

mojaloop

# Mifos Lab Update

January 2019

Edward Cable, The Mifos Initiative  
Istvan Molnar, DPC Consulting Hungary



# Agenda

- Overview of Mifos & Ecosystem
- Mifos Gen 2 and Gen 3 Technology Stack
- Vision for Mifos Lab
- Goals, Objectives, and Use Cases for Mifos Lab
- Architecture and Design Overview & Diagrams
- API Walkthrough
- Live Demo
- Lessons Learned
- What's Next
- Take Action



# Who is Mifos?



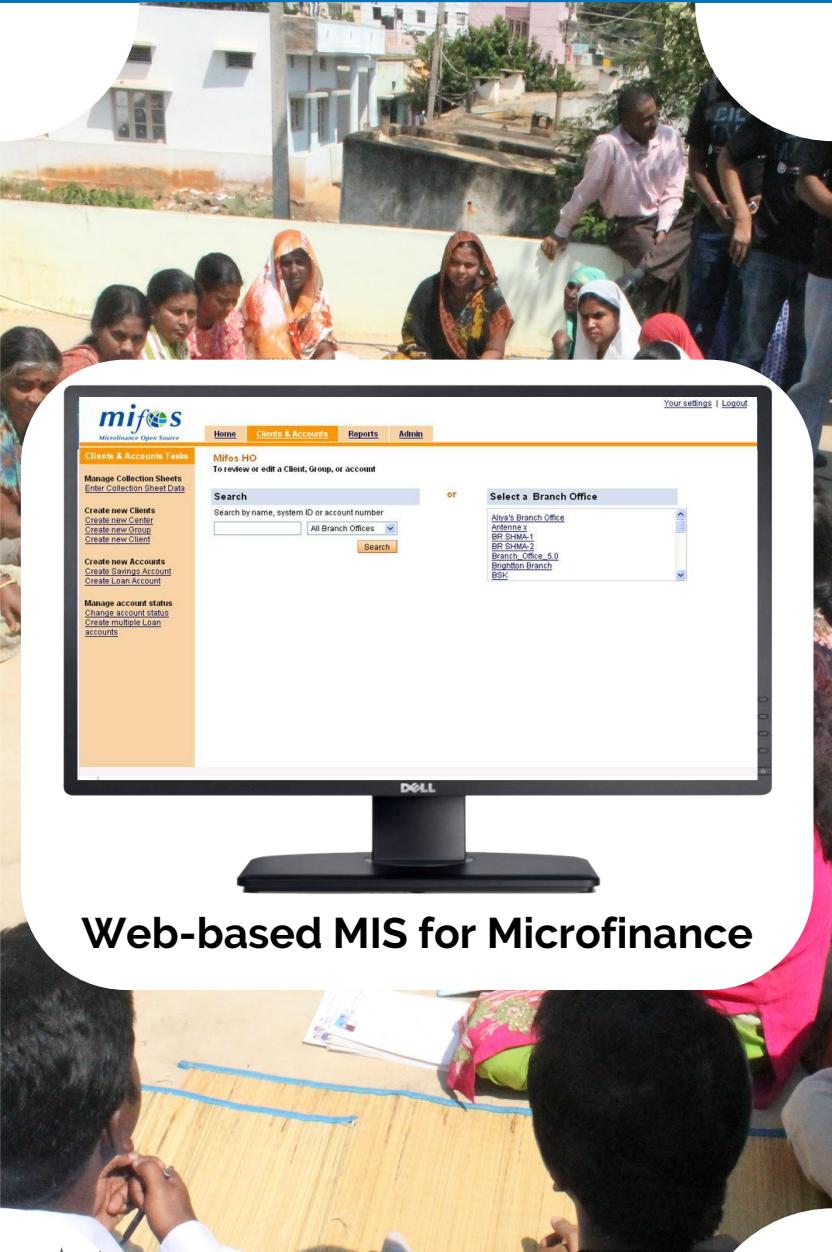
**FinTech non-profit leveraging the cloud, mobile, and open source community to transform the delivery of digital financial services to the world's 3 billion underbanked and unbanked.**

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10M clients  
300 orgs



# Evolving Technology



**Mifos**  
Microfinance Open Source

Home Clients & Accounts Reports Admin

Mifos HQ To review or edit a Client, Group, or account

Manage Collection Sheets Enter Collection Sheet Data

Create new Clients Create new Center Create new Group Create new Client

Create new Accounts Create Savings Account Create Loan Account

Manage account status Change account status Create multiple Loan accounts

Search Search by name, system ID or account number All Branch Offices Search

Select a Branch Office

Allan's Branch Office Address: BR SHMA-1 BR SHMA-2 BR SHMA-3 BR SHMA-4 BR SHMA-5 Brighton Branch BSK

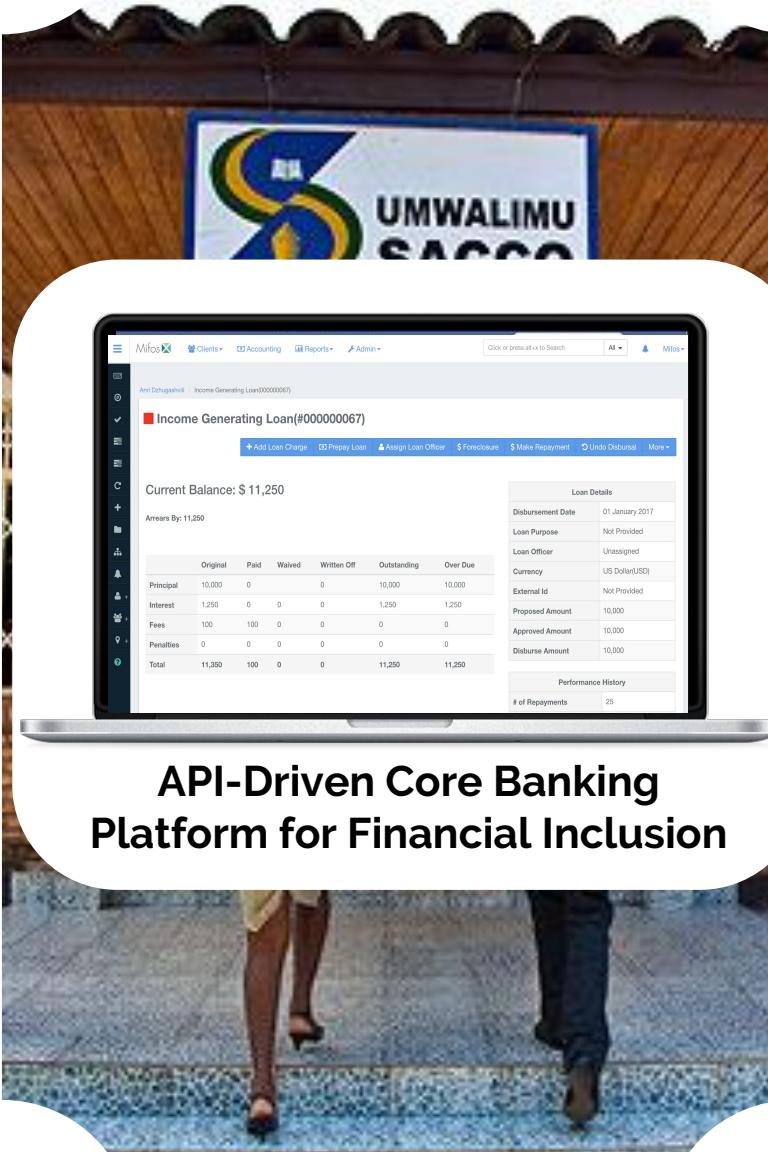
DELL

Web-based MIS for Microfinance



M

Microfinance



API-Driven Core Banking Platform for Financial Inclusion



Digital Financial Services

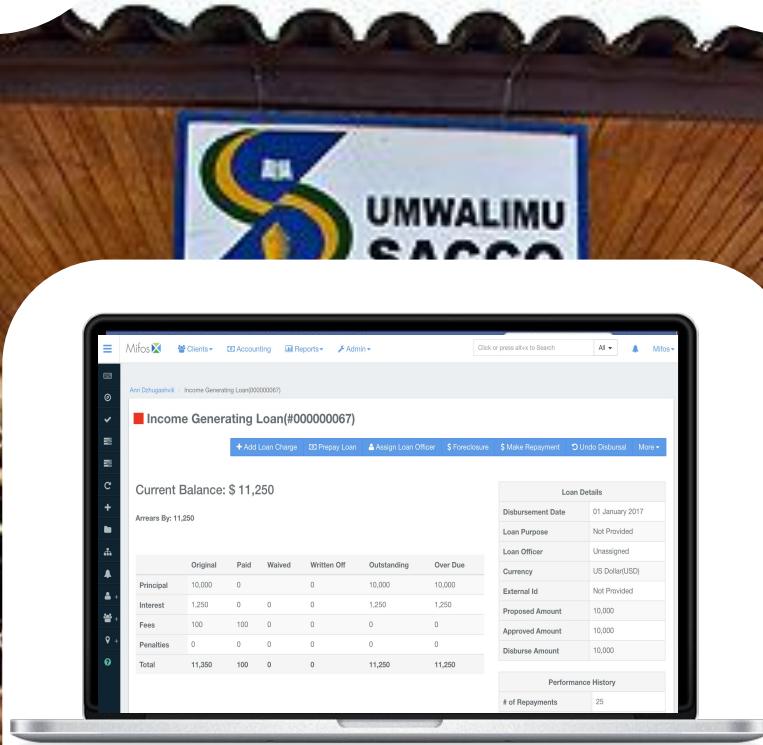
# Evolving Community & Governance Structure



Web-based MIS for Microfinance



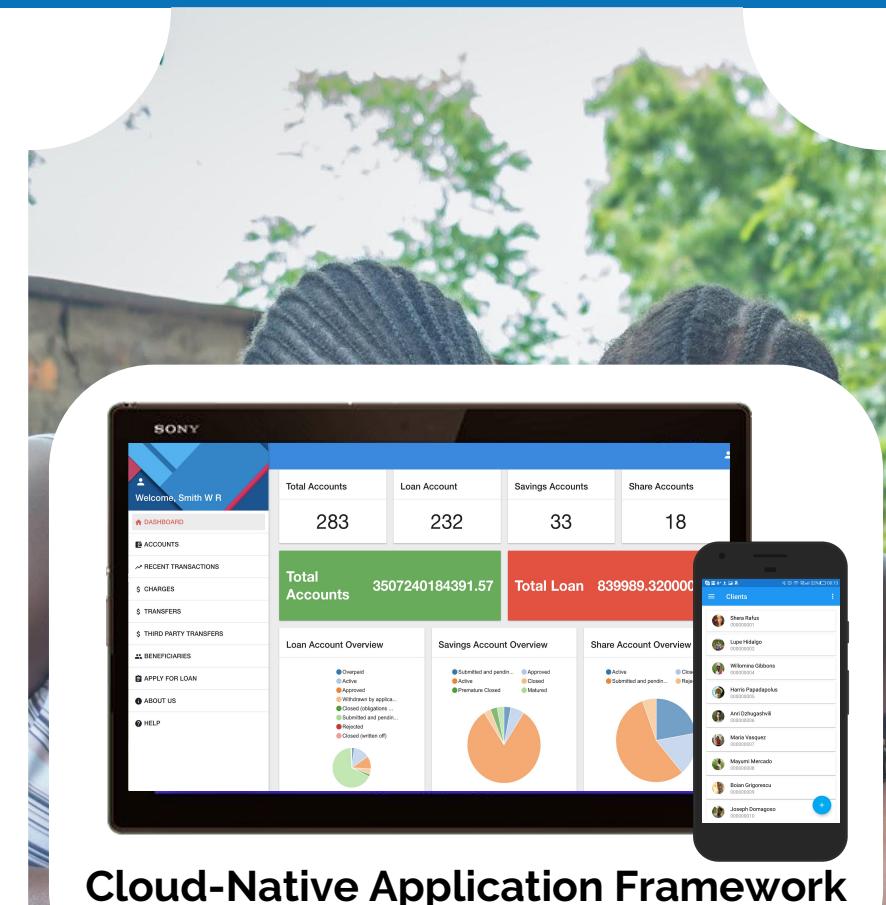
Microfinance



API-Driven Core Banking Platform for Financial Inclusion



Financial Inclusion



Cloud-Native Application Framework for Digital Financial Services



Digital Financial Services

## Generation 1

## Generation 2

## Generation 3

### Market Focus

#### Microfinance

Automation for Grameen JLG Lending

#### Financial Inclusion

Automation & Innovation for Financial Inclusion Providers

#### Digital Financial Services

Rapid Innovation, Rollout of Digital Channels and Digital Financial Services for Financial Inclusion & Fintech Sector

### Tech

#### Mifos 2.x First OS Web-Based MIS for Microfinance

We launched the world's first open source web-based management information system for joint liability group lending powering institutions like Grameen Koota & enda.

2006

#### Mifos X (Apache Fineract) First Open API Platform for Financial Inclusion

As the industry broadened its focus to financial inclusion, we launched Mifos X, the world's first truly open API-driven platform for financial inclusion.

2011

#### Mifos I/O (Apache Fineract CN) First Application Framework for DFS

Apache Fineract CN, the first open source application framework for digital financial services, providing a modern cloud-native microservices architecture for the sector to achieve Financial Inclusion 2.0.

2017



### Governance

**Launched as Project of Grameen Foundation**  
Licensed under Apache 2.0

**Spun Out as Independent 501(c)3 Non-Profit**  
Licensed under Mozilla Public License 2.0

**Graduated to top-level project of Apache Software Foundation**

Platform & Framework licensed under Apache 2.0  
Mifos X Suite of Apps licensed under Mozilla Public License 2.0

### Strategic Focus

#### Industry Initiative

Incubate the open source project and community through lighthouse adoption stewarded by Grameen Foundation

#### Independent Community & Non-Profit

Guide the development of the core open source platform and catalyze an ecosystem of innovation led by network of partners and community of volunteers.

#### Bi-directional Community

ASF: Technical governance of framework led by PMC.

#### Mifos.org Focus:

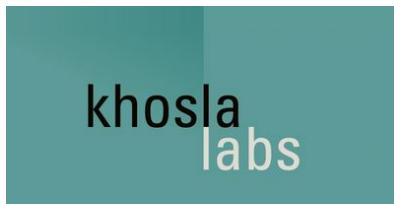
- Outreach/advocacy of digital financial services platforms
- Sustainability of the overall initiative
- Catalyze creation & implementation of sustainable market-driven solutions & innovation on the platform thru partner network
- Secretariat hub for financial inclusion community on



# Powering the Enterprise



On-site deployment reaching 2.5 million clients in Indonesia



On-site deployment of Novobank to Microfinance Bank in India reaching 2M+ clients

mojaloop



Innovation Lab in Parallel to SAP



German Bank migrated mortgage loan portfolio to streamline processes and lower costs.

