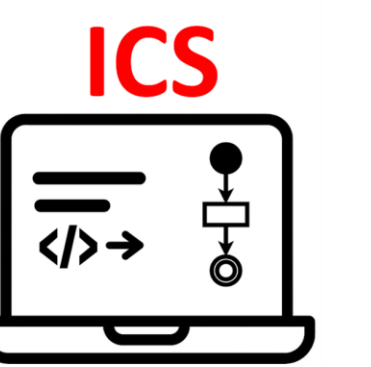


3



Introduction

Problem Statement

SMEs and underserved entrepreneurs in Saudi Arabia struggle to access financial services due to opaque credit evaluation, strict data-privacy regulations, and a lack of bilingual analytics tools. Traditional loan processes are slow, non-transparent, and inaccessible to rural and first-time entrepreneurs — restricting growth and participation in the digital economy.

Objective

Design and build a bilingual (AR/EN) web-based prototype that integrates AI-driven credit scoring with explainable outputs, a secure digital-wallet simulation, and KPI dashboards — validating how a privacy-aware fintech platform aligned with Vision 2030 can expand access to financial services.

Why It Matters

- Economic.** Faster, transparent credit decisions reduce SME loan-processing costs and unlock capital for rural micro-businesses
- Societal.** Explainable scoring builds trust and financial literacy among first-time borrowers and underserved communities
- Regulatory.** Conceptually aligned with SAMA and PDPL — a privacy-first prototype ready for a regulated fintech sandbox
- Vision 2030.** Directly supports digital transformation, SME empowerment, and financial-inclusion targets

Our Solution

A modular microservices platform that converts SME transactions into structured financial statements and a bounded, explainable credit score — operating on synthetic data and aligned with SAMA / PDPL principles.

AI Credit Scoring

Gradient Boosting model on 10,000-record synthetic dataset

Explainable AI (XAI)

