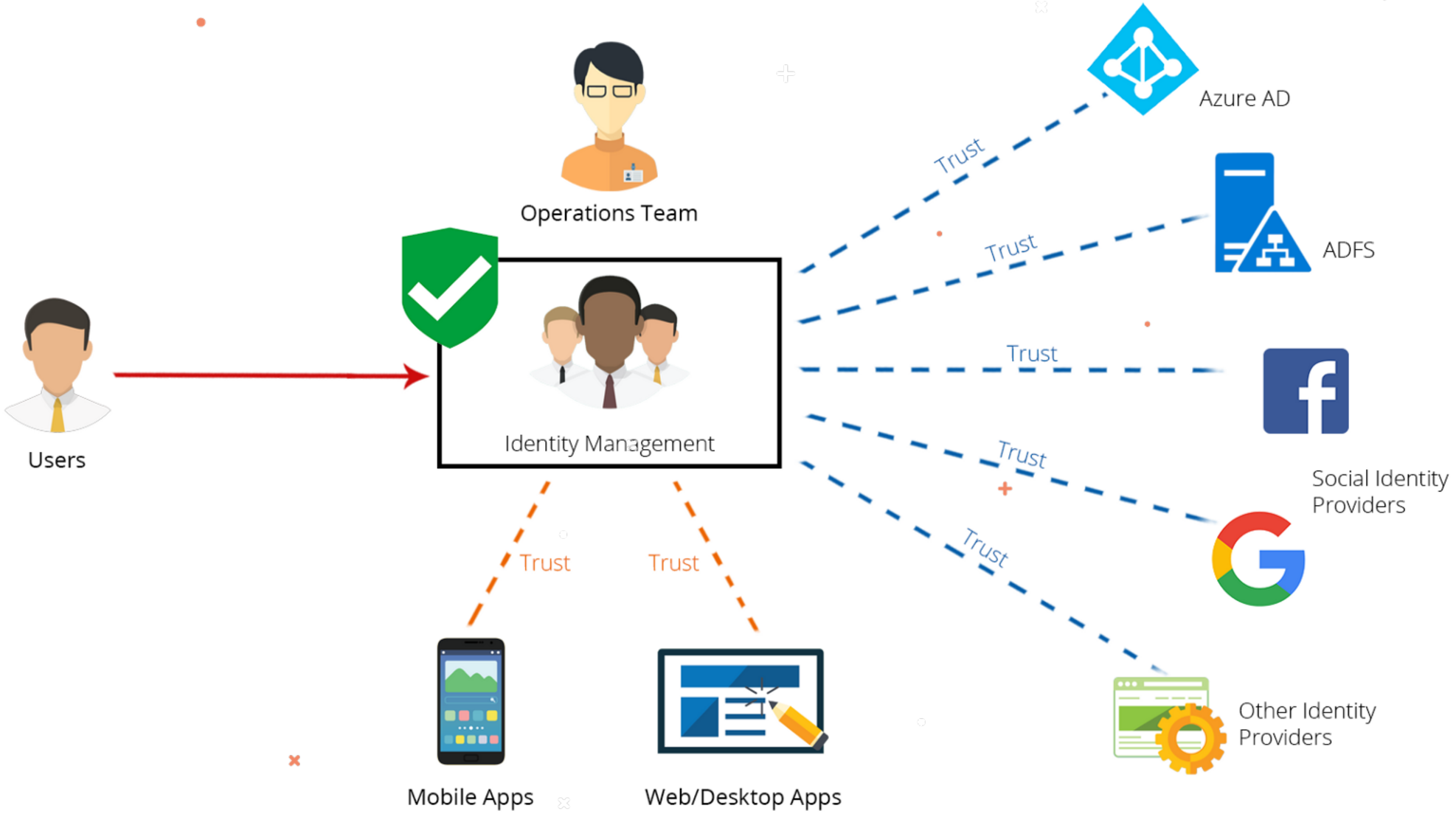

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Social Federated Identity

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Basecamp

Amazon Web Services

AOL Reader

Auth0 OpenIDConnect

Baidu

Bitbucket

Box

Docomo

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Dropbox

Dwolla

Evernote

Exact

Facebook

Fitbit

Github

Goodreads

Google

Instagram

LinkedIn

Microsoft Account

miiCard

Generic OAuth2 Provider

PayPal

Planning Center

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RenRen

Salesforce

Shopify

SoundCloud

The City

Twitter

vKontakte

Weibo

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WordPress

Yahoo!

Yammer

Yandex

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Enterprise Federated Identity

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Active Directory

ADFS

Azure Active Directory Native

Google Apps

IP Address Authentication

LDAP

Office 365 (Deprecated)

PingFederate

SharePoint Apps

WS-Federation

Azure Active Directory

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Legal Federated Identity

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Norwegian BankID

Swedish BankID

NEM ID

Danish NemID

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IAM: Authentication

- Ensuring that a given user is the user they identify as
  - Single Sign-On (SSO)
  - Multi-factor Authentication (MFA)
  - Passwordless
  - *Federated Identity (Management)*

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Knowledge

Possession

Biometric

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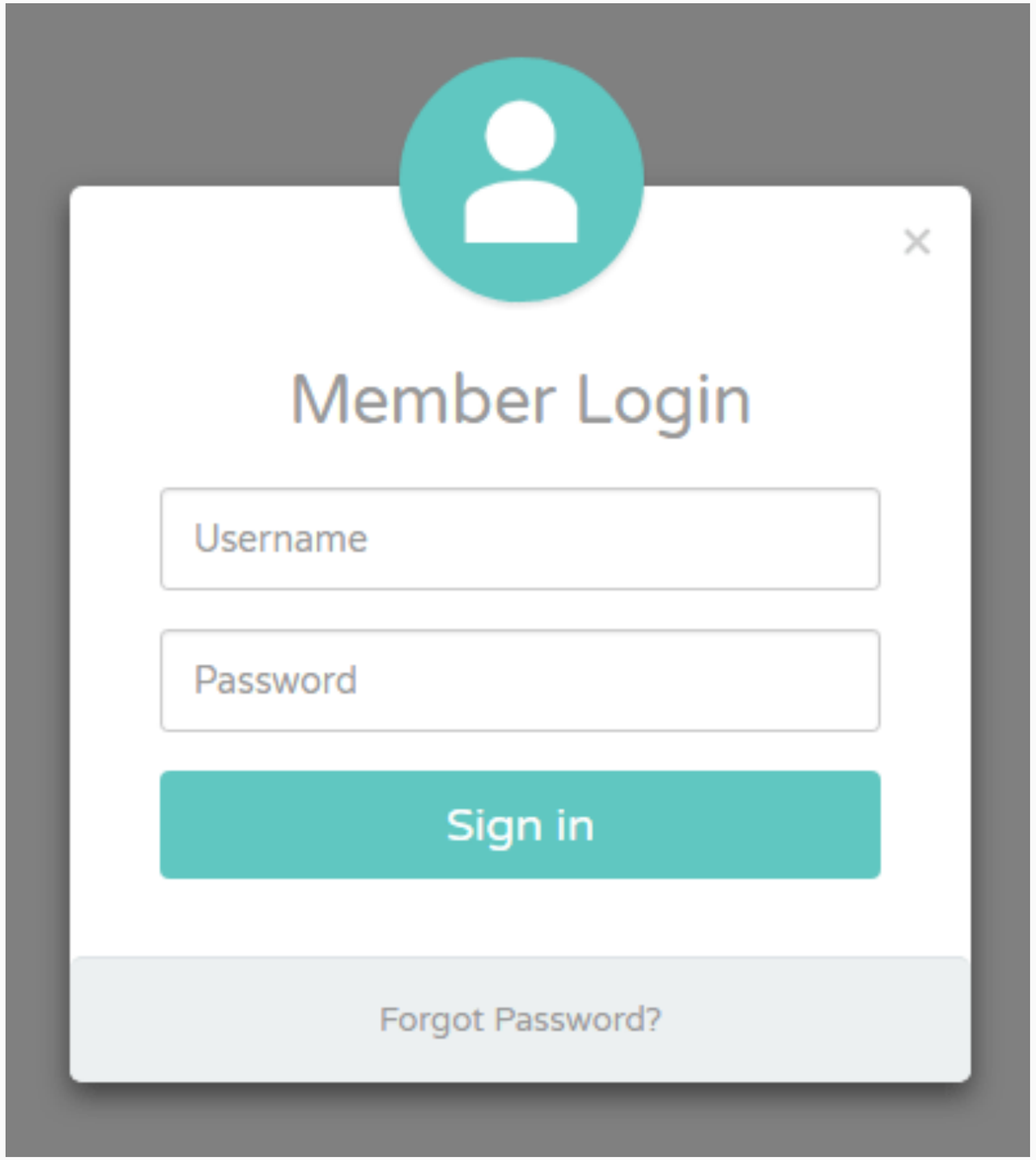