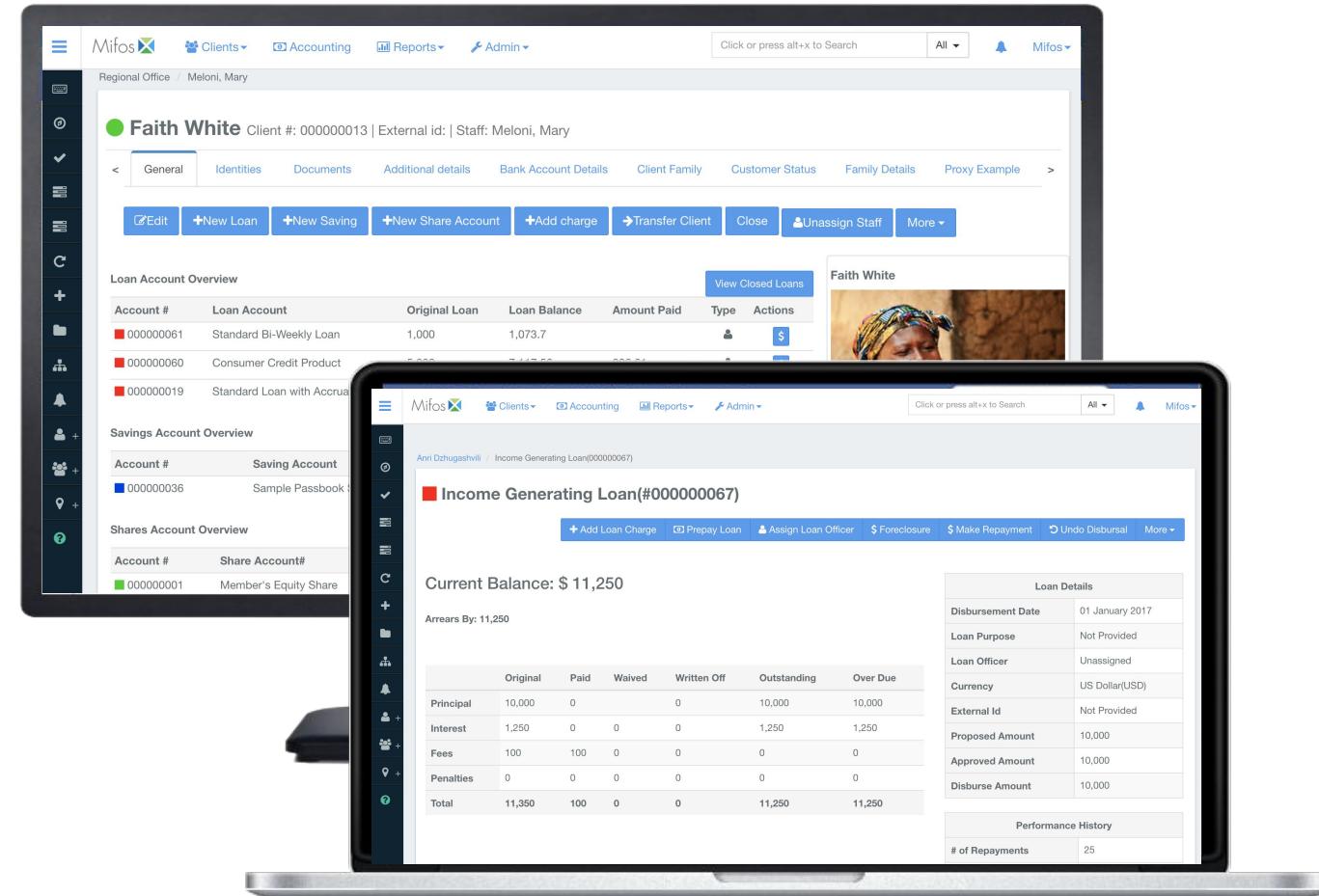


# Ecosystem - Fintech Powered by Mifos X



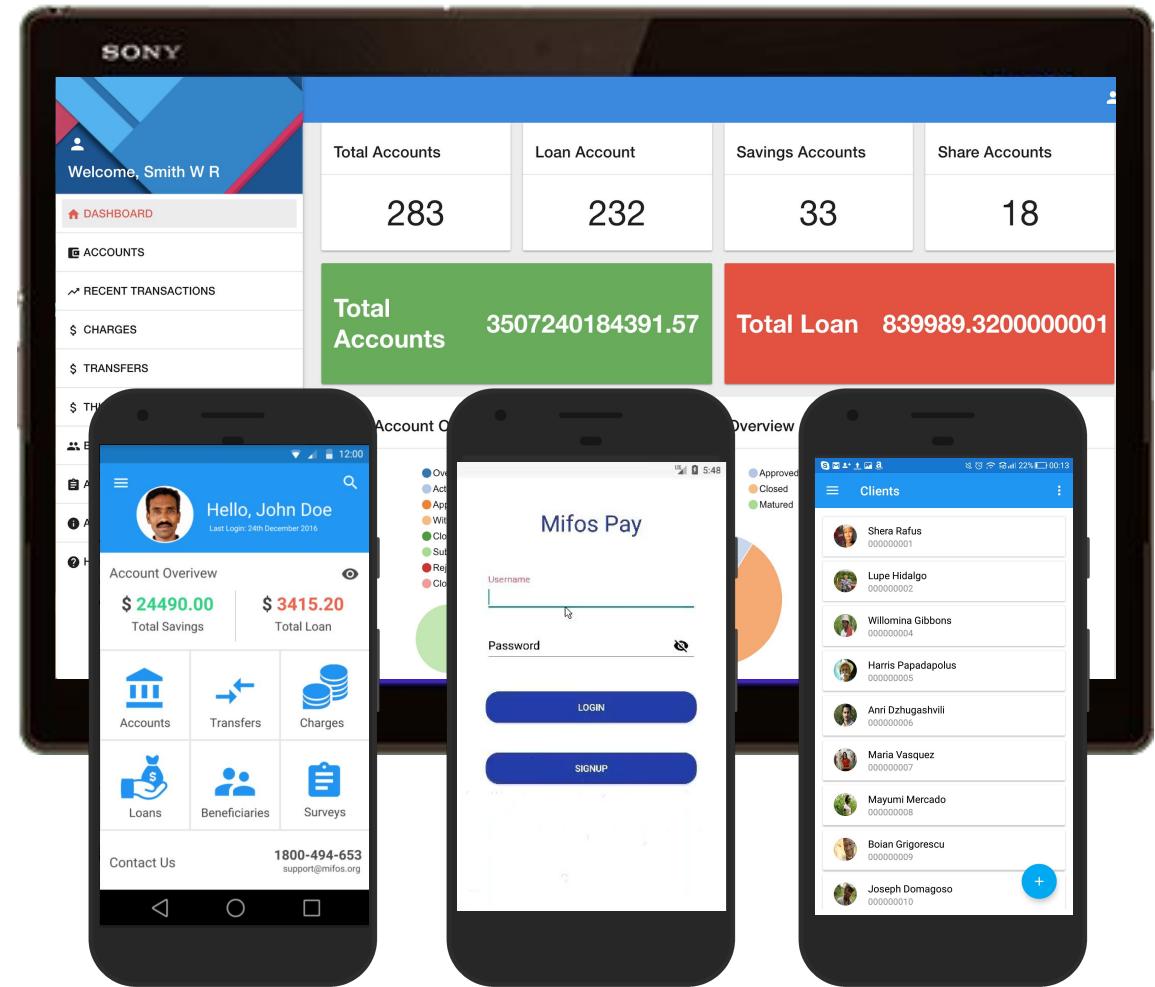
# Open Technology Stack for DFS Innovation

Platform & APIs



Web App

Online Banking App



Mobile Banking

Mobile Wallet

Mobile Field Ops

11



# Entire Market is Ripe for Open Innovation



## Financial Inclusion

### Financial Inclusion 2.0

Assist financial inclusion providers to make the digital transformation. For some, that will be deploying a solution at scale. For others that have already digitized, it will be in helping them to go digital or branchless.

- Banking as a Service
- Digital Financial Services Platforms
- Omnichannel Banking

## Fintech

### Build Apps Not Infrastructure

Fintech, and Digital Financial Service providers require flexible extensible architecture to rapidly build digital financial service innovations Telcos & Banks need cost-effective systems that allow them to scale and make profitable mobile money.

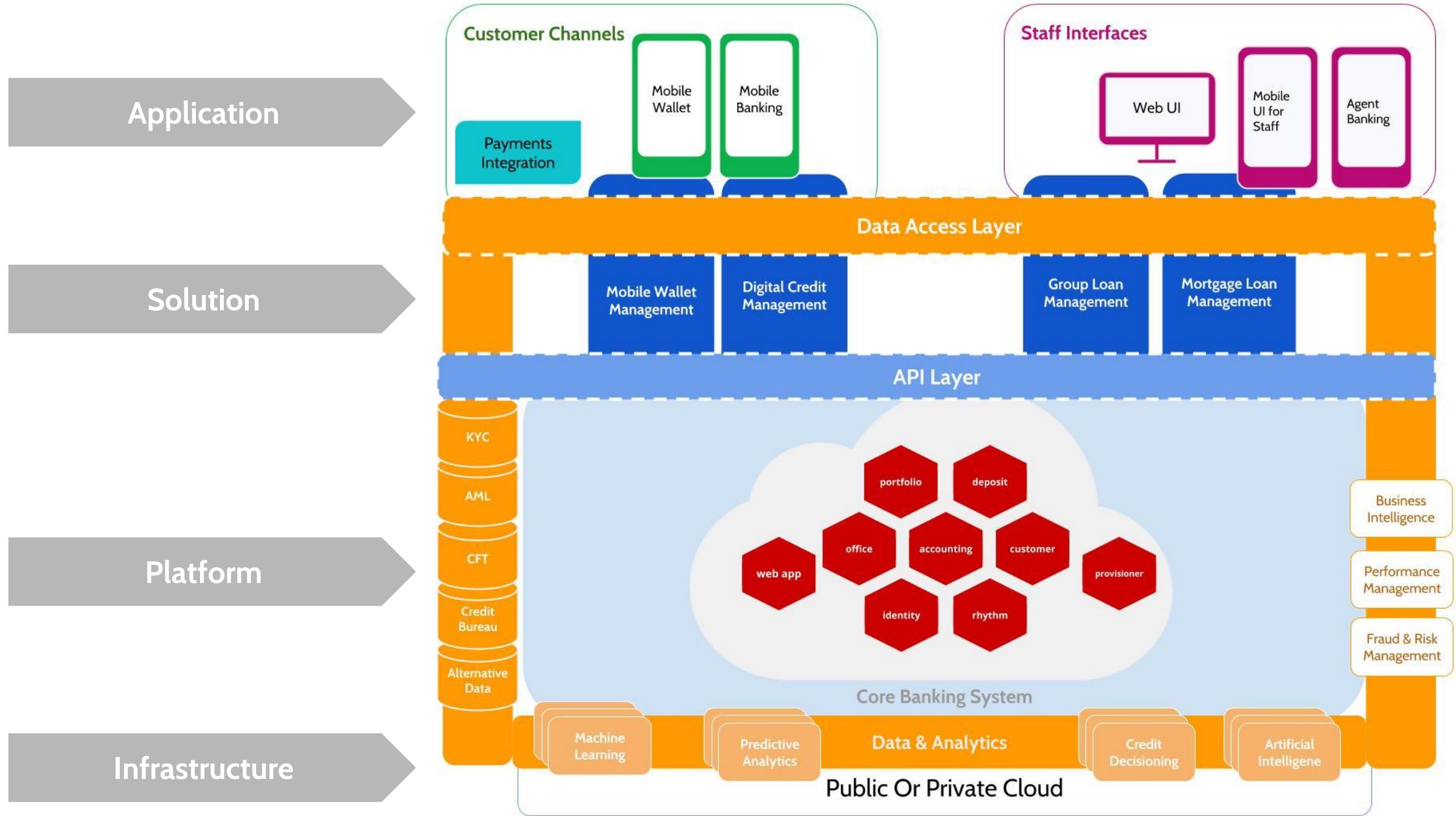
- Platform as a Service
- Enterprise Architectural Consulting
- Innovation Labs
- Application Framework

## Financial Sector

### Open Banking

Banks need to modernize their legacy core banking systems with more agile, responsive systems to improve customer experience. They need flexible architecture and APIs to compete and collaborate with fintech companies.

- Platform as a Service
- Enterprise Architectural Consulting
- Utilize front-end apps for innovation



# Open Goes Beyond Just the Technology Stack



# Why Mifos & Mojaloop

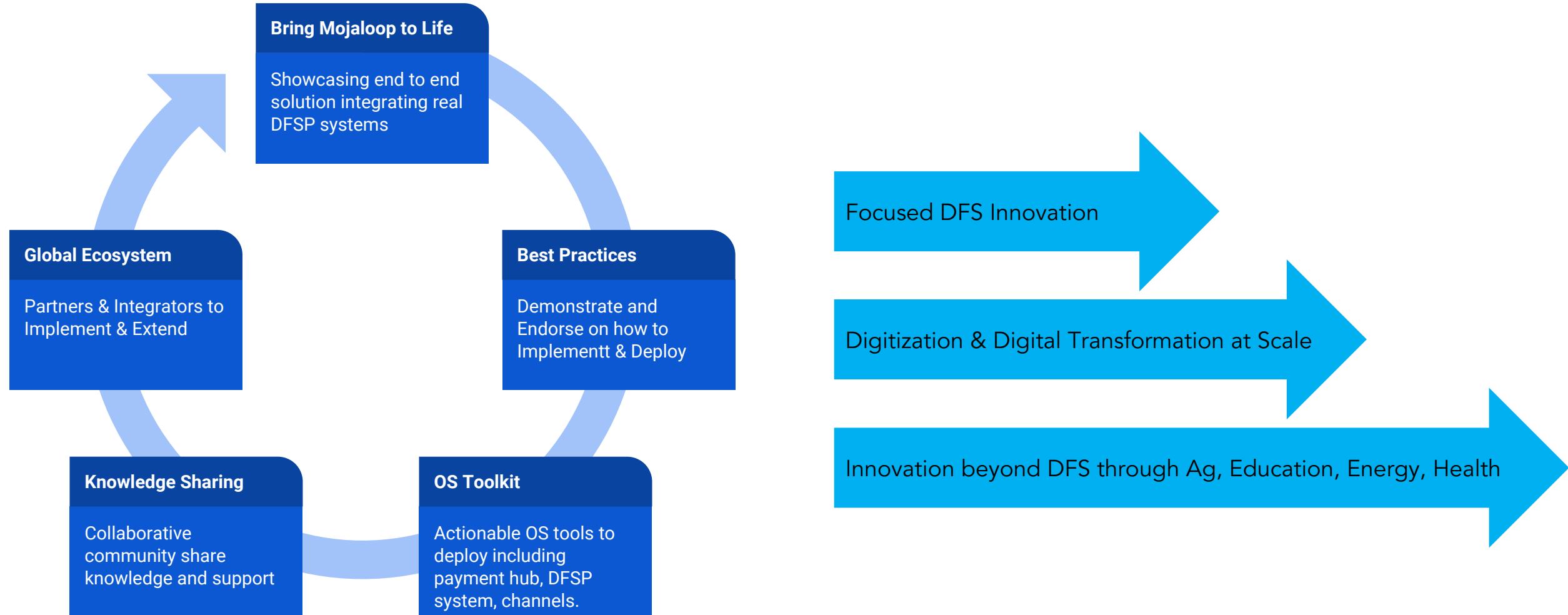
- Highly Complementary Open Source Systems
- Mifos/Fineract - Full Stack Banking Platform
  - Core Banking, Account & Wallet Management, Portfolio Management, Accounting, Business Intelligence, KYC
  - Mifos can be configured as a digital retail bank, an MFI, a savings group management solution, a mobile wallet provider, a savings cooperative, a marketplace lender, a digital credit solution, etc
- Mojaloop - Payment switch and Guiding Principles
  - Payment API, Interoperability, Central Directory
- 



End to End Open Source Architecture for Digital  
Financial Services



# Vision of Mifos Innovation Lab



Mojaloop provides the Digital Rails, Mifos is the mojaloop locomotive fueling innovation on top of it.

## Turn this Vision into a Reality

- Phase 1 being funded by Strategic Grant from DIAL to the Mifos Initiative
- Payment Hub Development & Integration with Mifos/Fineract being led by DPC Hungary
- Front End Channel Extension being led by developers from Mifos community'
- Mifos ecosystem provides a captive audience ready to consume and promote this integration.



# About DPC

- 20+ years in IT training, consultancy, software development from our own startup to support enterprises
- Experience with Instant Payment Systems (Singapore FAST, Hungary HCT Inst, SEPA Instant)
  - Including clearing house solutions, payment hubs, shadow balance solutions from key vendors
  - Developing central clearing house prototype, simulator for participants, payment hub
- Experience with Fineract & Fineract CN
- Meet the Team



Istvan Molnar



Peter Santa



Marta Jankovics

with the support of Adam Nemeth, Karoly Torok, Tamas Szabo, Janos Meszaros, Kristof Jozsa, Zoltan Mezei  
**mojaloop**

# Phase 1 Objectives & Functional Use Cases

- Setup and Configure Mojaloop in the Cloud
- Setup & Configure 4 DFSP instances across Fineract and Fineract CN (Mifos Gen 2 & 3)
- Build Payment Hub providing a Mojaloop Connector which enables transactions to flow via Mojaloop across the different DFSPs.
- Support four key transaction flow which demonstrate:
  - **Merchant Proximity Payment:**
    - Merchant displays dynamic QR code for client to scan with their smartphone (C2B)
  - **Peer to Peer Push Payment:**
    - Pay somebody just by knowing their phone number (P2P)
  - **Request for Payment:**
    - Receive a request for a payment and send back the funds to be paid (P2P/C2B)
  - **Bulk payment:**
    - Through online banking app, user initiates bulk payment by uploading CSV file. (B2C)



# What We've Done So Far?

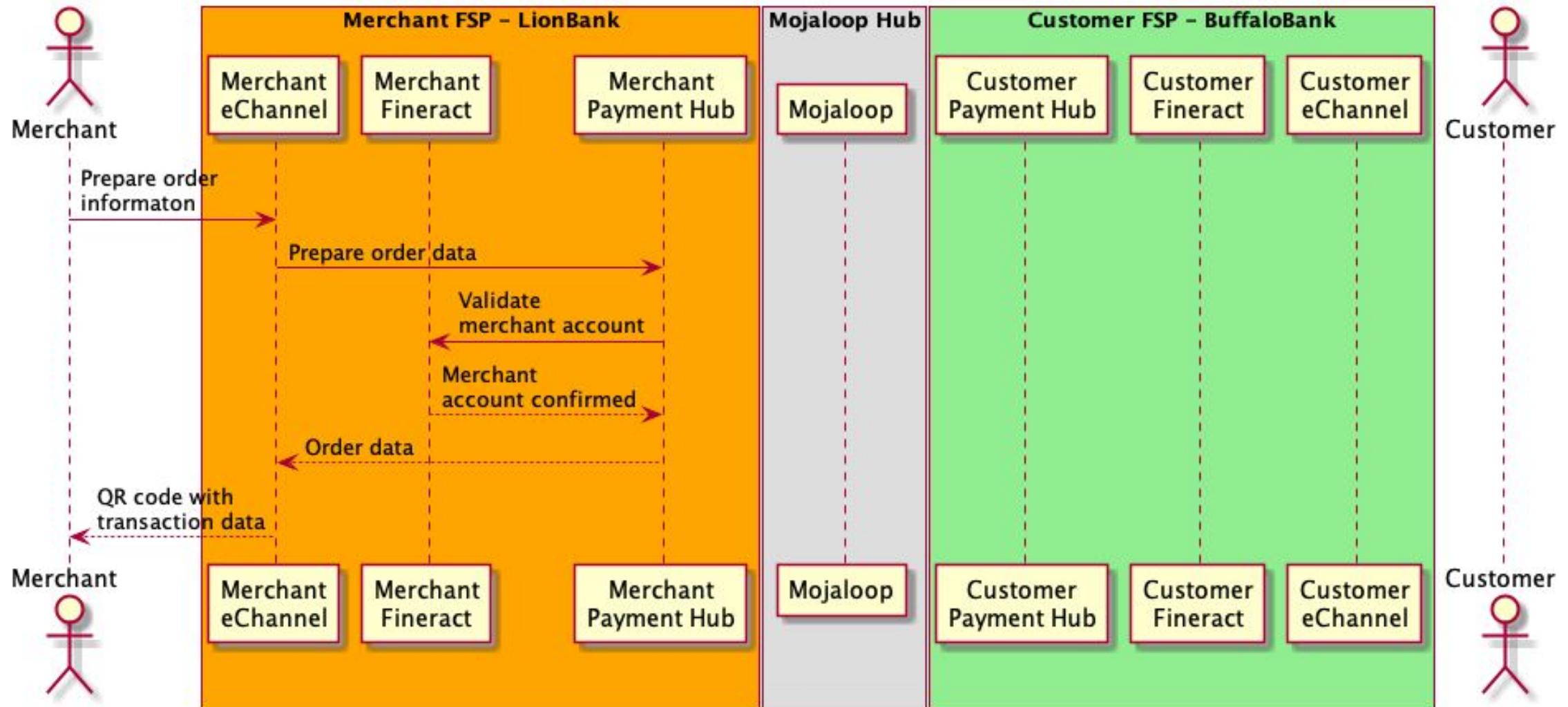
- Mojaloop and Fineract infrastructure fully deployed in AWS via Terraform Scripts, Fineract deployments are automated
- Designed the Payment Hub architecture
- Demo

