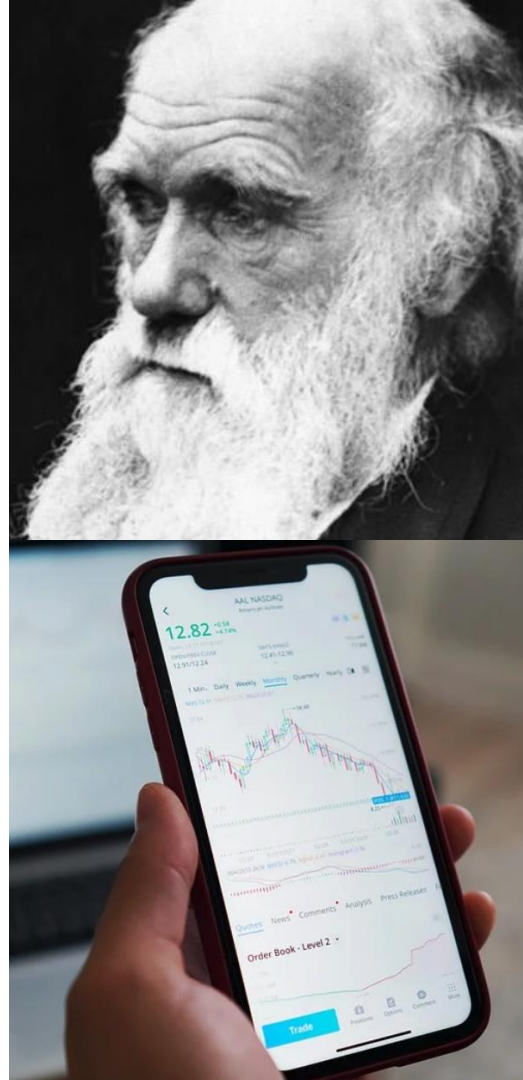


Test Automation in the age of **Digital Banking Darwinism**

Rudolf Grötz, Agile Engineering Coach@Raiffeisen Bank International AG
Software Test User Group Hamburg, 16th November 2021



Who am I?

Who am I?

- **Rudolf Grötz**

- Agile Engineering Coach / Raiffeisen Bank International AG
 - Guild Lead Test & Test Automation
- **Organizer** TestBustersNight VIENNA (Agile Test Automation Meetup Vienna)
- Conference Speaker (German Testing Day, Agile Tour Vienna,...)
- **Author** for IX-Magazin, Java-Magazin, ...
- Contact
 - Twitter: [the_agile_carpenter](#)
 - Mail: rudolf.groetz@gmail.com
 - LinkedIn: [rudolf-groetz-6955b9160](#)



Raiffeisen Bank International



Raiffeisen Bank International

- Austria & Central / Eastern Europe (CEE)
- Commerce- and investment bank for top 1.000-Commerce customers in Austria
- CEE covered by local network units
- 16,4 Million commerce- und privat customer business & investment banking
- 3.000 branches
- **Head Quarter** in Vienna



RBI Group **Digital** Solution (GDS)



Parts of GDS

- Banking Platform, Digital Service Enabler (Merlin)
- Open Banking API Platform (Galileo)
- Mobile Banking App (myRaiffeisen)

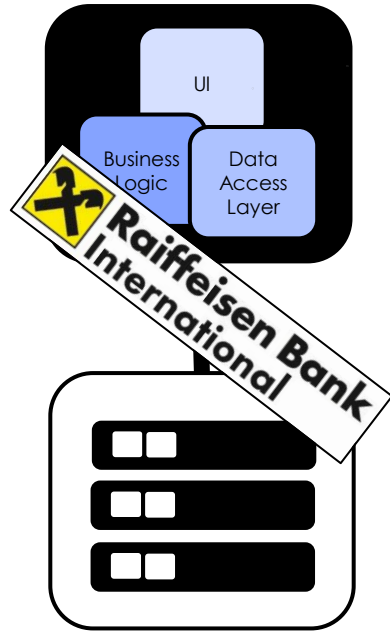


<https://pixabay.com/photos/ipad-online-tablet-internet-screen-407799/>

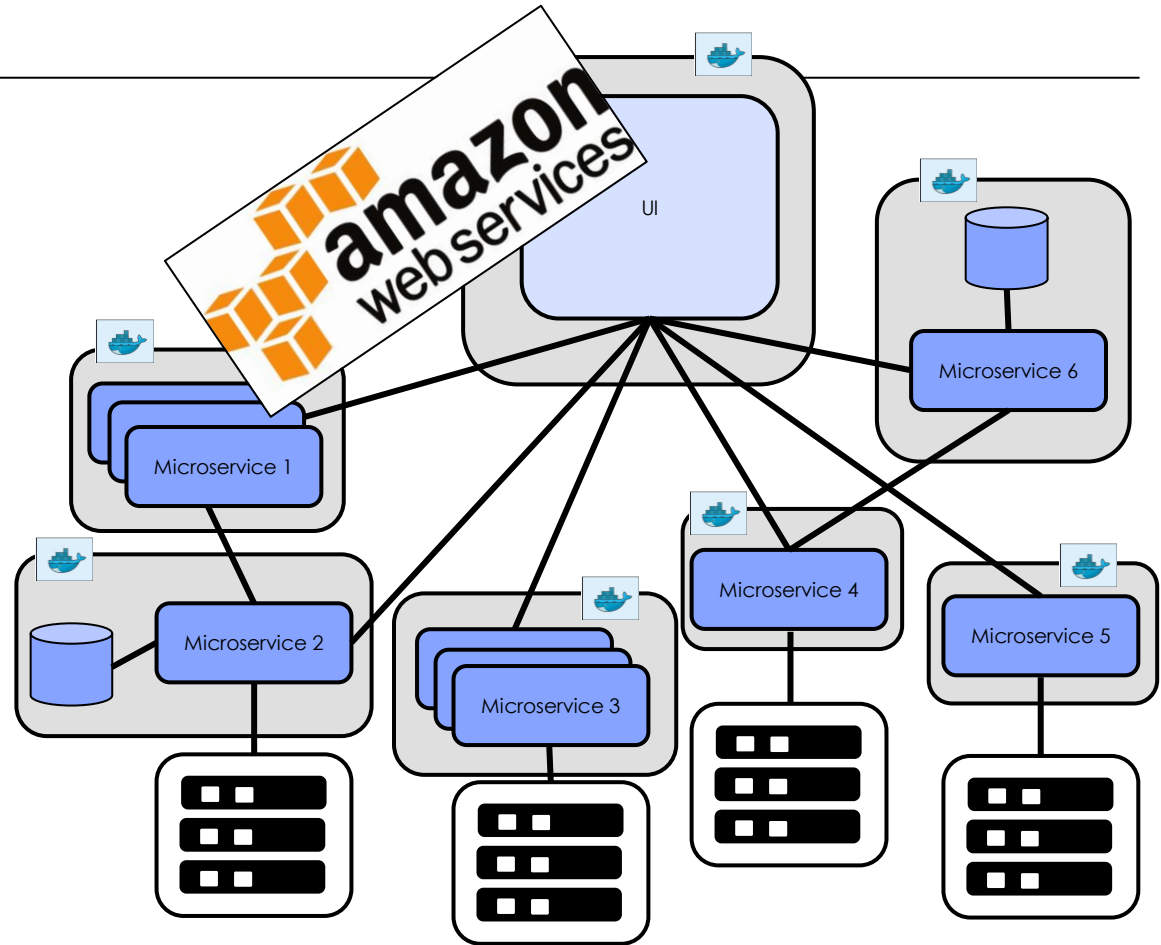
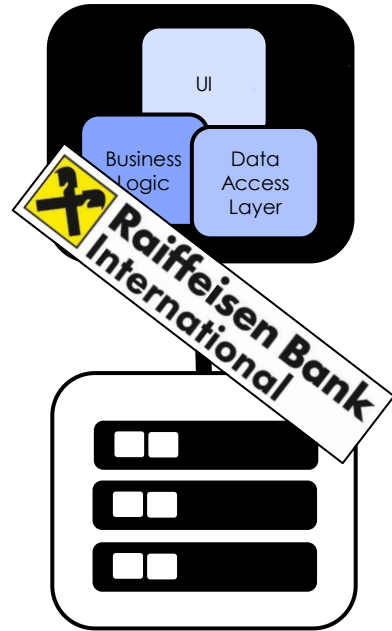
Microservice **Challenges**



