Design and Development of a Secure Civic Engagement Platform for Community Problem Reporting and Volunteer Management

Abdulla Ali Khamis - 202102256
Hussain Habib Sahwan - 202102620
Salman Mohammed Altal - 202102525

Introduction

"We Are The Change" is a secure mobile platform that enables citizens to report community issues and participate in volunteering. It addresses gaps in Bahrain's current reporting systems by combining issue reporting, volunteer coordination, and secure data management using FlutterFlow and Firebase.

Problem Statement

Tawasul

Unaddressed problems

Security

No trust

Literatre Review

01 Tawasul

02 Balady

03 Bu jarrah

04 FixMyStreet

Literatre Review

Platform	Main Features	Volunteer Integration	Community Collaboration	Reporting Mechanism	Limitations
Tawasul	Government complaints system	None	No	Formal, to government only	No volunteer action, government only solutions.
Balady	Government complaints system	No	No	Formal, to government only	No volunteer action, government only solutions.
Bu Jarrah (Social Media)	Awareness via influencer	Yes	Weak	Social, informal	Not sustainable, not secure.
SeeClickFix / FixMyStreet	Web/app issue reporting	None	Weak	Structured, mapped	Government only solutions.
We Are The Change	Issue reporting + volunteering	Full (built-in)	Strong	Structured, mapped	Still developing.

Requirement Collection

Method Used

Interview with Mr. Mohamed Khamis, Head of Estates and Support Services at RCSI Bahrain

Top Challenges

- Delays
- Transparency
- miscommunication
- Consistency

Key Requirements

What user wants?

Images

Image attachments for reporting cases

Volunteers

Volunteer sign-up functionality

Admin

Admin dashboard for assignment and monitoring

Security Requirements

How to secure the system?

SQUARE

structured nine-step process for identifying, categorizing, and prioritizing security requirements during the early stages of information technology (IT) system development

Security Requirement	Description	Priority
User authentication	Use Firebase to securely authenticate users before access	High
Role-based access control	Admin has privileged permissions separate from users	High
Data encryption in transit & storage	HTTPS + Firebase encryption ensures data confidentiality	High
Secure media upload filter	Validate image uploads and restrict file types	High
Input validation	Sanitize all user inputs to prevent malicious data submission	High
Audit logging	Log admin and user actions for accountability	Medium
Backup & recovery	Maintain data backups and restore ability	Medium
Session timeout	Auto-logout inactive sessions	Medium
Volunteer identity verification	Verify users before volunteer assignment for safety reasons	Medium
Report abuse mechanism	Allow reporting fake/misuse cases to admin	Medium

Security Requirements

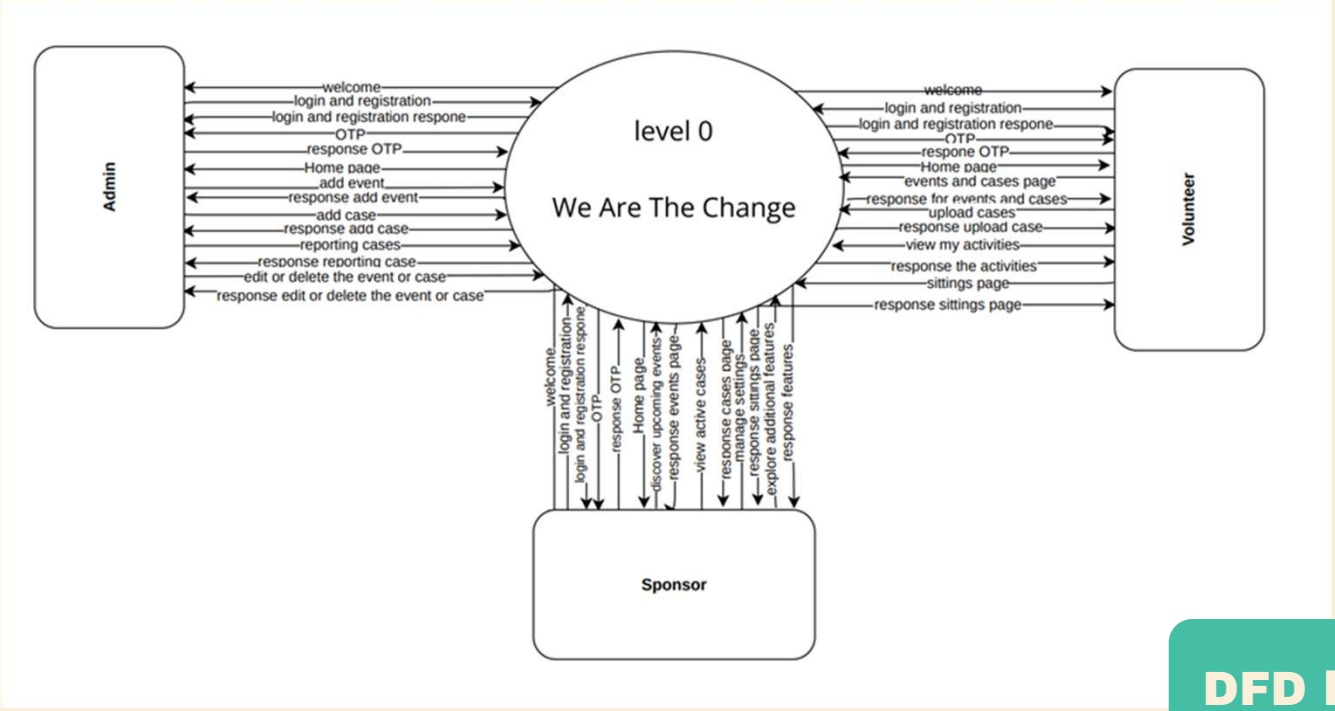
How to secure the system?