## Implementation details

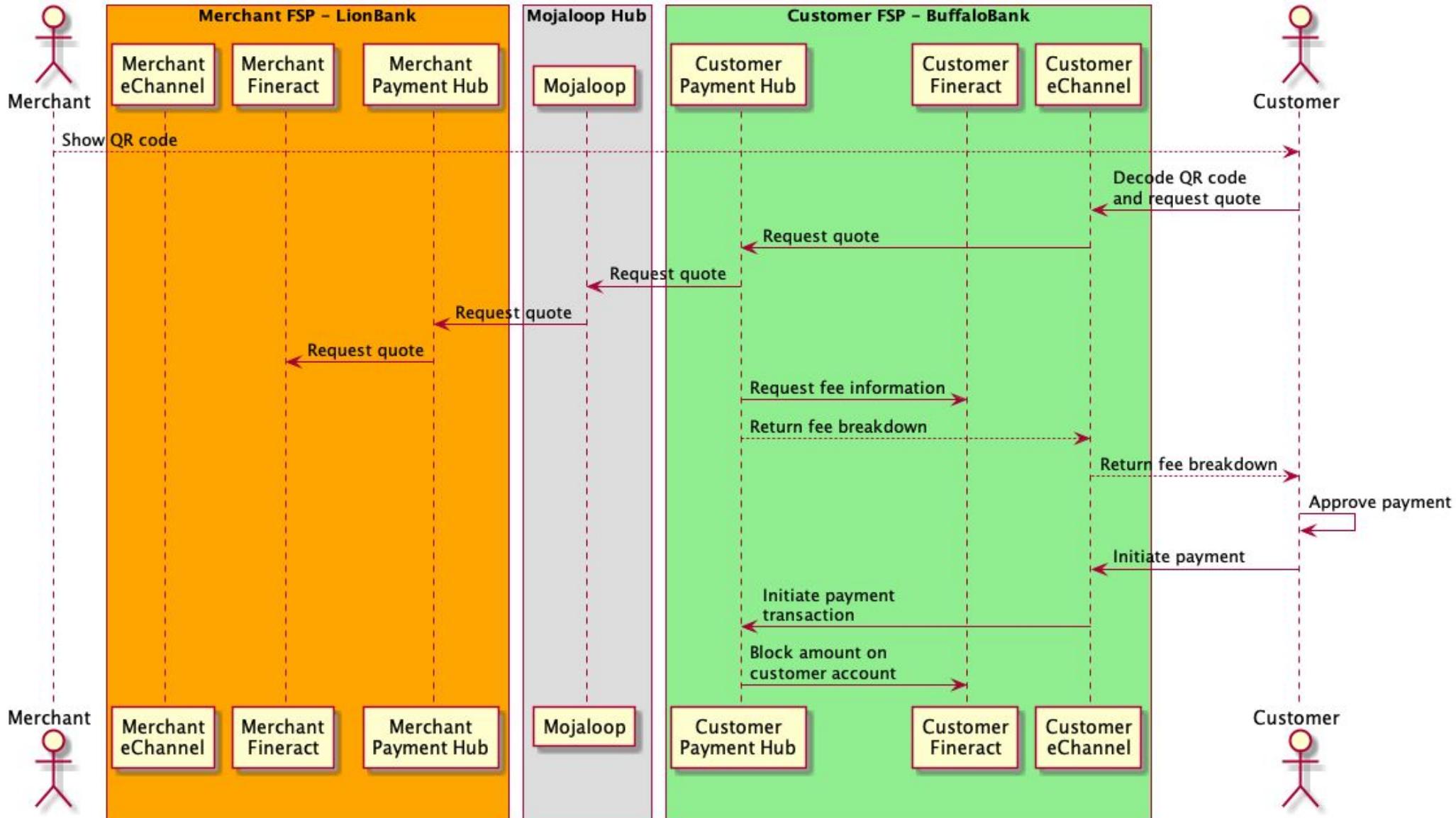
- Merchant payment flow
- Components of solution
  - Enhancing Fineract APIs
  - Payment Hub
  - Client application
- APIs to connect
- React Application to demonstrate
  - merchant interactions
  - customer interactions
- Fineract account details



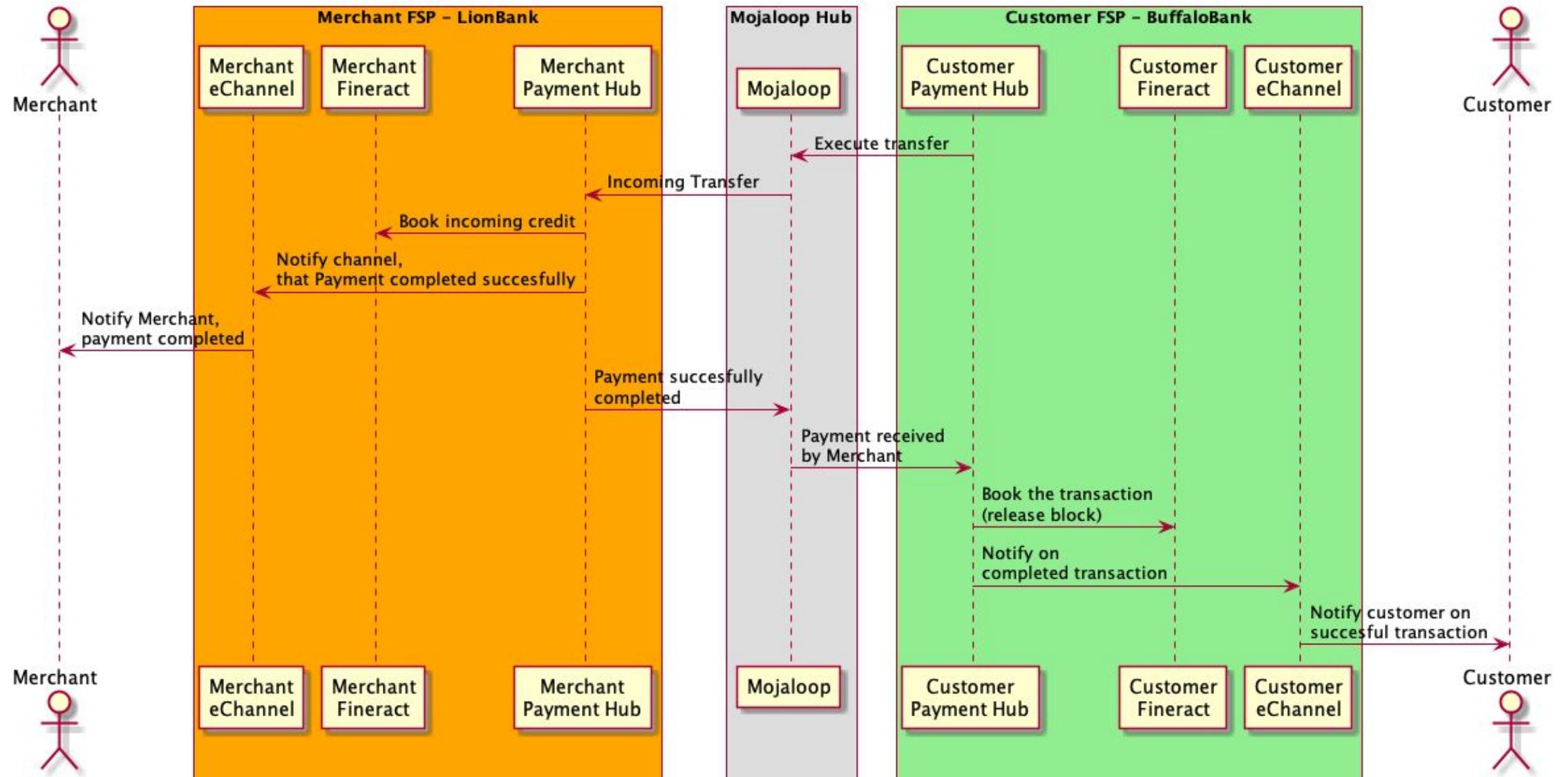
# Merchant prepare order information



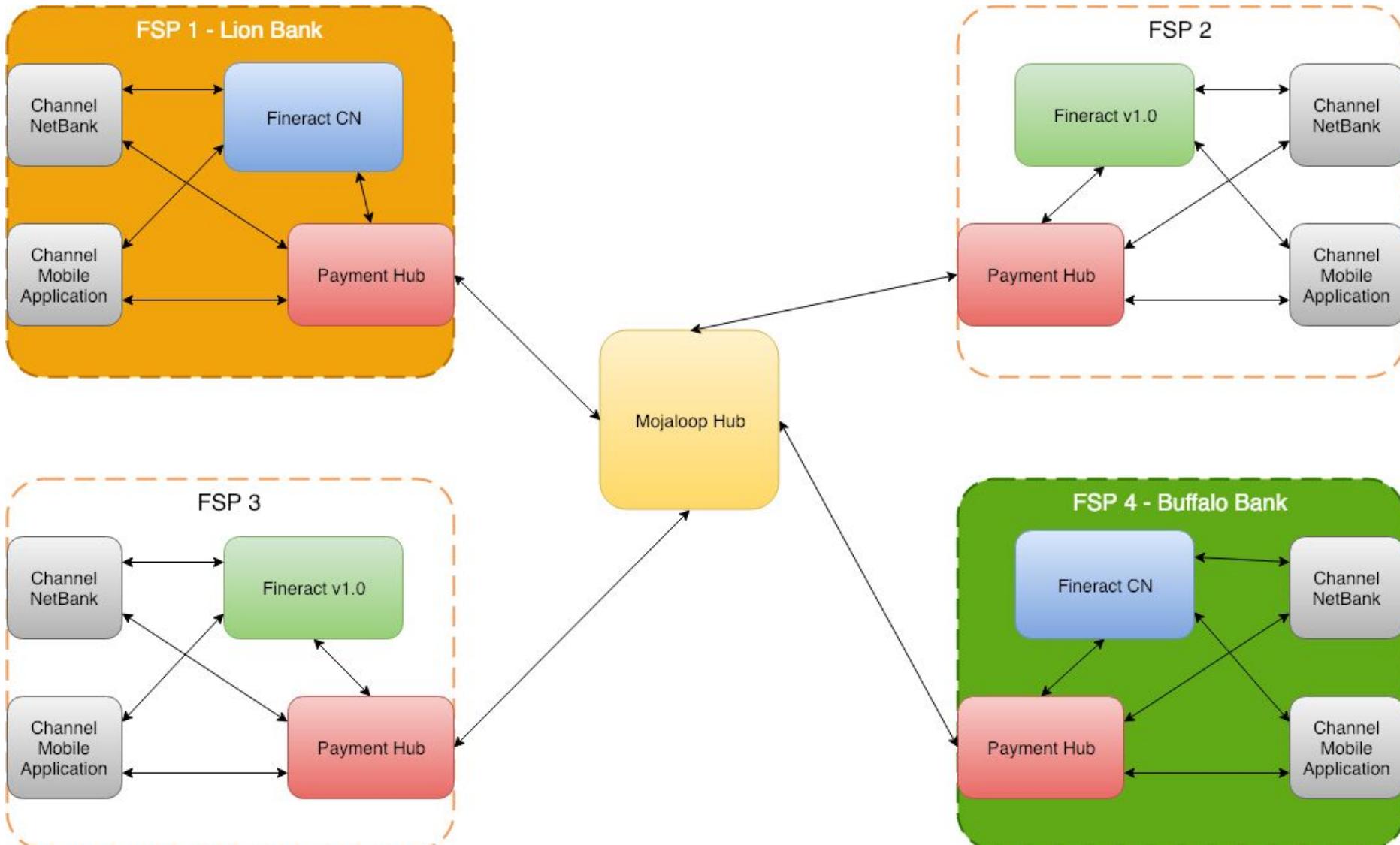
# Payment Initiated by Customer



# Payment received

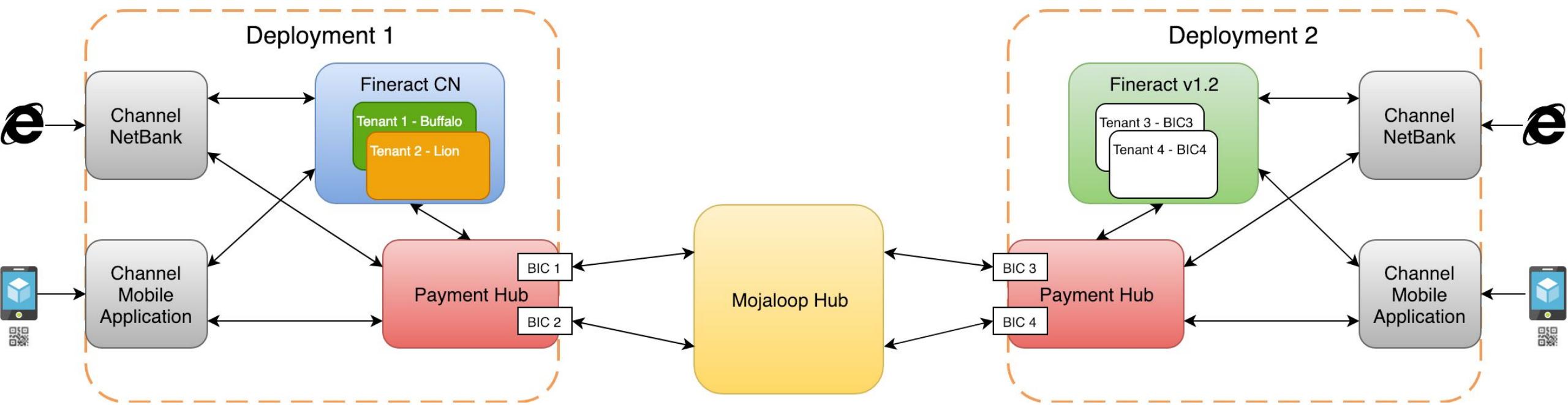


# Logical model of Lab Environment



# Lab environment deployment model

Utilizing Fineract multi-tenant capability



## ■ Infrastructure for LAB environment

Deployed to AWS

Infrastructure created with Terraform

Deployment of Fineract Instances are automated



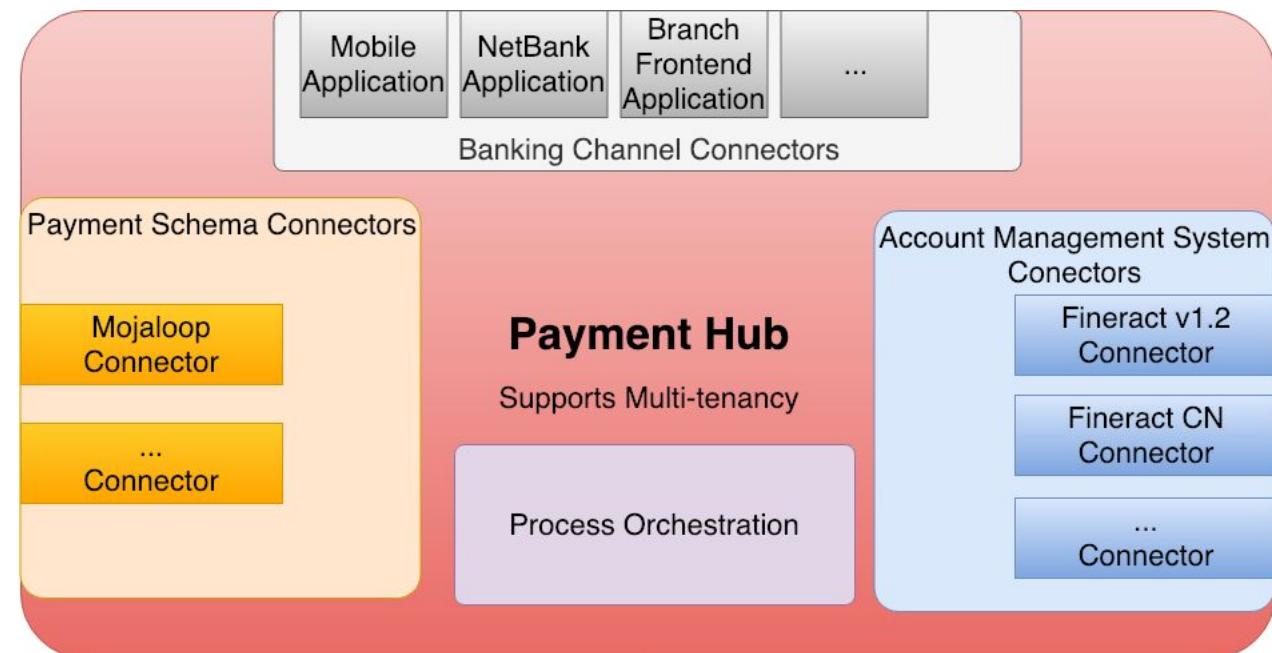
# Payment Hub at DFSP

The role of a payment hub to connect:

- Financial Institution channels (Mobile, Internet, Branch, Callcenter)
- Account Management System (AMS / Core banking platform)
- Payment Schemas, such as Mojaloop

Additional capabilities:

- Supports operation teams with investigation
- Could interface with Fraud monitoring system
- Automate reconciliation
- Manages the identifier – account assignment
- Trigger notifications



## Shadow Balance (?)

Enabling participation in realtime payment schemas by 24x7 operation, with 99.9+% availability.