Normalized feature-importance in AR/EN — ≥3 factors per decision

Digital Wallet

Deposits, withdrawals & transfers with 100% ledger logging

KPI Dashboards

Profit margin, cash runway, DSCR, liquidity, revenue growth

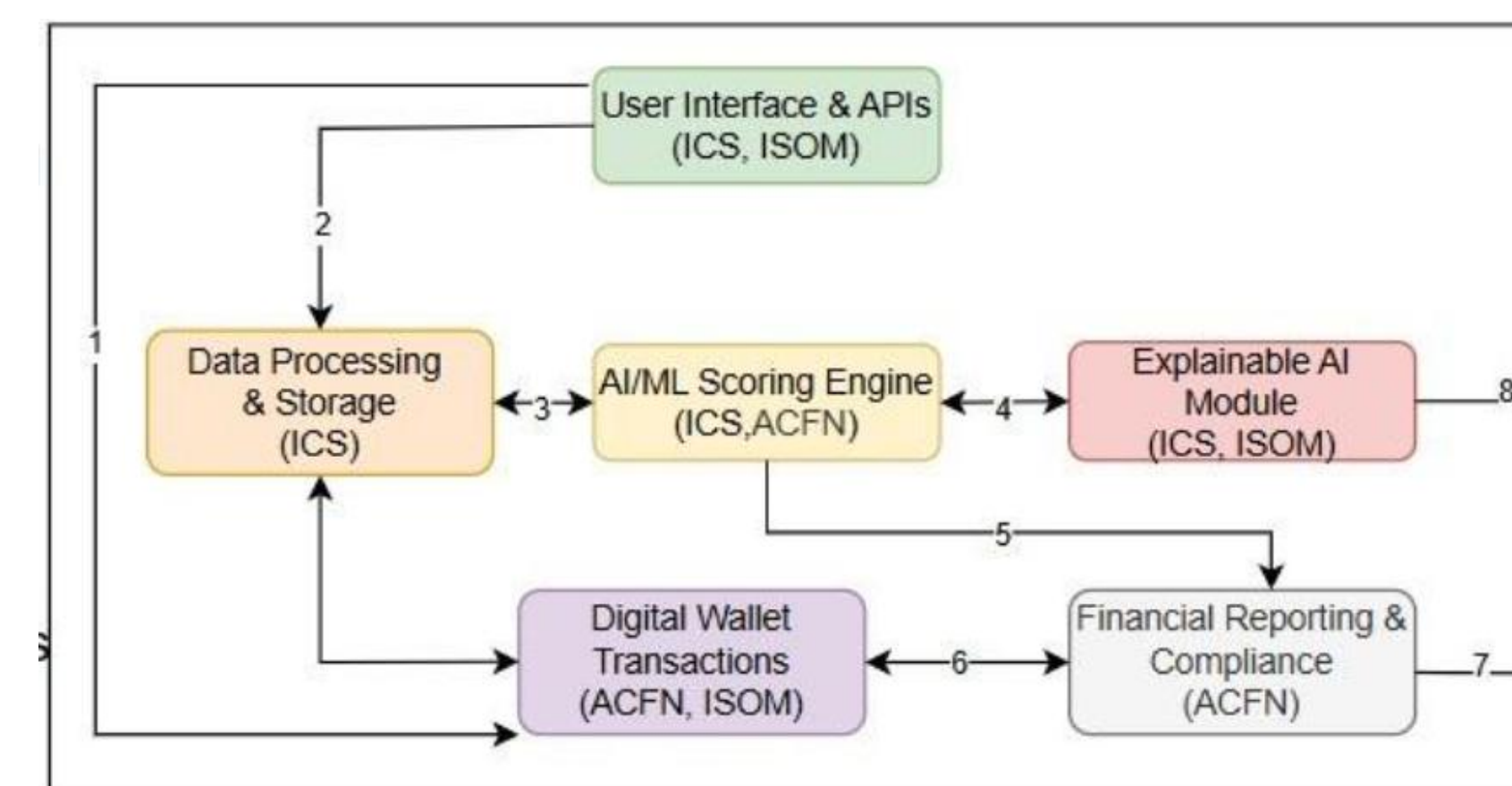
Secure APIs

Token auth (JWT) + AES-256 encryption, response < 2 s

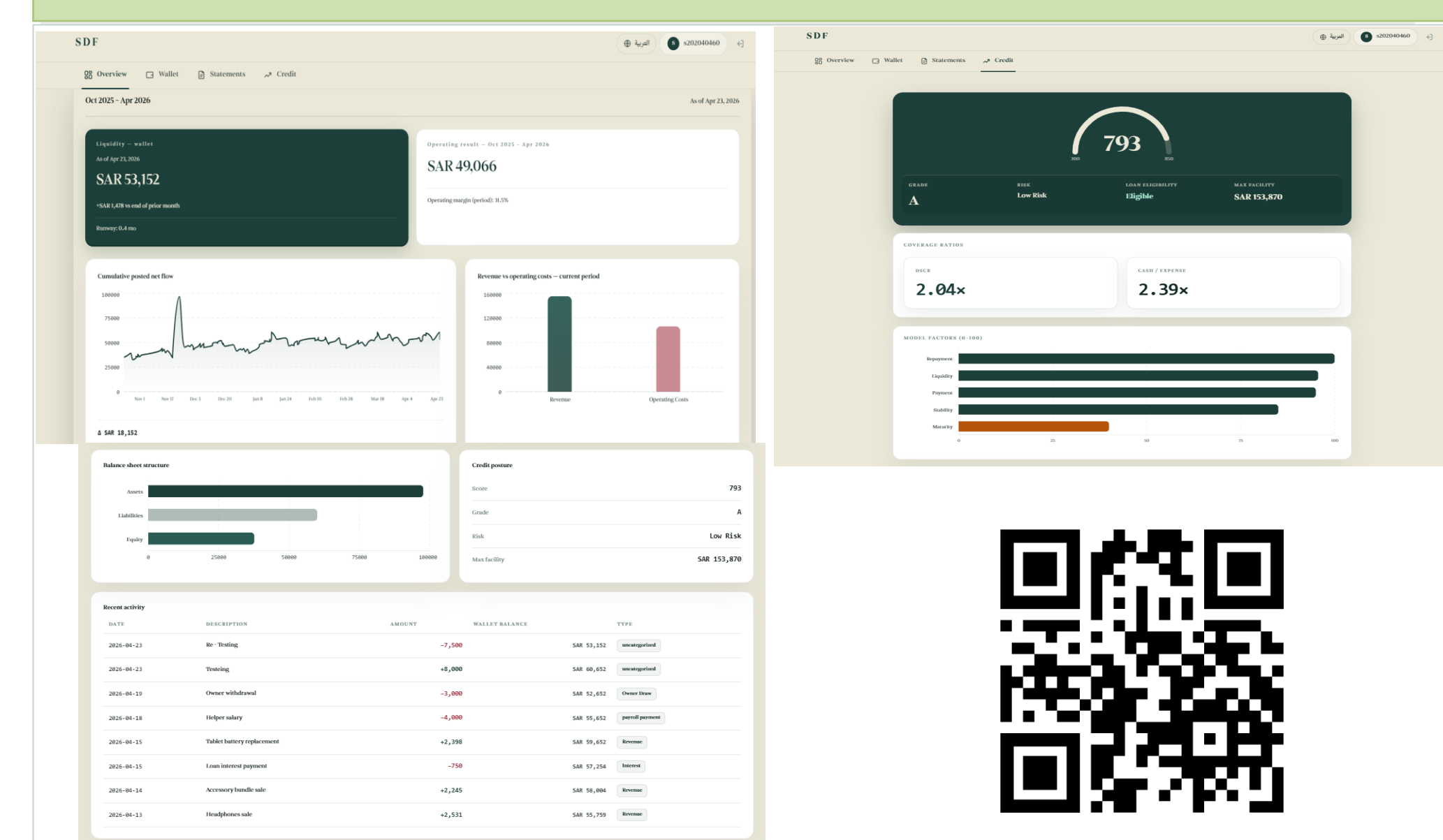
Bilingual UI

Structurally equivalent Arabic & English interfaces

System Architecture



Prototype Design



Testing / Validation

AI/ML Scoring Engine — Model Comparison (n = 2,000 test records)

Model	Accuracy	F1	Latency
Logistic Regression	76.85%	0.765	243 ms
Random Forest	80.15%	0.800	411 ms
Gradient Boosting ★	82.35%	0.820	467 ms

API Latency — Load Test (100 concurrent users)

Request Type	Mean (ms)	P95 (ms)	Success
Credit Scoring	1,672	1,912	98.4%
Wallet Transaction	1,354	1,763	99.1%
Dashboard Query	1,441	1,847	99.5%
Data Retrieval	1,213	1,546	99.8%
Overall (target < 2 s)	1,487	1,842	99.2% ✓

XAI pipeline: 50/50 scoring events produced structured explanations (100% coverage, 3.4 factors avg, $\Sigma w = 1.0 \pm 0.001$, full AR/EN parity).

Constraints

- No access to real SME financial data — synthetic / anonymized datasets only
- SAMA and PDPL compliance simulated conceptually (not production-certified)
- System must support at least 2 languages — Arabic and English
- Initial deployment limited to 1,000 concurrent users (prototype scale)
- AI models trained exclusively on synthetic data during the prototype stage
- Academic budget & timeline: open-source stack, ≤ 13 weeks of build time

Specifications

- Summary financial statements with 100% arithmetic accuracy