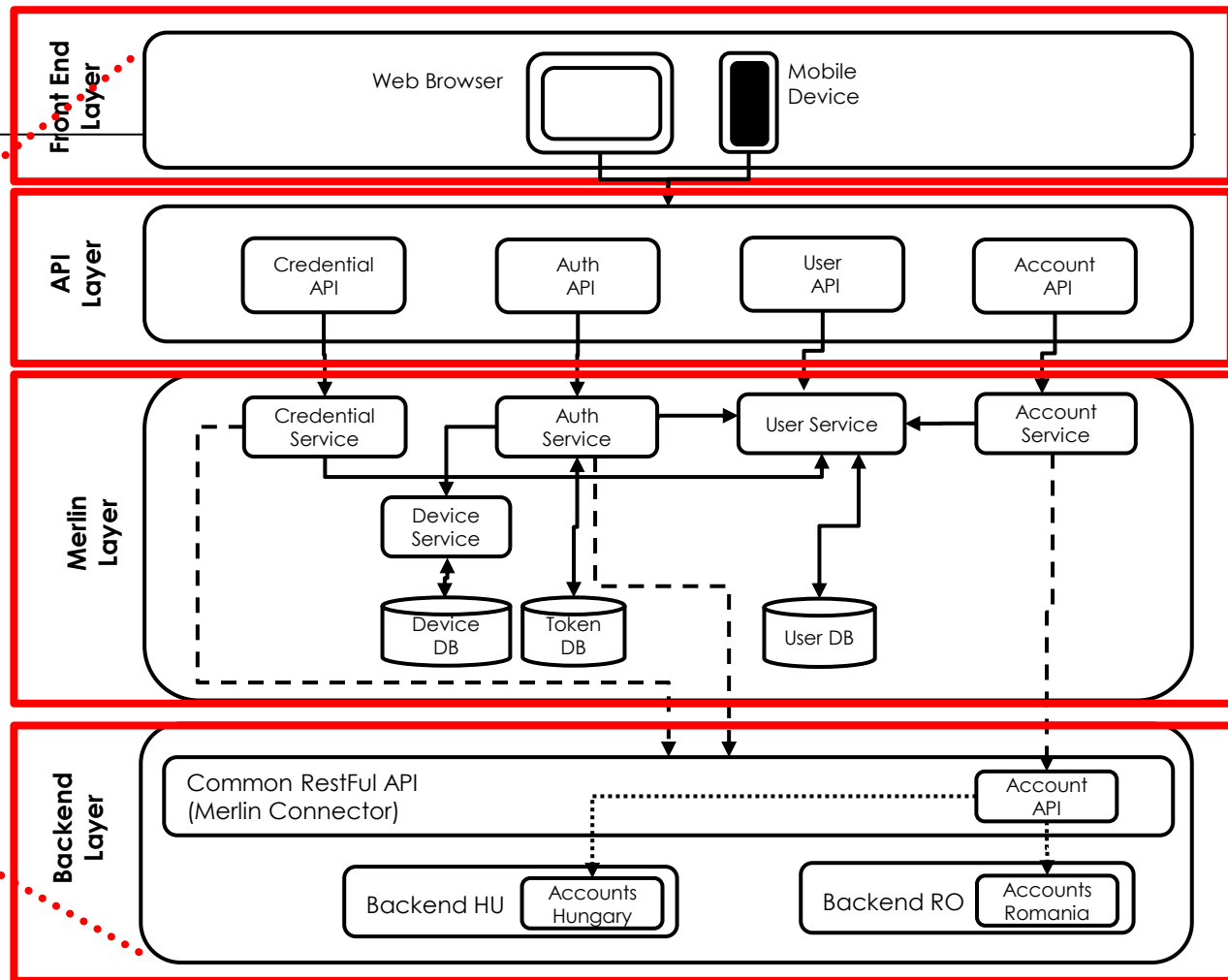
Architecture



Architecture

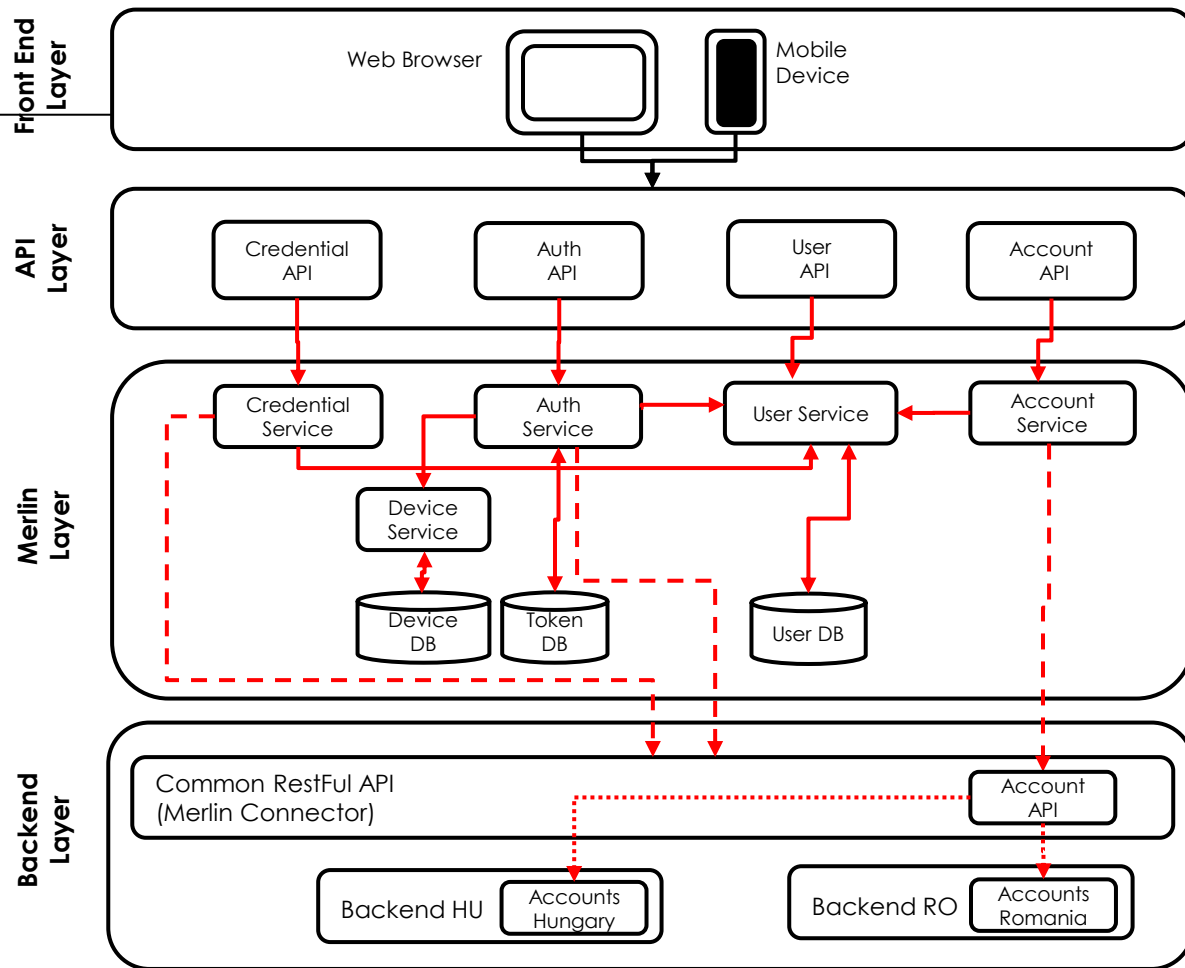


Architecture



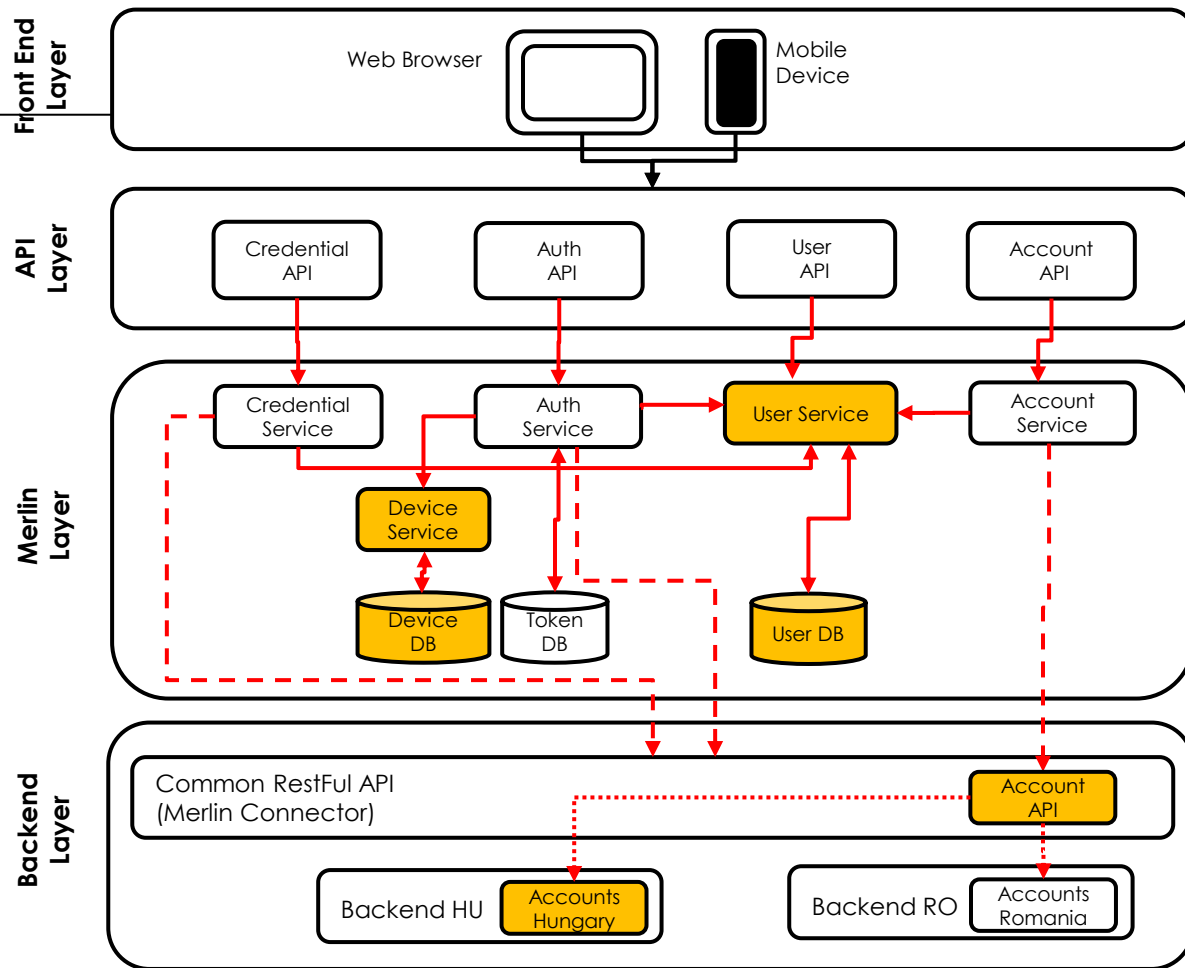
Differences

- Interconnectivity



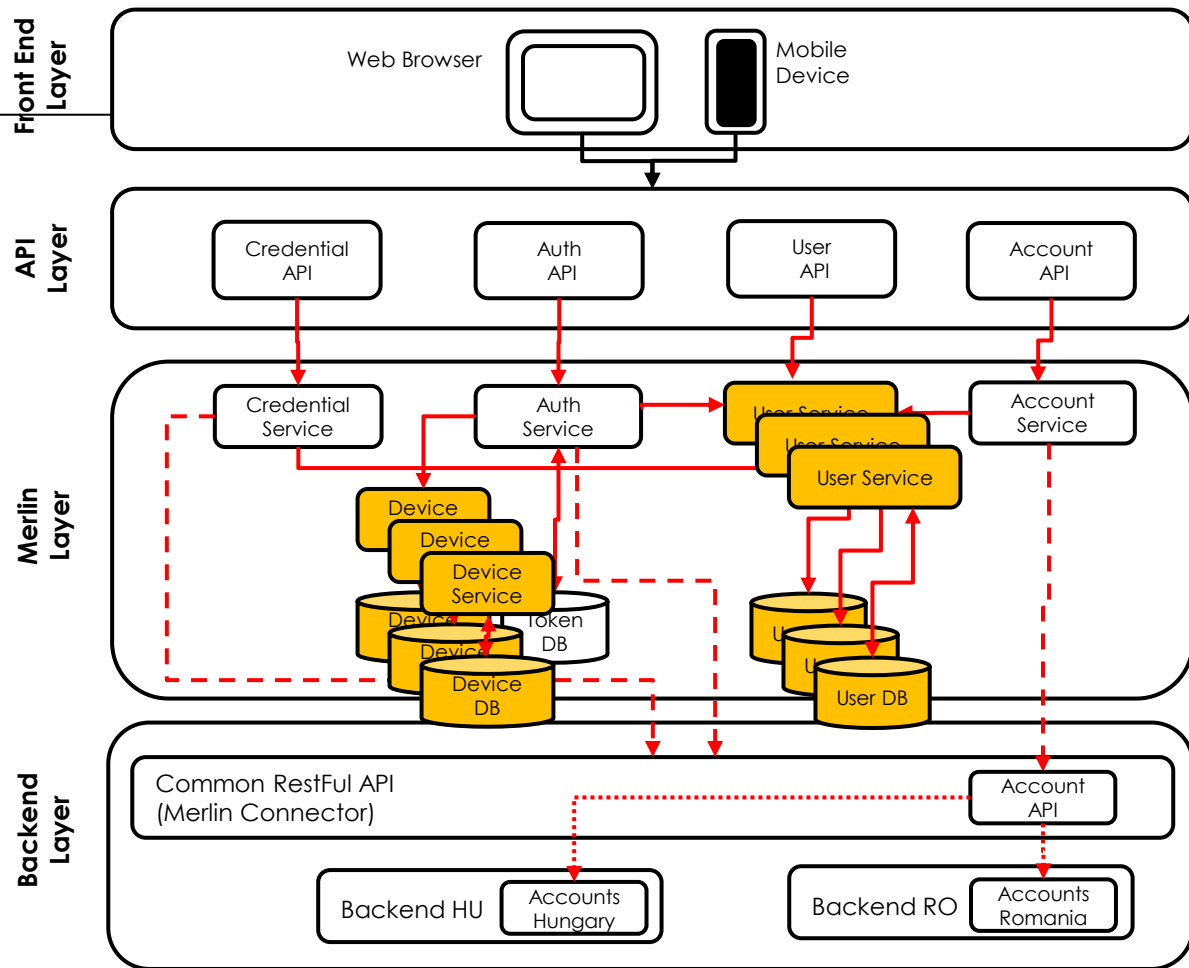
Differences

- Interconnectivity
- Independency



Differences

- Interconnectivity
- Independency
- Scalability

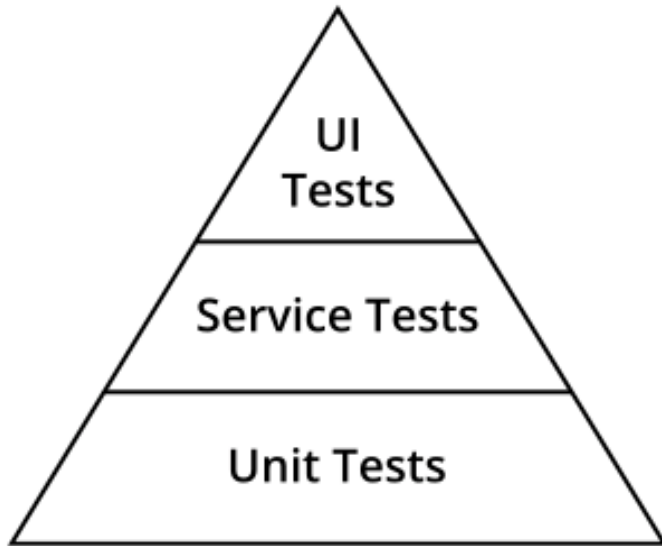


A close-up, slightly angled view of a computer keyboard. The central focus is a large, rectangular blue key with the word "Quiz" printed in white, sans-serif font. Above this key is a smaller blue key with a white arrow pointing diagonally up and to the left. Below the "Quiz" key is a black key with a white arrow pointing diagonally up and to the right. Surrounding these are various other black keys with white text: to the left of the "Quiz" key is a key with "A", and further left is a key with "? + /"; above the "Quiz" key is a key with "^ _ ~"; to the right of the "Quiz" key is a key with "Delete", and further right is a key with "Insert". At the bottom right, a "Ctrl" key is partially visible. The lighting creates soft shadows, giving the keys a three-dimensional appearance.

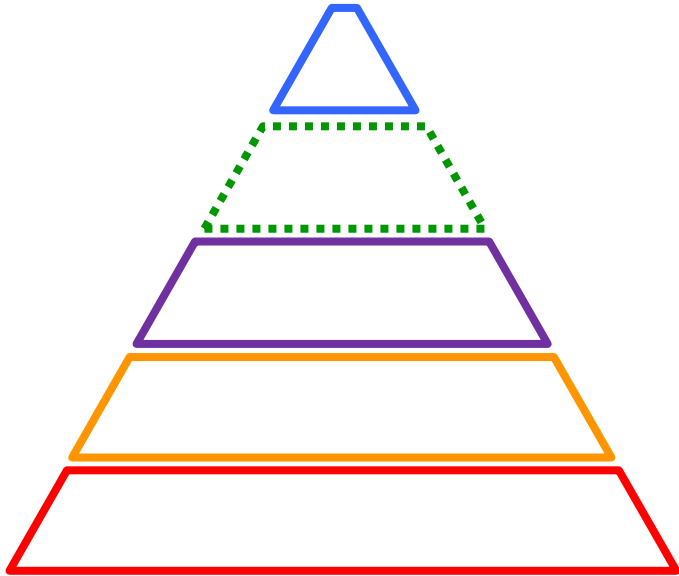
Quiz

**Which object has to be shown on
at least one slide at each
test conference?**

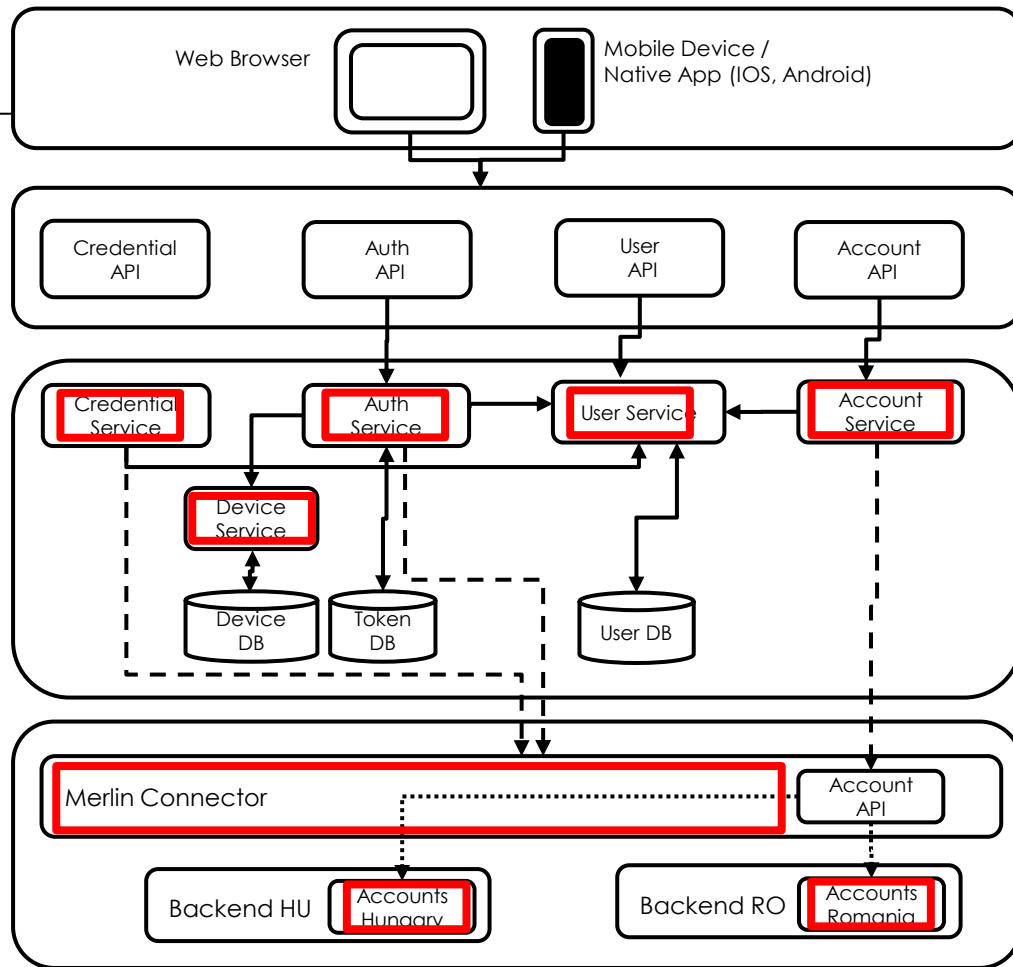
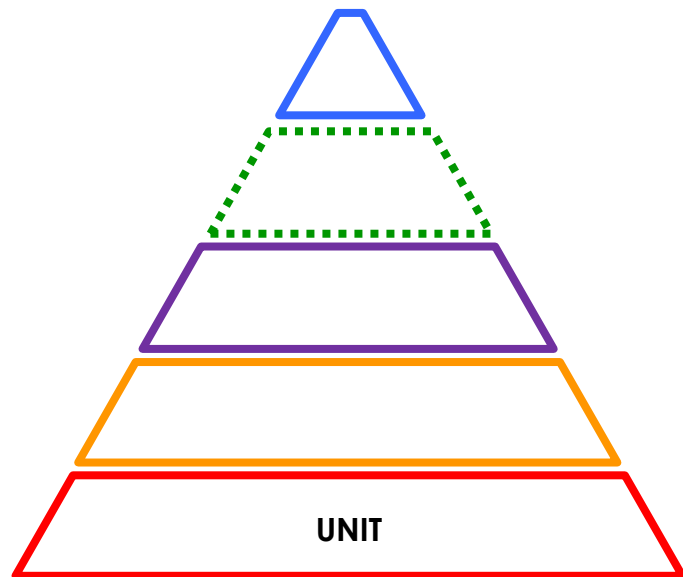
Test Pyramid