Hold all the account states and balances, synchronized with the AMS (Account Management System)

Main functionality:

- Enable receiving funds continuously
- Making funds available for outgoing transactions (for electronic channels, card transactions)

Usage models:

- Always stand in – manage load, better response time
- Authorization (blocking) is passthrough, booking is asynchronous
- Passthrough when AMS is available, stand in when unavailable

# Payment Hub internals

Orchestrate the message flow between

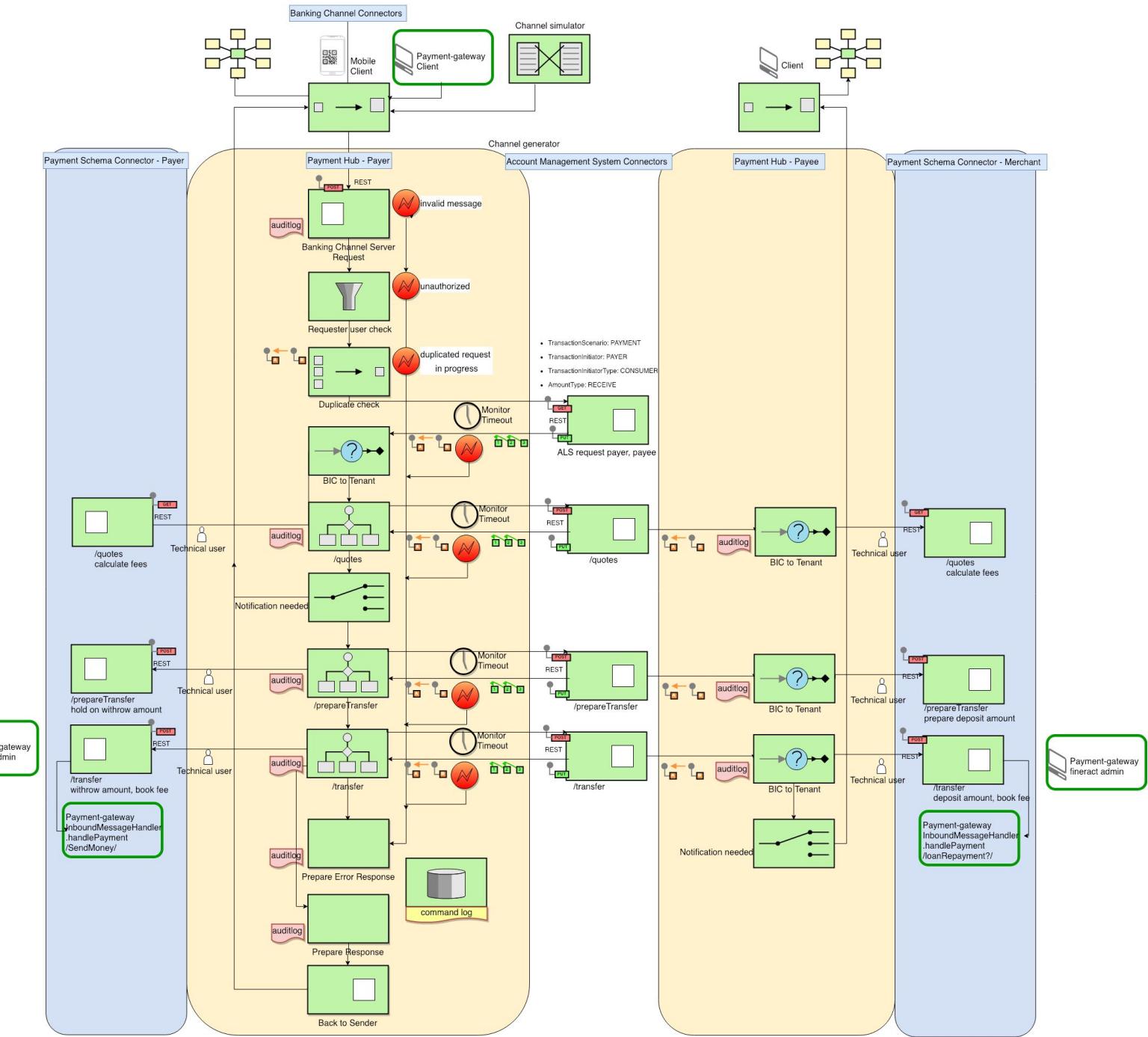
- banking channel
- AMS
- Mojaloop

both at the payer and the payee

Implementation is utilising Apache Camel in a Springboot container.

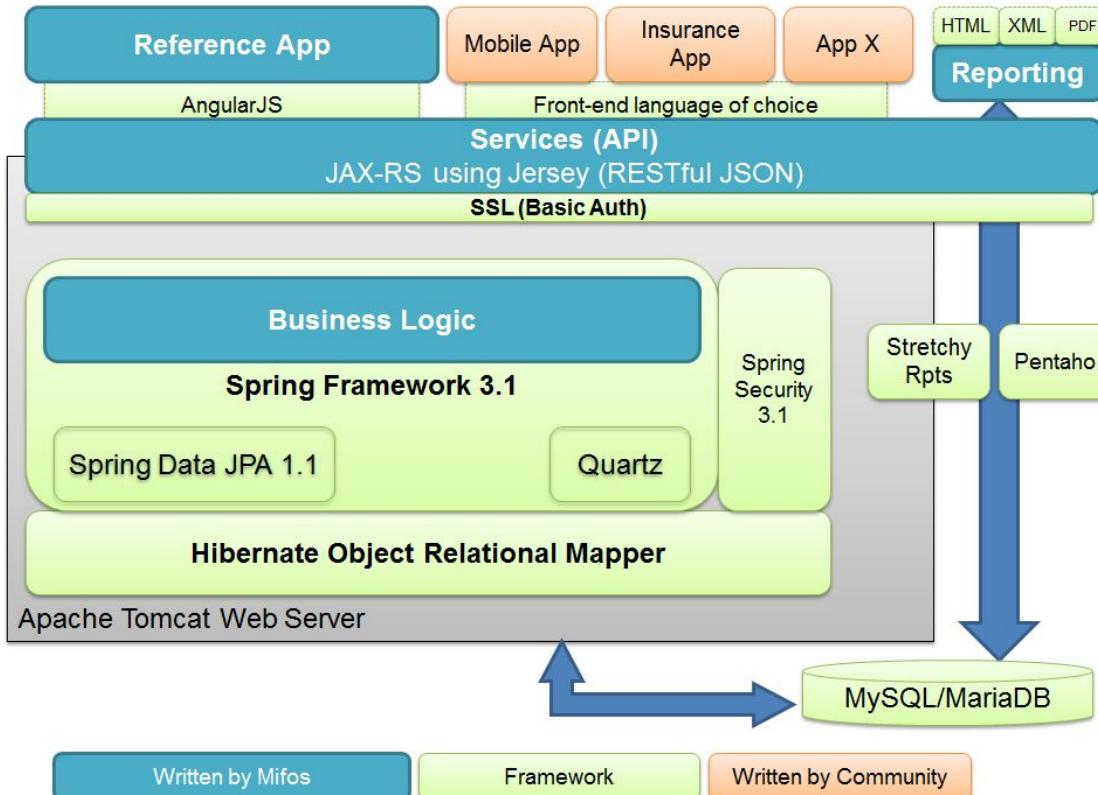
Deployment options:

- co-located with the AMS
- separate infrastructure to handle higher load
- autoscaling microservice

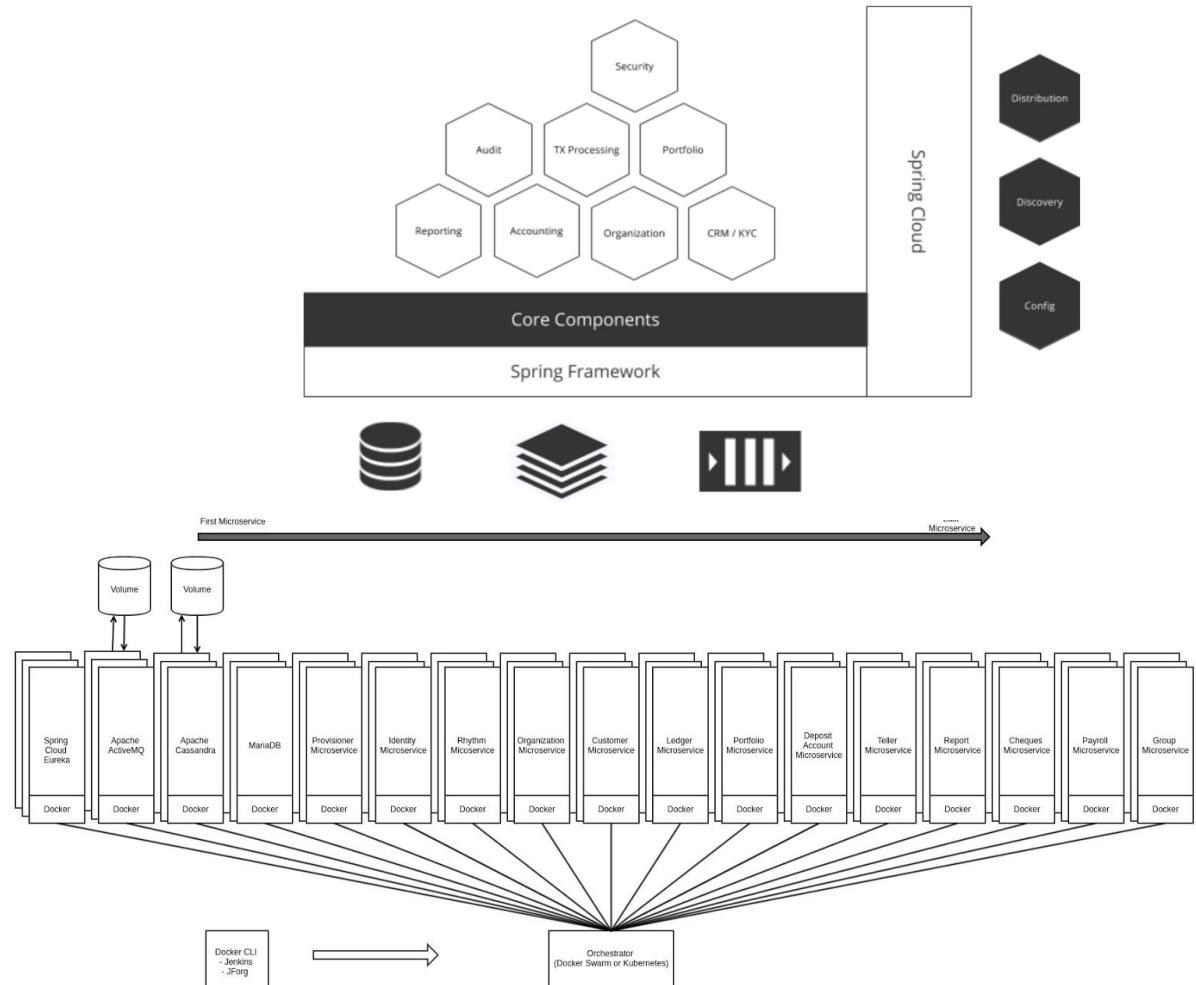


# Fineract Architecture

Fineract 1.x - Generation 2

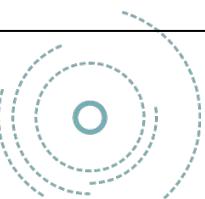


Fineract CN - Generation 3



# Fineract CN and 1.2 APIs supporting Payer integration

API	Description
GET /interoperation/v1/health	Checkpoint of the application is up and running
POST /interoperation/v1/requests	Ask a payer for approval to transfer funds to payee (for payee initiated transactions only)
POST /interoperation/v1/quotes	Calculation of possible fees and commissions involved in performing the payment
POST /interoperation/v1/transfers ?action=PREPARE	“Blocking” amount and quotes on customer account
POST /interoperation/v1/transfers ?action=CREATE	“Booking” Debit on customer account



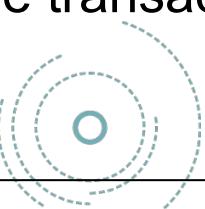
# Fineract CN and 1.2 APIs supporting Payee integration

API	Description
GET /interoperation/v1/health	Checkpoint of the application is up and running
POST /interoperation/v1/quotes	Calculation of possible fees and commissions involved in receiving the transaction
POST /interoperation/v1/transfers ?action=CREATE	“Booking” Credit on merchant account



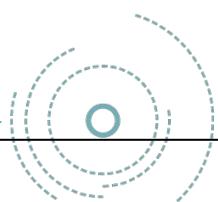
# Payment HUB API for banking channels

API	Description
POST /channel/transactions	Customer initiates payment
GET /channel/transactions	Inquiry of Payment State based on the transaction identifier
GET /channel/transactions/client	Inquiry of Payment State based on the channel client reference identifier
POST /interoperation/notifications/quote	Notification sent from Payment HUB to customer to confirm calculated transaction amount and costs
POST /interoperation/notifications	Notification sent from Payment HUB to merchant when the transaction has been performed
PUT /interoperation/transactions/{id}	Response from Payment HUB to customer when the transaction has been finished /error if transaction failed



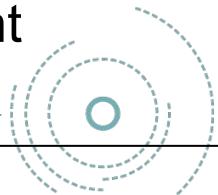
# Payment HUB API for Mojaloop

API	Description
POST /participants/{idType}/{id}	MSISDN based lookup to find out in which FSP the customer and merchant are located
PUT /switch/participants	Callback to inform the client of a successful lookup /error if Mojaloop was unable to find the provided identity
POST /switch/quotes	Payer HUB sent a quoting request to Mojaloop and merchant HUB receives it
PUT /switch/quotes/{id}	Payer HUB receives the result of the calculated Payee quotes /error if quote calculation failed
POST /switch/transfers	Transfer request to the Payee (merchant) from Mojaloop
PUT /switch/transfers/{id}	Callback endpoint for Mojaloop where the response of successful transfer is received /error if transfer failed



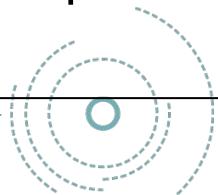
# Mojaloop APIs utilized for transfer from Payer

Mojaloop API	Description
POST /participants/{idType}/{id}	MSISDN based lookup to find out in which FSP the customer and merchant are located
POST /quotes	Get a quotation from payee to validate account and receive conditions
POST /transfers	Initiates to book the payment on merchant side
Callback API (invoked by Mojaloop)	Description
PUT /participants/{idType}/{id}	Callback to inform the client of a successful lookup /error if the server was unable to find the provided identity
PUT /quotes/{id}	Guarantees that payee quotes are applicable until the quote expires /error if something went wrong calculating the payee quotes
PUT /transfers/{id}	Initiates that merchant has booked the transfer amount /error if merchant was unable to perform the transfer

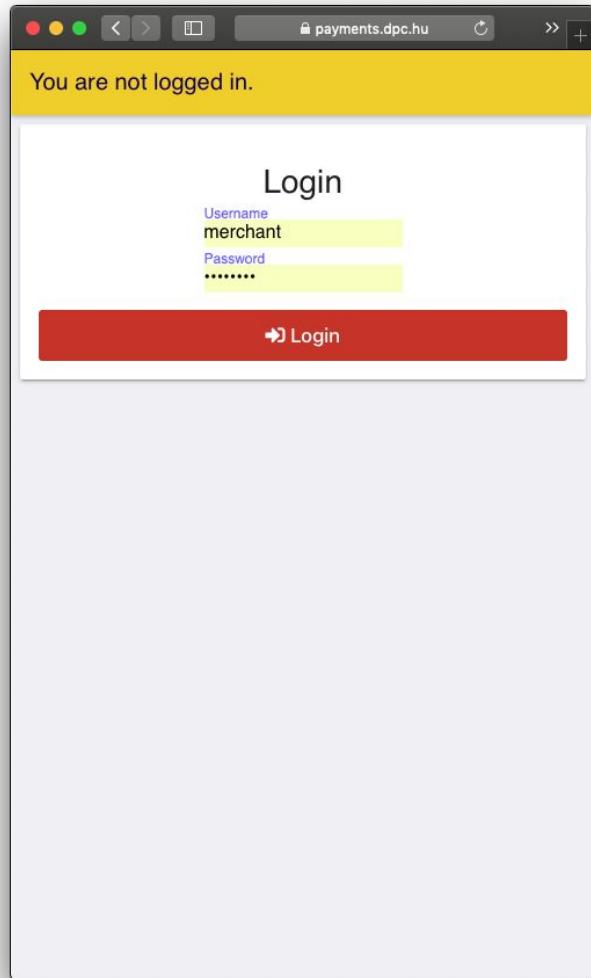


# Mojaloop APIs utilized for transfer to Payee

<b>Callback API (invoked by Mojaloop)</b>	<b>Description</b>
POST /quotes	Requests quotation from payee to validate account and receive conditions
POST /transfers	Initiates to book the payment on merchant side
<b>Mojaloop API</b>	<b>Description</b>
PUT /quotes/{id}	Payee quotes are calculated and applicable until the quote expires
PUT /quotes/{id}/error	Initiates that something went wrong calculating the payee quotes
PUT /transfers/{id}	Callback that merchant has successfully booked the transfer amount
PUT /transfers/{id}/error	Merchant was unable to perform the transfer, or another processing error occurred



# Merchant prepares transaction



# Merchant prepares transaction

The image displays two side-by-side screenshots of a payment application interface, likely Mojaloop, running in a web browser on a Mac OS X system.

**Screenshot 1: Login Screen**

You are not logged in.

Login

Username: merchant

Password:

→ Login

**Screenshot 2: Prepare Order Screen**

Carl Baker

Prepare Order

Amount: 32768

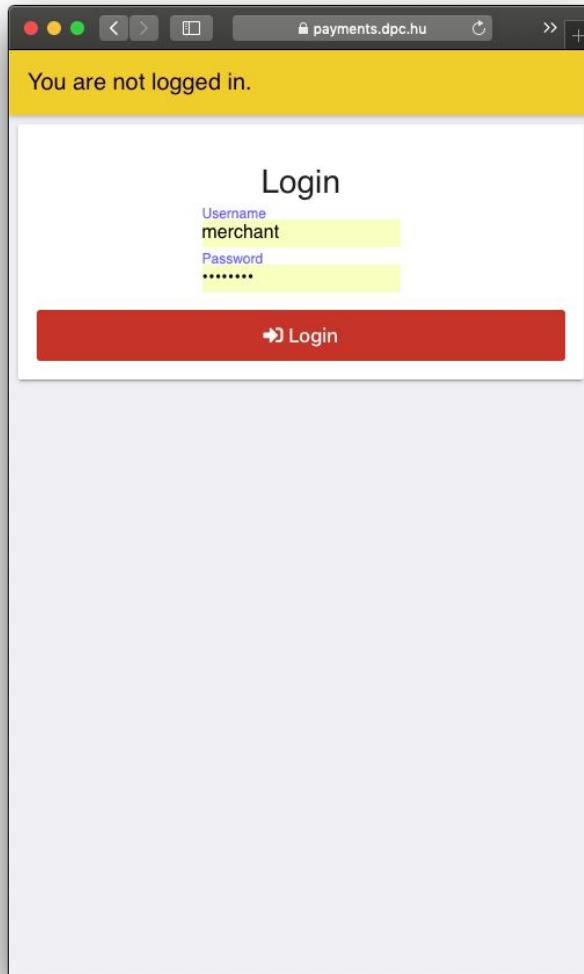
Description: Gift from Tanzania

Create Payment Request



# Merchant prepares transaction

Dynamic QR code includes transaction details



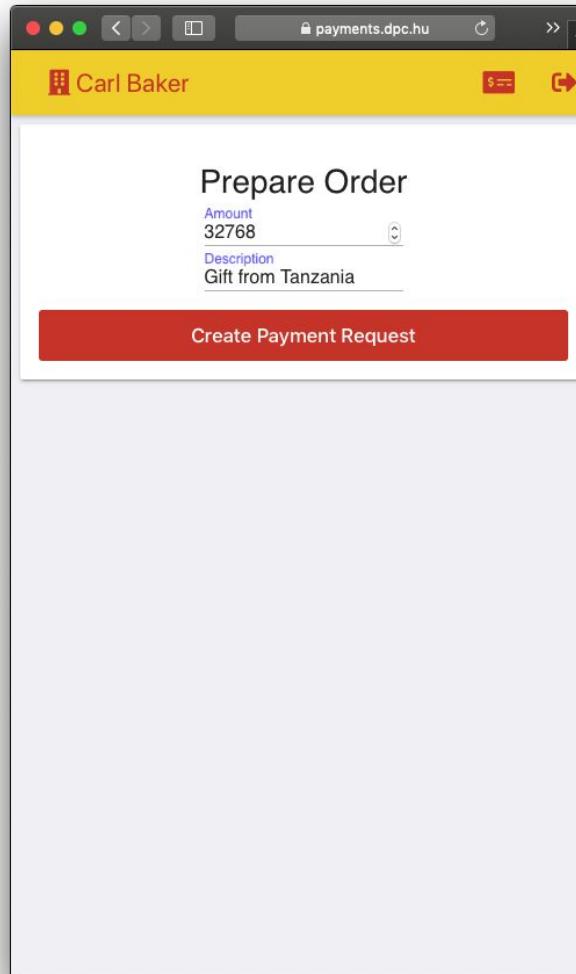
You are not logged in.