STRIDE

threat modeling methodology to analyze security threats facing the "We Are The Change" platform

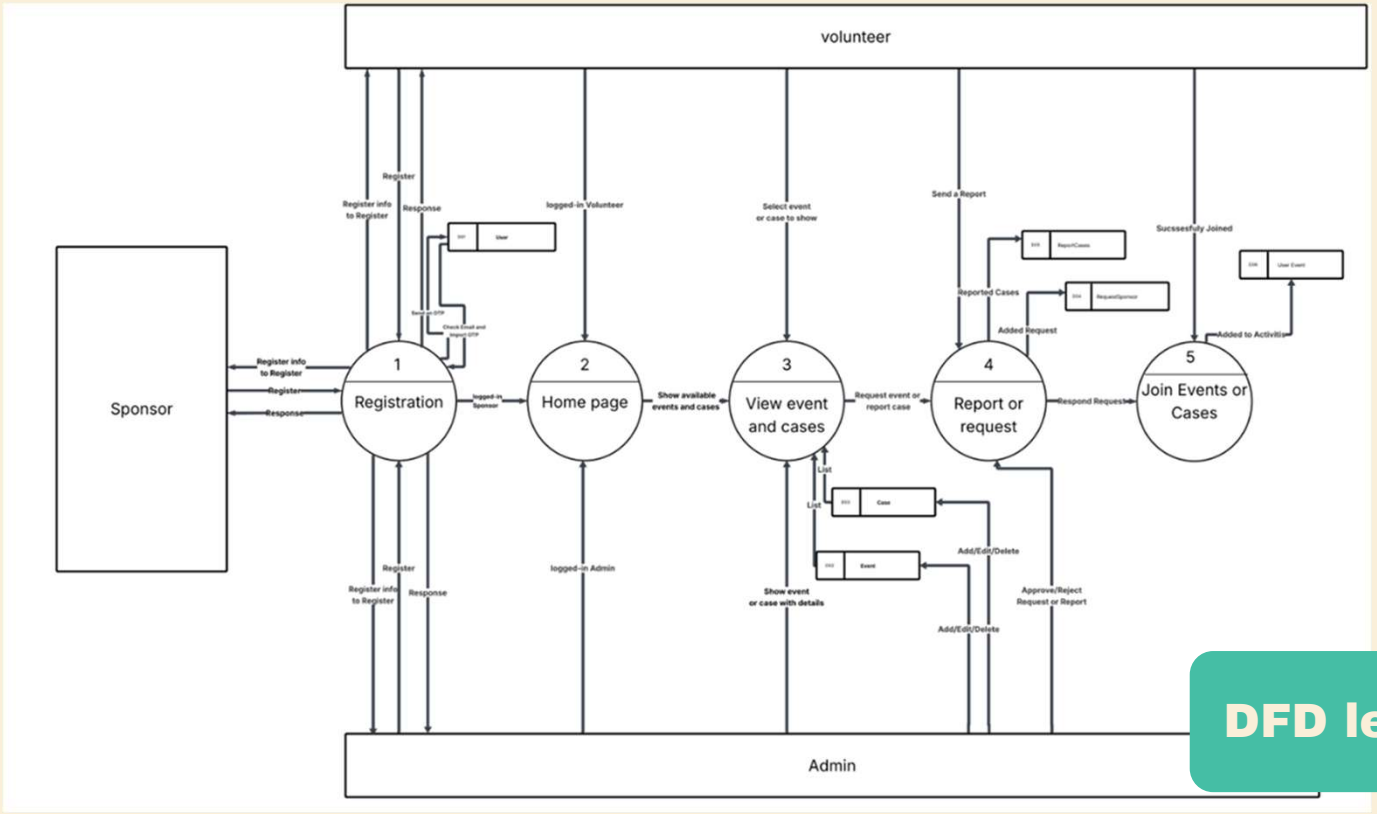
Threat ID	Threat Name	STRIDE category	Impact	Likelihood	Risk Level
S-1	User Identity Spoofing	Spoofing	High	Medium	High
S-2	Admin Impersonation	Spoofing	Critical	Medium	High
T-1	Report Data Manipulation	Tampering	High	Medium	High
T-2	Database Injection	Tampering	Medium	Low-Medium	Medium
T-3	Malicious Media Upload	Tampering	Medium	Medium	Medium
R-1	Denial of Volunteer Participation	Repudiation	Medium	Medium	Medium
R-2	Denial of Administrative Actions	Repudiation	High	Low-Medium	Medium
I-1	Personal Data Exposure	Information Disclosure	Critical	High	Critical
I-2	Unauthorized API Access	Information Disclosure	High	Medium	High
D-1	Report Flooding	Denial of Service	Medium	High	High
D-2	Media Upload Exhaustion	Denial of Service	Medium	Medium	Medium
E-1	Privilege Escalation to Admin	Elevation of Privilege	Critical	Low-Medium	High
E-2	Injection-based Escalation	Elevation of Privilege	Critical	Low	Medium

