

Fuliza Credit Score Migration

REVISION HISTORY

Version	Date	Author	Comments
V1.0	11 th September 2023	Maryann M. Kavita	

PURPOSE

This document proposes the design and architecture to be used in credit score migration.

REFERENCED DOCUMENTS

Document Name	Description
Credit Product Score Migration Technical Documentation	Technical documentation as presented by NCBA following initial design discussion
Initial Migration Design Document	Solution design document as presented by SFC Credit Portfolio team

GLOSSARY

Acronym	Full Description
API	Application Programming Interface
AWS	Amazon Web Services
ECR	Elastic Container Registry
IPRS	Integrated Population Registration System
KYC	Know Your Customer
SFC	Safaricom PLC

SOLUTION OVERVIEW

Business Objectives

In keeping with laid-out regulations by Office of The Data Protection Commissioner, Credit product Scoring - a key component of the Credit product offering that performs scoring for determination of a customer's limit - is to be migrated for hosting within Safaricom's eco-system. Fuliza scoring model is currently hosted external to SFC's eco-system.

The key asks for the migration are:

1. Solution design re-architecting to reflect hosting of the Scoring Engine within SFC's eco-system, as well as reflect the new architecture of the Credit product offering.
2. Infrastructural alignment to host the re-architected solution taking into consideration functional and non-functional requirements.

Requirement Scope

In-Scope

Key requirements in scope are:

1. Migration & hosting of scoring platform within SFC's eco-system.
2. Deployment & execution of NCBA's scoring model within SFC.
3. Integrations within the Automated Scoring Engine eco-system targeting:
 - a. Scoring Database (DB source) for customer data fetch for scoring.
 - b. NCBA's endpoint for Score provision & *Limit* determination payloads.

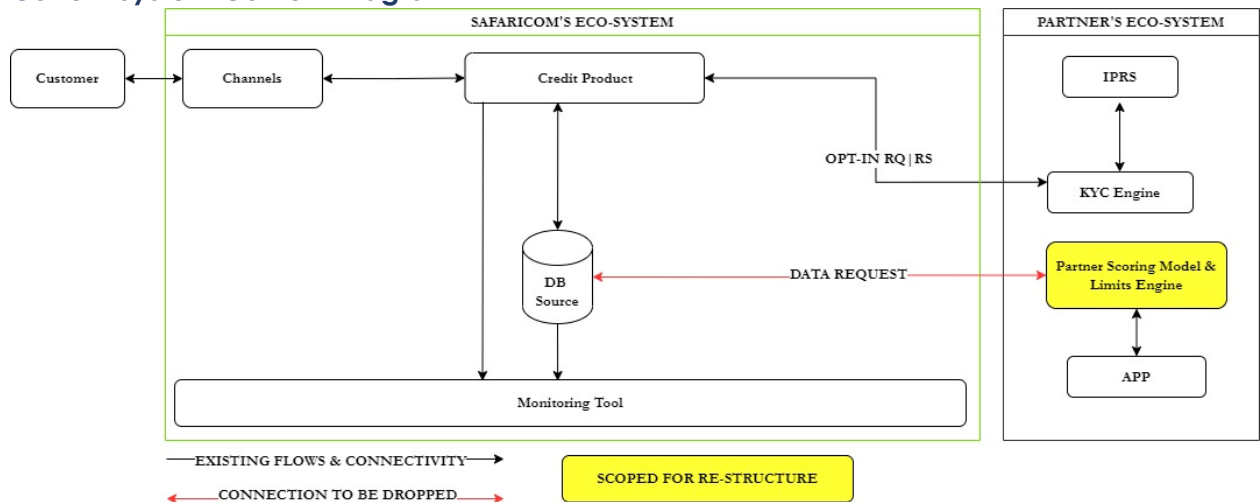
Out-of-Scope

Credit product processes that do not directly impact the scoring flow will be considered out of scope for the migration. These are:

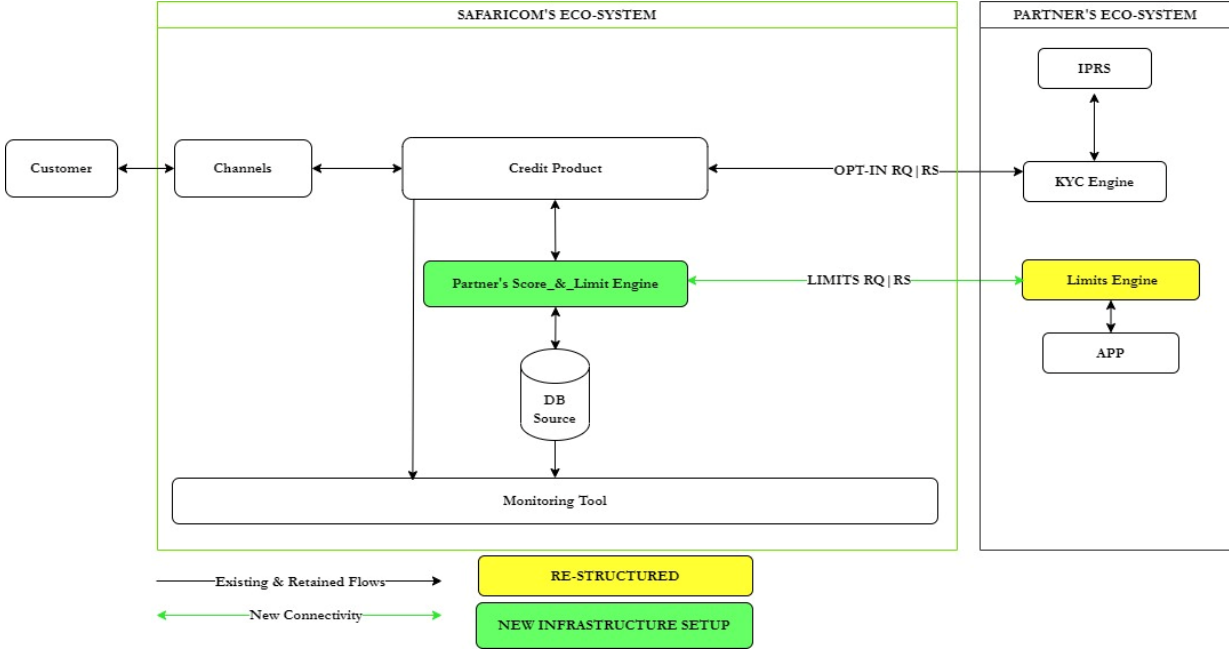
1. KYC process performed during customer opt-in as currently performed by onboarding partner.
2. Existing scoring functionalities currently performed by SFC.

HIGH-LEVEL ARCHITECTURE

Current System Context Diagram



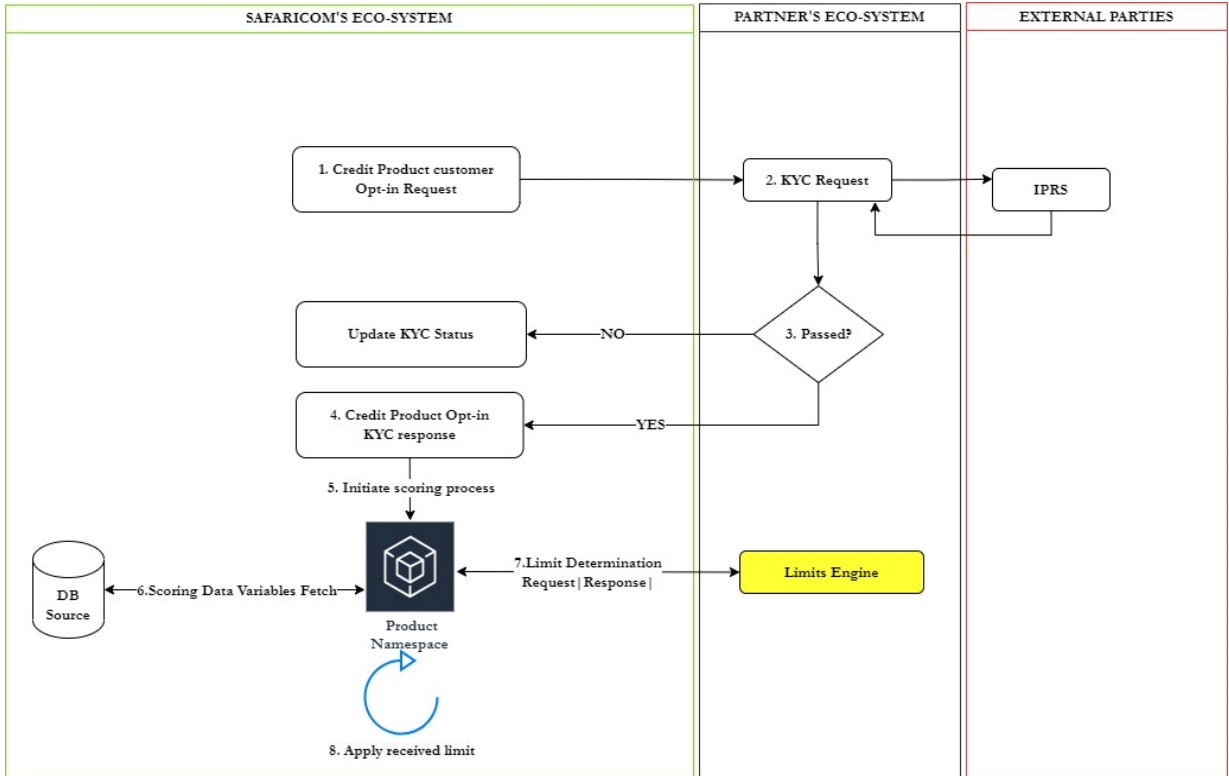
Proposed System Context Diagram



Use-Case

Use case: **Establish credit limit for an opt-in credit product customer**

Proposed Flow Diagram



From the proposed flow above:

1. A customer requests credit product opt-in through respective USSD code and accepts Terms and Conditions. The request is sent to SFC's credit product system, then forwarded to NCBA's eco-system for KYC check.

2. SFC enriches & re-packages the request forwarding to NCBA's endpoint which receives the request and using the ID number, invokes external IPRS endpoint for customer validation. A response is returned to the IPRS endpoint with the customer's names, for a match assessment against the names received from SFC.
3. Where the details' match assessment
 - a. Fails – a response is sent back to SFC with a failure, and appropriate error dispatched to the customer.
 - b. Passes – a response is sent back to SFC with a SUCCESS and:
 - Customer is created on Fuliza credit system
 - CRB trigger is done
 - Credit scoring is triggered to Fuliza score model hosted within SFC
 - c. On KYC update:
 - i. For failed KYC, a response is sent back to the (SFC hosted) credit product system with a FAILURE, and appropriate error dispatched to customer.
 - ii. For passed KYC, a response is received to initiate customer scoring.
 1. The (SFC hosted) credit score model is executed, fetching required scoring variables from Scoring Database for input.
 2. Once received, the scoring model, utilizing the fetched variables, generates a score.
 3. Following generation, the Scoring Model service formulates a limit determination request payload consisting of the output variables – in name value pairs - together with MSISDN, Safaricom customer score and global limit.
 4. The service then invokes NCBA's end point passing the payload.
 5. The endpoint receives the output of scoring from SFC and passing the variables received as input to the limit engine, a final limit is generated and returned as a callback to SFC.
 6. The receiving service then flows the score & received final limit to Fuliza lending platform for keeping.

Manual Processes

There is no anticipated manual nor user-intervened process within the eco-system.

DATA ARCHITECTURE

1. There are new data source connections anticipated within the re-architected eco-system.
2. Data fields required to actualize request/response payloads and newly developed functionalities will be agreed upon for provisioning.

SECURITY ARCHITECTURE

Security Solution Overview:

1. NCBA is to drop an encrypted image on provided AWS ECR instance.
2. Access to the ECR will be through shared credentials & whitelisted IP between SFC & partner.
3. SFCs' AWS platform will manage the versions of files dropped on the ECR.
4. There will be an integration pipeline to perform integration and security runs on the image prior to pulling.