Login

Username  
merchant

Password  
\*\*\*\*\*

Login



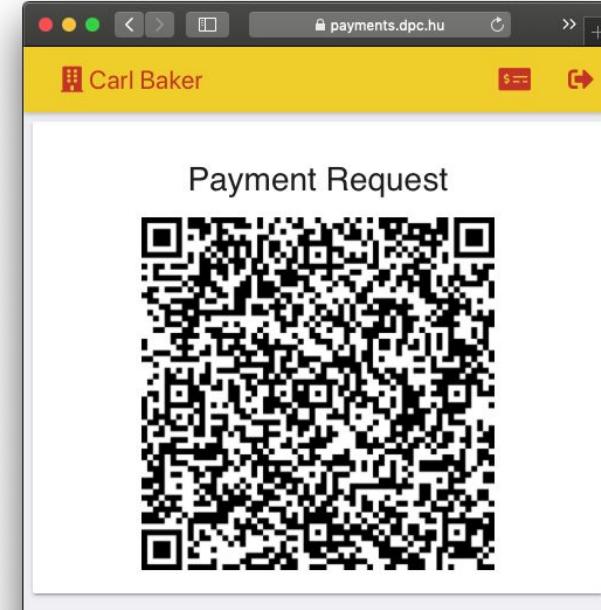
Carl Baker

Prepare Order

Amount  
32768

Description  
Gift from Tanzania

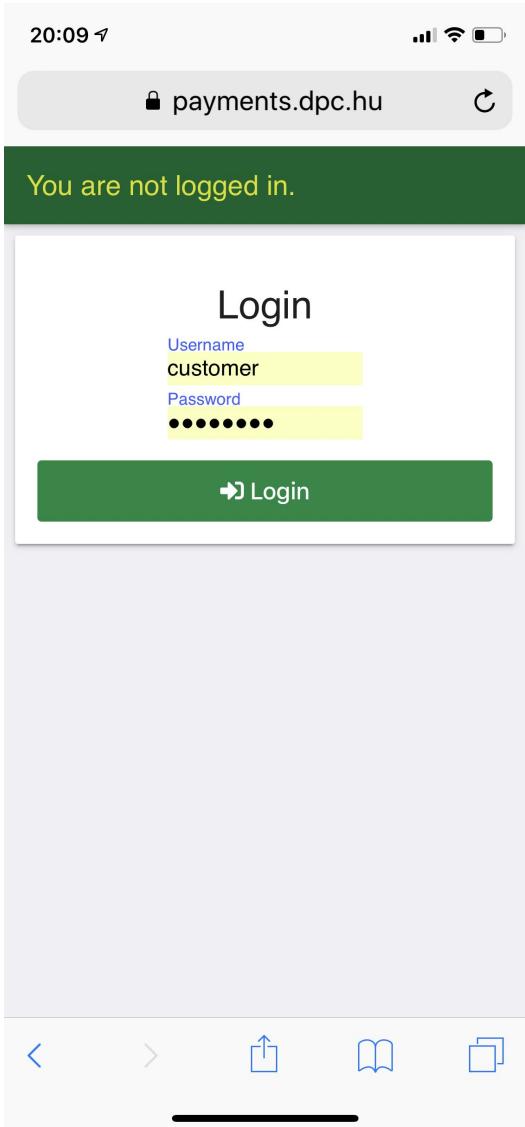
Create Payment Request



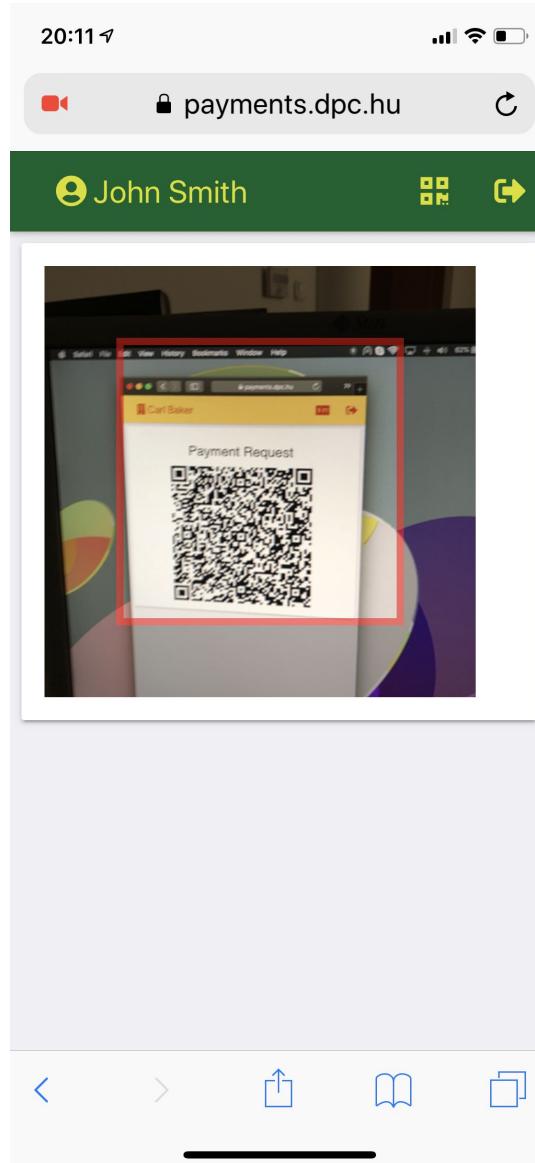
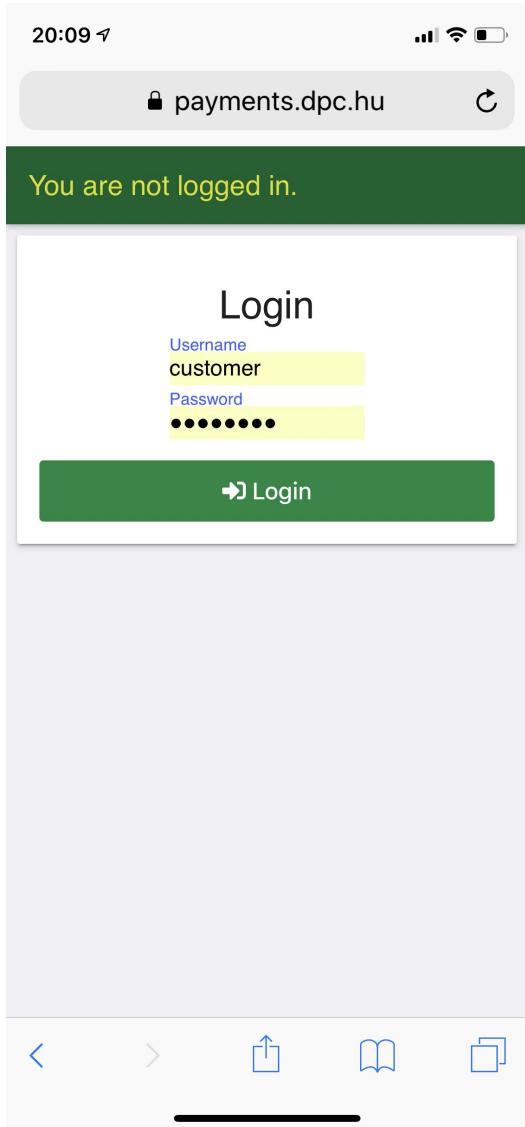
```
upi://pay?pa=IC11in02tn01305e663e1e4611e9ab14d6&pn=Carl%20Baker&mc=0000&tr=f9fb43a0-20d4-11e9-9250-9b947ad8cda0&tn=Gift%20from%20Tanzania&am=32768&cu=TZS&refUrl=https://webshop.dpc.hu/orderId=f9fb6ab0-20d4-11e9-9250-9b947ad8cda0
```



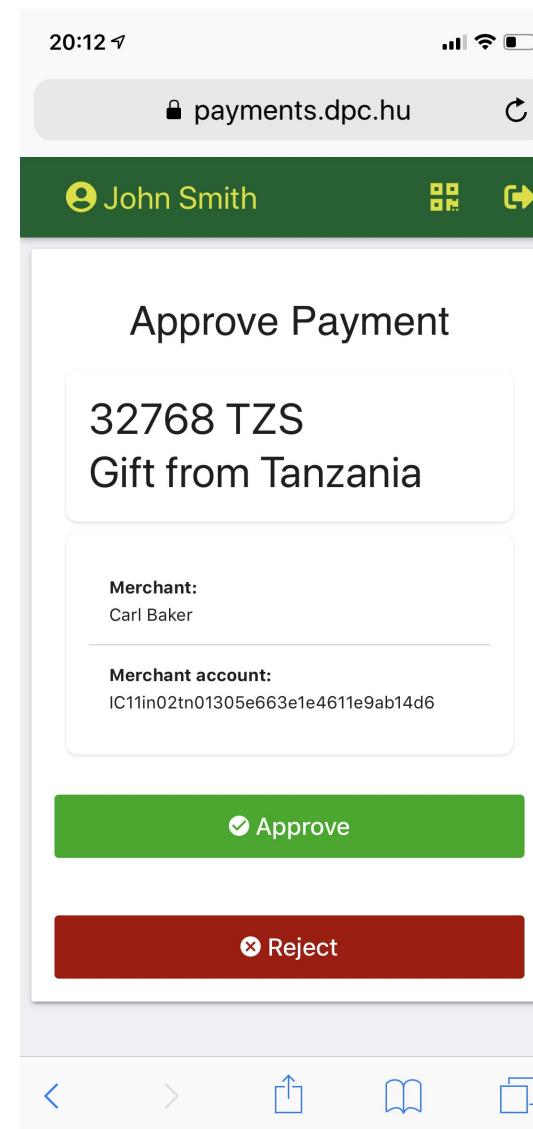
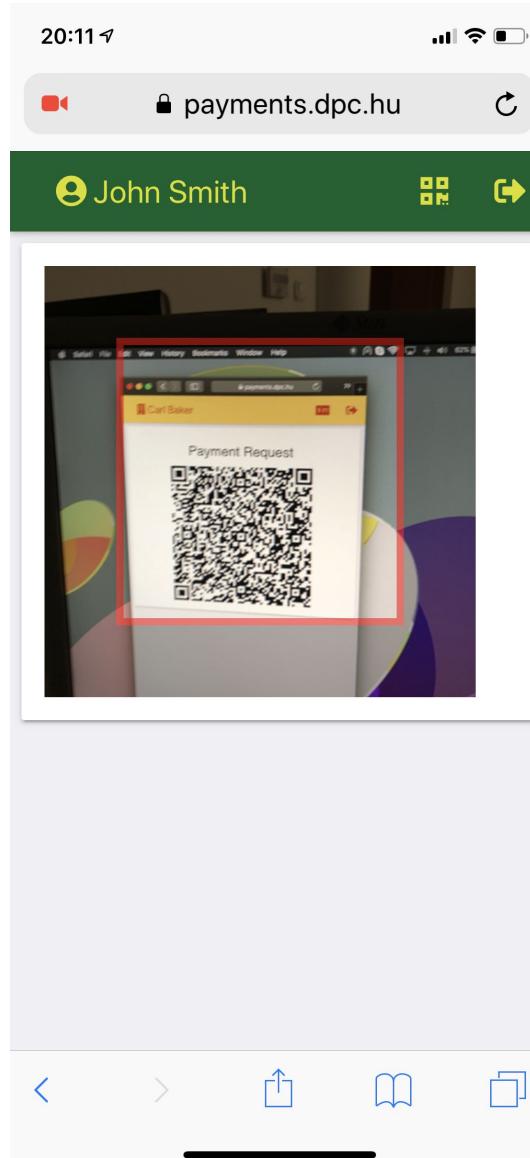
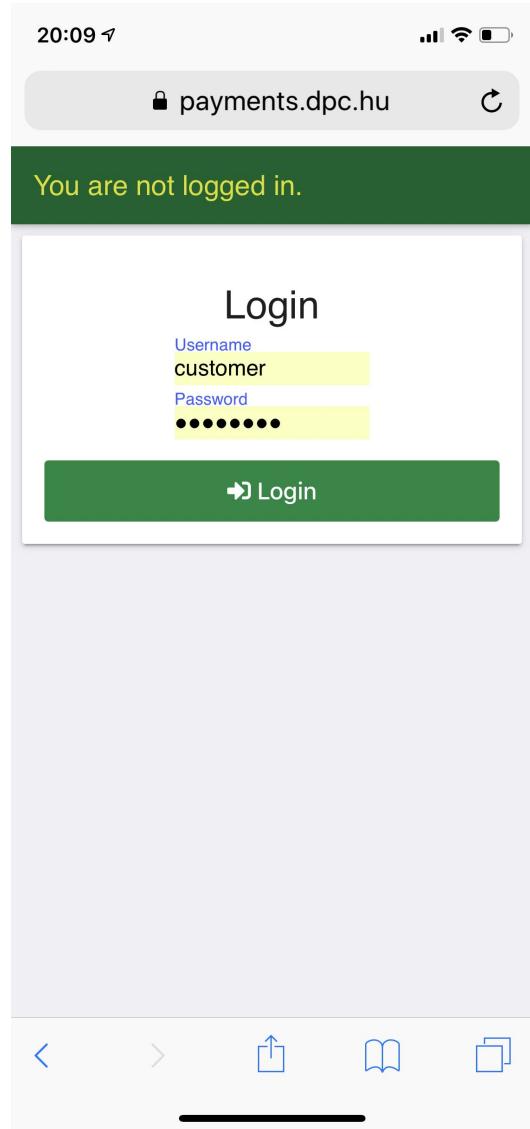
# Customer Initiate Payment