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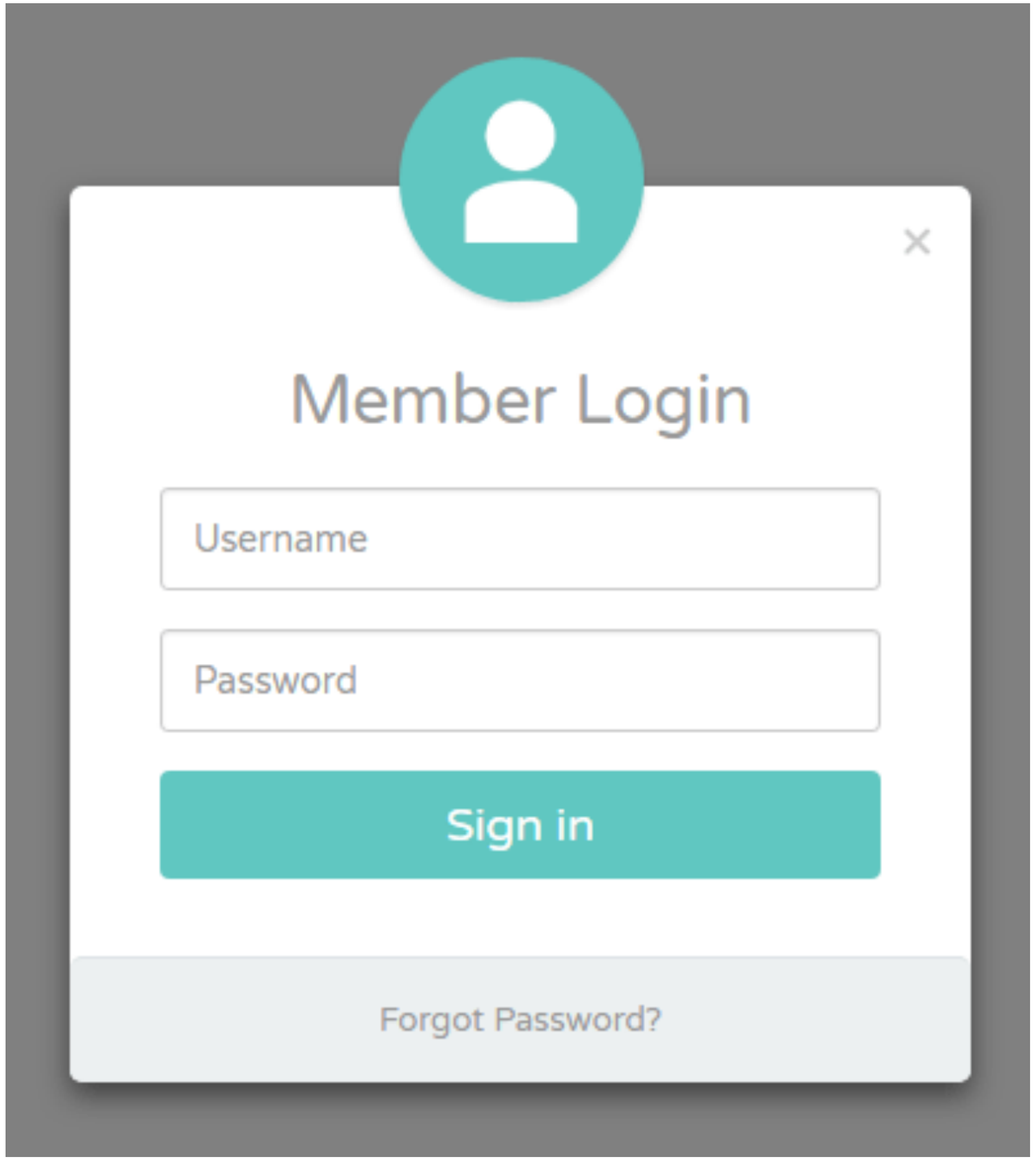

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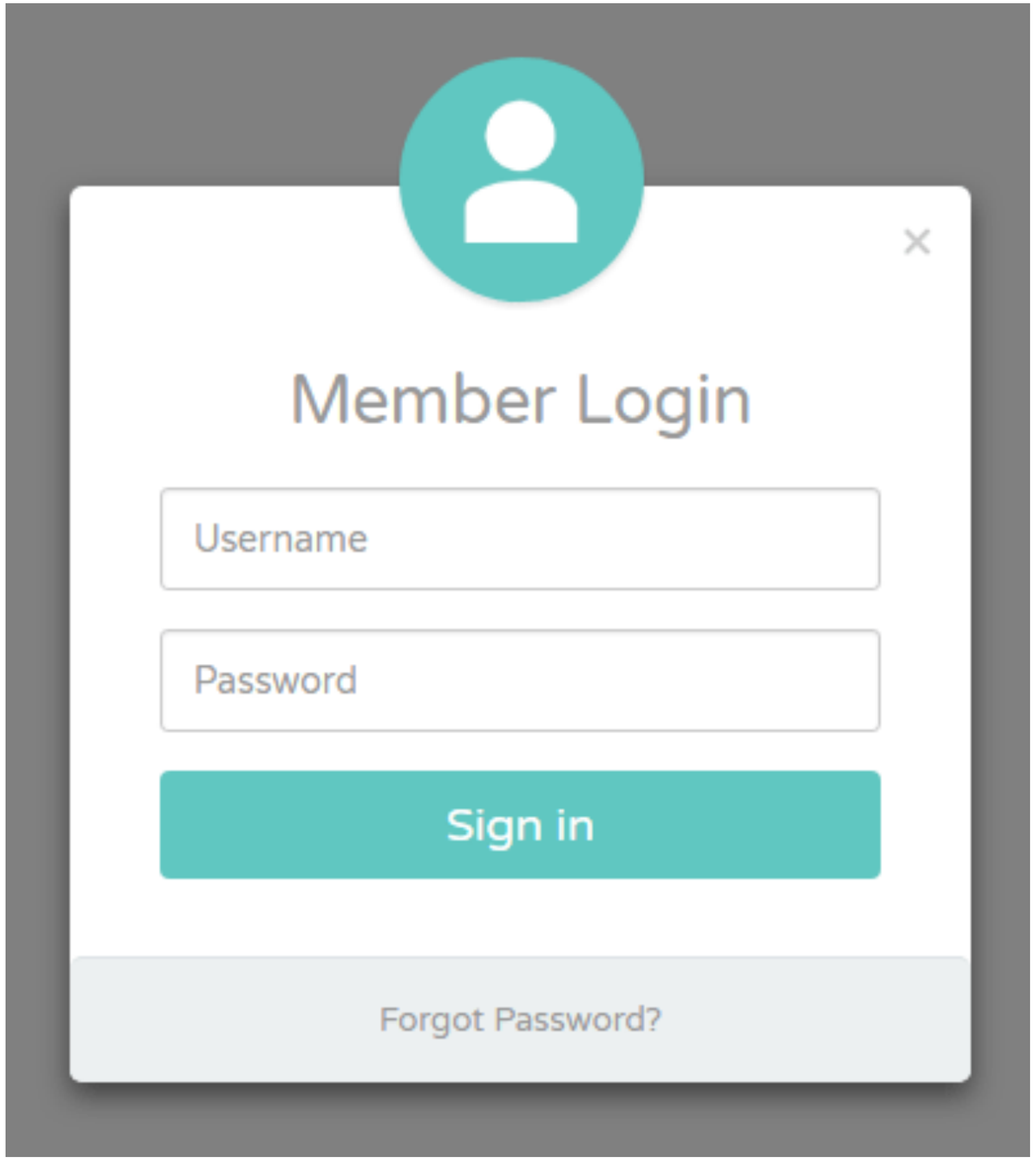

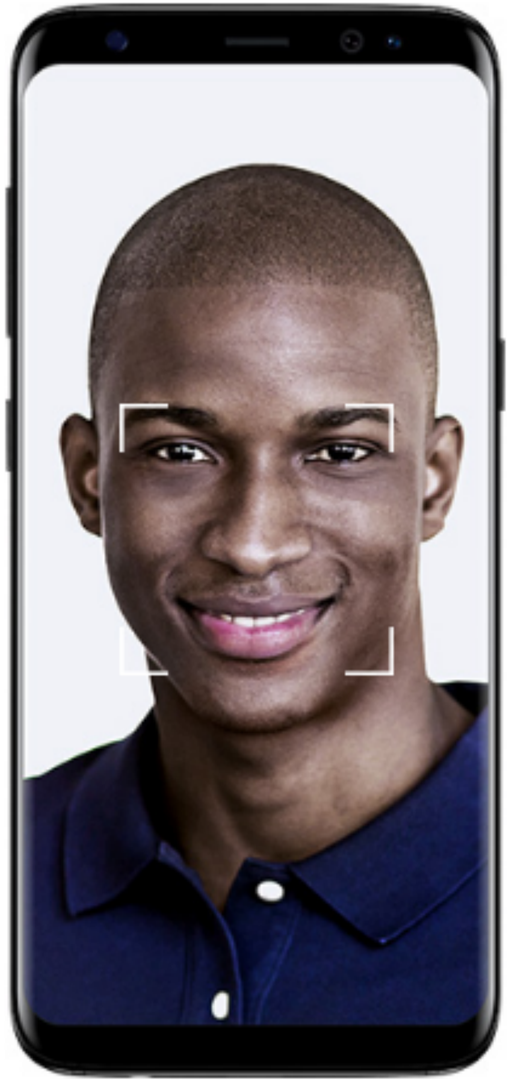

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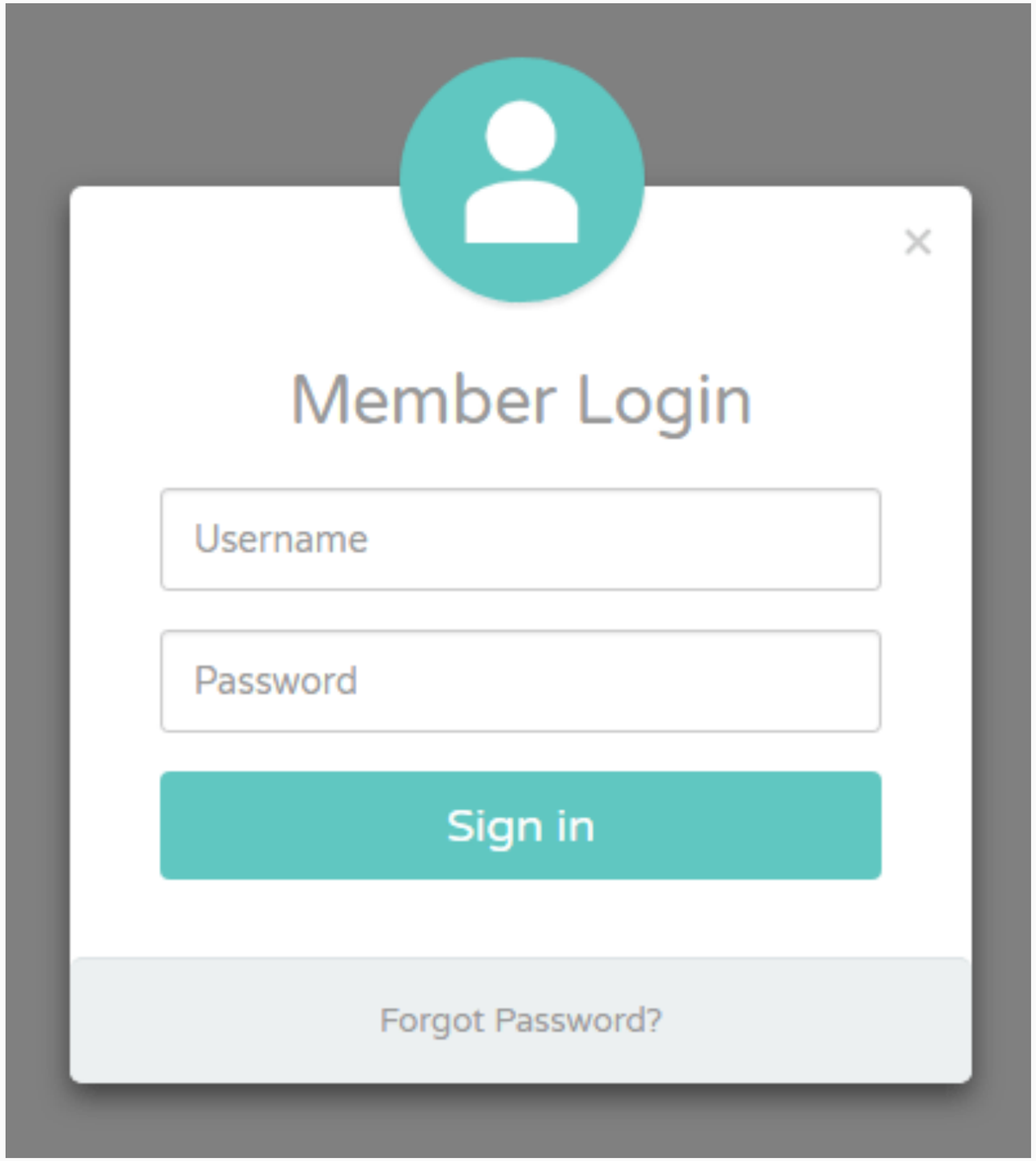