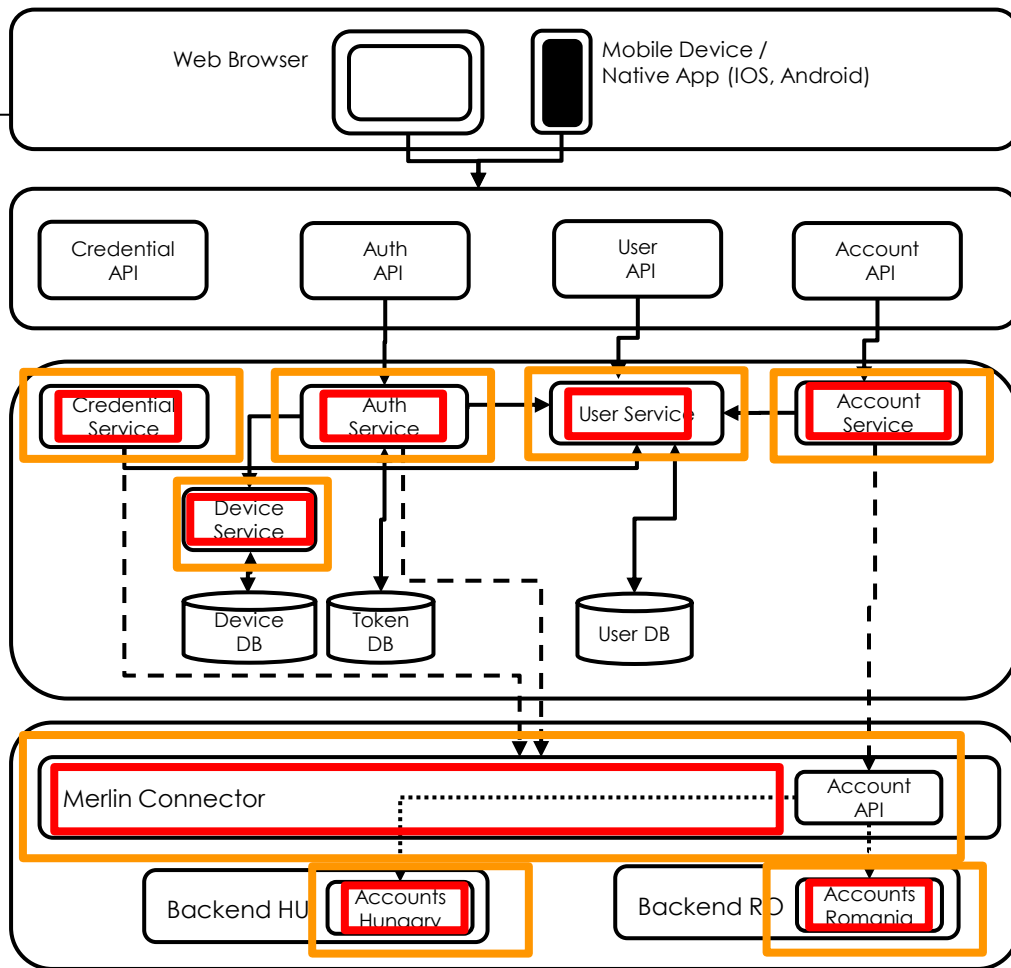
Test Pyramid



Unit



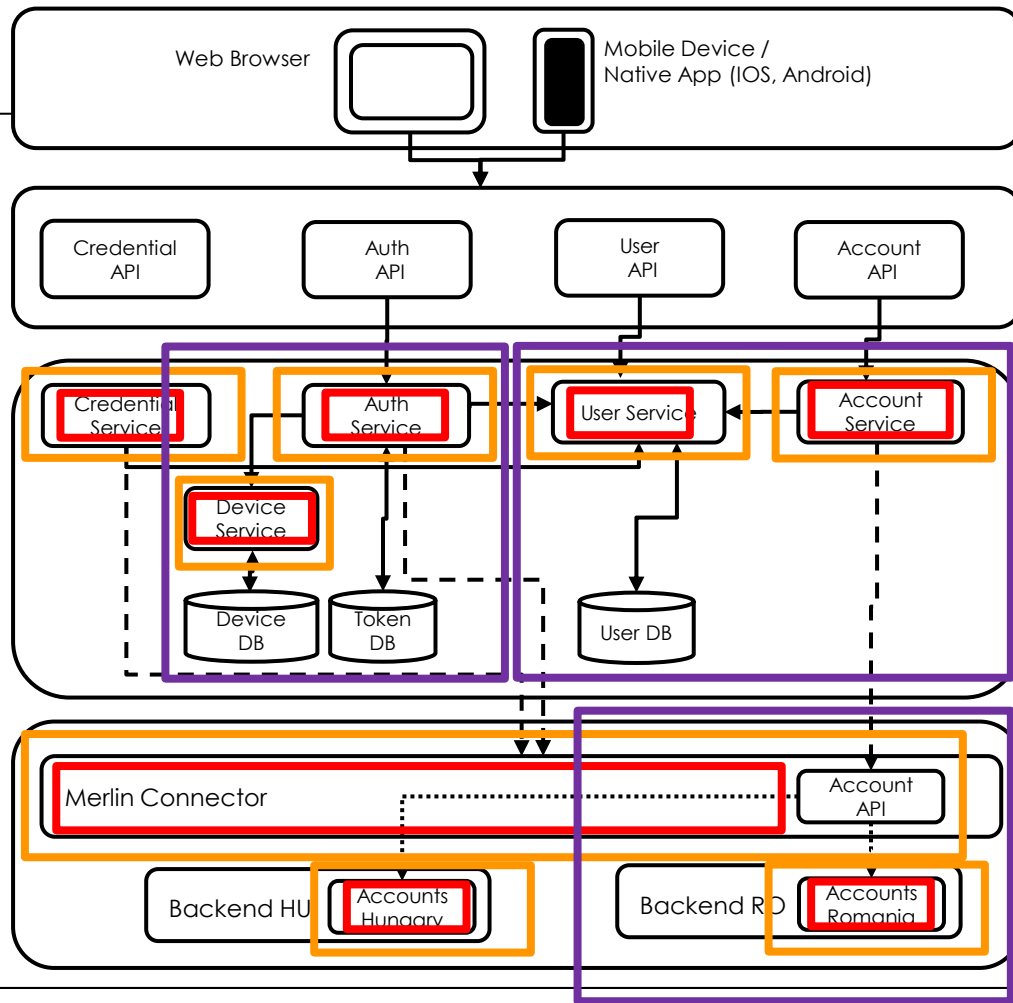
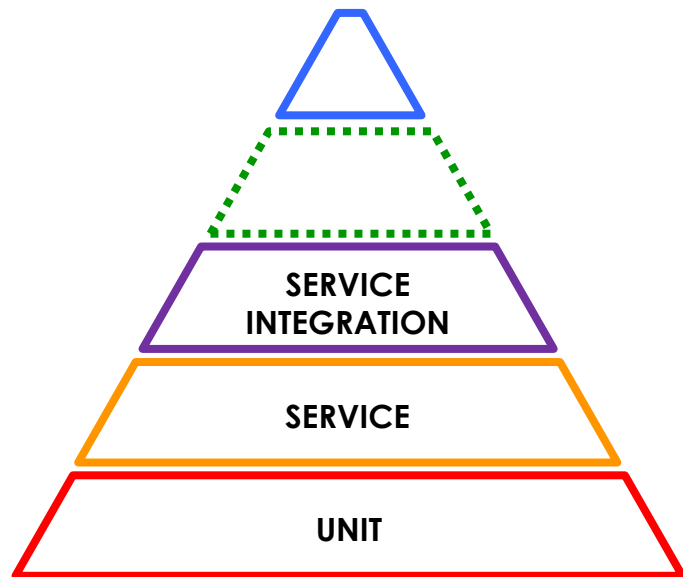
Service



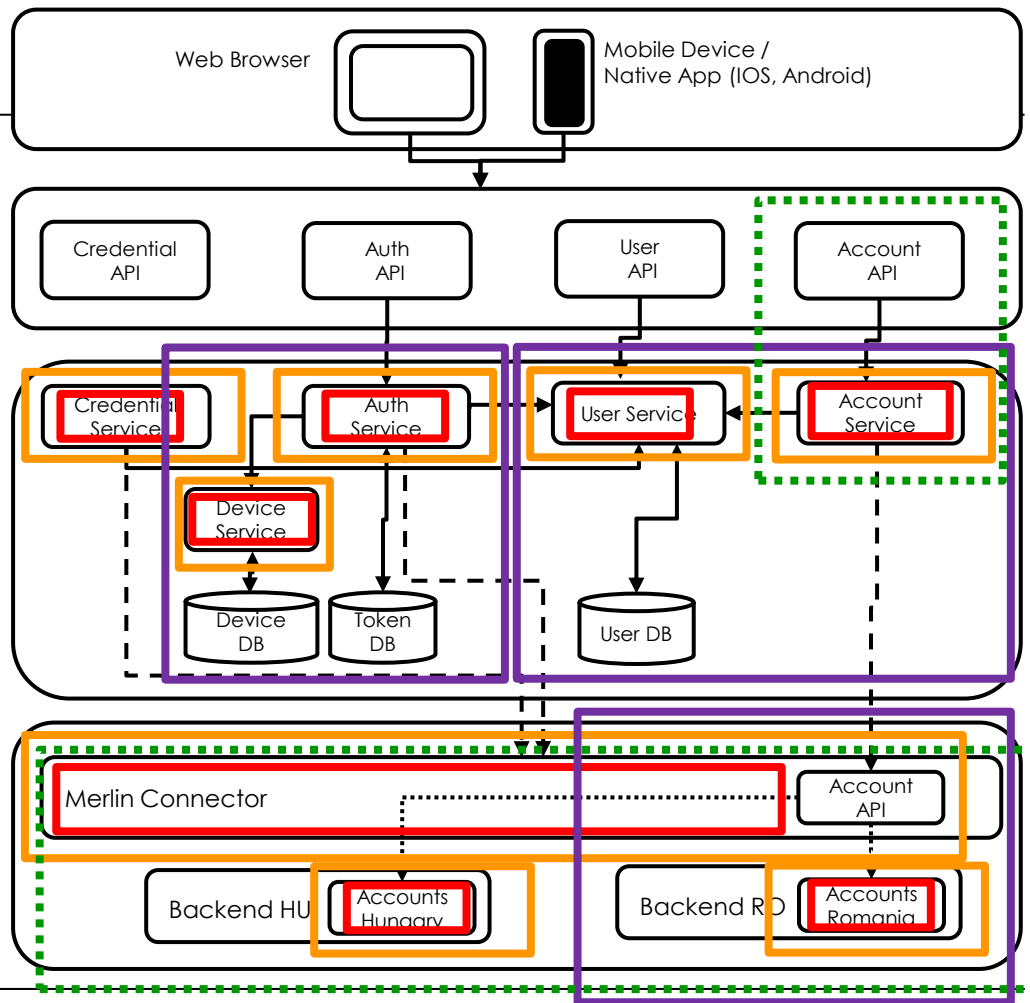
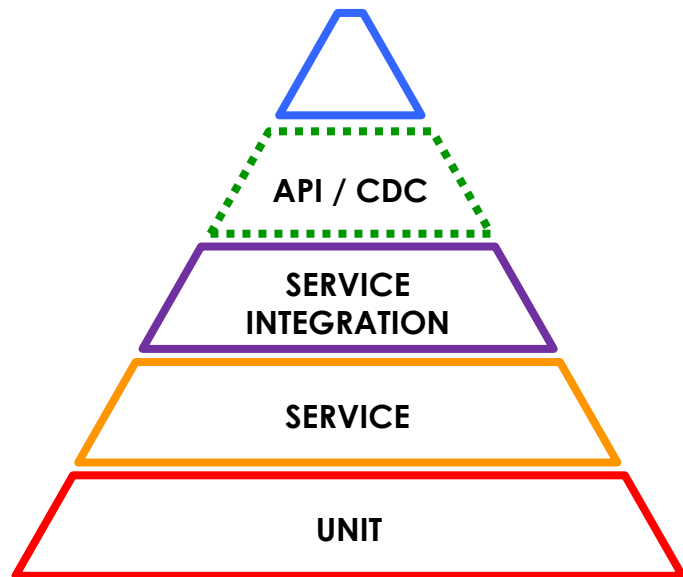
SERVICE

UNIT

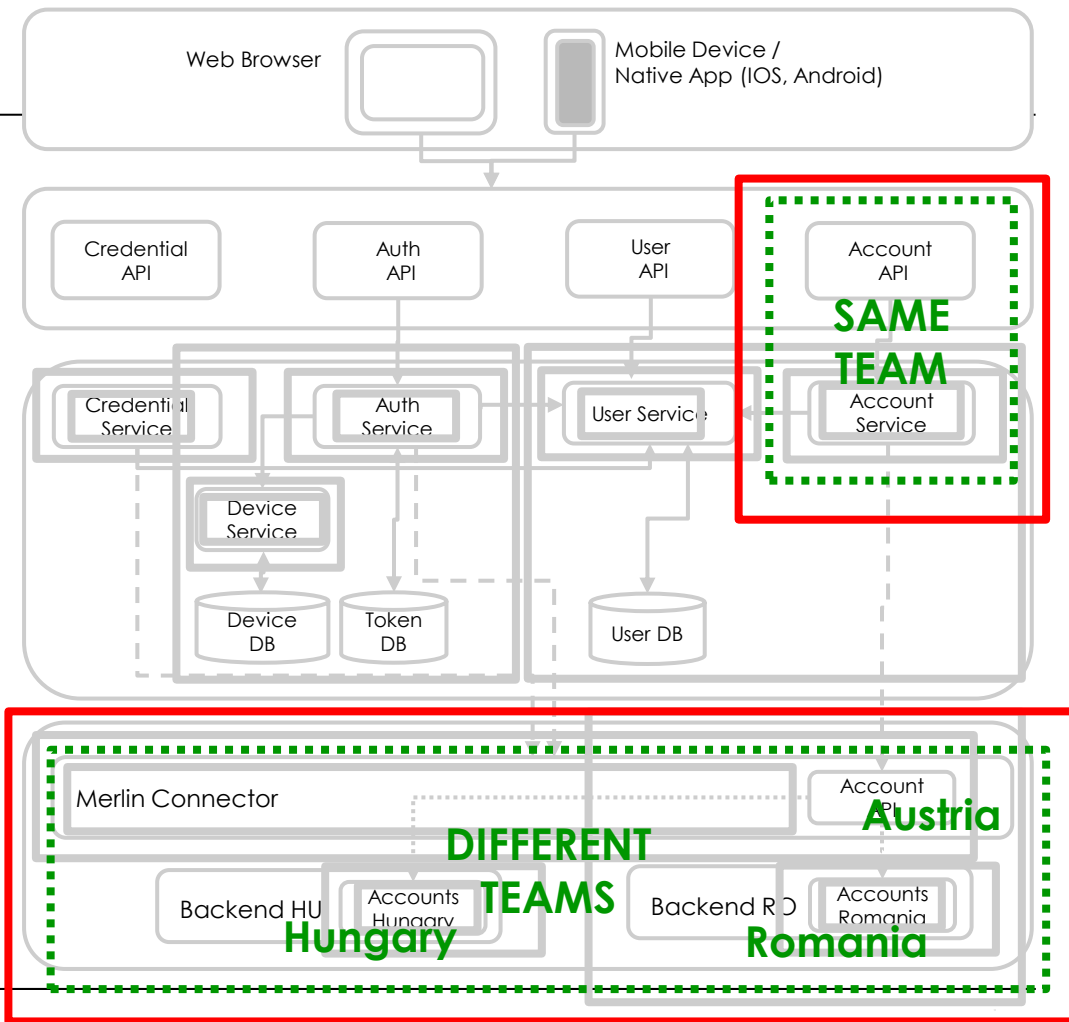
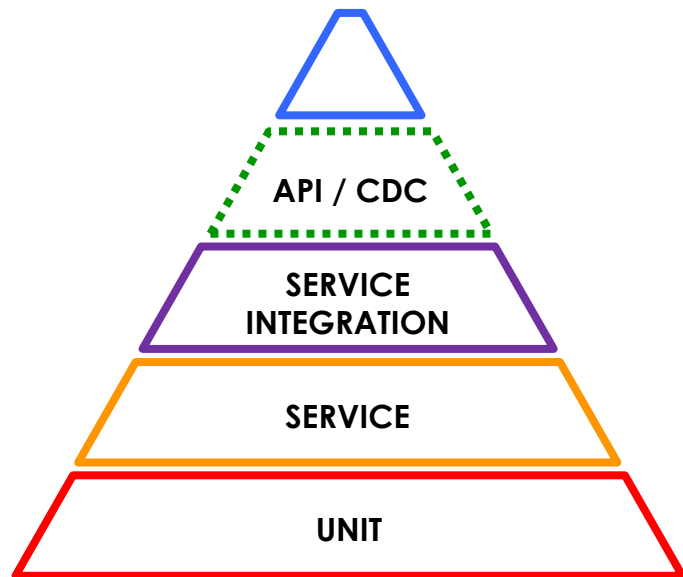
Service Integration