DEPLOYMENT MODEL

INFRASTRUCTURE SETUP

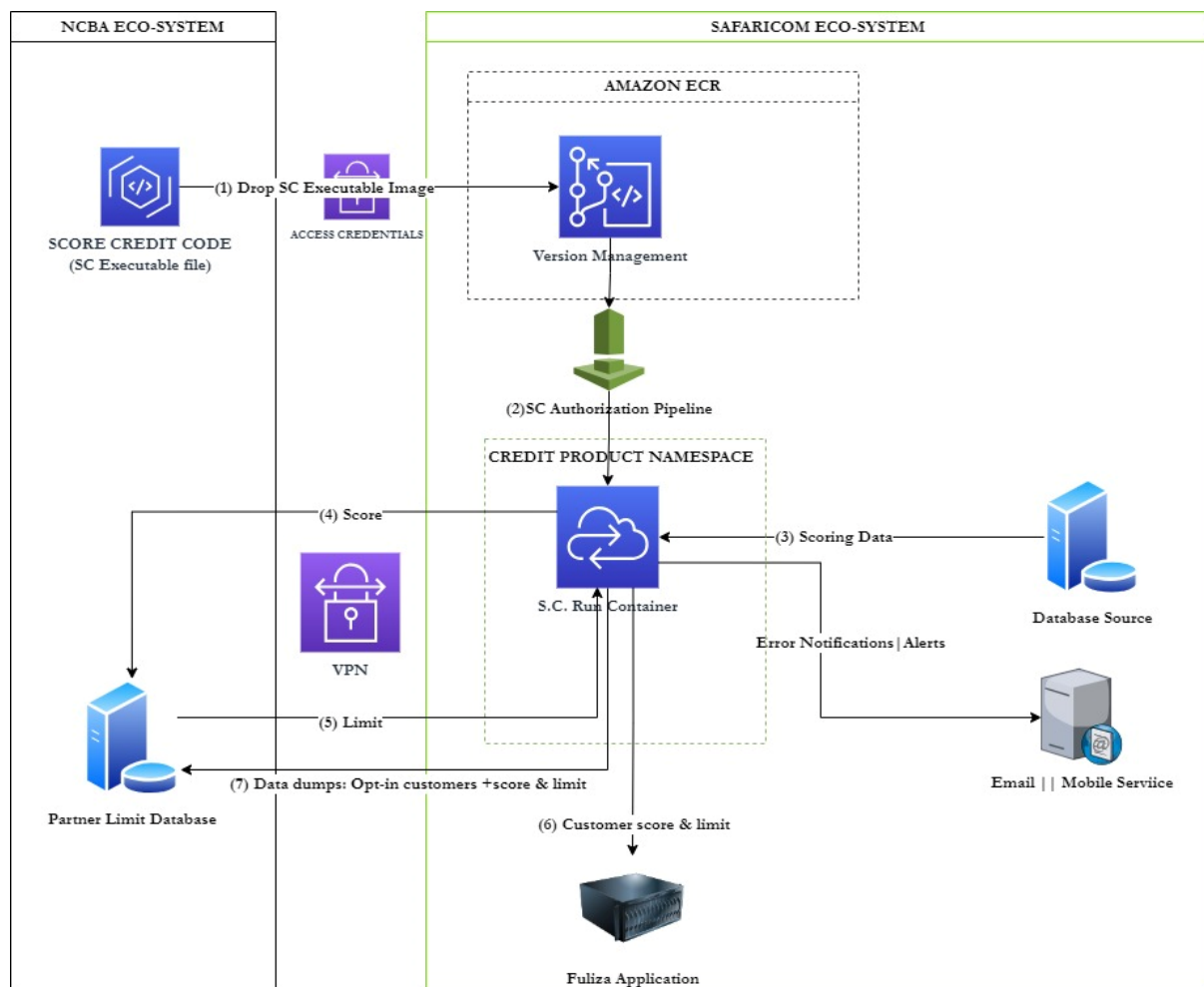
1. Software: Scoring Model will be deployed as an executable image (Docker).

2. Hardware: Solution will be hosted on AWS infrastructure and in a container within SFC's environ.
3. Network: The solution will have two implementations.
 1. On Cloud – for the Docker image - accessed through internet (HTTPS).
 2. On-premises – for limit request - via API integration through VPN establishment.

The deployment model for the solution is highlighted below:

1. NCBA is to develop & package the Score Credit (SC) model code as an encrypted executable image.
2. The SC image is dropped on AWS ECR where it is version tagged & lifecycle managed.
3. The SC image is pulled by SFC Pipeline service, and integration and security checks performed.
4. Where:
 - a. Authorization checks fail, the Pipeline marks the action as failed authorization for action by NCBA.
 - b. Authorization checks are deemed successful:
 - i. the SC image is copied to the credit product's container and executed, resulting in score generation in the Credit Product's Namespace.
 - ii. From the Namespace, the SC service invokes the NCBA's endpoint for limit determination. Once limit is received as part of callback, the score & final limit are flowed into Fuliza lending platform for capture & utilization.
 - iii. Once the limit is assigned, data dump is sent to NCBA for a view on total generated scores & respective limits assigned.

Deployment model described above is as illustrated below:



Assumptions

Assumptions guiding the deployment model above are:

1. The executable scoring model will be specific to Fuliza product.
2. Roles and obligations with regards to the AWS ECR instance are:
 - a. NCBA:
 - i. development of the scoring model image
 - ii. compressing, encryption and hashing of the scoring model image
 - b. SFC:
 - i. version & lifecycle management of the scoring model image
 - ii. security & integration checks
3. Access to the AWS instance will be through credentials provided by SFC.
4. SFC will provide payload structure for Fuliza score card model's configurations to NCBA.

NON-FUNCTIONAL REQUIREMENT

Monitoring & Exception Handling

1. NCBA is anticipated to have structured logs, error & exception handling for error alerts to the score service.
2. Monitoring of solution will be handled by NCBA and SFC for the components within respective eco-systems.

Performance testing

Performance testing is required owing to the re-structure of the architecture to ascertain that scoring is maintained to be seamless. With the re-structured architecture, the performance testing will serve to:

1. Identify volume provided by business
2. Calculate peak load (per hour) to system
3. Determine resources required – scaling up, scaling out – to manage load
4. Identify fault areas within the architecture

High Availability & Disaster Recovery

High availability and disaster recovery will be leveraging on existing infrastructural setup within SFC's environs. The same is expected of NCBA's endpoints.