- Credit risk model using ≥ 3 dynamic metrics (5 implemented: DSCR, PB, LQ, ST, BM)
- AES-256 encryption with ≥ 95% authentication success rate
- Secure API protocols — token response < 2 seconds
- Financial dashboards with ≥ 3 KPIs (profit margin, cash runway, DSCR, liquidity, growth)
- Support 1,000 concurrent users at 99.9% design uptime
- Training data pipeline ≥ 5,000 synthetic records (10,000 used)
- Predictive model ≥ 80% test accuracy
- AI-based scoring model end-to-end < 5 seconds per request
- Wallet deposit / withdraw / transfer with 100% logging

Platform in Numbers

82.35%

AI Accuracy

Gradient Boosting model (≥ 80% target)

1,487 ms

Mean API Latency

100 concurrent users (< 2 s target)

96.7%

Auth Success

AES-256 + JWT (≥ 95% target)

467 ms

Inference Time

Per credit scoring request (< 500 ms)

100%

Wallet Logging

All deposits, withdrawals & transfers

300–850

Credit Score

Basel / SAMA-aligned bounded range

Conclusion

The Digital Financial Inclusion Platform demonstrates that modular microservices, explainable AI, and deterministic financial logic can be combined into a privacy-aware fintech prototype that satisfies every constraint and specification in the project scope.

Outcomes verified

100% of Table 1 constraints and specifications attained across ICS, ACFN, and ISOM contributions — load, latency, accuracy, explainability, wallet logging, bilingual delivery, and Saudi-aligned credit scoring.

Path to impact

Transparent credit decisions, reduced information asymmetry for SMEs, and a scalable foundation that maps directly to Saudi Vision 2030's financial-inclusion and digital-transformation goals — ready to extend to real data inside a regulated sandbox.