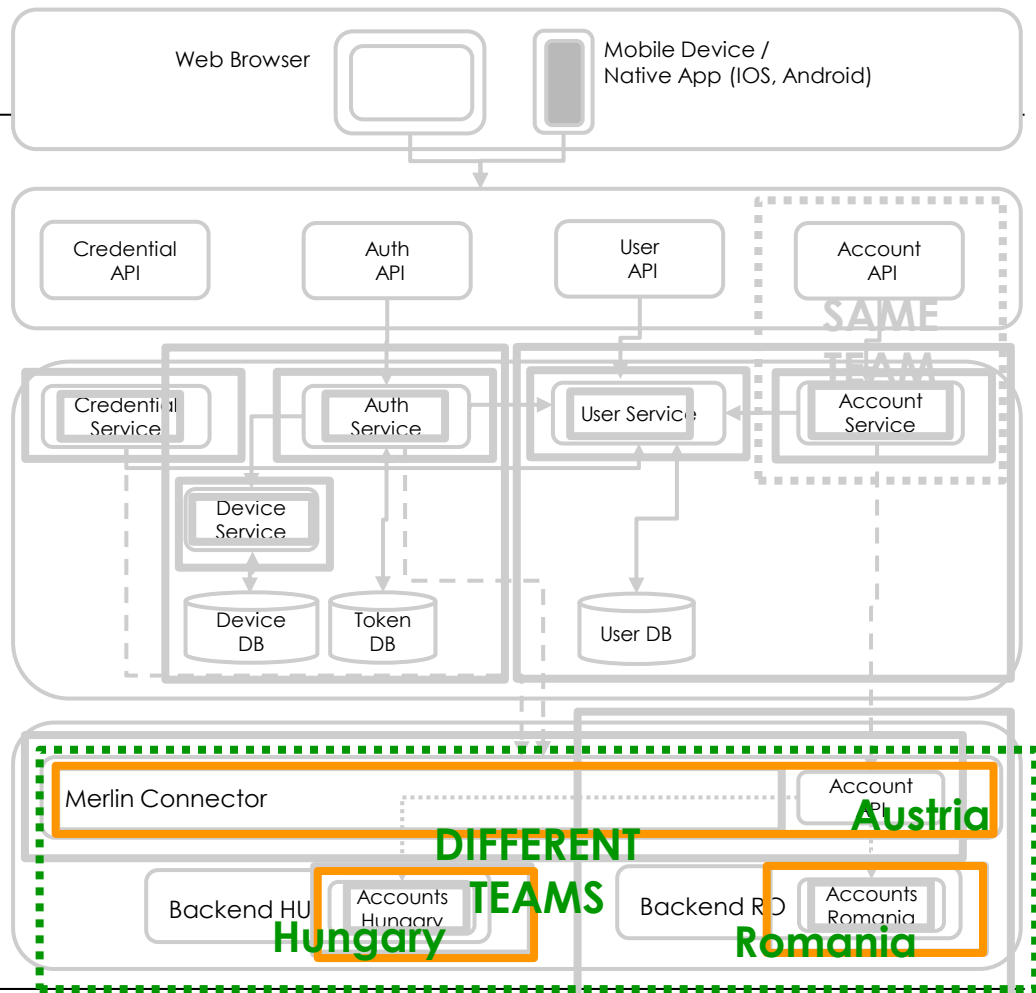
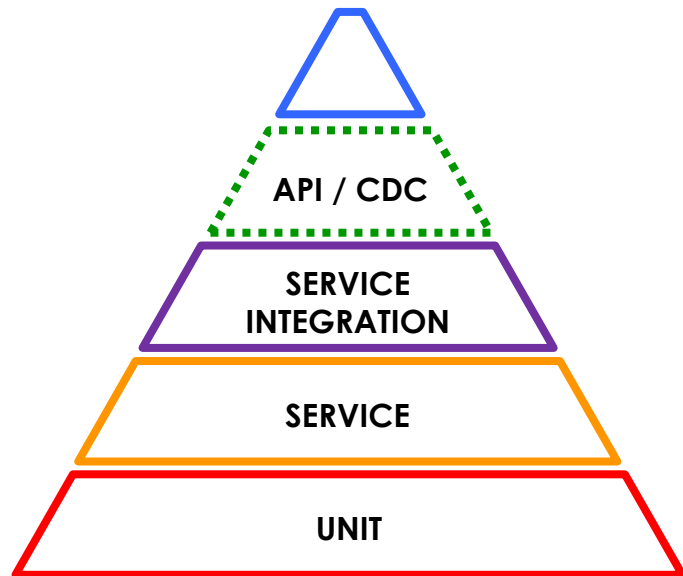
API / CDC



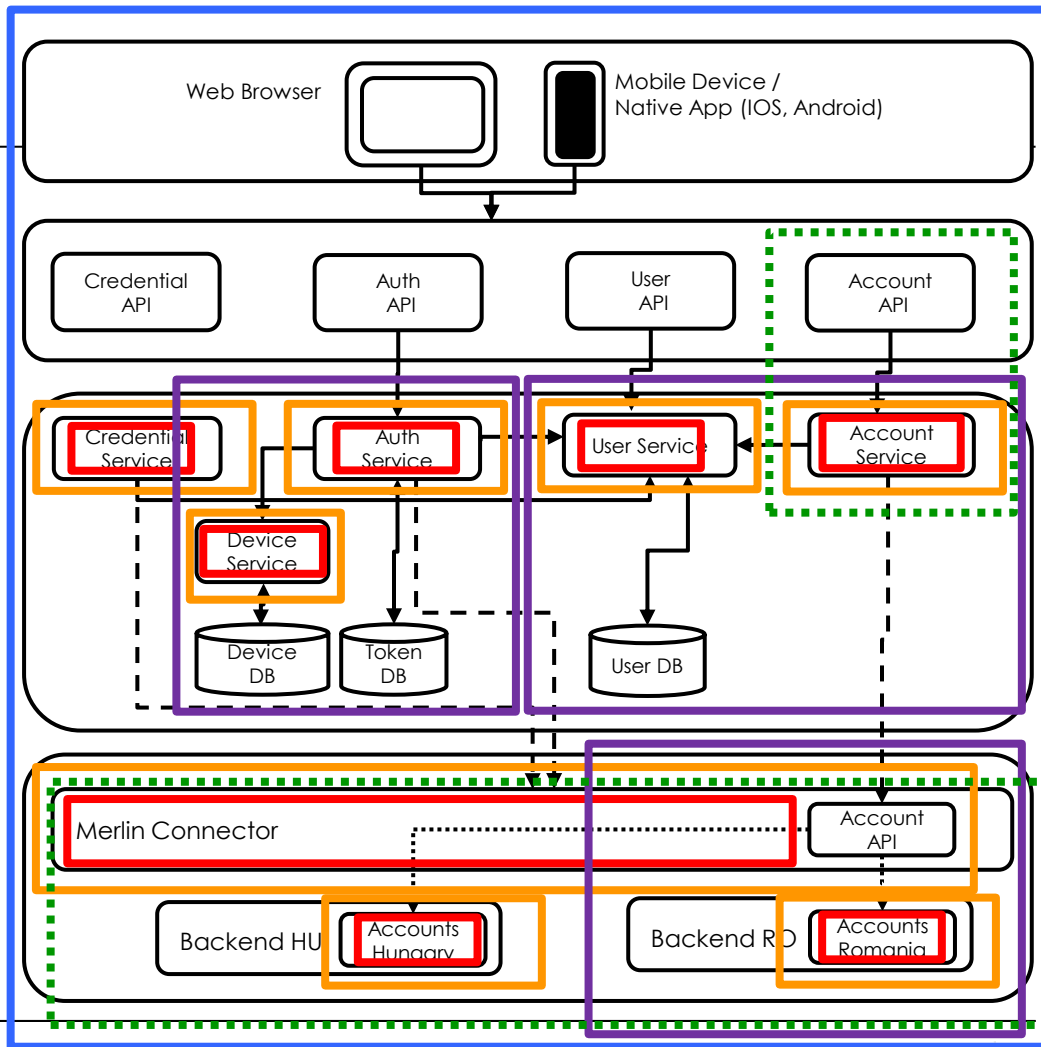
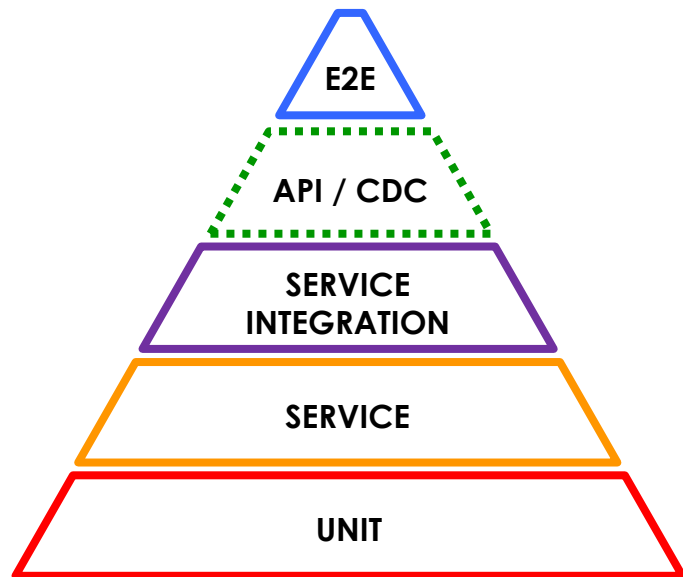
API / CDC



API / CDC

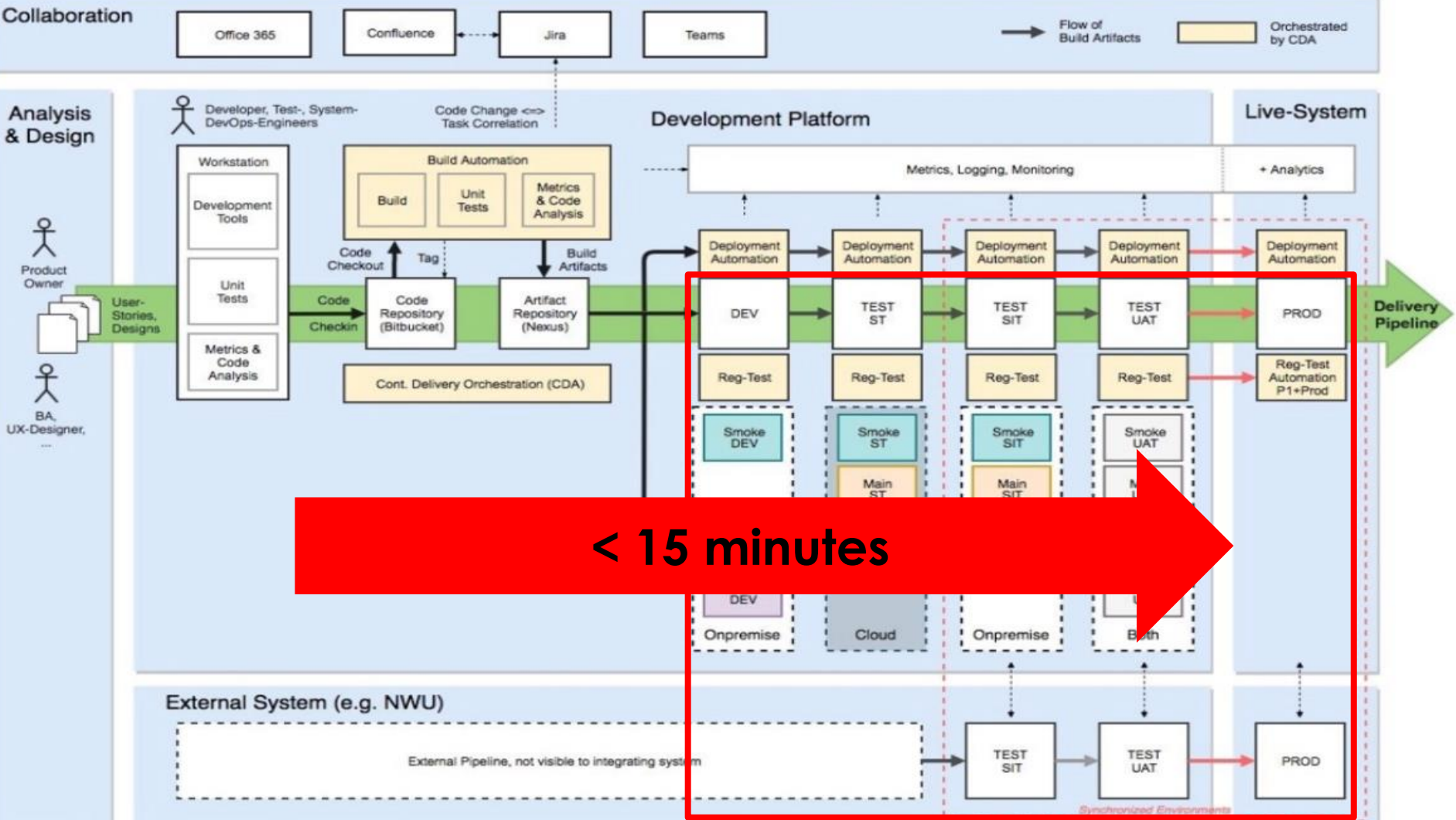


E2E



A photograph of a theater interior. In the foreground, several rows of red upholstered seats are visible, receding into the distance. The stage is at the far end, covered by a long, vertical pleated curtain that is illuminated with a warm, golden light, creating a series of vertical stripes. The overall atmosphere is quiet and anticipatory.