System Design



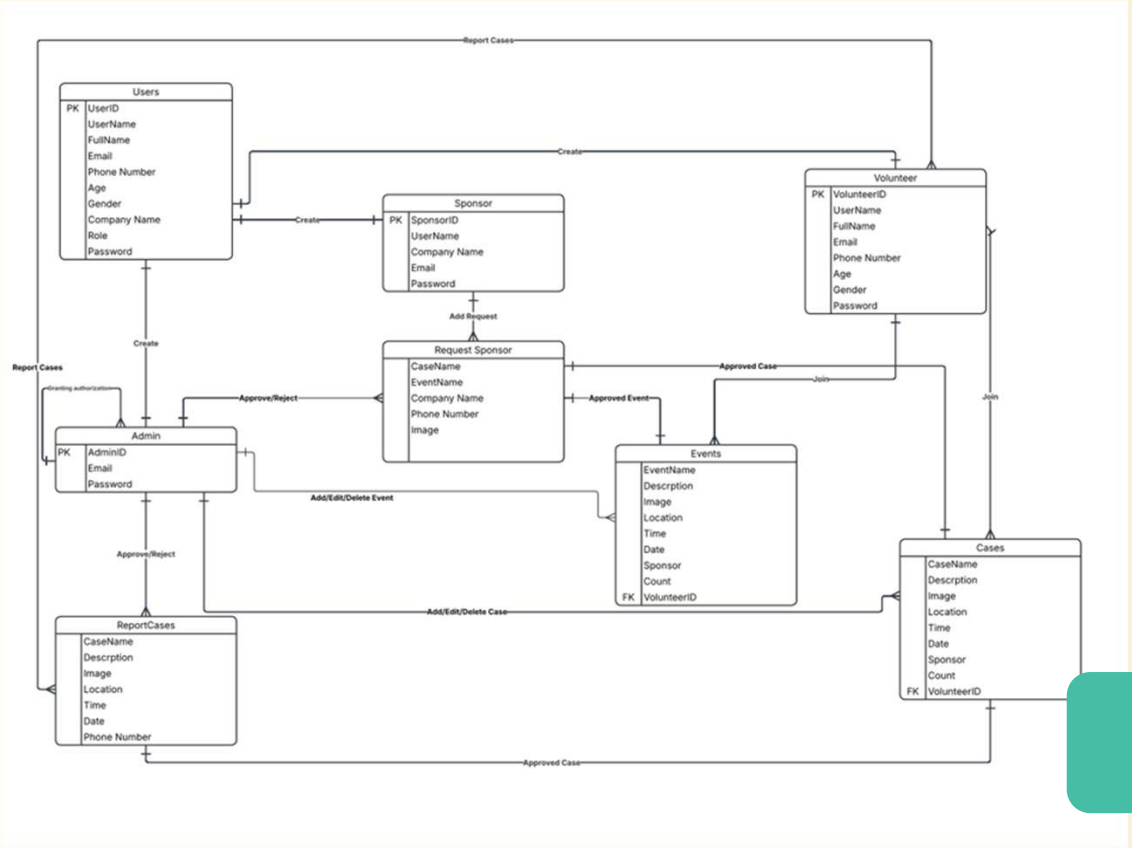
DFD level 0

System Design



DFD level 1

System Design



ERD

Demonstration

Future Work

Notifications **Geolocation** **Tawasul**

Conclusion

Successfully built and tested a secure civic engagement app for Bahrain that lets citizens report issues, join volunteer activities, and connect sponsors, with all main features working reliably and securely.

Thank you!