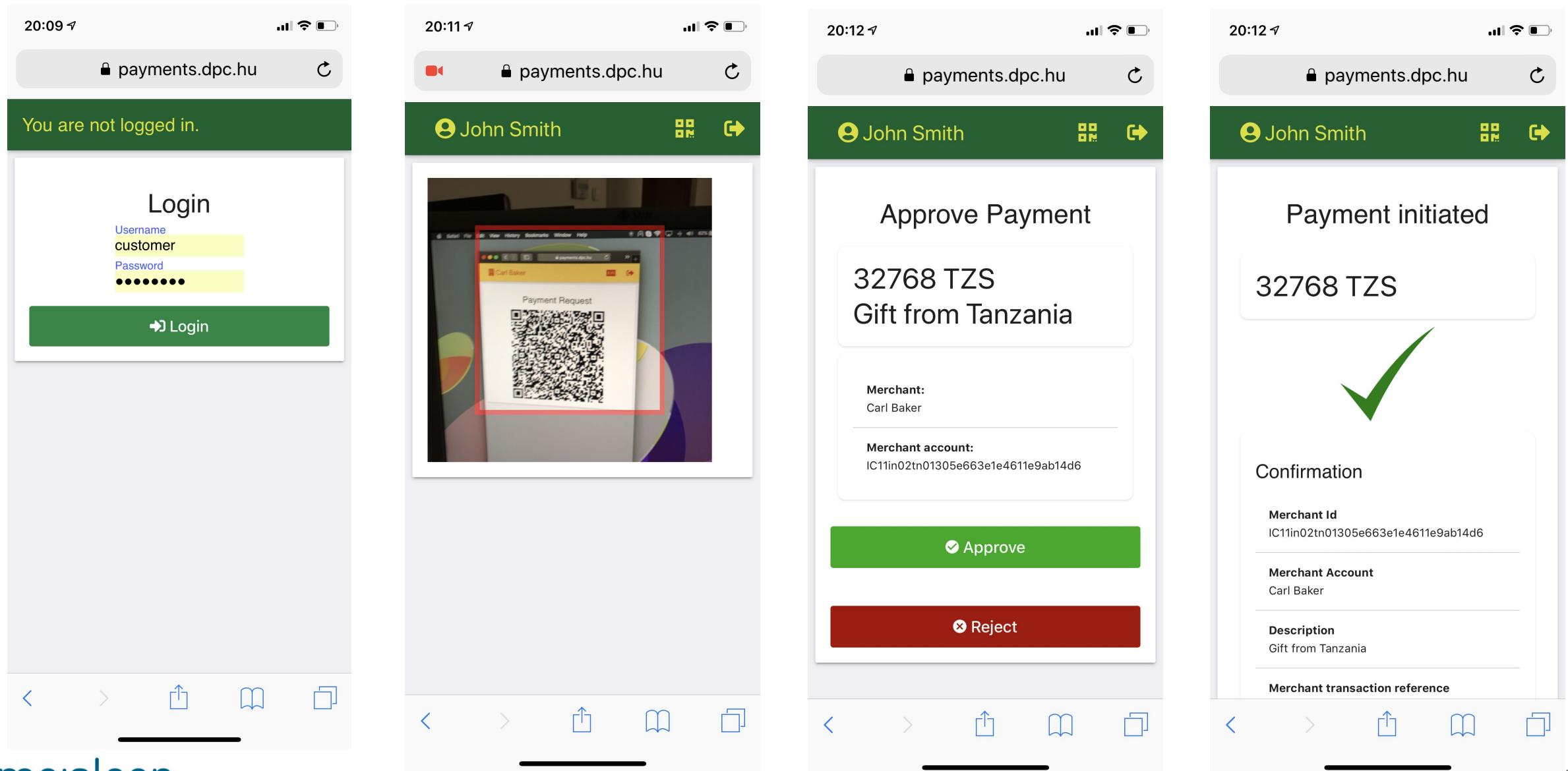
# Customer Initiate Payment



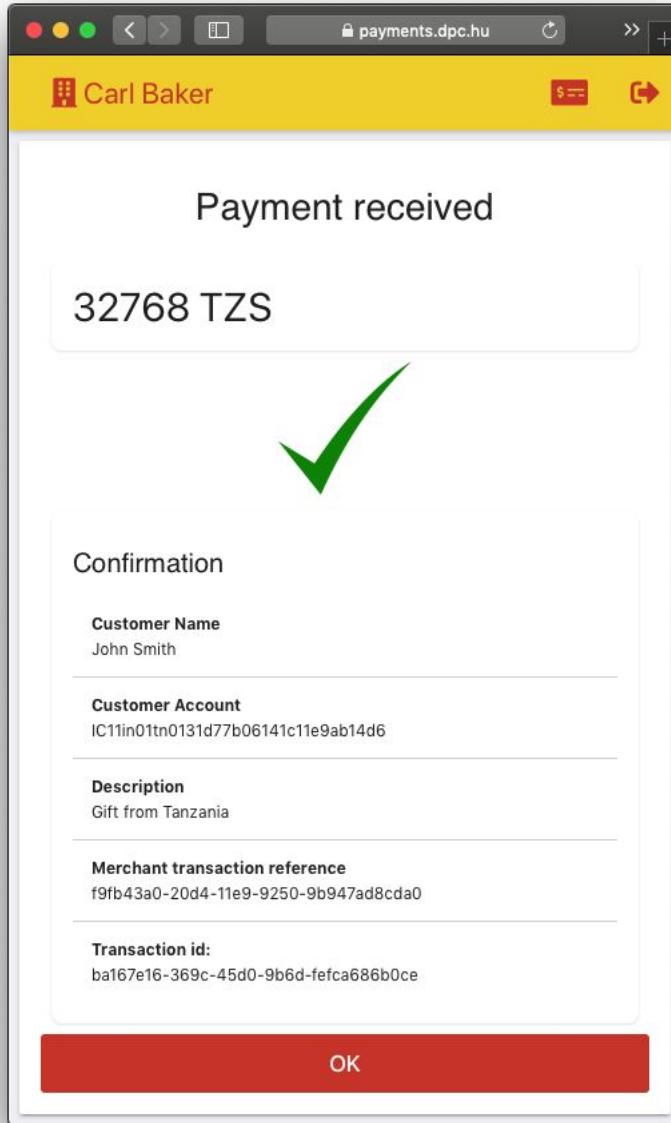
# Customer Initiate Payment



# Customer Initiate Payment



# Payment received by Merchant



# Merchant bank account in Fineract – Lion Bank

The screenshot shows the Fineract web application interface. The left sidebar contains navigation links: Quick access, Offices (Manage offices), Roles/Permissions (Manage roles and permissions), Employees (Manage employees), Accounting (Manage ledger accounts), Member (Manage members), Loan products (Manage loan products), Deposit (Account management), and Teller (Teller management). The main content area displays account entries for account 83c4ed1c074b484e85cc79, filtered by start date 2019-01-29 and end date 2019-01-29. The table lists transactions with columns: Transaction date, Type, Message, Amount, and Balance.

Transaction date	Type	Message	Amount	Balance
1/29/2019, 10:47 PM	DEBIT	Gift from Tanzania	32768	1141990
1/29/2019, 6:02 PM	DEBIT	this is african mask	5000	1109222
1/29/2019, 6:01 PM	DEBIT	tanzanite is not enough	8000	1104222
1/29/2019, 6:00 PM	DEBIT	one more tanzanite	9000	1096222
1/29/2019, 6:00 PM	DEBIT	one more tanzanite	9000	1087222
1/29/2019, 5:57 PM	DEBIT	one more tanzanite	9000	1078222
1/29/2019, 5:57 PM	DEBIT	7th purchase from the bank	6000	1069222
1/29/2019, 5:56 PM	DEBIT	tanzanite 3	2222	1063222
1/29/2019, 5:55 PM	DEBIT	tanzanite 2	10000	1061000
1/29/2019, 5:54 PM	DEBIT	tanzanite	30000	1051000

# Customers bank account in Fineract – Buffalo Bank

The screenshot shows the Fineract Buffalo Bank application interface. On the left is a sidebar with various management options: Quick access, Offices (Manage offices), Roles/Permissions (Manage roles and permissions), Employees (Manage employees), Accounting (Manage ledger accounts), Member (Manage members), Loan products (Manage loan products), Deposit (Account management), and Teller (Teller management). The main area displays account entries for account 31d77b06141c11e9ab14d6, filtered by start date 2019-01-29 and end date 2019-01-29. The table lists transactions with columns for Transaction date, Type, Message, Amount, and Balance. The transactions are:

Transaction date	Type	Message	Amount	Balance
1/29/2019, 10:47 PM	DEBIT	Gift from Tanzania #release on hold	327.68	776903.56
1/29/2019, 10:47 PM	DEBIT	Gift from Tanzania #release on hold	32768	809671.56
1/29/2019, 10:47 PM	CREDIT	Gift from Tanzania	327.68	776248.2
1/29/2019, 10:47 PM	CREDIT	Gift from Tanzania	32768	743480.2
1/29/2019, 10:47 PM	CREDIT	Gift from Tanzania #put on hold	327.68	809343.88
1/29/2019, 10:47 PM	CREDIT	Gift from Tanzania #put on hold	32768	776575.88
1/29/2019, 6:02 PM	DEBIT	this is african mask #release on hold	50	814771.56
1/29/2019, 6:02 PM	DEBIT	this is african mask #release on hold	5000	819771.56
1/29/2019, 6:02 PM	CREDIT	this is african mask	50	814671.56
1/29/2019, 6:02 PM	CREDIT	this is african mask	5000	809671.56

At the bottom, there are navigation controls for rows per page (10), page number (1-10 of 96), and arrows for navigating through the results.

# What We've Learned

- Challenges
  - Knowing status of whether an API has been implemented yet or not
  - Viewing transaction end to end flow in Mojaloop
  - Simulators for pathfinder works with MSISDNs only at the current form
  - Having a complete running instance requires adequate resources
- Suggestions
  - Create a simulator of Mojaloop for DFSPs with a very small footprint (single container) to help DFSPs or their system integrators with development effort
  - Enable the simulator to accept transactions with predetermined successful and failure scenarios
  - Enable the simulator to generate transactions
  - Having a Mojaloop instance online to register and utilize for development and testing purposes



## Phase 2 - What's Next?

- Extend Payment Hub with
  - persistent flow management
  - operation team support capability (UI, search),
  - failure scenario investigation,
  - resolution of in doubt transactions (investigation messages),
  - reconciliation support
- Monitoring Dashboard at the DFSP level
- Testing Harness
- Implement and Test Components to be Released
  - Bulk Payments
- Pilot Implementation
- Refine User Interfaces and Harden security of the channels.
  - Extending Tiered KYC support
  - Implementation of ILP Protocol Description
- Community Contributions Towards
  - Merchant Registry
  - Centralized Fraud Detection
  - Cross-Ledger Transactions within Remittance Corridors
- Make the Lab a true lab
  - Infrastructure to spin up sandboxes for individual instances.
  - Allow govts to see how an entire ecosystem working on an open stack could work



## How Can You Help?

- What functional use cases would you like to see supported next?
- How can we extend Fineract CN to better support DFSP requirements?
- What would you like to see Mifos community contribute to Mojaloop?
- We're seeking implementers:
  - Would you like to implement Payment Hub?
  - Are you a financial institution needing a DSFP system?
  - Are you a fintech innovator needing a DFSP to build your application?
- What would an ideal innovation sandbox look like for you?



# Thank You

- Modusbox developer and QA teams who have assisted via Slack or on phone calls
  - Murthy, Samuel, Nico, Miguel, and more.
- Miller Abel
- Kim Walters

Edward Cable

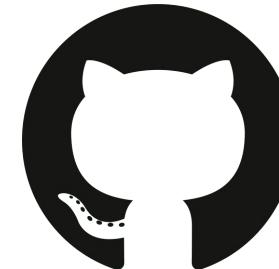
[edcable@mifos.org](mailto:edcable@mifos.org)

<https://mifos.org>

Istvan Molnar

[istvan.molnar@dpc.hu](mailto:istvan.molnar@dpc.hu)

<https://dpc.hu>



[github.com/openMF](https://github.com/openMF)

[github.com/apache/fineract](https://github.com/apache/fineract)

<https://fineract.apache.org>



# Backup Slides





**Solution:** Mifos X

**Total Client Base:** 3M customers,  
\$1.7B portfolio

**Location:** Mexico

**Support Partner:** Mifos Initiative/Fiter



- ❖ Needed to rapidly innovate and not be bogged down by legacy core banking system.
- ❖ Innovation Lab, FiinLab, uses Mifos X as its innovation platform to roll out and test new innovations and products:
- ❖ Long term plan to migrate core banking from SAP to Apache Fineract



“With SAP, in order to get to market with new functionality it took over a year. With Mifos, we were able to shorten development cycles to one week. Mifos is really flexible and has such a strong API that we were able to do it faster than on SAP”

- Eduardo Licona, Director of Innovation Platforms



**Solution:** Mifos X (Apache Fineract 0.6)

**Total Client Base:** 50,000 customers

**Location:** Germany

**Support Partner:** DPC Consulting Hungary

- ❖ Entasked with reducing operational costs from 900M euros to 700M euros per year.
- ❖ Migrating mortgage loan portfolios to Apache Fineract to lower costs and streamline processes.
- ❖ Strong champion in executive leadership but skepticism amongst German IT staff
- ❖ Recently acquired by IBM who is exploring as part of a managed service offering to other banks.



**“Loan portfolio can now run “unattended” without the monthly manual error-prone and time-consuming review processes”**

- **Frank Klingspor, Managing Director**



**Solution:** KwikCash

**Total Client Base:** 1,000,000 customers

**Location:** Nigeria

**Support Partner:**  
Mines.io



- ❖ Mteka data analytics platform can process terabytes of data in seconds so needed a banking platform with a modern architecture that could match that level of scale.
- ❖ Open source freed them to focus on customer experience and partnerships with telcos and microfinance banks
- ❖ Achieved fast time to market and reliable scale



“Mifos saved us considerable time and money in accelerating our platform and accelerating our financial inclusion efforts. The redesign and continuous improvement for scale and pluggable microservices is critical for us to continue using it vs. developing something on our own.”  
(Ekechi Nwokah, CEO & Co-Founder)



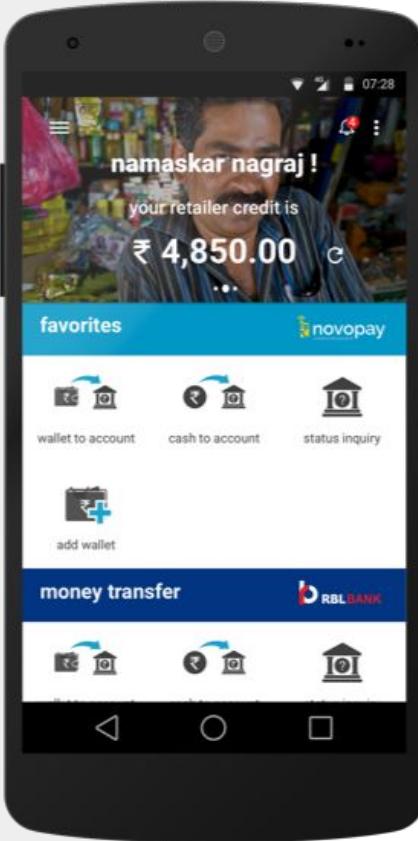
**Solution:** Novopay

**Total Client Base:** 2.1M customers

**Location:** India

**Support Partner:**

Conflux Technologies & Khosla Labs

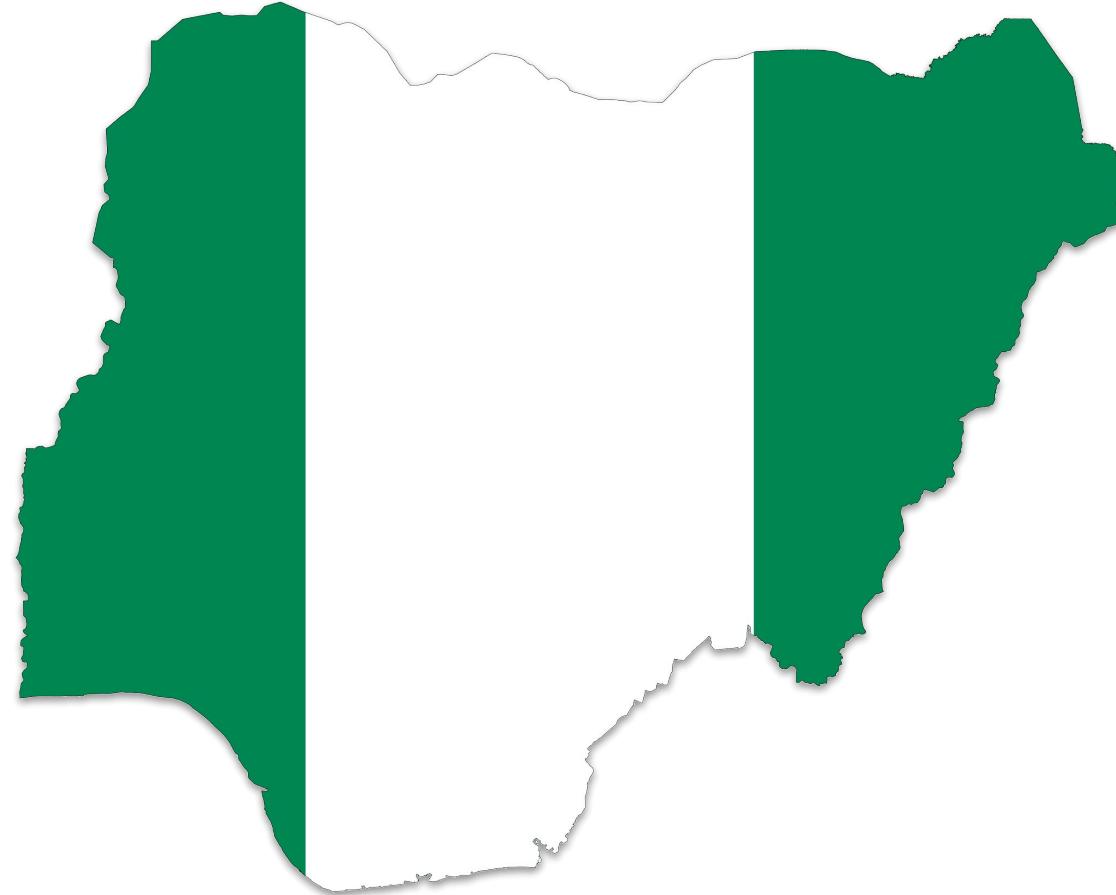


- ❖ First mover advantage leveraging proven Mifos X core banking system
- ❖ Mobile wallet solution enabling agent-led money transfers, account openings, bill payments, cash management, financial services & more.
- ❖ Gold standard for agent management - real-time visibility into agent activity and transaction workflows



“Mifos has played an integral role as part of our open source stack. We have scaled to a billion dollars worth of gross transaction value in a year using Mifos for wallet management & accounting.”  
(Arun Sevakule, CTO Novopay)

# Nigeria



- Population of 197 Million
- 70% of adults are underbanked
- Highly fragmented mobile money market

# MINES.IO

Modern financial services for emerging markets





**Solution:** KwikCash

**Total Client Base:** 400,000 customers

**Location:** Nigeria

**Support Partner:**  
Mines.io

- ❖ Mteka data analytics platform can process terabytes of data in seconds so needed a banking platform with a modern architecture that could match that level of scale.
- ❖ Open source freed them to focus on customer experience and partnerships with telcos and microfinance banks
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“Mifos saved us considerable time and money in accelerating our platform and accelerating our financial inclusion efforts. The redesign and continuous improvement for scale and pluggable microservices is critical for us to continue using it vs. developing something on our own.”  
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# Offering a white-labeled lending service in emerging markets, Mines raises \$13 million

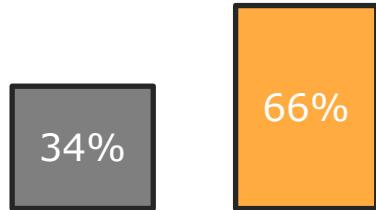


Jake Bright @JakeRBright / 2 months ago

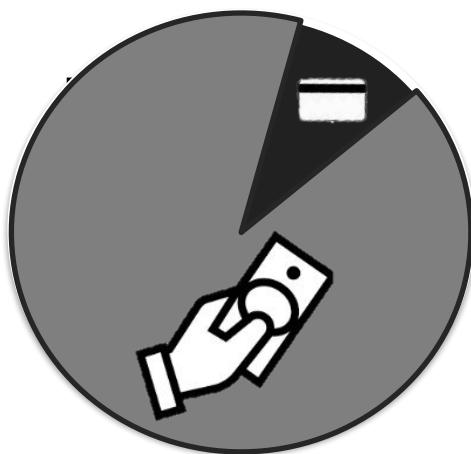
Comment



**120 M** Mexico's total population.



**60%** Of Mexicans **don't have a banking account.\***



**90%** Of transactions in Mexico are in cash

**6M** Merchants in Mexico do not accept electronic payments



\*Source: Mexico's Financial Inclusion Report

# What is Gentera and Fiinlab?

Gentera is a financial group with social responsibility, with 25 years of existence composed by the following companies and brands



Bank offering savings and microfinance loans.

3 M customers  
1.7 Bn USD portfolio.



Remittances company with 4.4 M remittances per year



Financial correspondents network with 2,700 merchants.