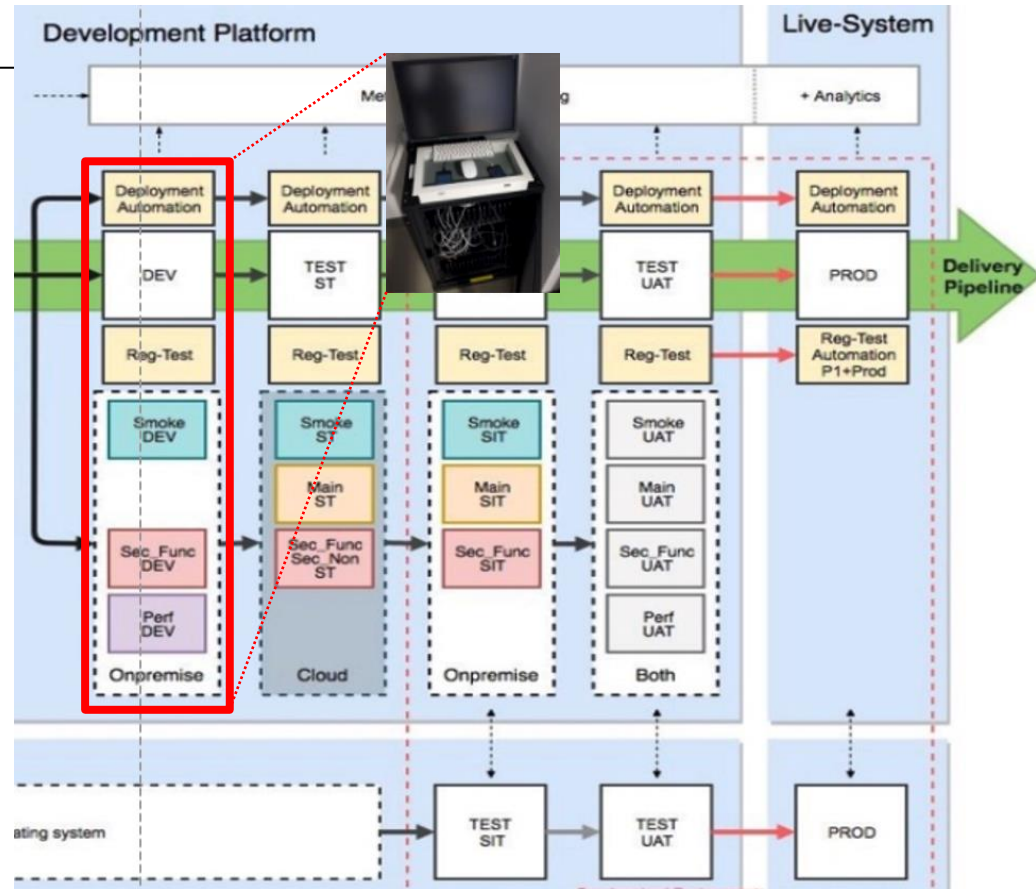
Test Stages



Test Stages (Mocked)

- Development Test Stage

- Objective: Validate that data is displayed and feature is working correct.
- Data: Mocks with synthetic data.
- Mobile devices: **2 core physical mobile devices** (1 IOS, 1 Android) in on-premise device lab.



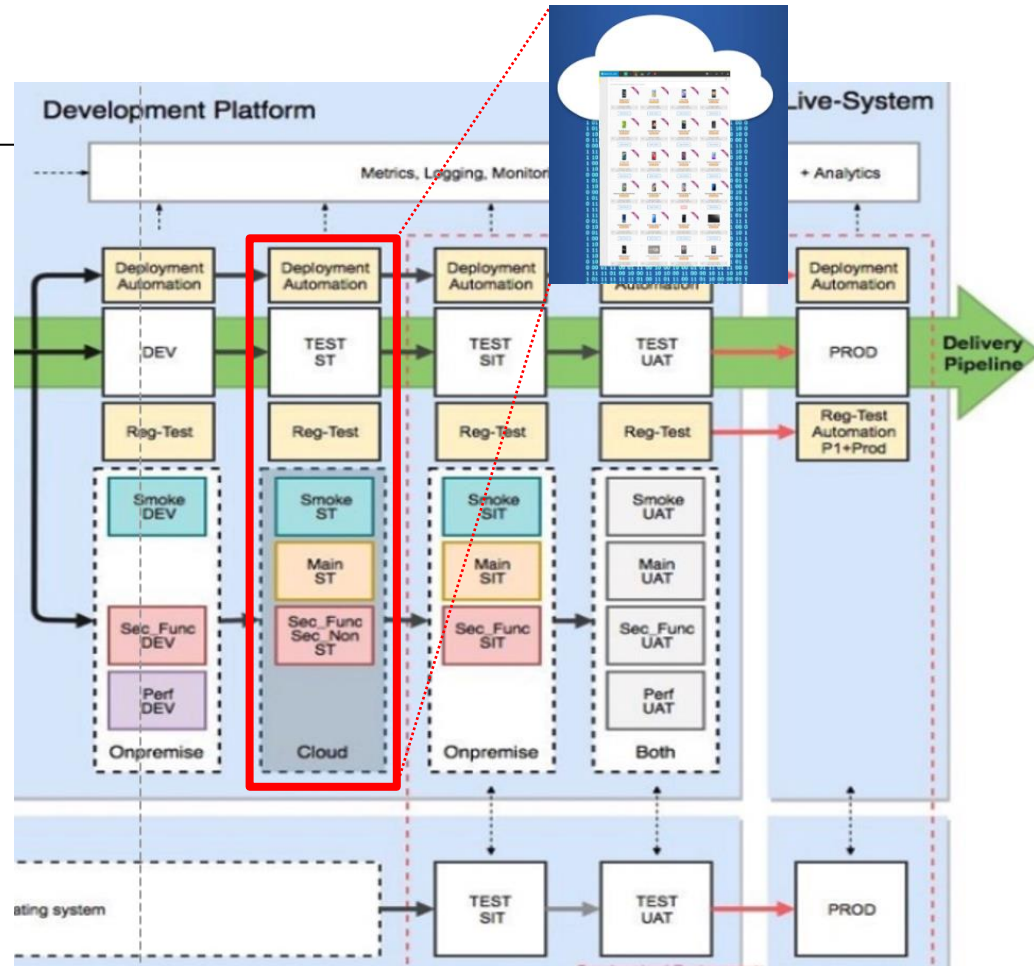
Test Stages (Mocked)

- Development Test Stage

- Objective: Validate that data is displayed and feature is working correct.
- Data: Mocks with synthetic data.
- Mobile devices: 2 core physical mobile devices (1 IOS, 1 Android) in on-premise device lab.

- System Test Stage

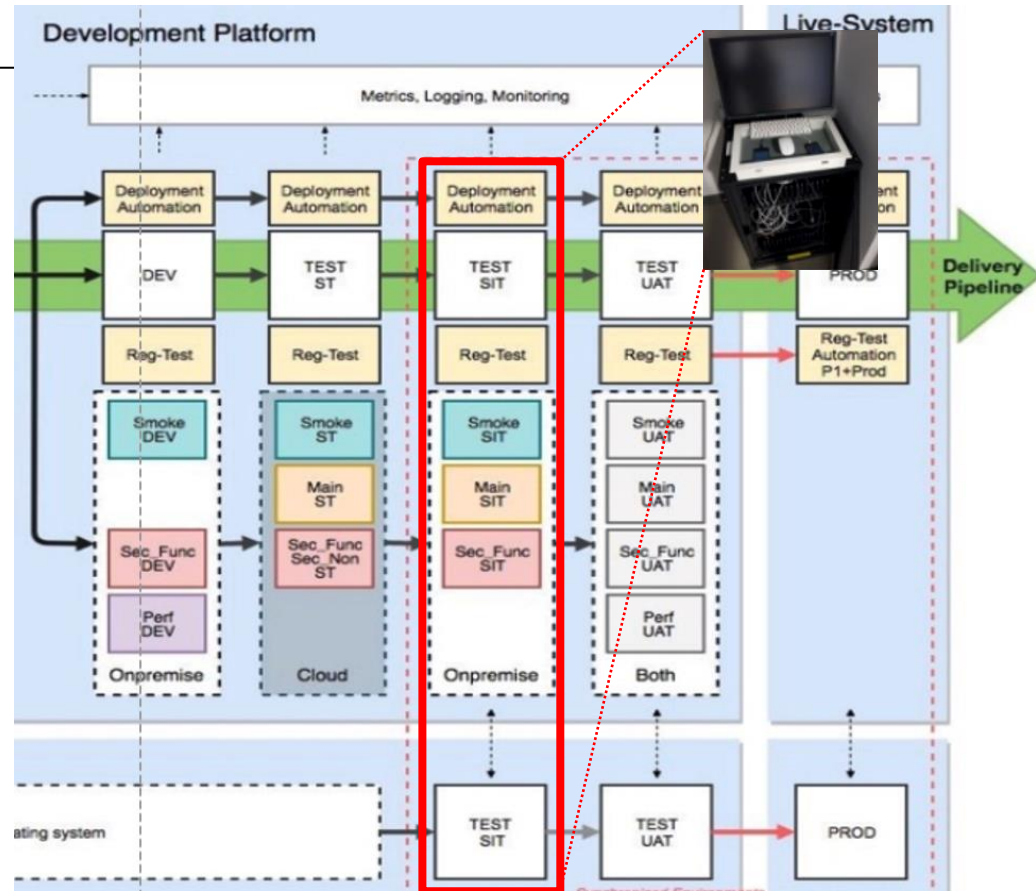
- Objective: Validate that data is displayed and user-journeys are working correct on all core & extended mobile devices (30 devices).
- Data: Virtual Bank.
- Mobile devices: All core & extended physical mobile devices in cloud device lab.



Test Stages (Integrated)

- System Integration Test Stage

- Objective: Validate that connection to country backends is working and data is displayed correct.
- Data: Pseudonymized data on country SIT.
- Mobile devices: **2 core physical mobile devices** (1 IOS, 1 Android) in on-premise lab.



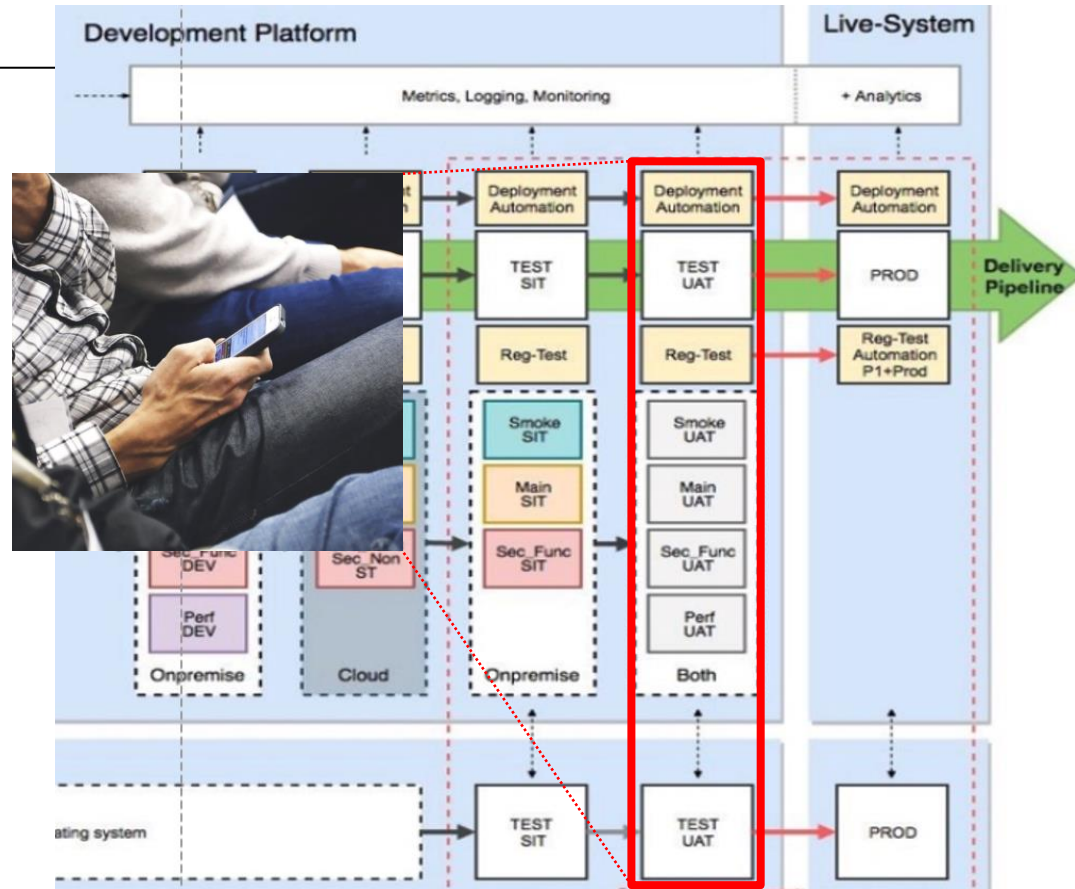
Test Stages (Integrated)

- System Integration Test Stage

- Objective: Validate that connection to country backends is working and data is displayed correct.
- Data: Pseudonymized data on country SIT.
- Mobile devices: 2 core physical mobile devices (1 IOS, 1 Android) in on-premise lab.