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MFA | Multi-Factor Authentication

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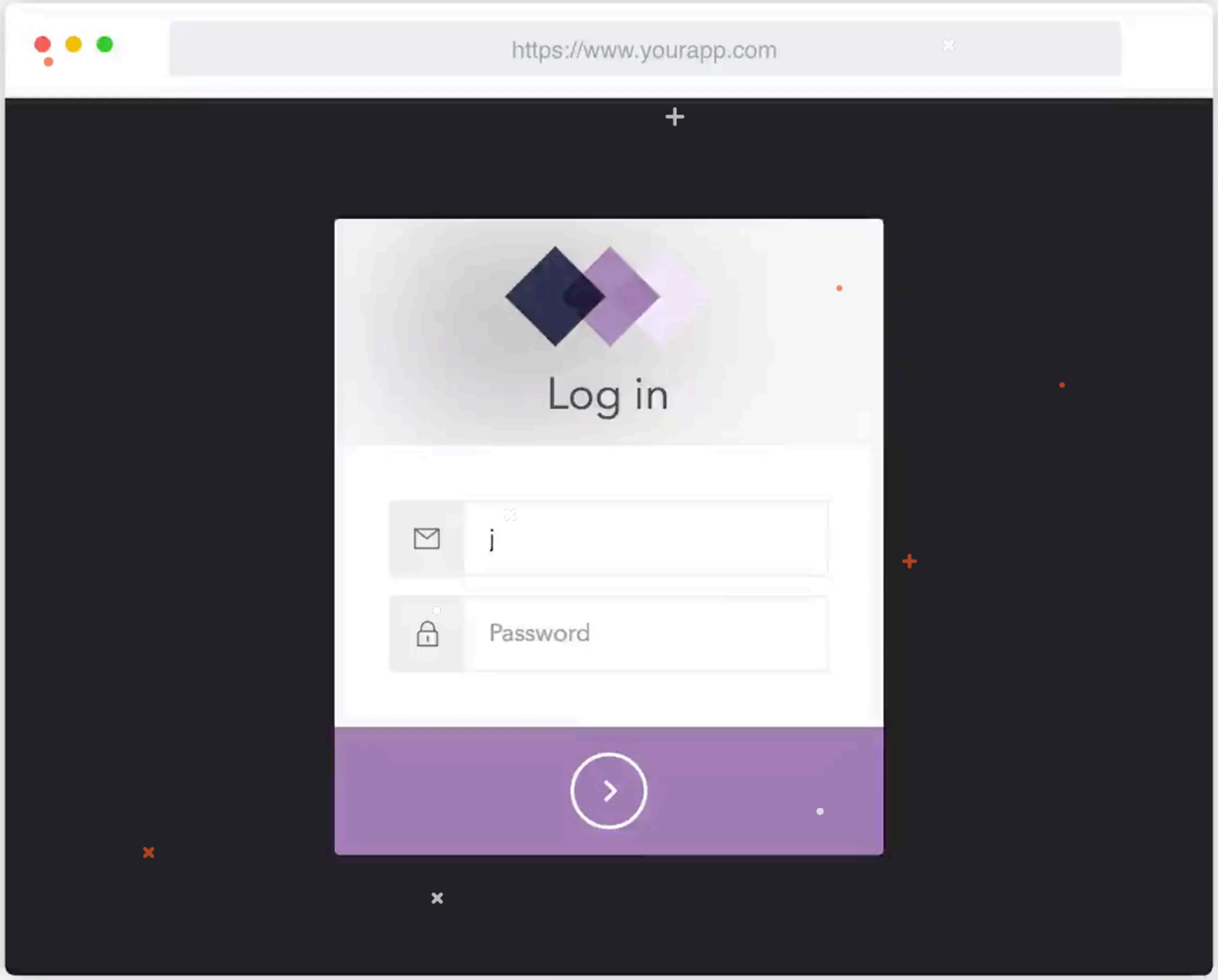
User logs into an account using their primary password

An authentication code (OTP) is sent to the user's mobile phone

User enters the OTP as the secondary password and is granted access to their online account



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MFA: Biometrics

- Common methods are touch ID (fingerprint), facial recognition.
- We can have other ones:
    - Iris or retina recognition
    - Voice recognition (Twilio)
    - Typing recognition
    - DNA usage

MFA: Biometrics

- Common methods are touch ID (fingerprint), facial recognition.
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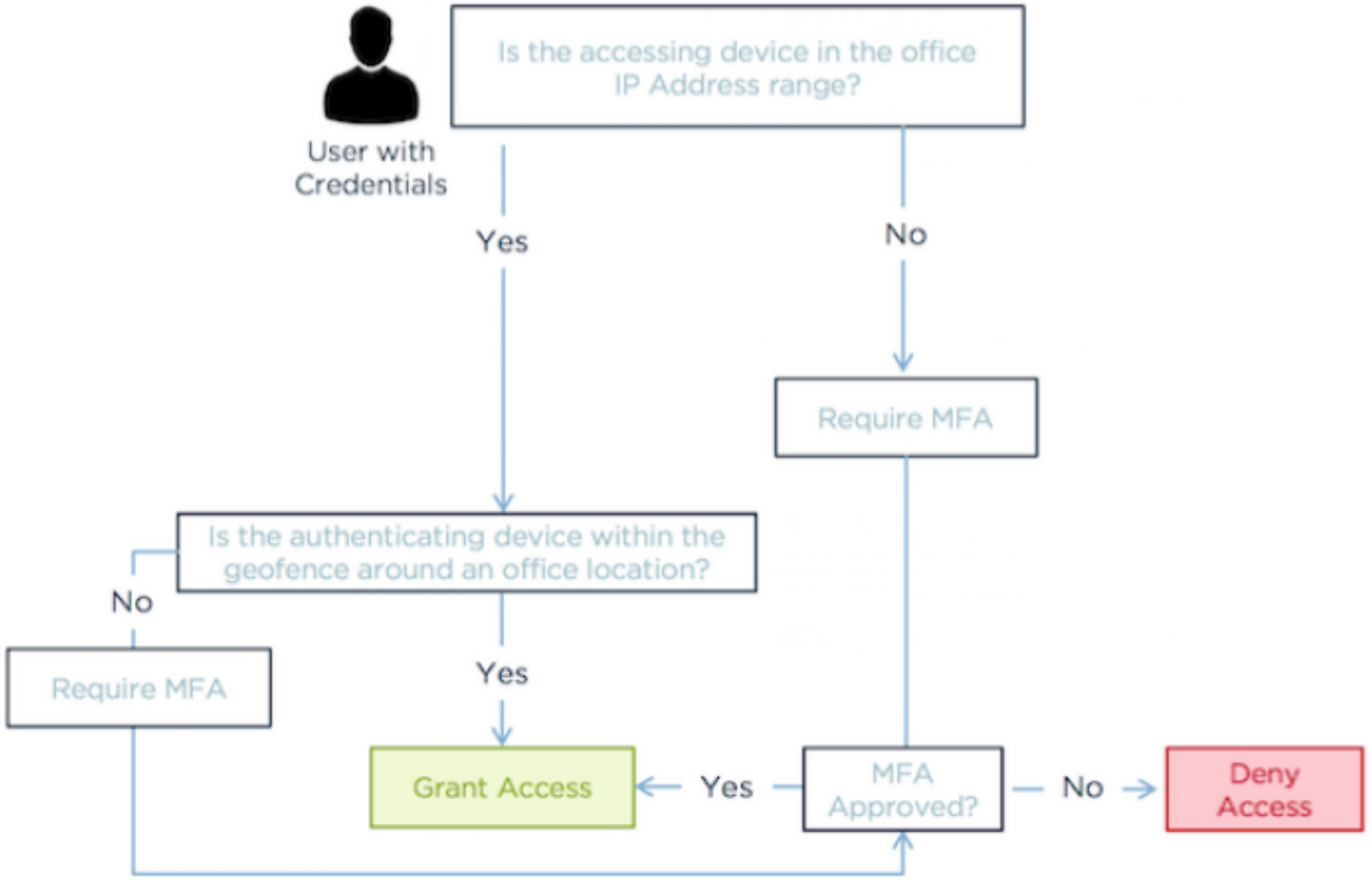
Passwordless

- It means authenticating a user by means other than having them type in a password
- Can also evaluate user and device contexts to provide authentication methods.