5.7 M tx processed



5 Million active insurances



Financial Inclusion lab devoted to creating new business models



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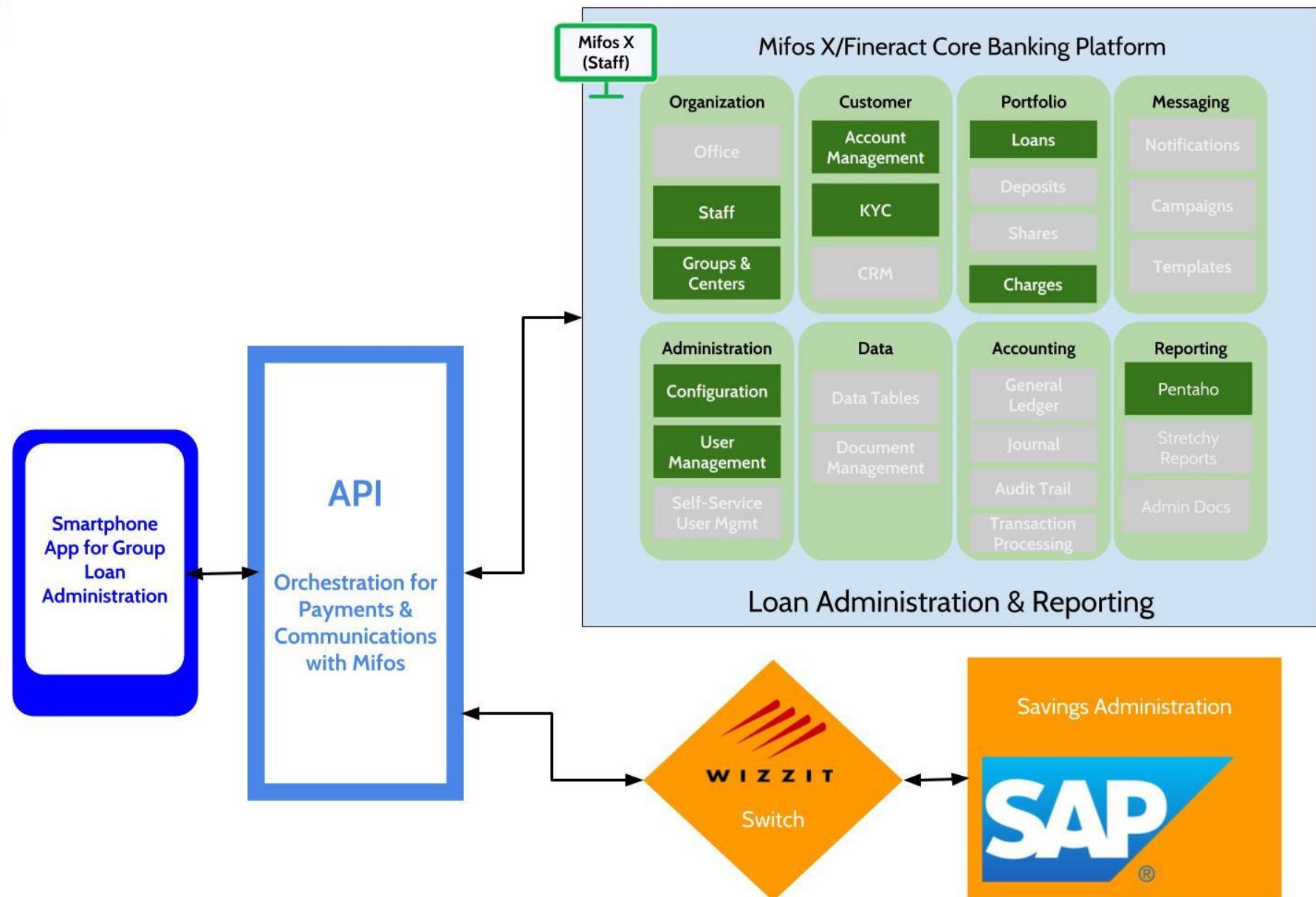


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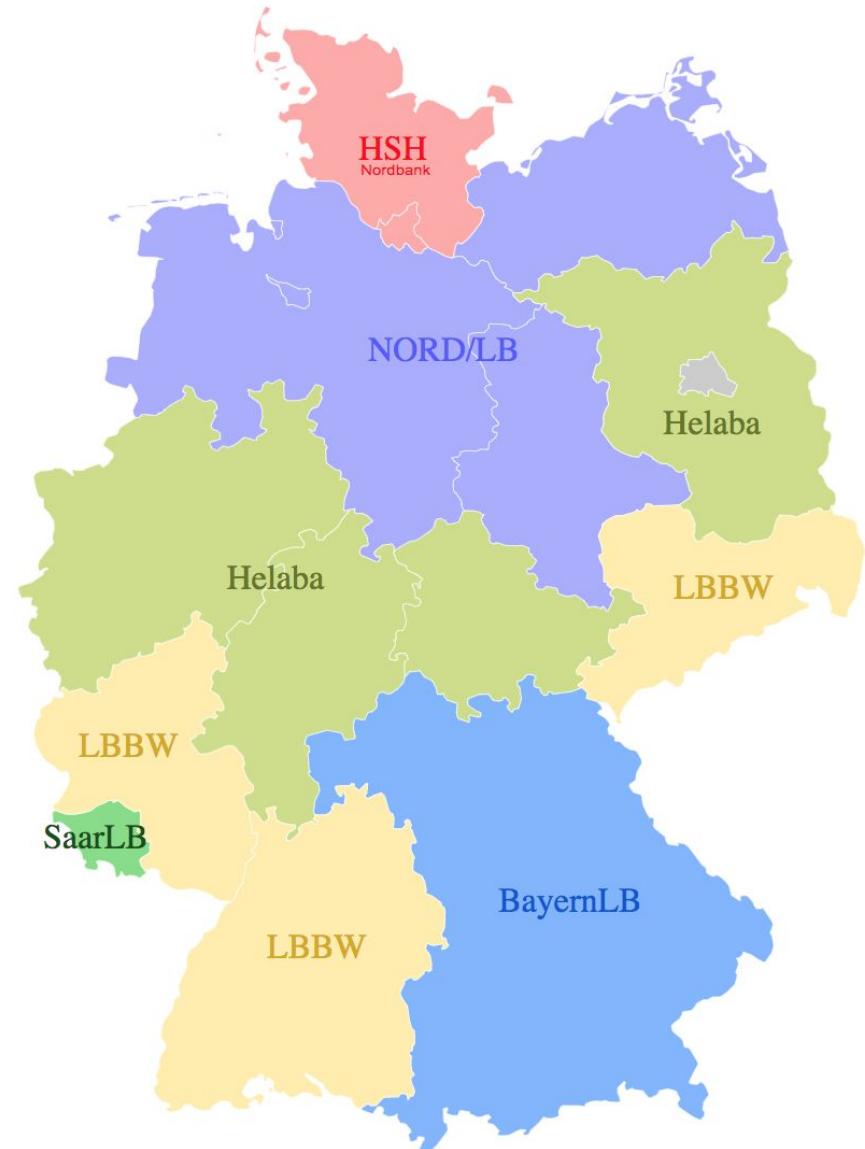


## Mobile App for Group Loan Administration



# Erste Financial Services

- Landesbanken - state-owned banks focused on wholesale lending
- Landesbanken sector hit especially hard by the financial crisis - 70B Euro Bailout
- Some, had to be completely restructured - WestLB Bank became EAA Bank





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**Total Client Base:** 50,000 customers

**Location:** Germany

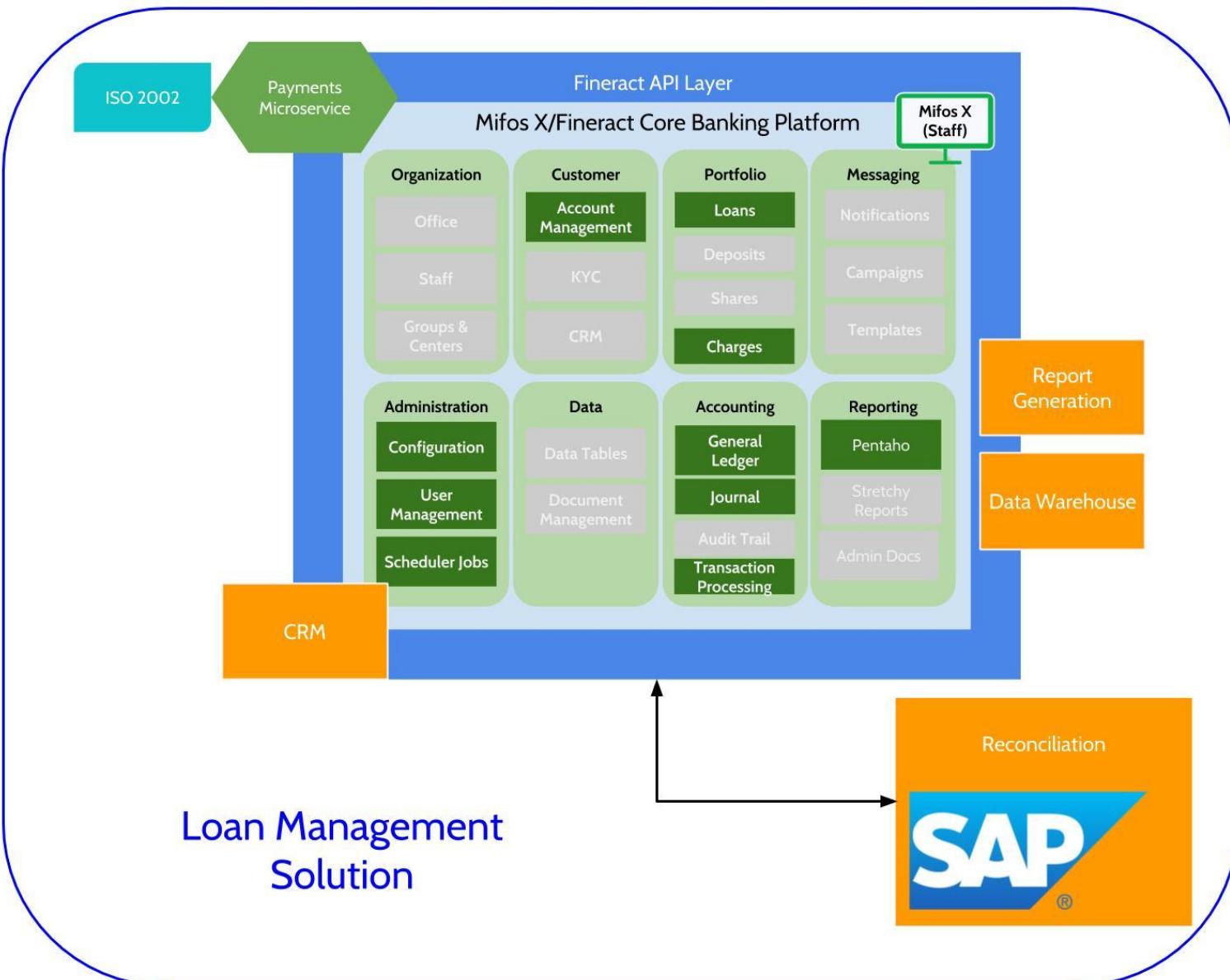
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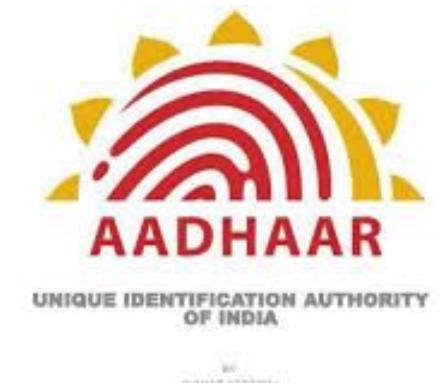
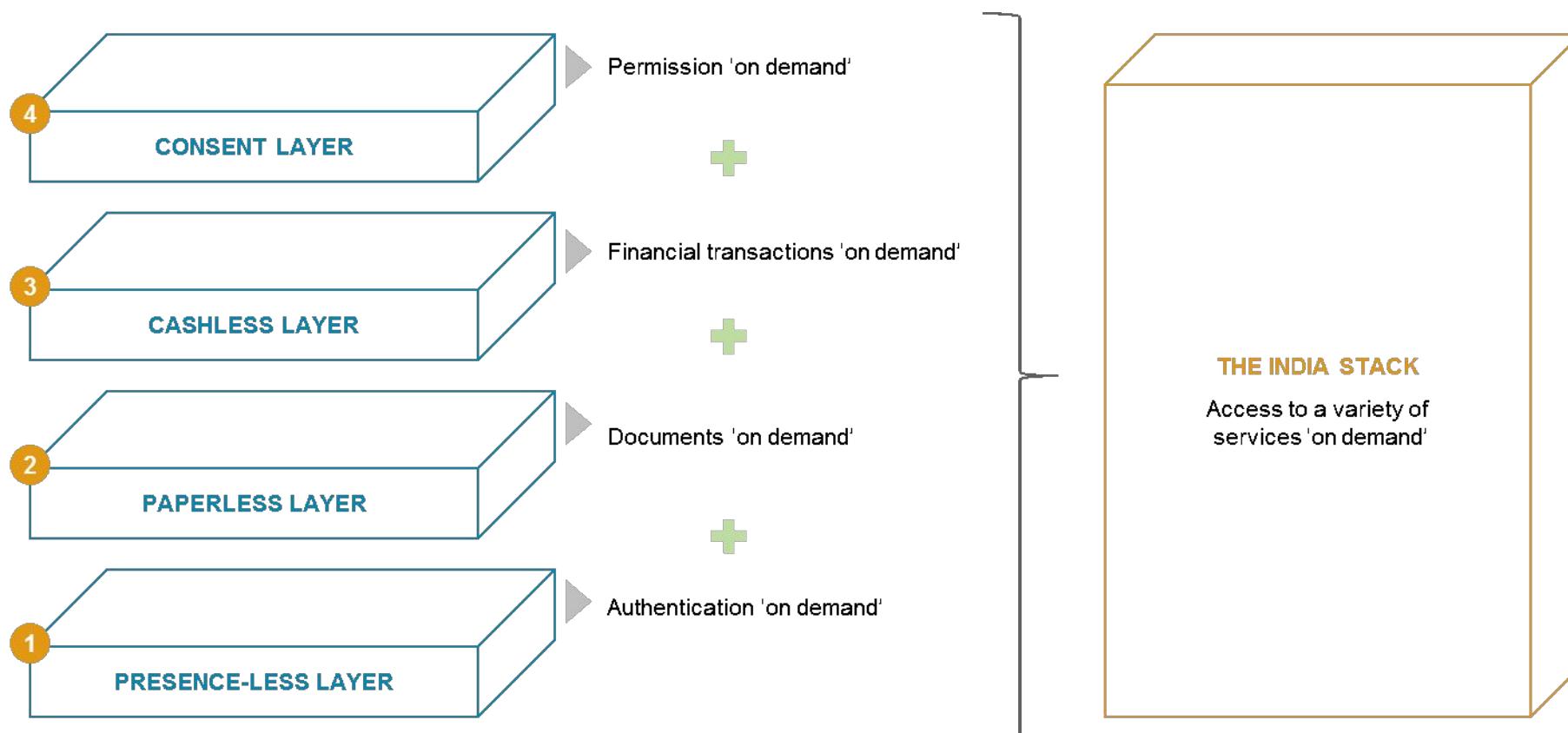


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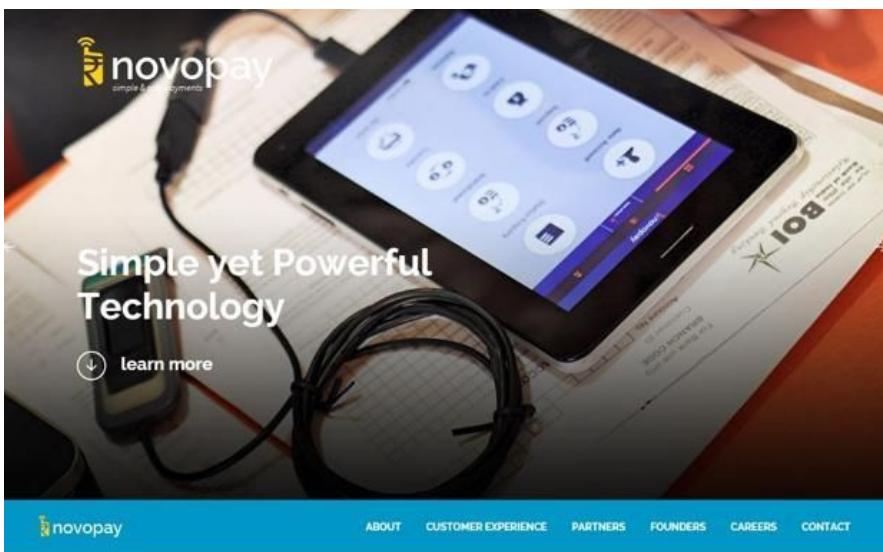


# India





100M Adults, 70% are unbanked or underserved by banking system, highly fragmented mobile money market with very low adoption



# Mission

---

Bring banking to billions using hundreds



**1.5 million**

unique consumers served  
Apr 2018

# Business

---

India-wide last mile financial services delivery network & SaaS branchless banking platform



**\$124 million**

Transaction Value in Apr 18 (Annualized GTV of USD 1.5 bn)



**>40,000**

Active Retail Outlets

# Vision

---

Transform payments & banking for all by providing retail financial services points across India. Provide the next generation banking platform for mobile-based, AI-enabled seamless banking.