- User Acceptance Test Stage

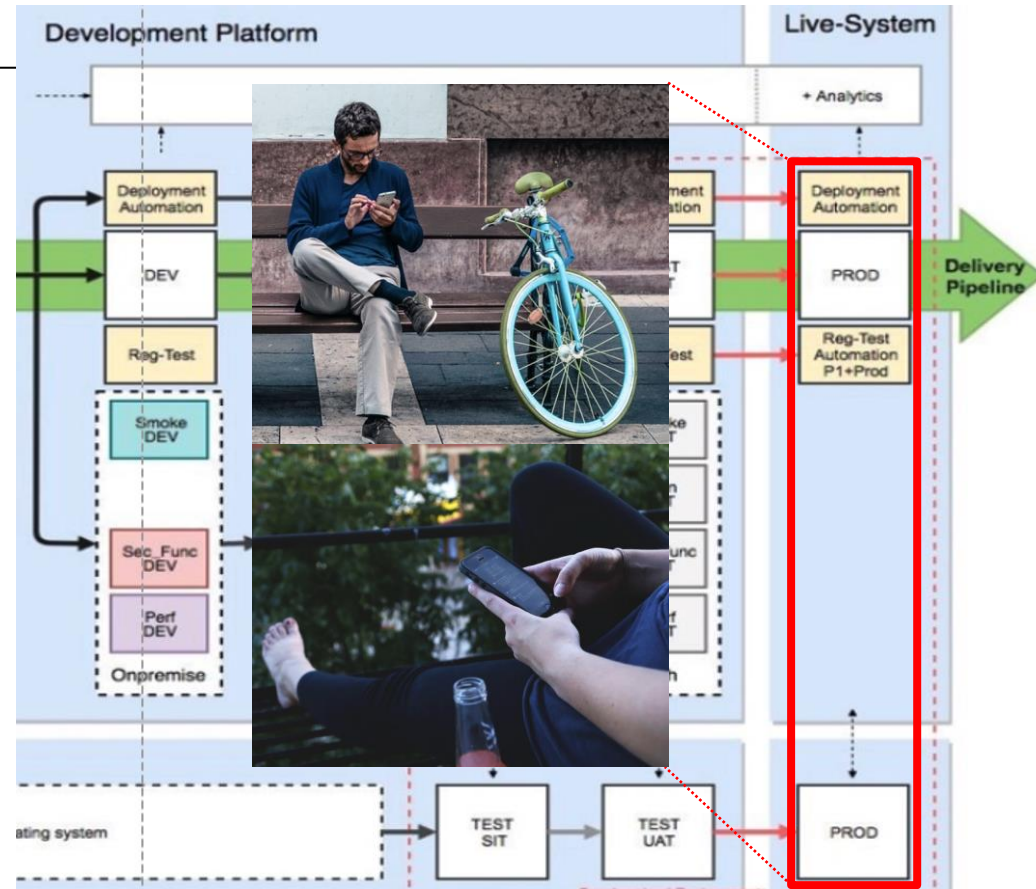
- Objective: Validate that data is displayed and feature is working correct.
- Data: Pseudonymized data on country UAT.
- Mobile devices: **UAT-User mobile devices.**



Test Stages

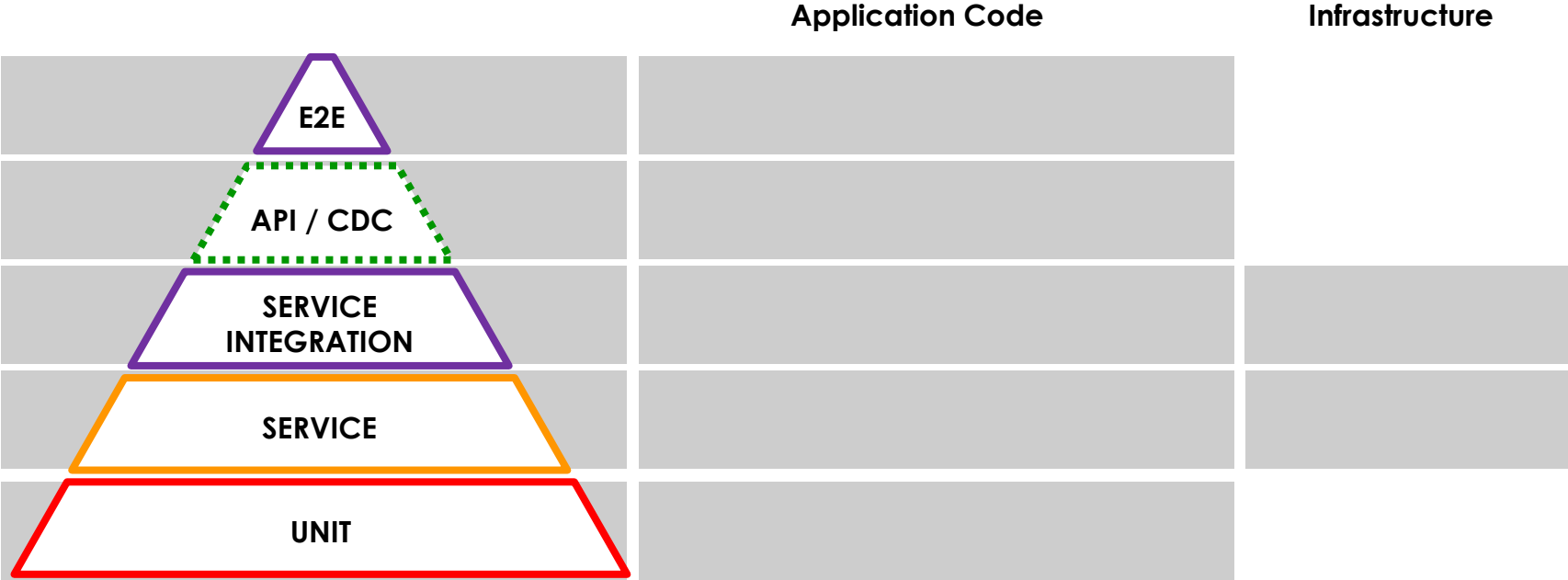
- Production Stage

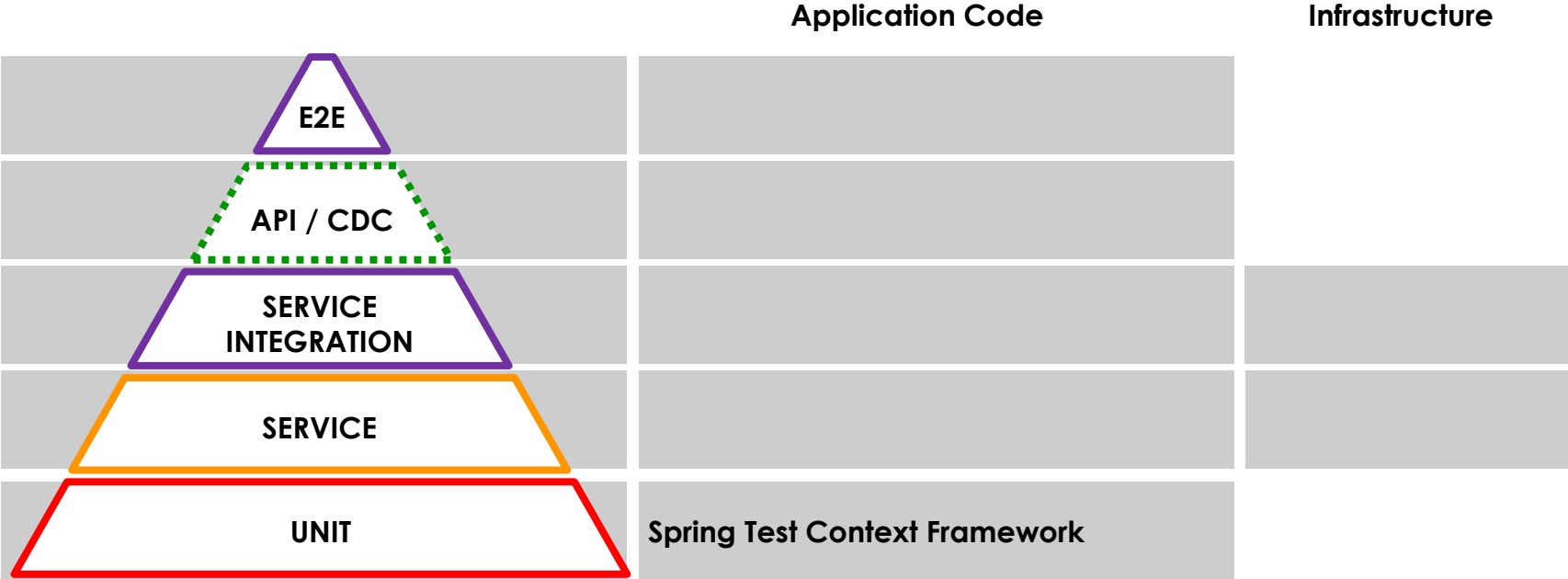
- Objective: Validate that data is displayed and feature is working correct.
- Data: 10 Beta-Users.
- Mobile devices: Beta-Users mobile devices.

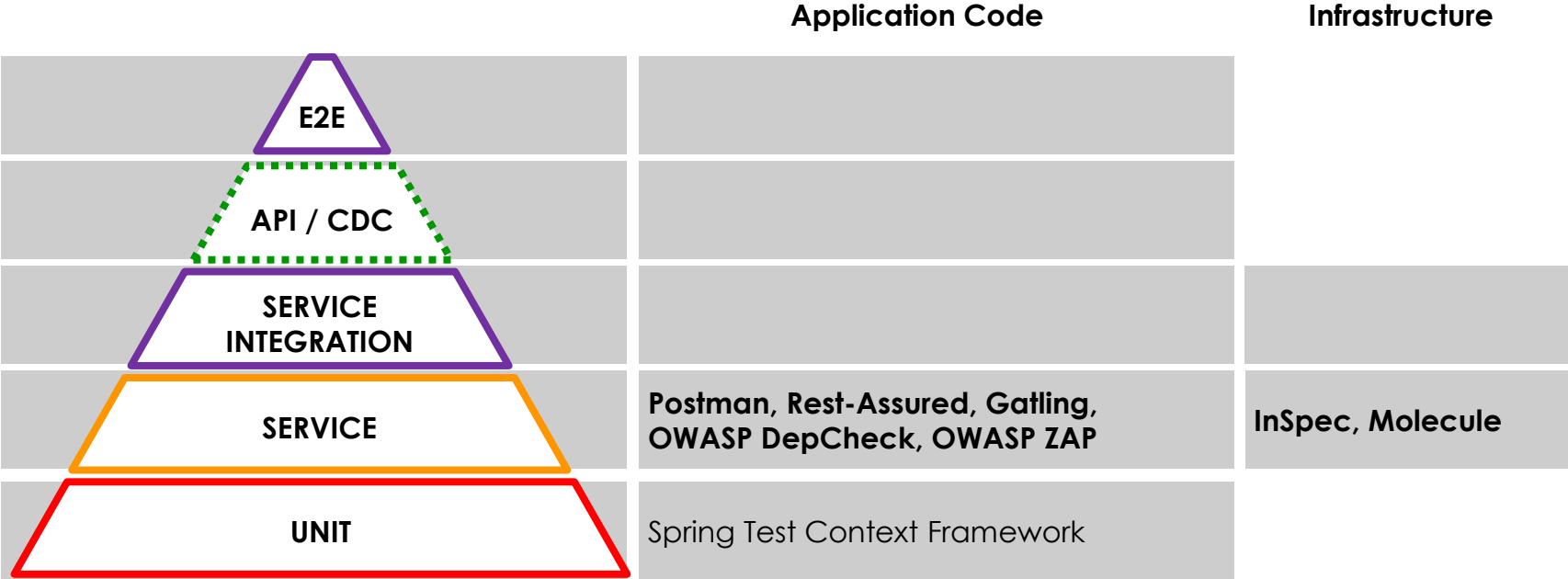


Test Automation

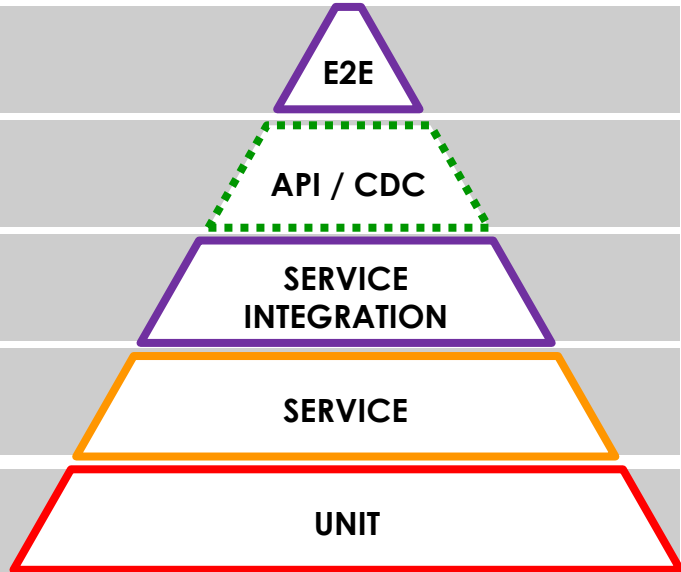




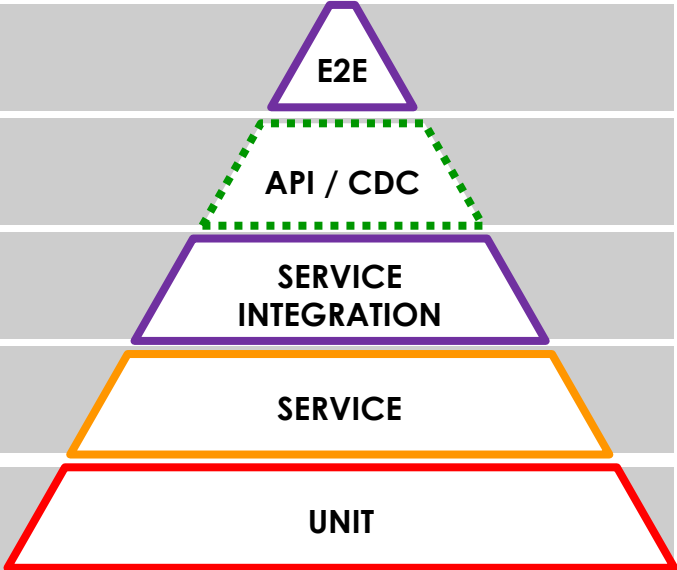




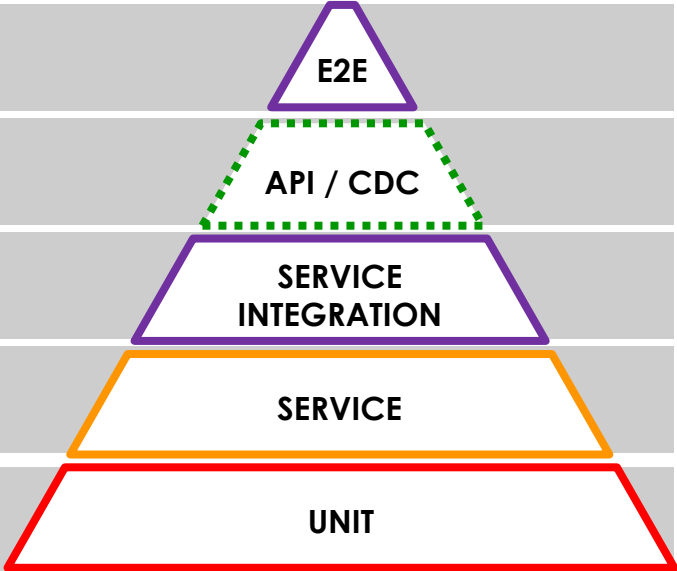
Tools

	Application Code	Infrastructure
		
E2E		
API / CDC		
SERVICE INTEGRATION	Postman, Rest-Assured	InSpec, Molecule
SERVICE	Postman, Rest-Assured, Gatling, OWASP DepCheck, OWASP ZAP	InSpec, Molecule
UNIT	Spring Test Context Framework	