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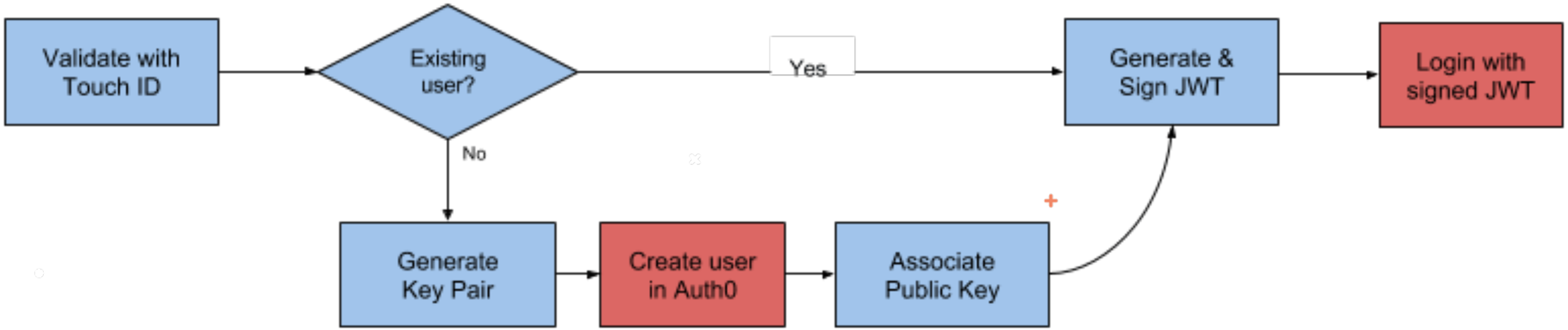
Touch ID



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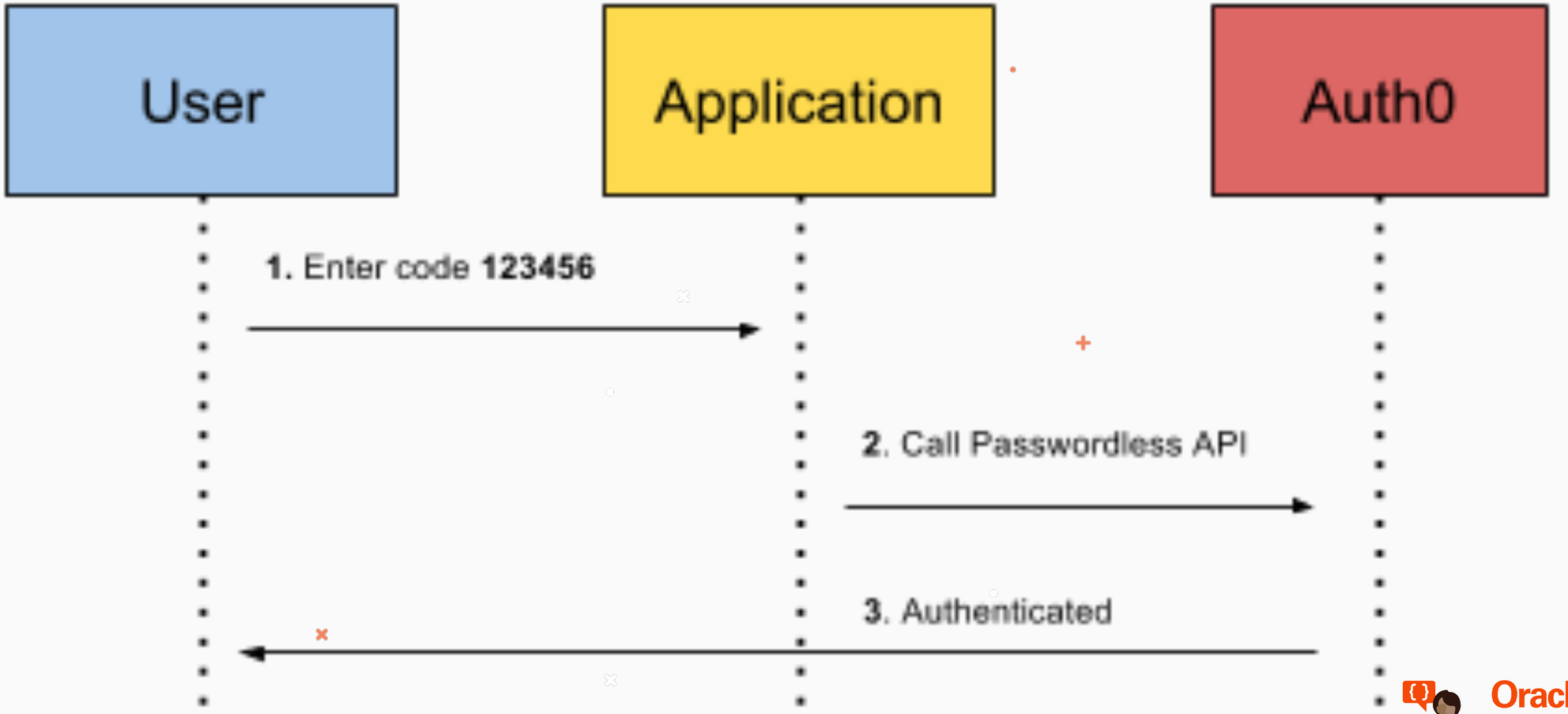
SMS Code



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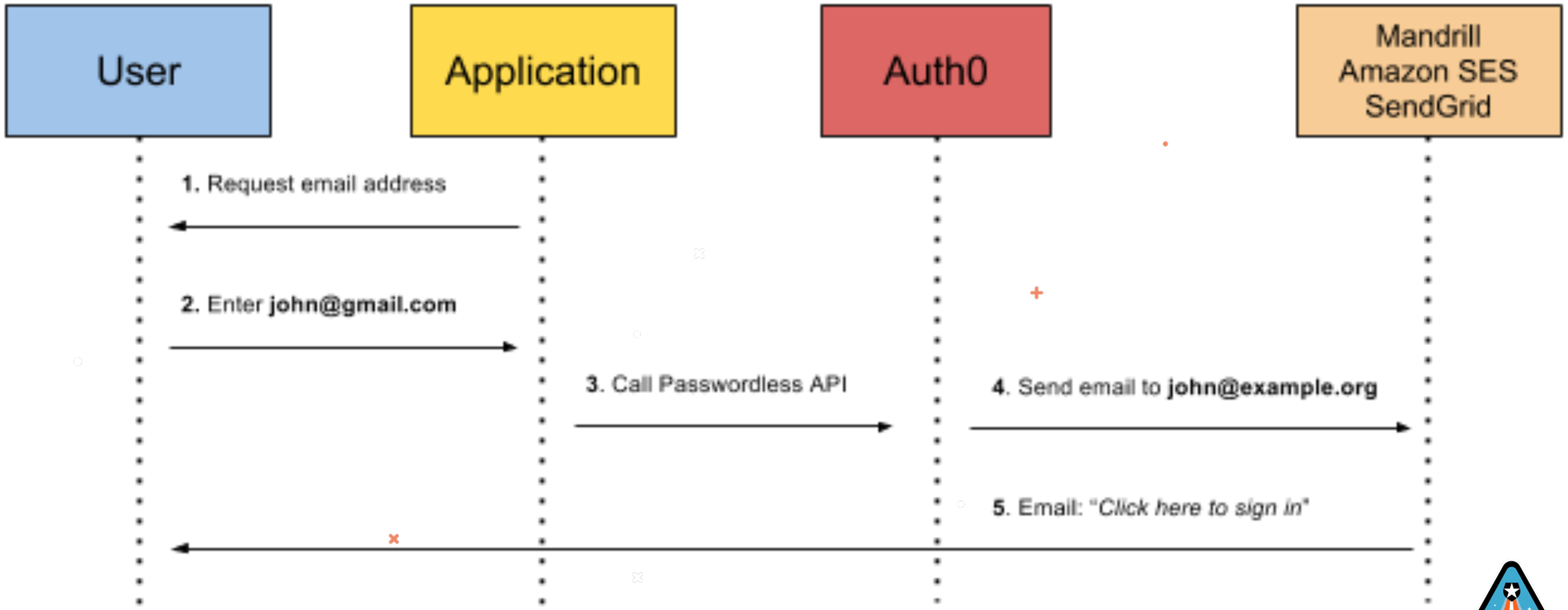
Magic Link



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slack

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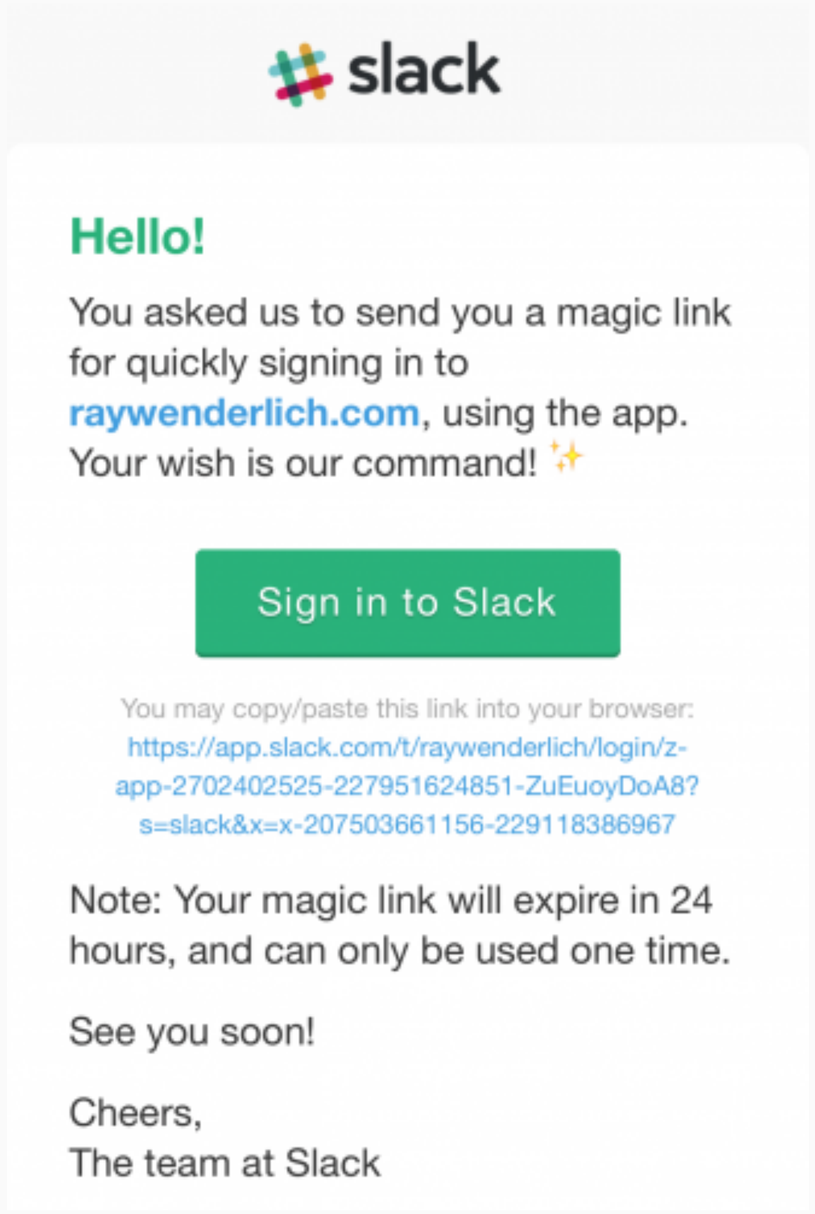

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How to have a successful Identity Management Project

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Common Oversights and Pitfalls

- Identify requirements for the ***entire identity management lifecycle***, not just logging in
- Plan for identity failure and change, so you are ready for such events
- Address security and compliance requirements


1. How will user accounts be created?
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2. Will user profiles need to be synchronized?