**Solution:** Novopay

**Total Client Base:** 2.1M customers

**Location:** India

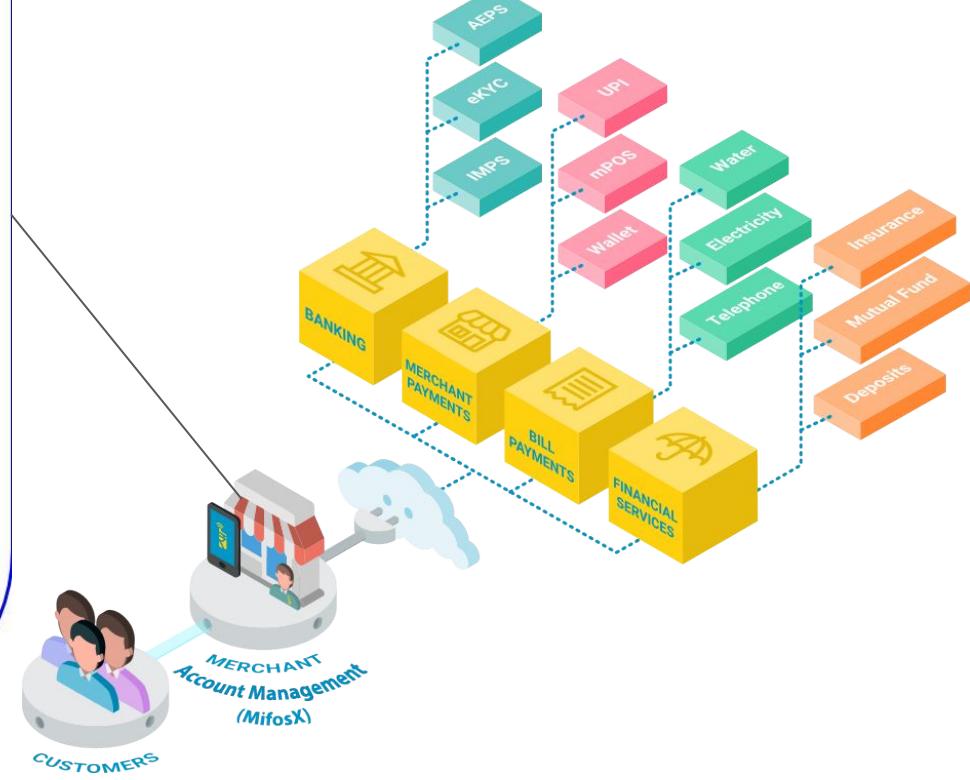
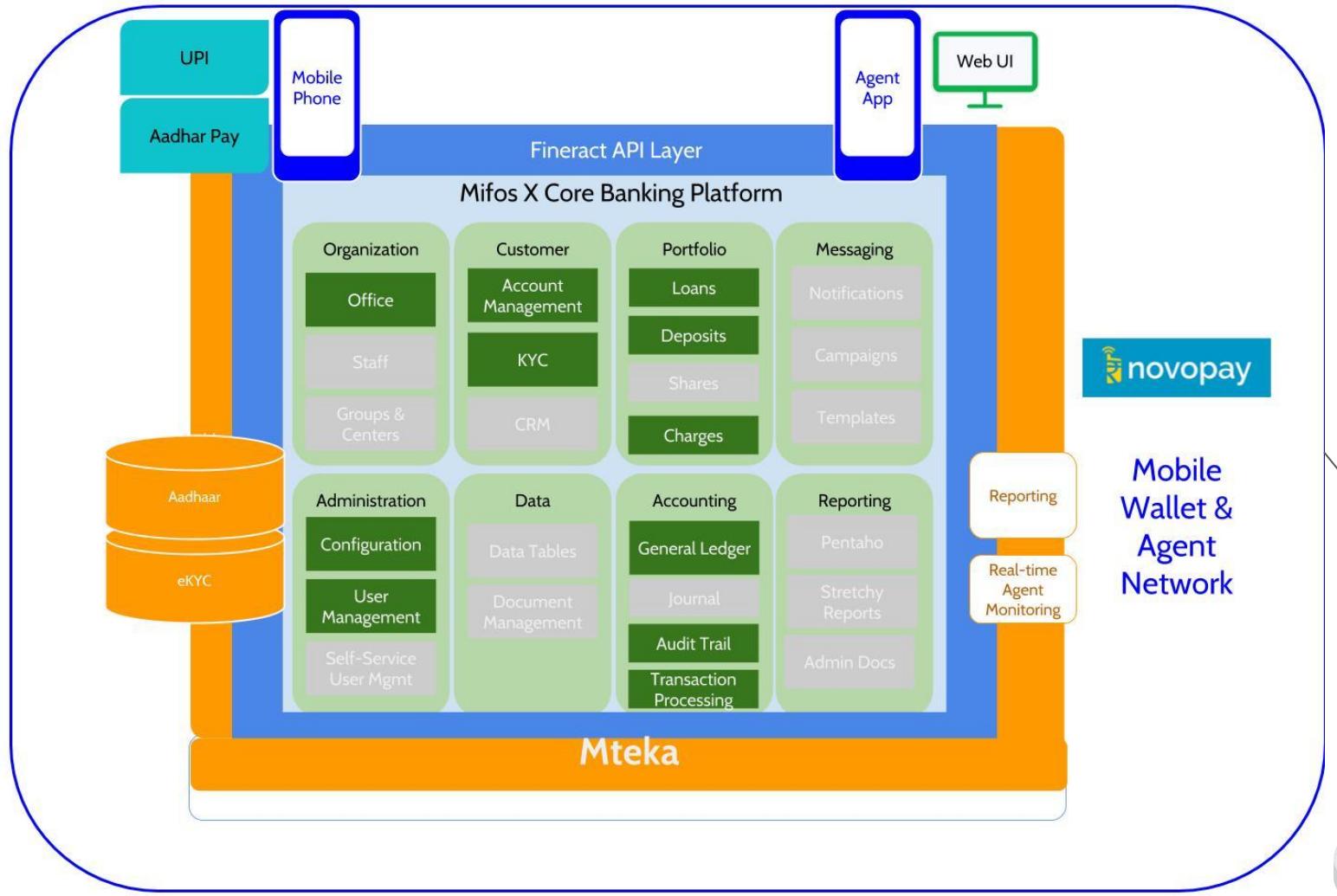
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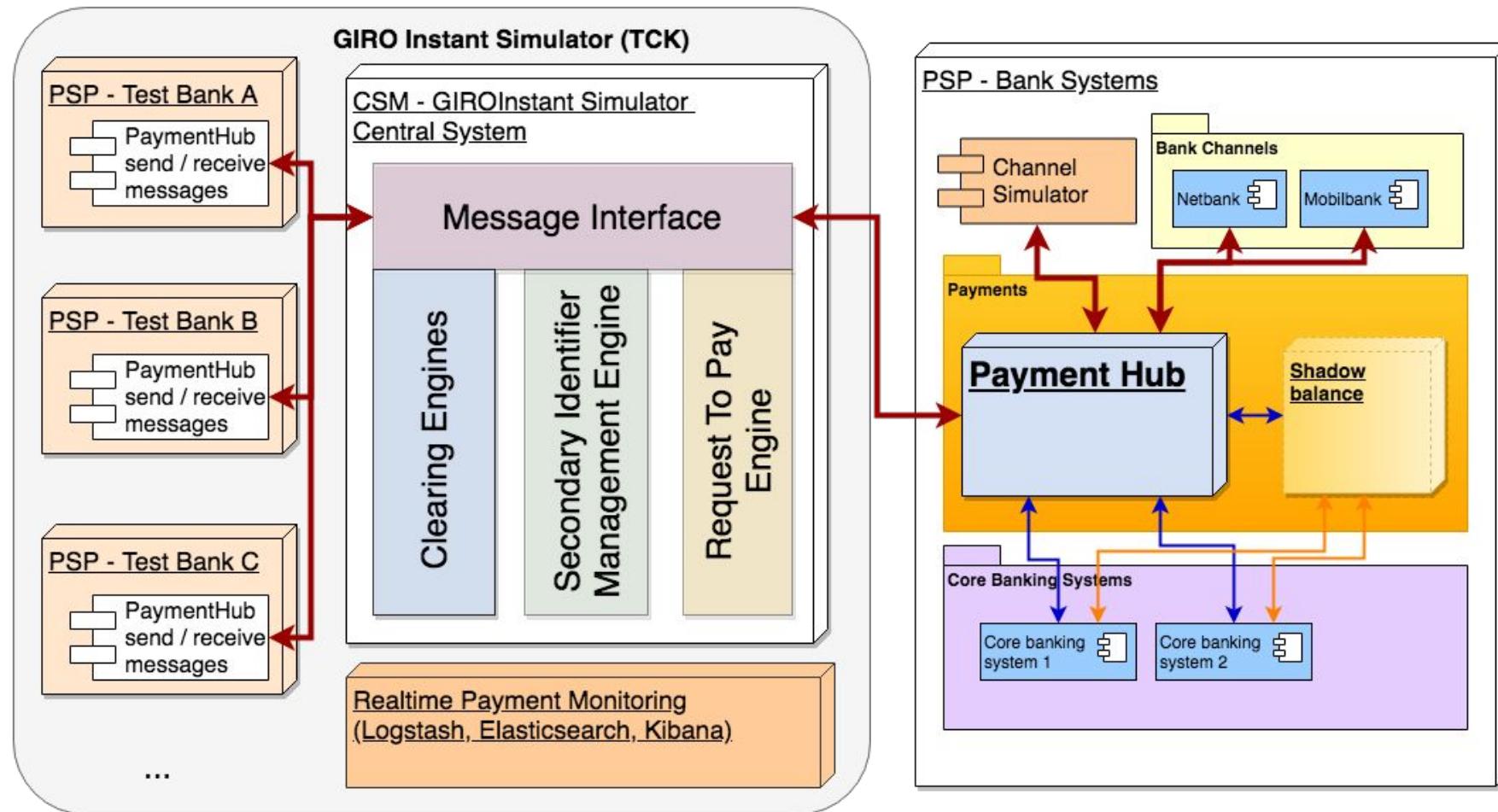
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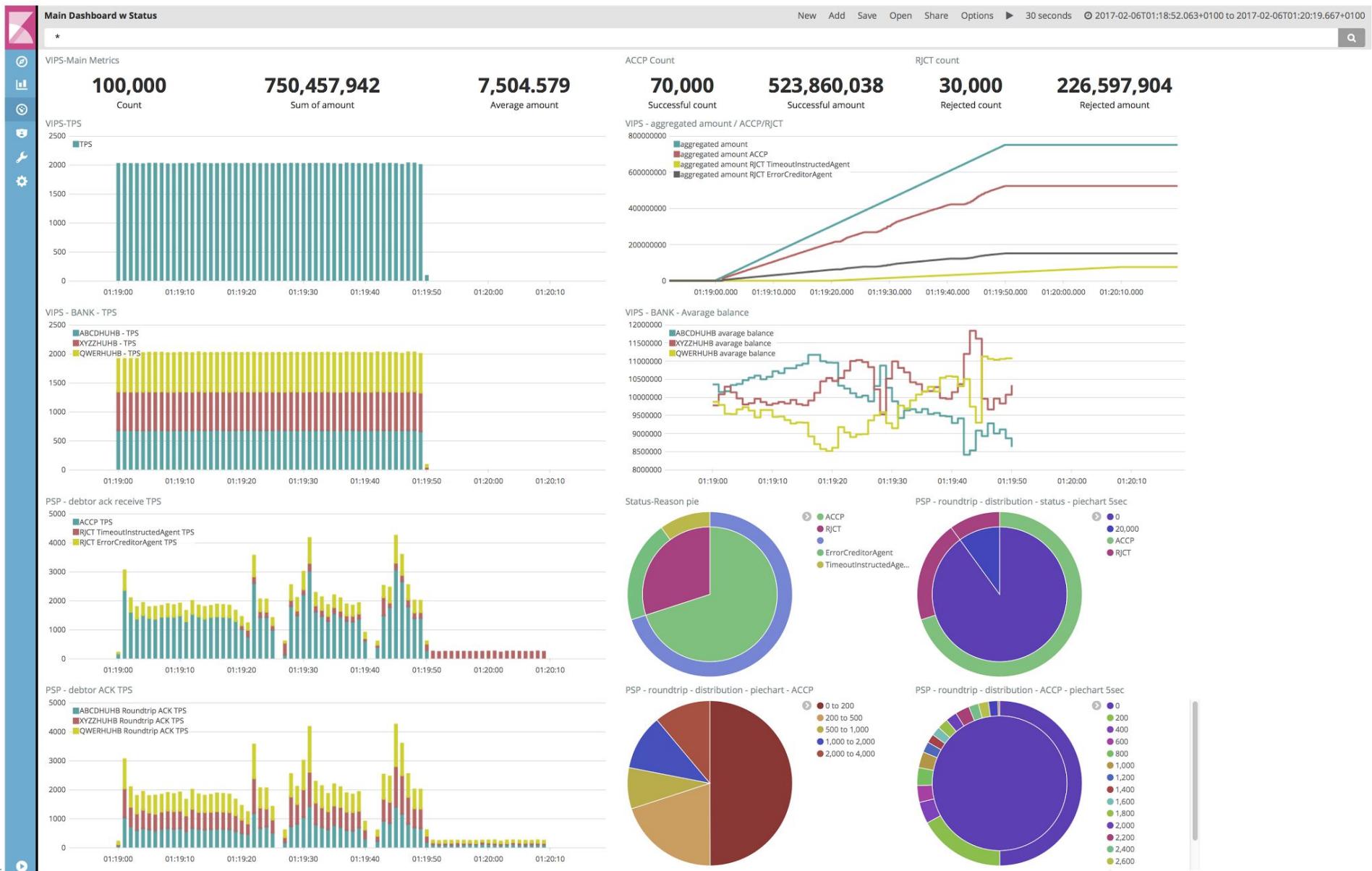
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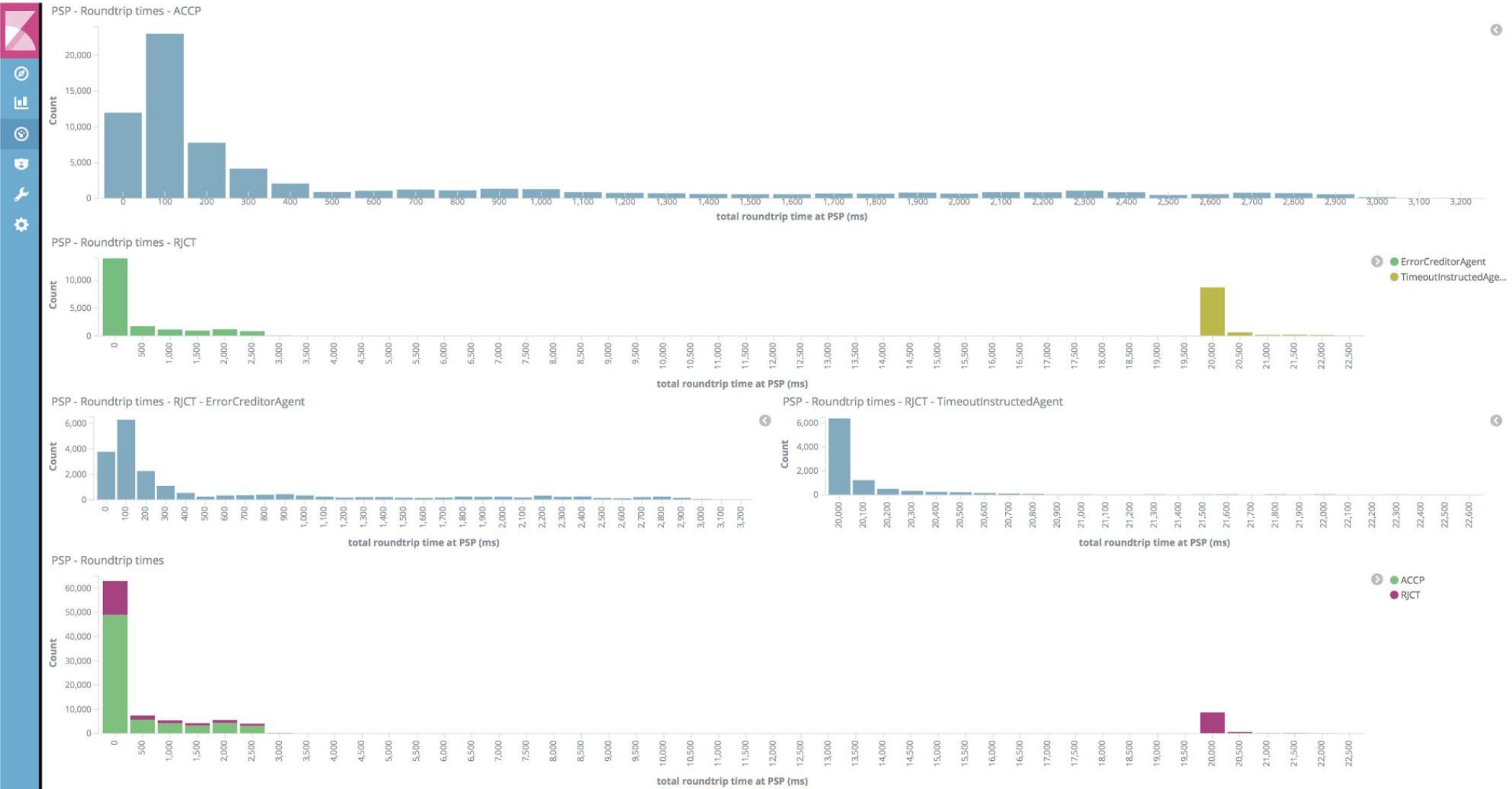
# Central clearing house simulator and load generator



# Test execution (1/2)



# Test execution - time distribution (2/2)



- October 17th 2017, 17:44:59.959 ISO20022: pacs.008 LogDtTm: October 17th 2017, 17:44:59.959 TxOrgnldtTm: October 17th 2017, 17:44:59.903 amount: 6,039,681 Description: VIPS incoming transfer request pacs\_008 ABCDHUHB VostroBalance: 10,228,274,852 XYZZHUHB VostroAvail: 9,643,672,788 creditorBIC: ABCDHUHB type: audit tags: vips, audit, xml debtorBIC: XYZZHUHB @timestamp: October 17th 2017, 17:44:59.967 XYZZHUHB VostroBalance: 9,705,476,383 XML: <?xml version="1.0" encoding="UTF-8" standalone="yes"?> <Document xmlns="urn:iso:std:iso:20022:tech:xsd:pacs.008.001.02"> <FIToFICstmrcdtTrf> <G

Table JSON

[Link to /auditlog-2017.10.17/audit/pacs.008-625bd8f5-c66e-4d38-9e2b-d61ac709ca8e](#)

①	@timestamp	Q Q □ * October 17th 2017, 17:44:59.967
t	@version	Q Q □ * 1
#	ABCDHUHB VostroAvail	Q Q □ * 10,266,700,423
#	ABCDHUHB VostroBalance	Q Q □ * 10,228,274,852
t	Description	Q Q □ * VIPS incoming transfer request pacs_008
t	ISO20022	Q Q □ * pacs.008
①	LogDtTm	Q Q □ * October 17th 2017, 17:44:59.959
①	TxOrgnldtTm	Q Q □ * October 17th 2017, 17:44:59.903
t	XML	Q Q □ * <?xml version="1.0" encoding="UTF-8" standalone="yes"?> <Document xmlns="urn:iso:std:iso:20022:tech:xsd:pacs.008.001.02"> <FIToFICstmrcdtTrf> <GrpHdr> <MsgId>c355d165-58cd-4f4c-b714-6e0824787694</MsgId> <CreDtTm>2017-10-17T15:44:59.903Z</CreDtTm> <NbOfTxns>1</NbOfTxns> <TtlIntrBkSttlmAmt Ccy="HUF">6039681</TtlIntrBkSttlmAmt> <IntrBkSttlmDt>2017-10-17</IntrBkSttlmDt> <SttlmInf> <SttlmMtd>CLRG</SttlmMtd> </SttlmInf> <PmtTpInf> <SvcLvl> <Cd>VIPS</Cd> </SvcLvl> <LclInstrm> <Cd>INST</Cd> </LclInstrm> </PmtTpInf> </GrpHdr> <CdtTrftxInf>