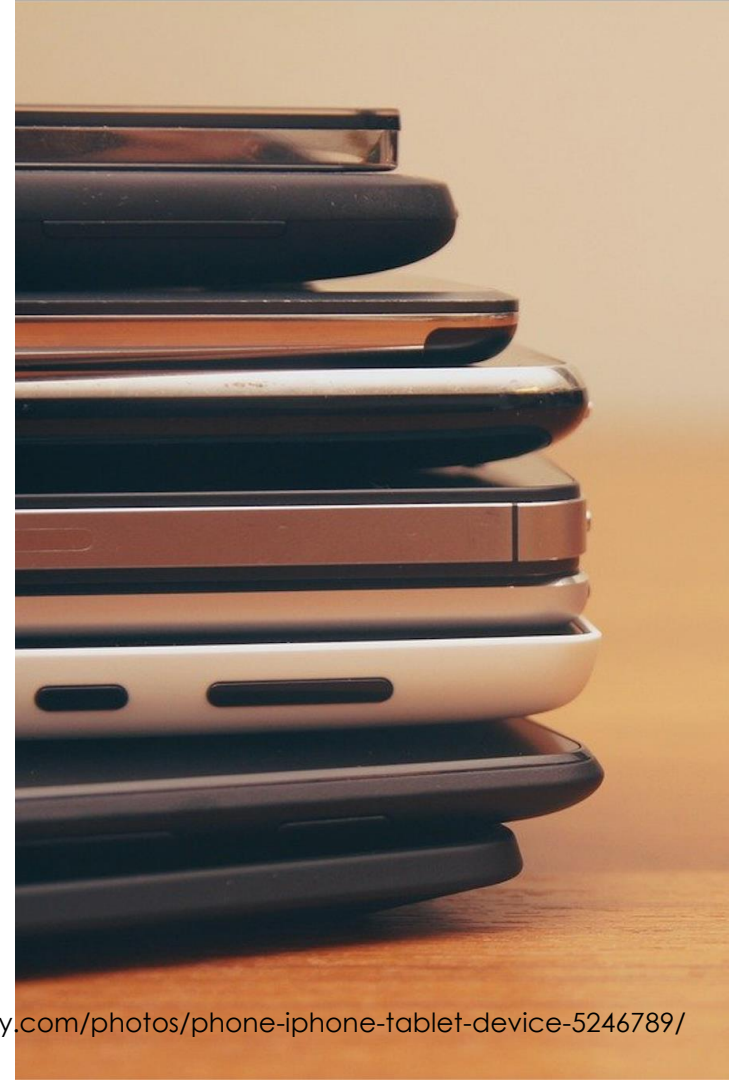
Tools

	Application Code	Infrastructure
		
E2E		
API / CDC	Postman, Rest-Assured, Gatling, Pact	
SERVICE INTEGRATION	Postman, Rest-Assured	InSpec, Molecule
SERVICE	Postman, Rest-Assured, Gatling, OWASP DepCheck, OWASP ZAP	InSpec, Molecule
UNIT	Spring Test Context Framework	

Tools

	Application Code	Infrastructure
 E2E	Postman, Appium , Gatling	
API / CDC	Postman, Rest-Assured, Gatling, Pact	
SERVICE INTEGRATION	Postman, Rest-Assured	InSpec, Molecule
SERVICE	Postman, Rest-Assured, Gatling, OWASP DepCheck, OWASP ZAP	InSpec, Molecule
UNIT	Spring Test Context Framework	

Mobile **Device** Lab



<https://pixabay.com/photos/phone-iphone-tablet-device-5246789/>

 GETTING STARTED LIVE

Test Results

Mobile-App

Cross-Browser

 AUTOMATED INSIGHTS SAUCE APPS TUNNELS

Live / Cross-Browser

 Desktop Mobile Real Mobile Virtual

Google Pixel 4 XL

Android 10
1440 x 3040

Huawei P10 Lite

Android 7.0
1080 x 1920

iPad Pro 12.9

iOS 14.1
2048 x 2732

iPhone 8 Plus

iOS 13.4
1242 x 2208

iPhone XS

iOS 13.3
1125 x 2436

iPhone XS

iOS 13.3.1
1242 x 2688Motorola Moto G7
PowerAndroid 9
720 x 1520

OnePlus 7T

Android 10
1080 x 2400

Samsung Galaxy S20

Android 8.0.0
1080 x 1920

Samsung Galaxy S9+

Android 9
1440 x 2960Samsung Galaxy Tab
S4Android 9
1600 x 2560

Xiaomi Redmi

Android 9
1080 x 2340

BQ Aquaris M5

Android 71.2
1080 x 1920

BQ Aquaris X2

Android 9
1080 x 2160

Google Pixel 3

Android 10
1080 x 1920

Google Pixel 2 XL

Android 11
1440 x 2880































Google Pixel 3

Android 11
1080 x 2160

Google Pixel 3

Android 11
1440 x 2960

Products: 127 items

- Search...
-  gds-merlin-inapp-analytics
 -  gds-merlin-logging
 -  gds-merlin-logging-es
 -  gds-merlin-logging-ingest
 -  gds-merlin-monitoring
 -  gds-merlin-personalisation
 -  gds-merlin-personalisation-offline-cate
 -  gds-merlin-personalisation-offline-cate
 -  gds-merlin-personalisation-testing
 -  gds-merlin-rbhh
 -  gds-merlin-smeon
 -  gds-merlin-support-functions
 -  gds-newton
 -  gds-newton-build
 -  gds-newton-mobile
 -  gds-newton-mobile 2.5.0
 -  **2.5.0.b5**
 -  2.5.0.b4
 -  2.5.0.b3
 -  2.5.0.b2
 -  2.5.0.b1
 -  gds-newton-mobile 2.4.1
 -  gds-newton-personalisation
 -  gds-playground
 -  gds-psd2
 -  gds-psd2-aisp
 -  gds-psd2-auth-bridge
 -  gds-psd2-bgs-consent
 -  gds-psd2-cisp
 -  gds-psd2-consent

Product release data




































Dependency Management

Shipping & Environment Management

Component releases: 38 items

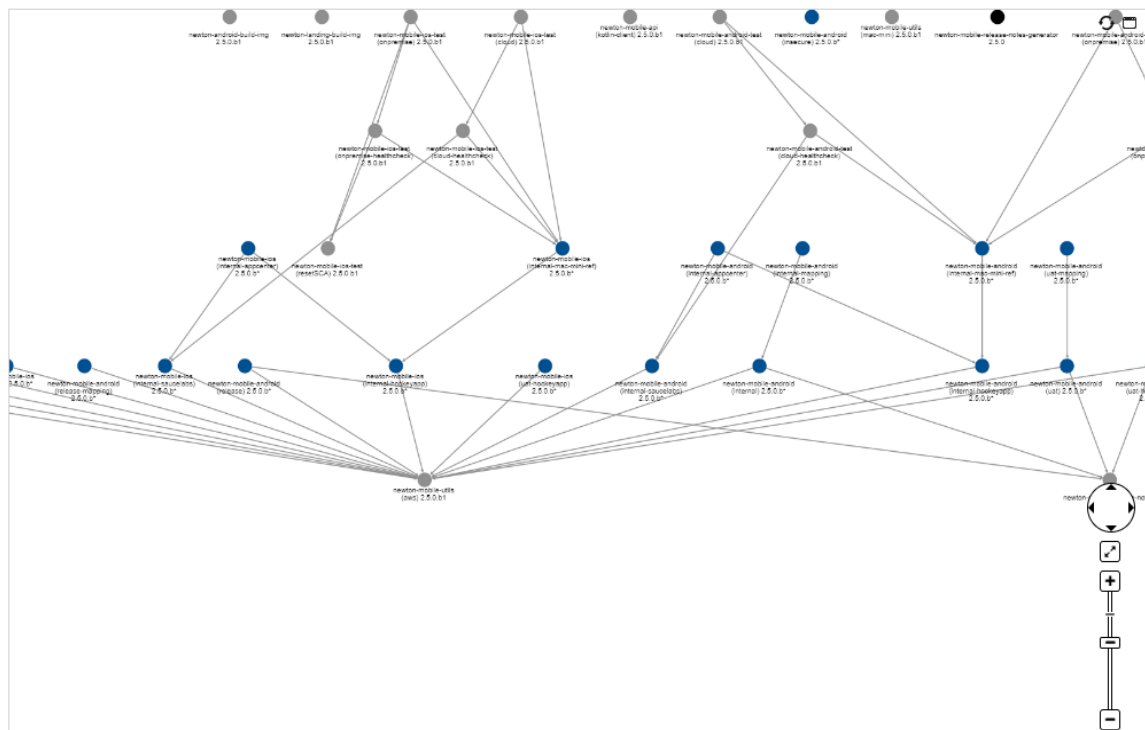
Search...

Overview

-  newton-android-build-img 2.5.0.b1
-  newton-landing-build-img 2.5.0.b1
-  newton-landing-page 2.5.0.b1
-  newton-mobile-api (kotlin-client) 2.5.0.b1
-  newton-mobile-api (kotlin-client) 2.5.0.b1
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-  newton-mobile-api (kotlin-client) 2.5.0.b1

Add component

Dependency graph



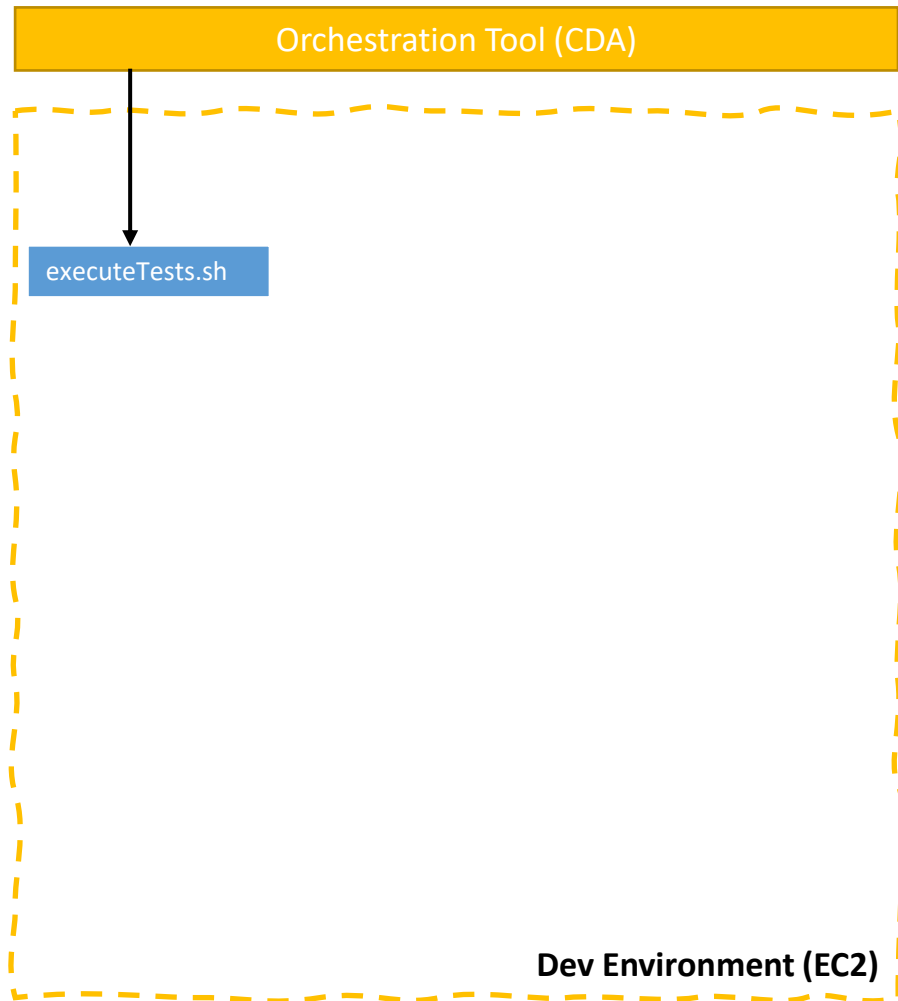
Orchestration Tool (CDA)

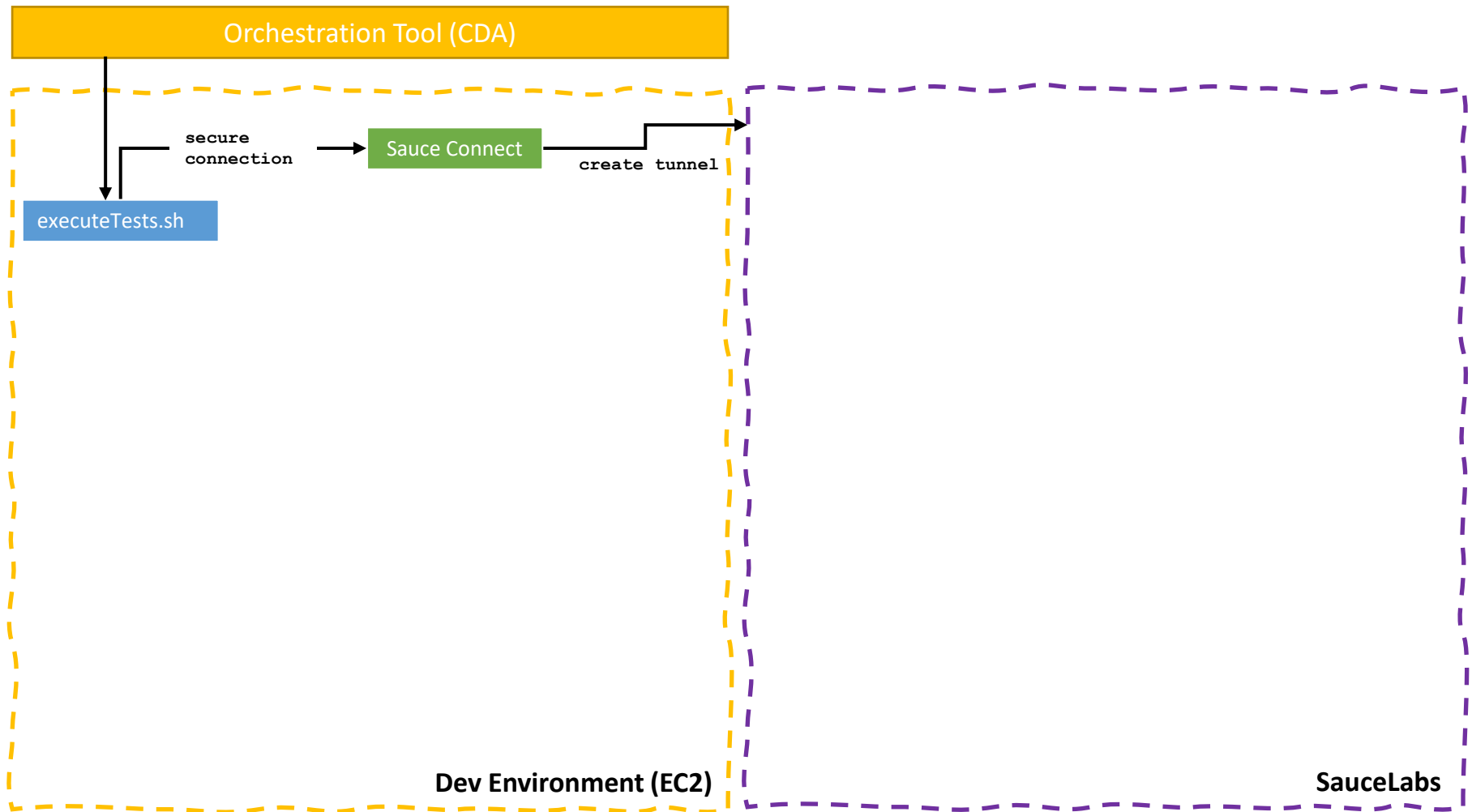
Dev Environment (EC2)