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3. Username uniqueness

4. How will users Log In?

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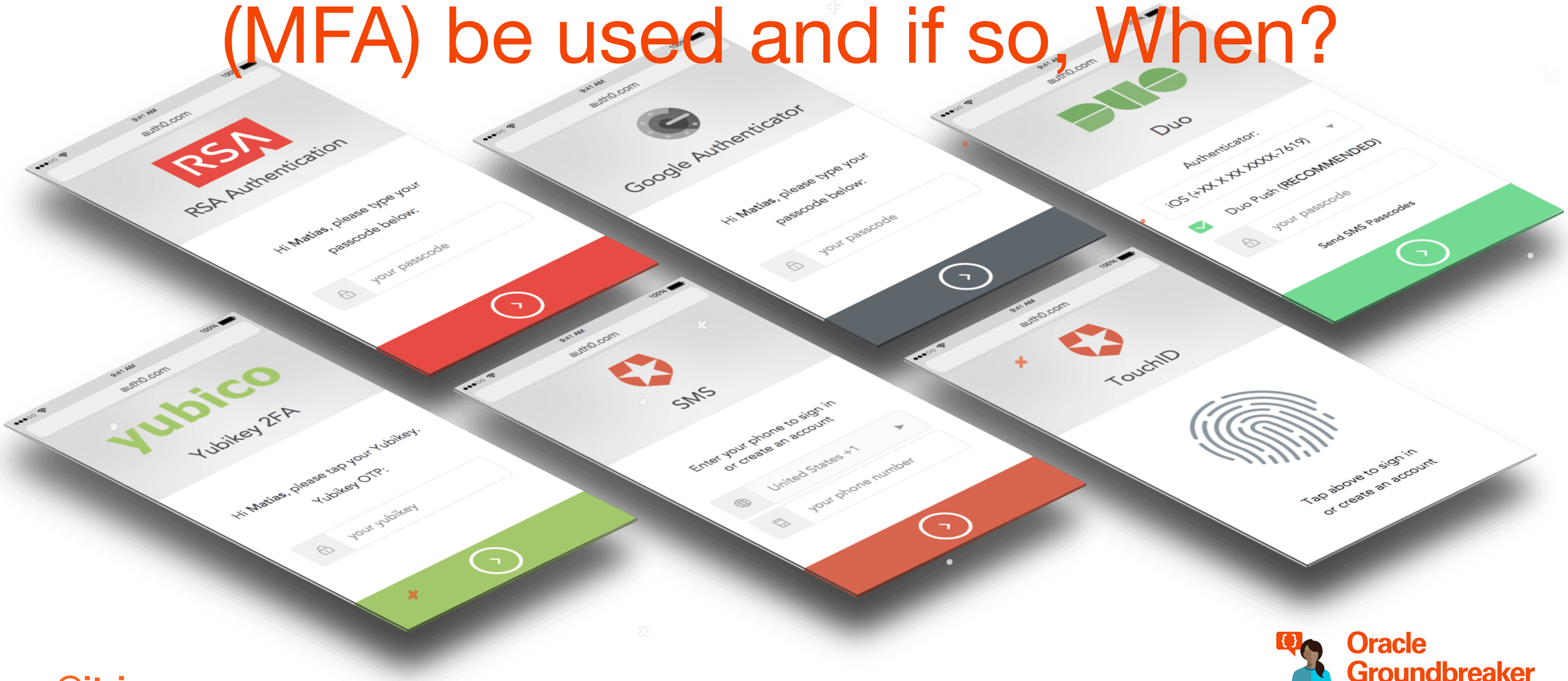
5. Should Multi-Factor Authentication (MFA) be used and if so, When?



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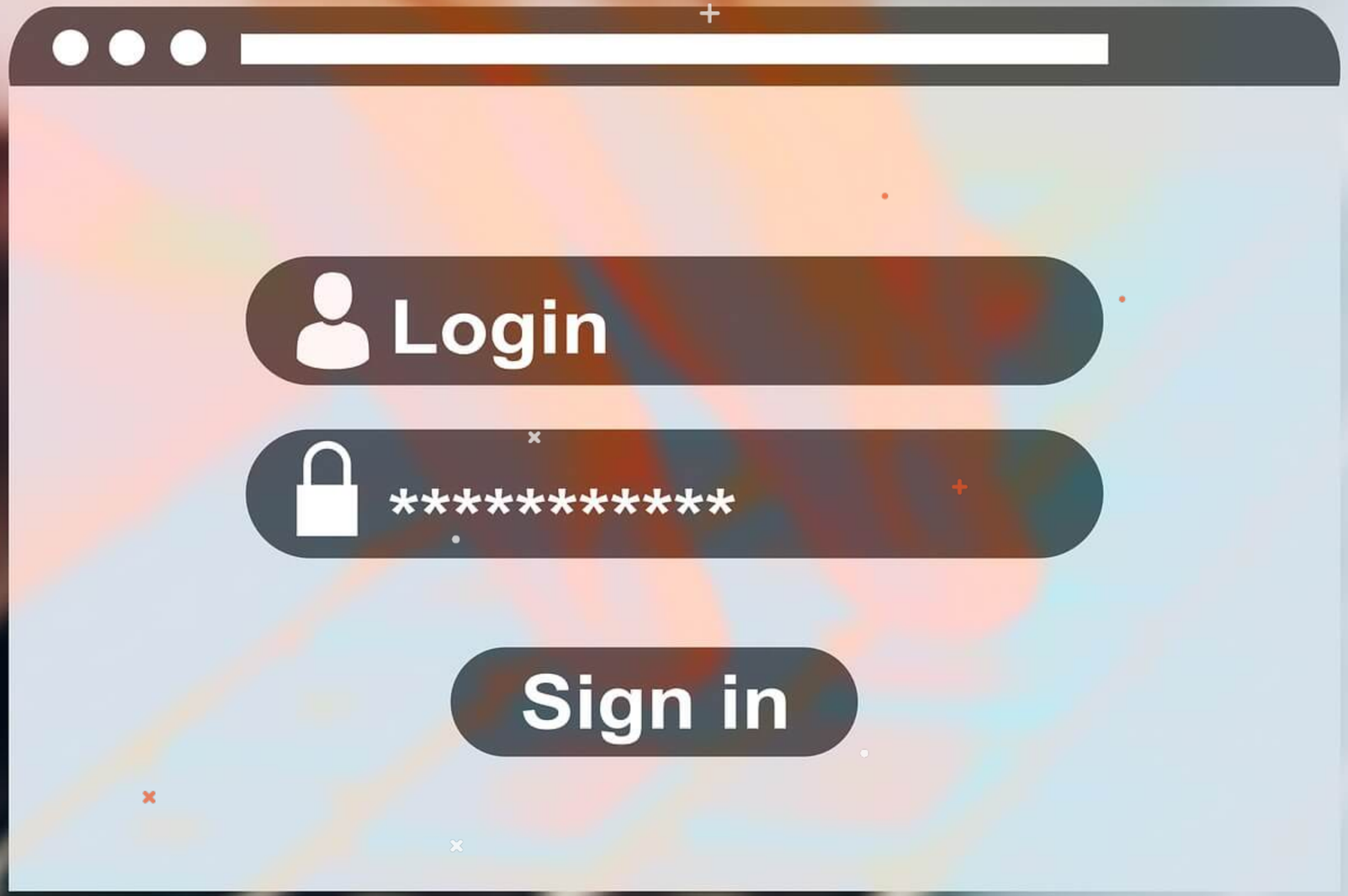
6. Is single Sing-On needed?



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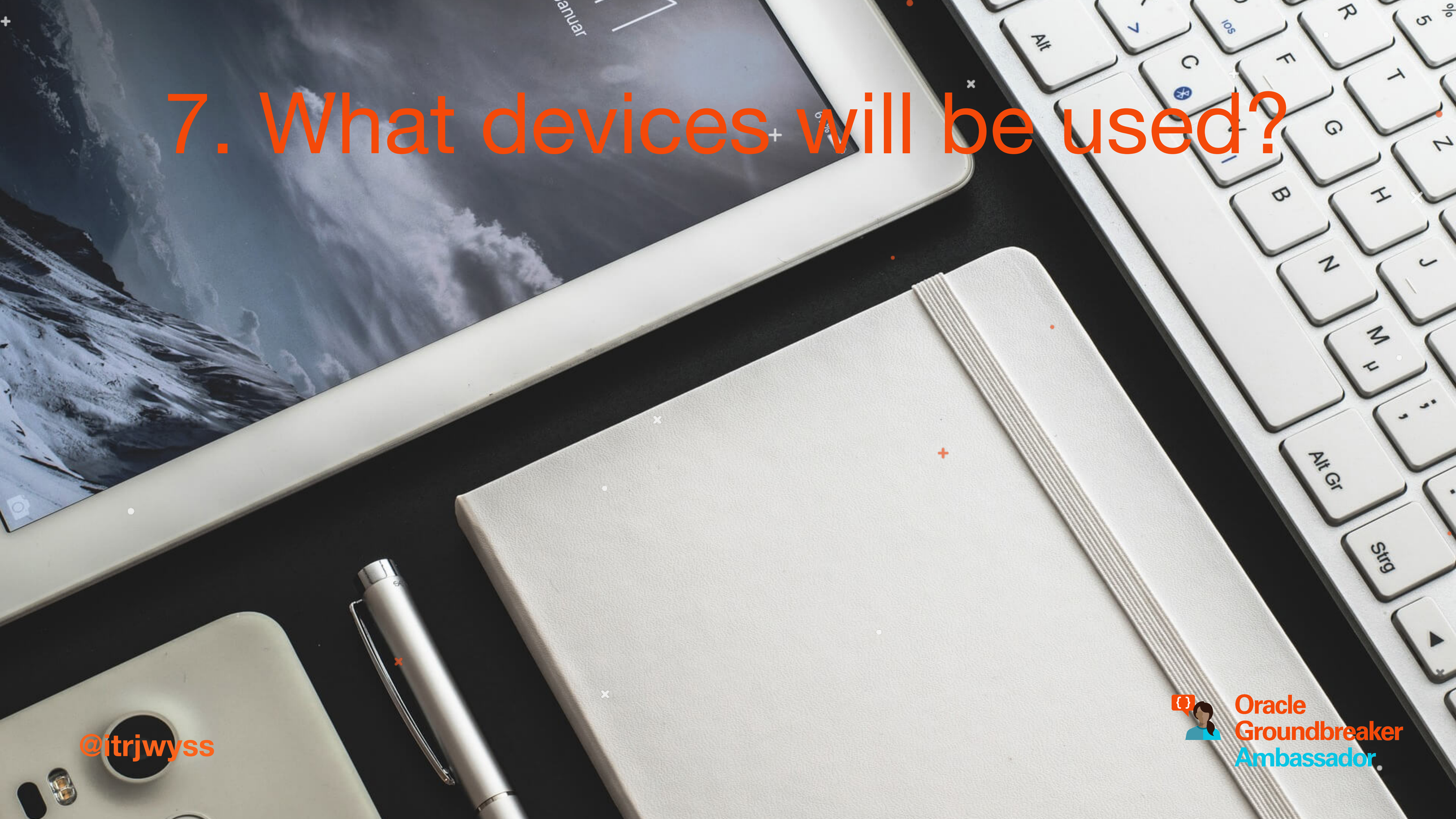

7. What devices will be used?

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8. What should happen when the User decides to Log Out?