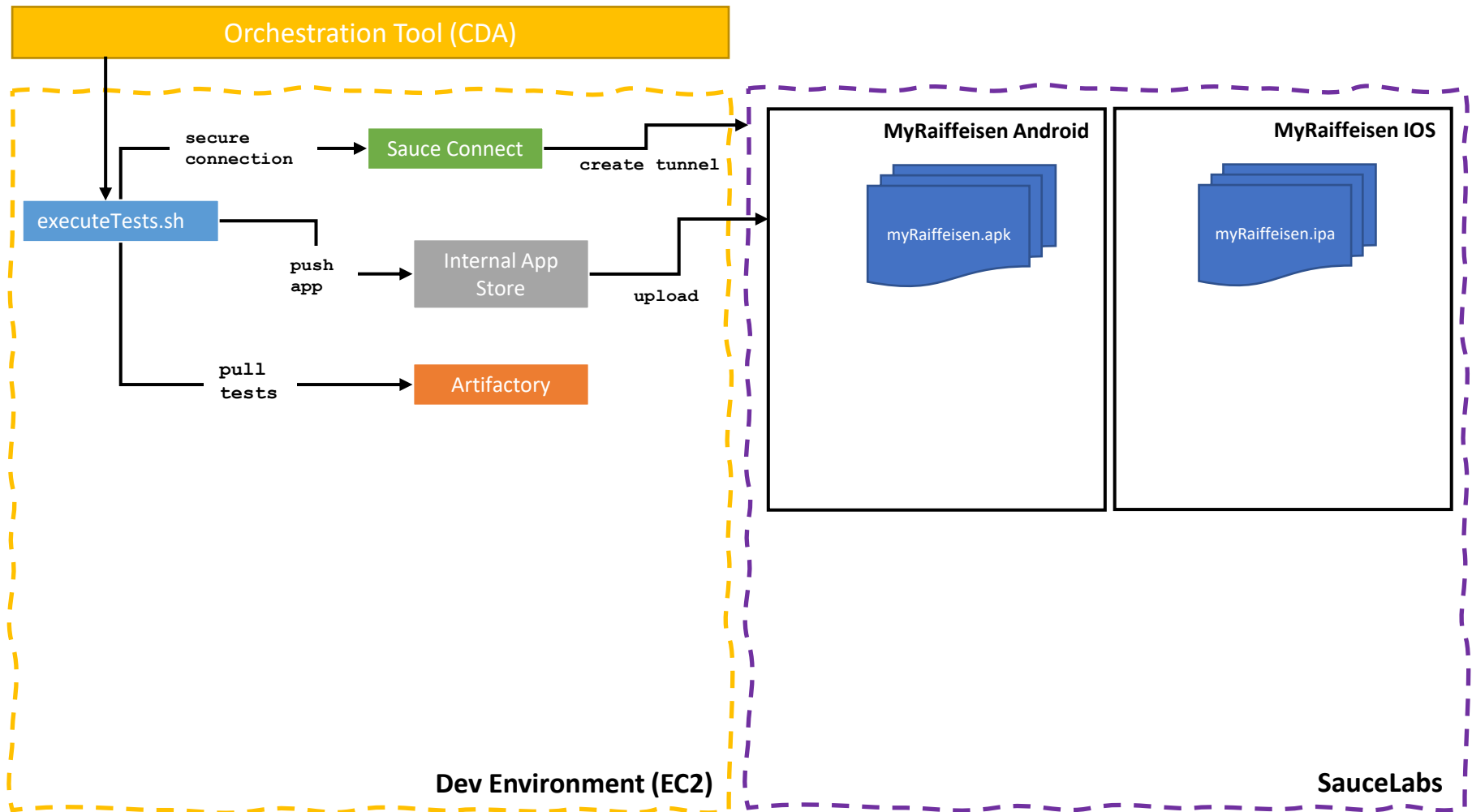
Orchestration Tool (CDA)

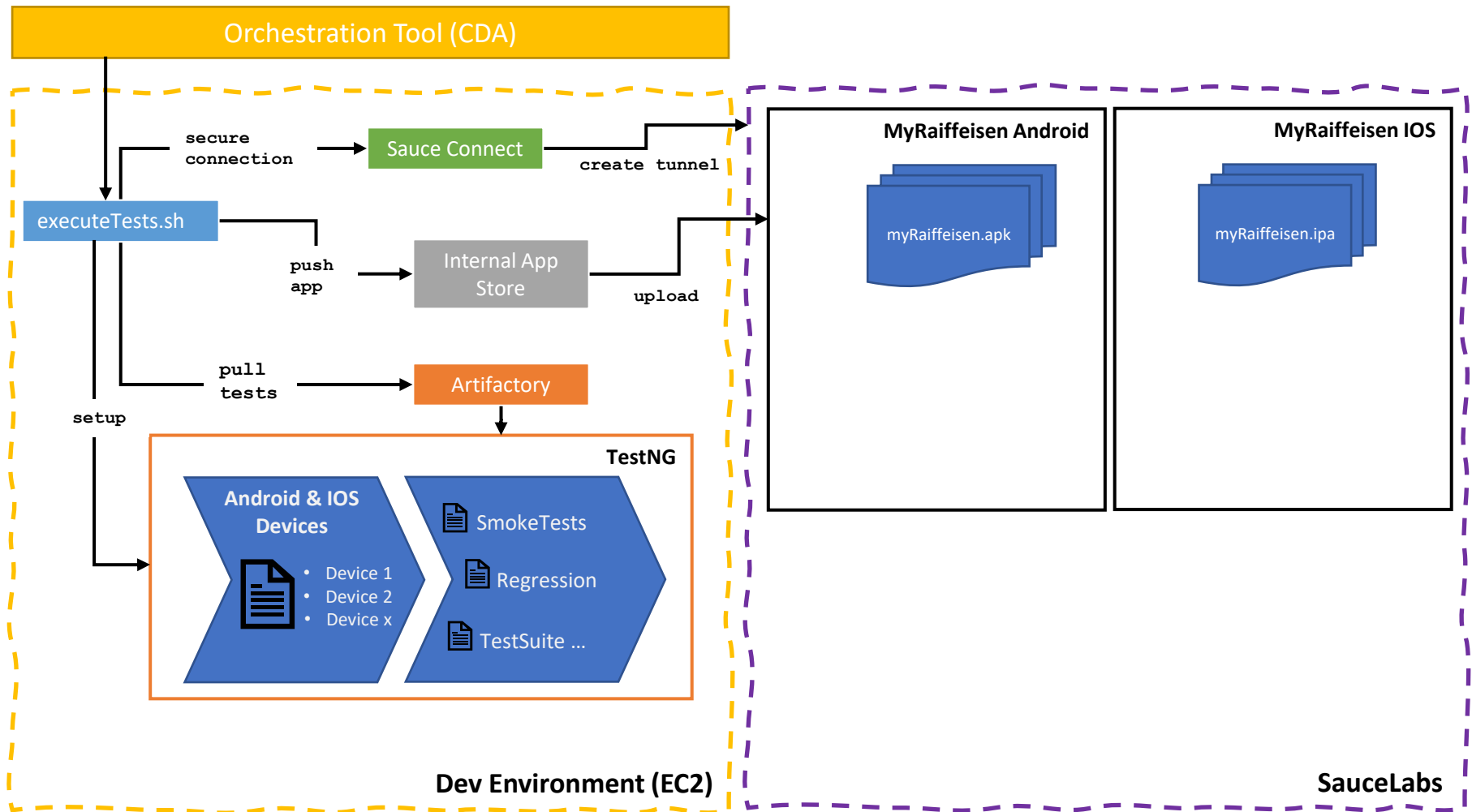
executeTests.sh

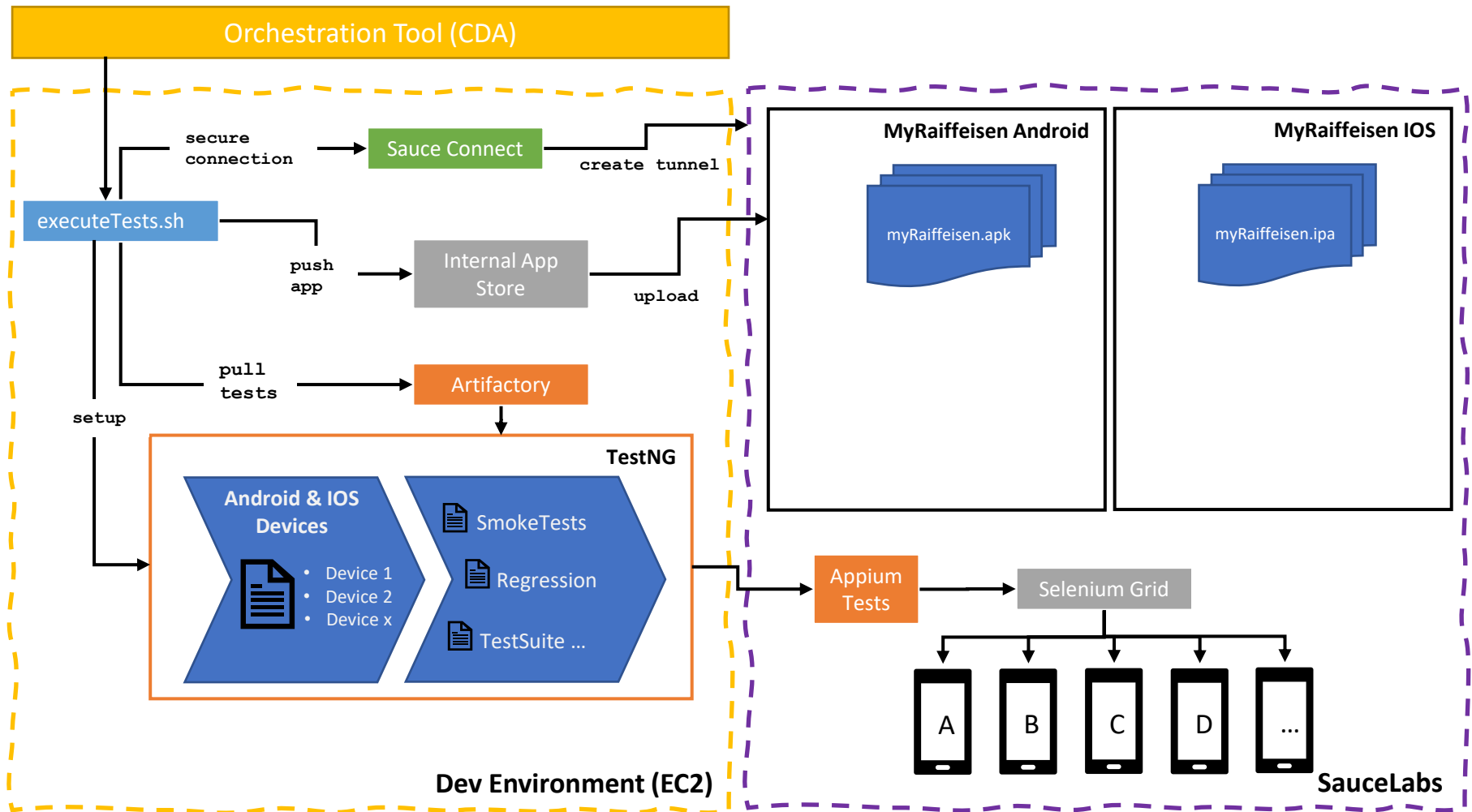
Dev Environment (EC2)

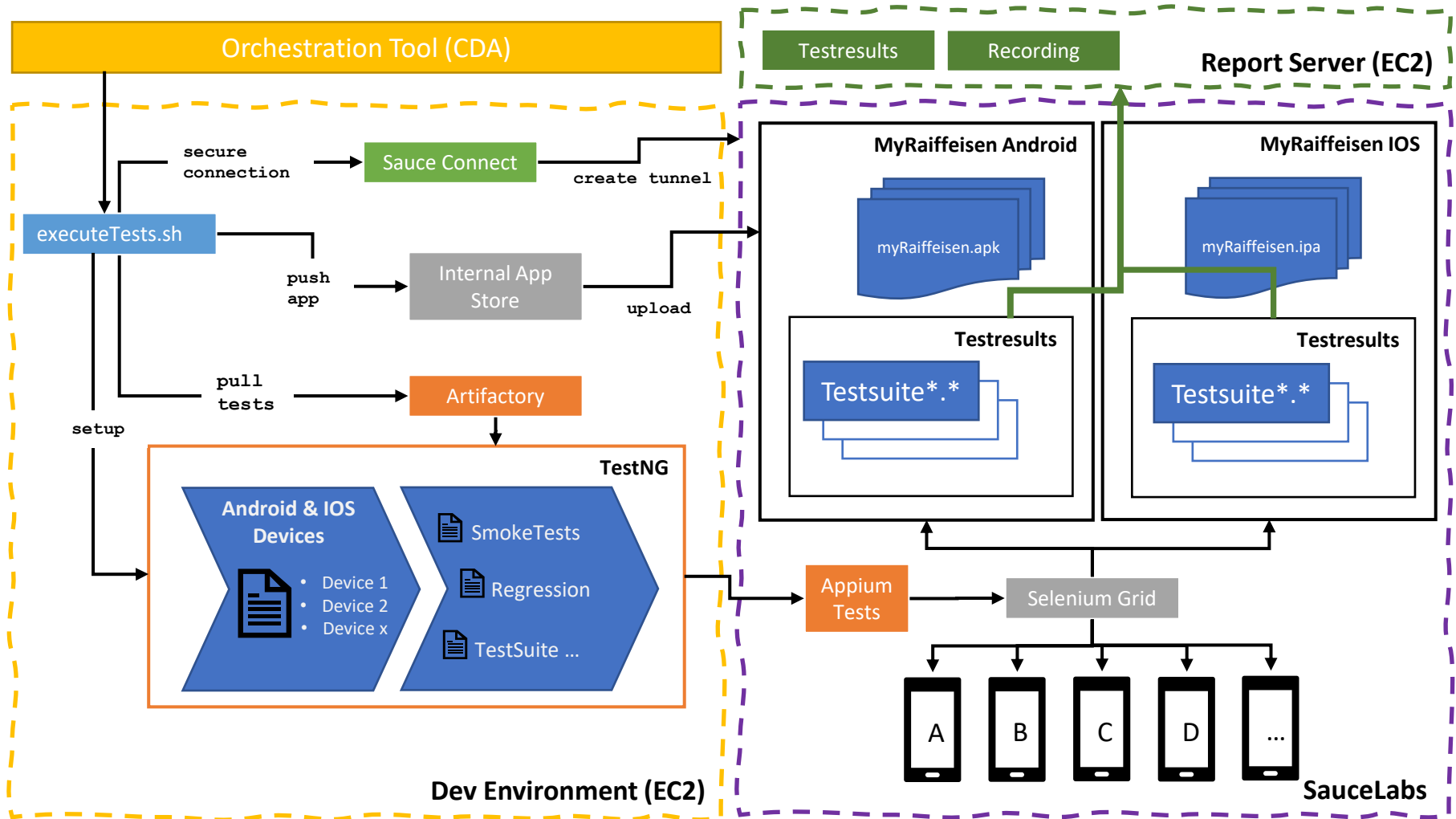




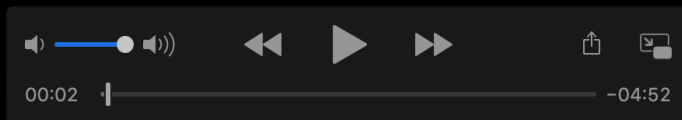








RBI MOBILE DEVICE CLOUD **MYRAIFFEISEN**



Lessons Learned



Lessons Learned

1. Use microservices only if you really need them.
2. Use Non-Functional tests at microservice level.
3. Use Consumer Driven Contracts.
4. Use physical mobile devices if you really need them.
5. Use infrastructure testing to validate your cloud infrastructure.





END

Credits:

• <https://pixabay.com>