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9. How will browser configuration influence Sessions?

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10. Session Timeouts

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11. Deprovisioning: What happens when it's over?

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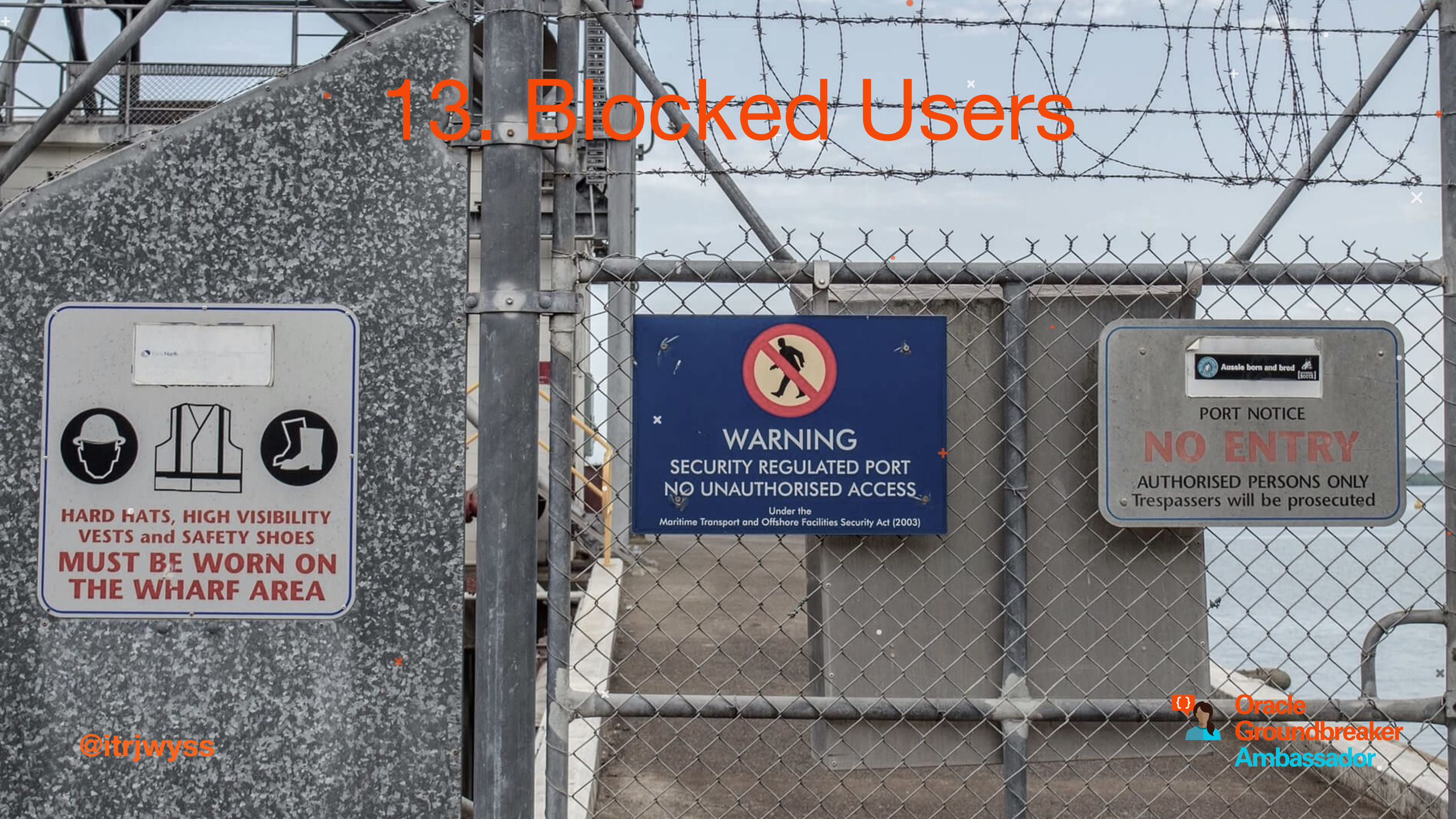
13. Blocked Users



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14. Anomaly Detection

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14. Anomaly Detection

- A particular user having a large number of failed logins.
- A user logging in from two widely separated geographic locations within a short amount of time.
- Users whose credentials have been compromised and published on the internet in databases of hacked passwords, such as Troy Hunt's haveibeenpwned.

15. Privacy/Compliance requirements

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16. Audit Logs

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17. Consider how Identity Information might change over time

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Identity as a Service
IDaaS

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IDaaS

- Comprises cloud-based solutions for IdM and IAM functions.
- Also means collecting intelligence to better understand, monitor, and improve their behaviors.

Popular Clouds

Azure Active Directory

ORACLE

IDENTITY MANAGEMENT

Firebase

Authentication

amazon web services

Auth0

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Other Popular IDaaS

Other IDaaS

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Other Providers

SailPoint
The Power of Identity

INTERMEDIA AppID
ENTERPRISE

ForgeRock Identity Platform™
Identity Management
Based on the OpenIDM Project

miniOrange

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Architecture Level

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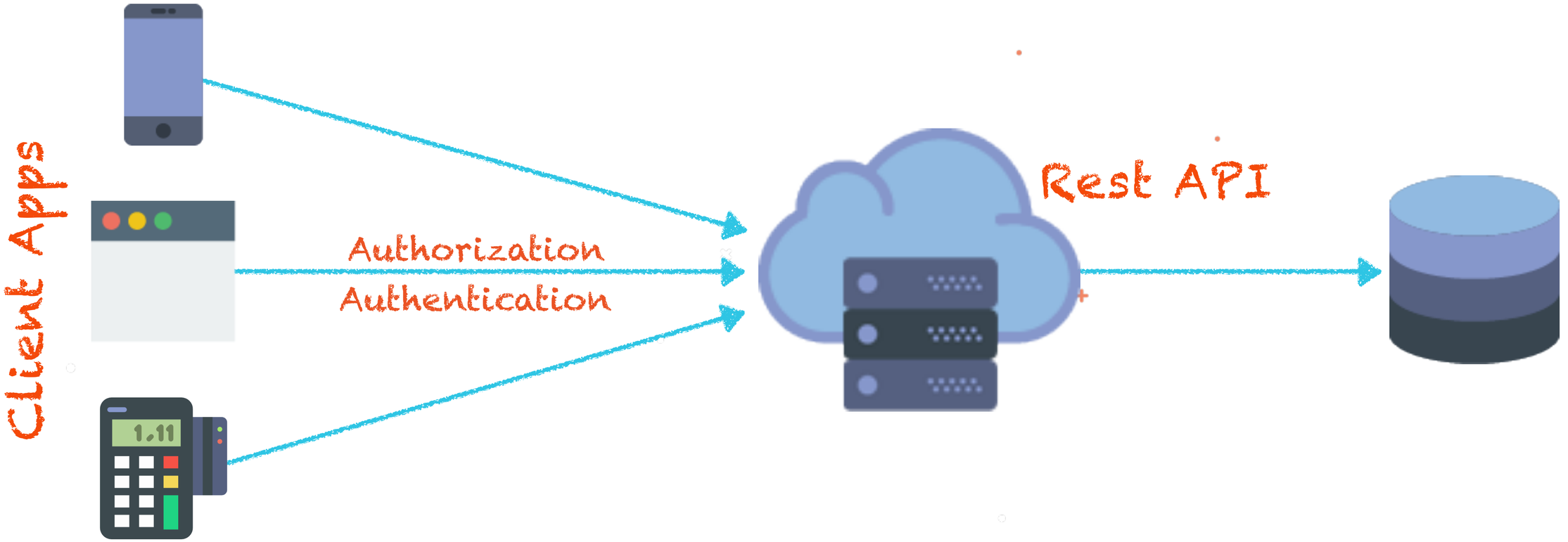
Developing REST APIs



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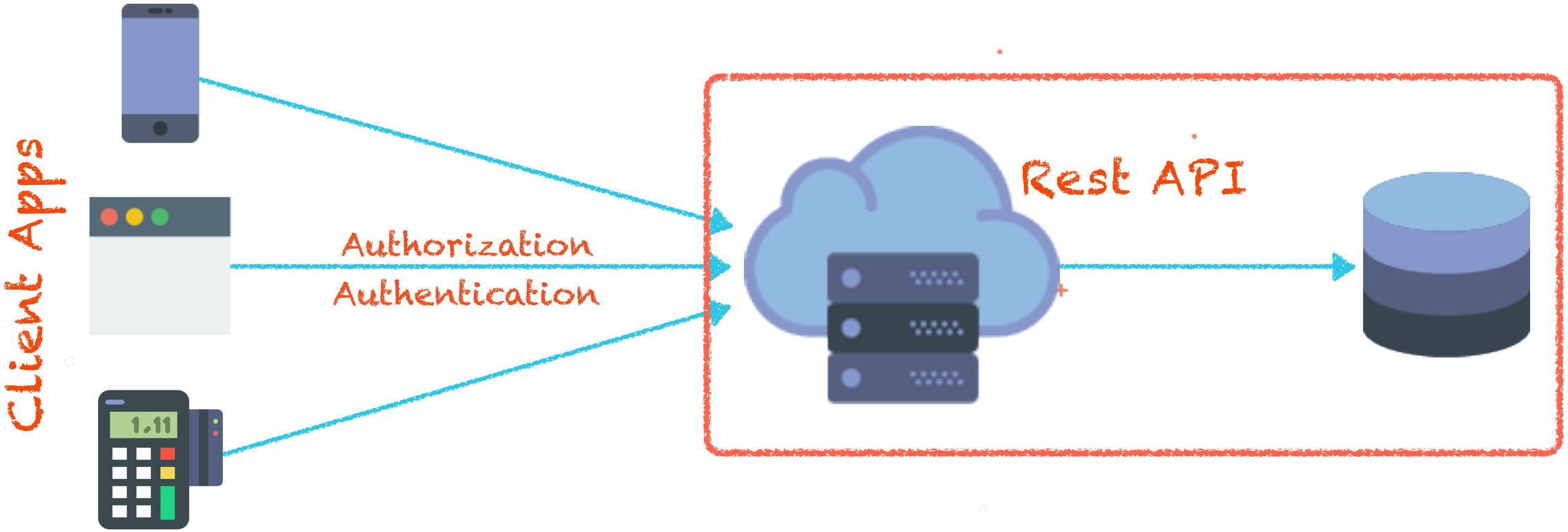
Developing REST APIs



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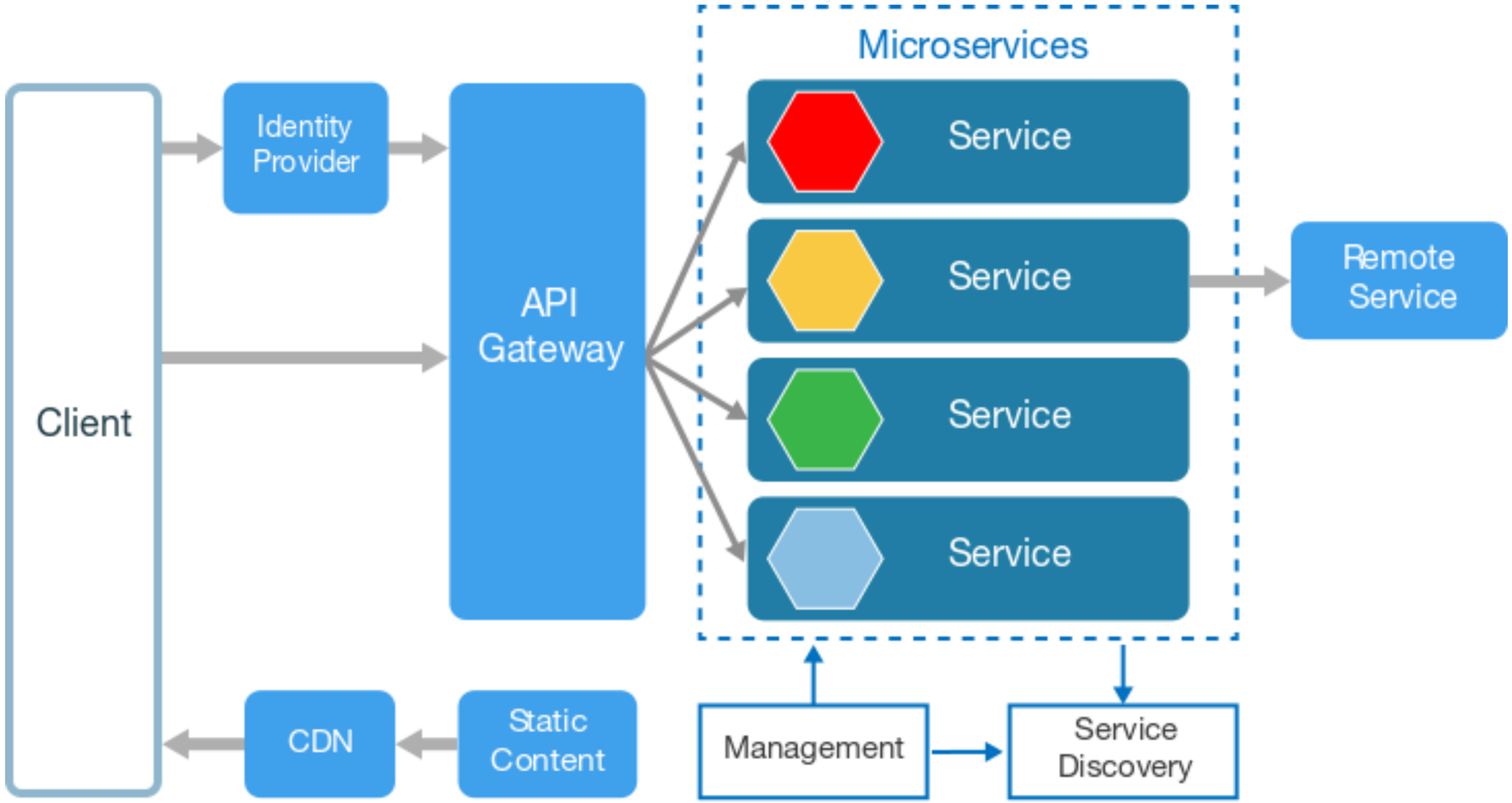
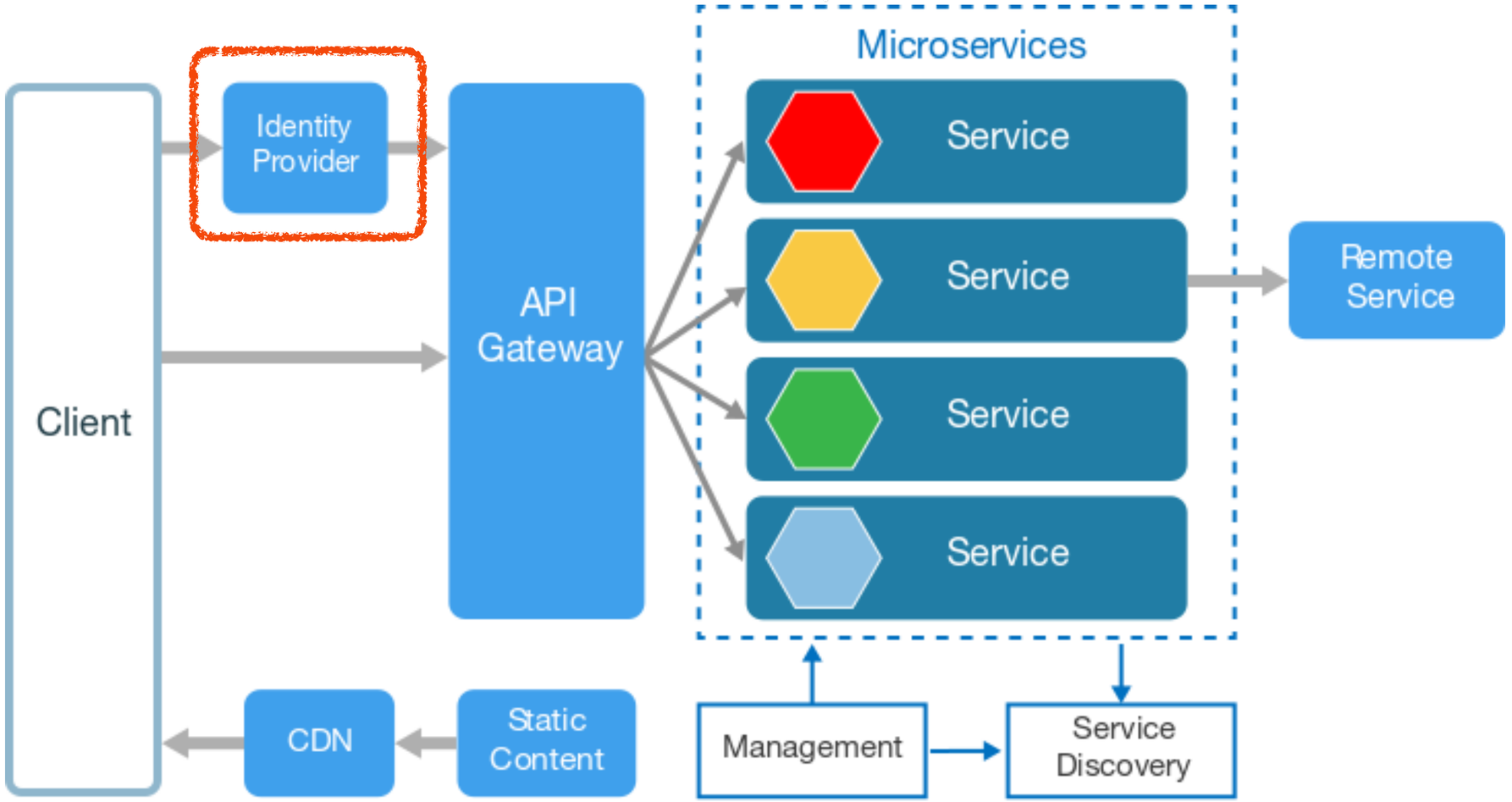

Microservices
Client
Identity Provider
API Gateway
Service
Service
Service
Service
Remote Service
CDN
Static Content
Management
Service Discovery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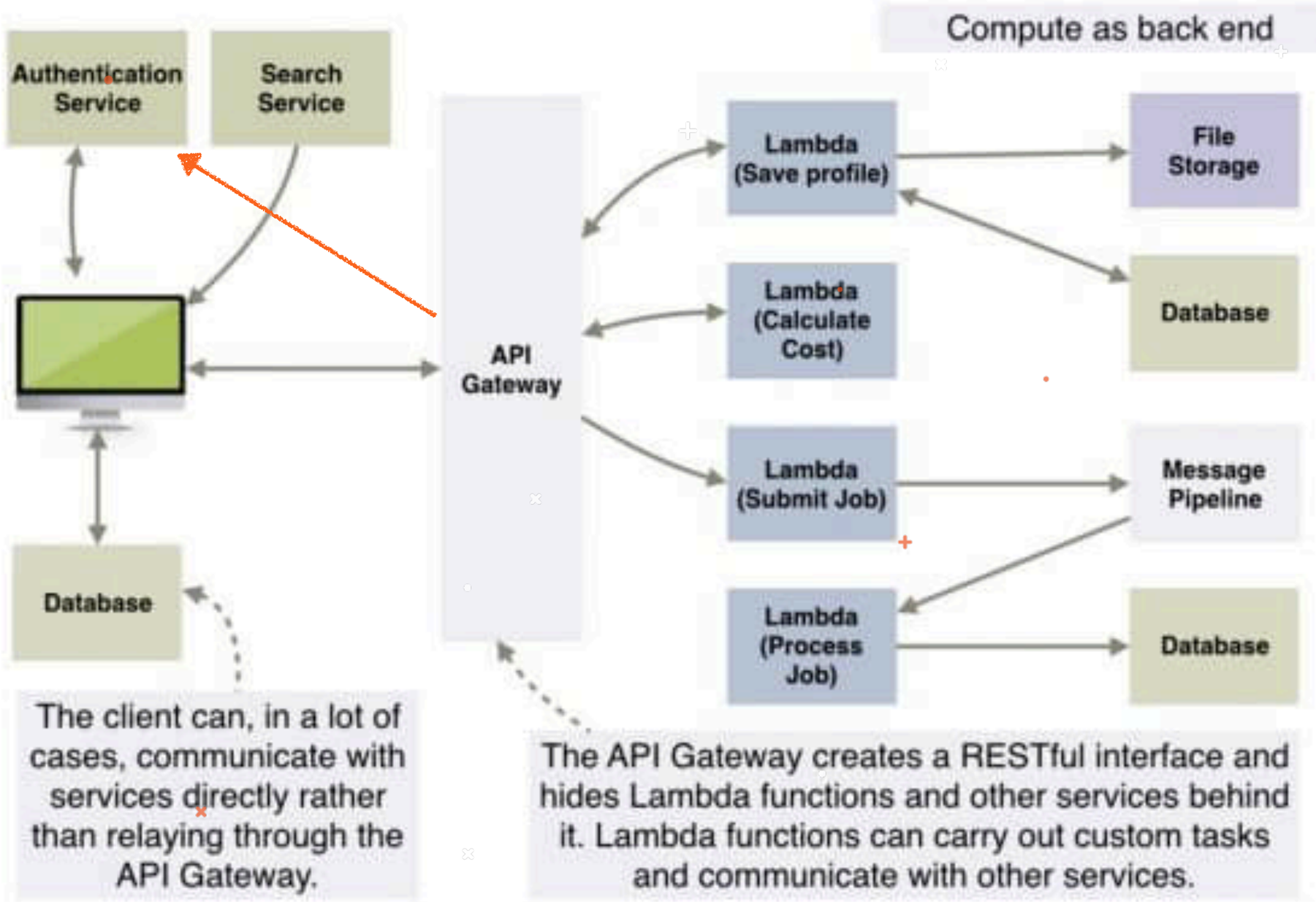

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Figure 2: The front end can communicate with services directly and invoke Lambda functions through the API Gateway (Sbarski, Serverless Architectures on AWS, 2016).

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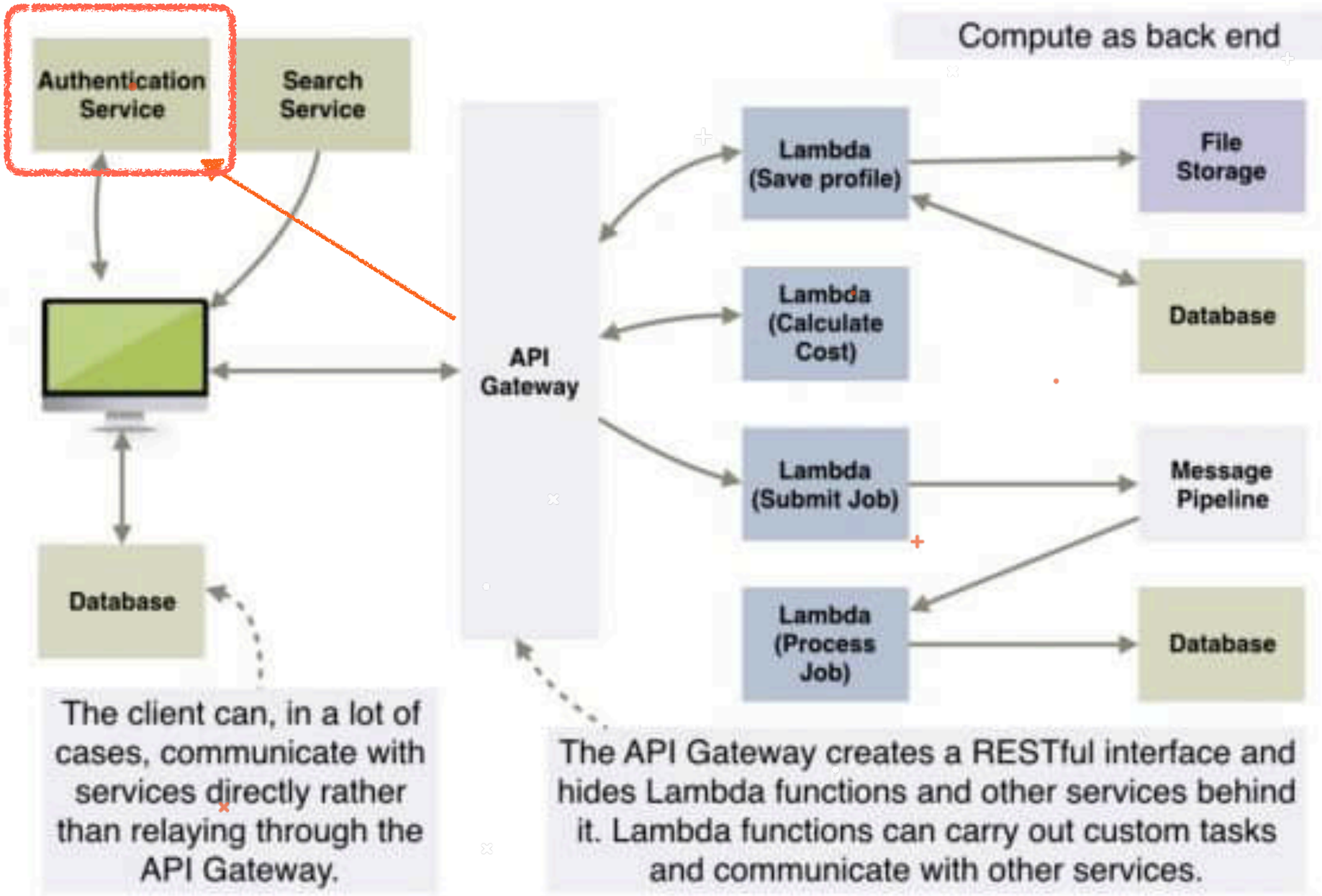

Figure 2: The front end can communicate with services directly and invoke Lambda functions through the API Gateway (Sbarski, Serverless Architectures on AWS, 2016).

Practical Case

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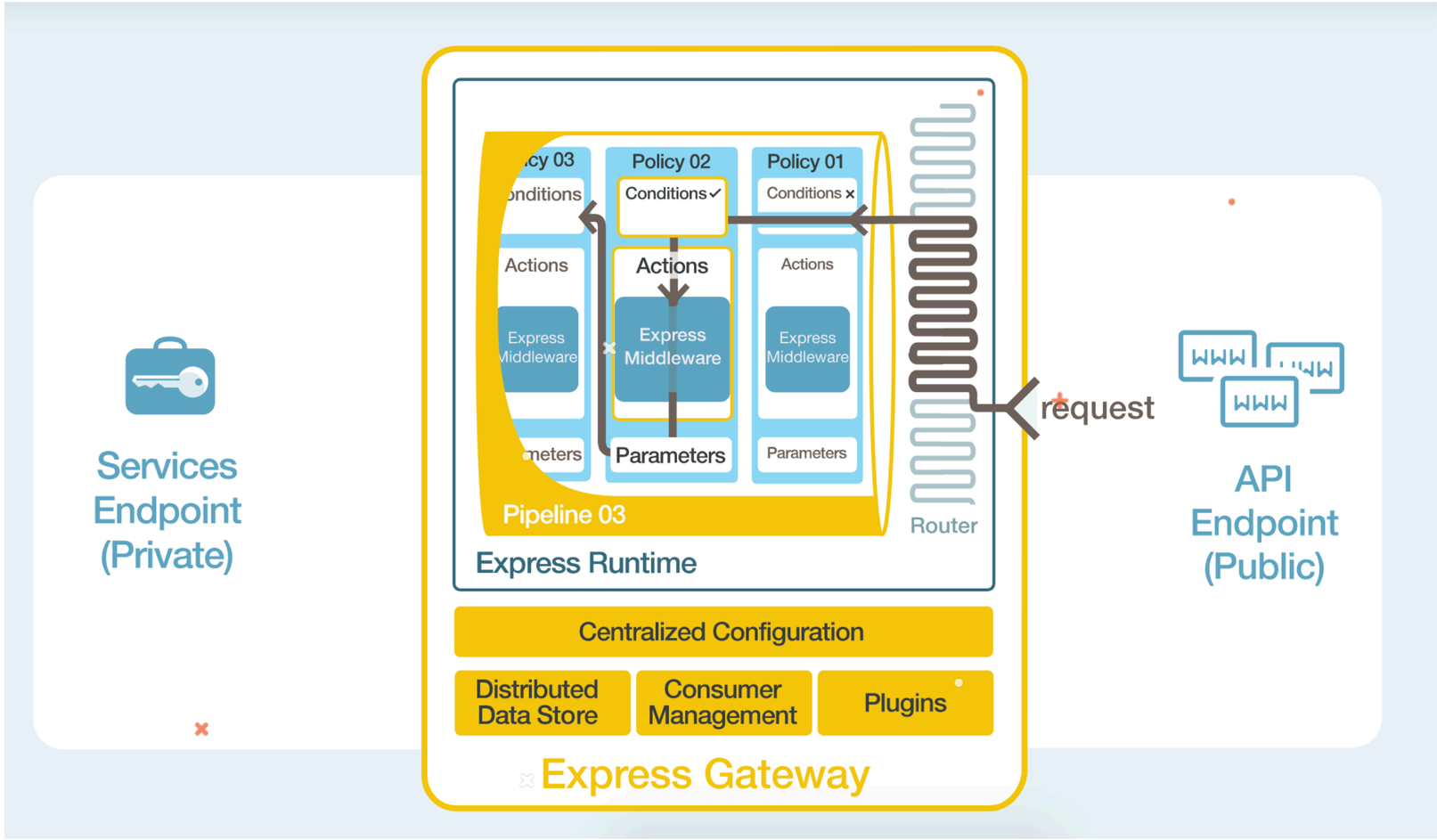
Express Gateway



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https://github.com/itrjwyss/ModernIdM/

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