Al-Azhar University

Faculty Of Engineering

Systems And Computers Engineering Department

A picture containing text, emblem, symbol, logo

Description automatically generatedDAWAM Platform for Everlasting documents security using blockchain technology- Waqf as an example

**Proposed By:**

**Omnia Essam Elden Mohamed Kamal**

**Janna Ibrahim Moustafa Elsheshtawy**

**Doaa Amin Sami Ahmed Abdulrahim Elfawal**

**Salma Ahmed Ali Zaki**

**Mai Hassan Muhammad Abu Taleb**

**Hager Abobaker Hussein Mohamed**

**ID No: 904052**

**ID No: 904114**

**ID No: 904126**

**ID No: 904172**

**ID No: 904260**

**ID No: 904275**

**Supervised By:**

**Dr. Momtaz Alkholy**

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Abstract

The increasing need for secure data storage has led to the development of Blockchain technology that gives us the ability to store data in an immutable, transparent, secure and decentralized form. Dawam is a platform that harnesses the power of Blockchain to provide everlasting document security. This project focuses on the development of a web and mobile application that allows users to explore and store their documents as Non-Fungible Tokens (NFTs) on the Blockchain.

Having the Blockchain power we decided to explore it in one of the fields that needs it the most witch is Waqf. As Waqfs are everlasting assets that tended to enrich Muslim communities in various aspects over the years. And as we discovered it was suffering from several problems, many of them was because of the document security which led to tedious systems and Waqf recession.

The project takes Waqf documents as an example to show how blockchain technology can be used to ensure the security, immutability, and longevity of important documents. The platform converts documents into NFTs and stores them on a Blockchain, such as Ethereum, making them tamper-proof and permanent.

Dawam also includes a web dashboard to enter documents and approve the applied documents. The platform aims to provide a secure and easy-to-use solution for document storage, making it accessible to everyone.

Dawam's web and mobile applications make it easy for users to explore and store their documents, while the web dashboard simplifies the document approval process all connected with the same API to make sure they are up to date all the time.

In summary, Dawam is a groundbreaking platform that utilizes blockchain technology to provide everlasting Waqfs document security. The project's web and mobile applications, along with the web dashboard, make it an accessible and user-friendly solution for document storage and everlasting security. Hopping from God to make us among those who save his Waqfs

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# Project Initiation

## Introduction

Waqf documents are a crucial part of Islamic history, providing insights into the social, economic, and religious practices of past generations. However, the preservation of these documents has been a challenge for many years, with issues such as damage, loss, and forgery posing significant threats.

Blockchain technology, with its decentralized, transparent, and immutable nature, has emerged as a promising solution for preserving Waqf documents. Blockchain technology allows for the creation of a tamper-proof and secure environment for storing and managing these documents, ensuring their authenticity and accessibility for future generations.

Overall, this project aims to highlight the importance of preserving Waqf documents, and the potential of blockchain technology for achieving this goal. It is hoped that this work will inspire further research and development in this area and contribute to the preservation of this important part of Islamic heritage for generations to come.

### Problem Definition

If we look at our society, we find that saving contracts are essential in all fields. Saving Contracts with the traditional way isn’t secure   because of that it’s more vulnerable to hacking and change. There is no trusted way for saving contracts:

* Contracts could get lost.
* Contracts could be destroyed.
* Contracts could be changed.
* Some contract functions need to offer more trusted systems.

So, we decided to take Waqfs as an example, because Waqf facing lot of problems such as:

* There are no eternal contracts to save waqf documents which are eternal and some of them were lost across history due to different reasons like occupation and change of successions and more.
* Investing in waqf and ongoing charities had fallen back (when they are one of the most powerful aspects of the Islamic economy) due to the lack of trust and difficulty of accomplishment.
* It’s very difficult to access waqf documents because they are archived under security protection at Waqfs Ministry.

Through our website and mobile application, we provide a way for saving waqf documents permanently by using Blockchain & decentralized Web 3 technologies. Waqf documents will be more reachable and encourage people to invest in waqf and the ongoing charities.

Therefore, the problem definition for this project is to explore the feasibility of using blockchain for preserving Waqf documents, and to develop a blockchain-based solution that can ensure the integrity and security of these important documents. The project aims to investigate the potential of blockchain in preserving Waqf documents, and to identify the challenges and limitations of implementing such a solution. The project will also develop a blockchain-based solution that considers the unique features and requirements of Waqf documents, and that can provide a reliable and secure system for preserving these important documents.

### Project Objectives

**Objective 1:** Develop a functional web and mobile application for the storage of documents as NFTs on the Blockchain, with a user-friendly interface that allows users to explore and apply documents for storage.

**Objective 2:** Create a web dashboard that allows for the easy entry of documents and the approval of applied documents, with a clear and efficient workflow for document management.

**Objective 3:** Integrate Blockchain technology, such as Ethereum, into the platform to ensure the immutability and security of stored documents, measured by the absence of document tampering or unauthorized access.

**Objective 4:** Implement smart contract functionality to provide automated document storage and management, allowing for streamlined processes and efficient document tracking.

**Objective 5:** Ensure scalability of the platform, measured by its ability to handle an increasing number of users and stored documents without compromising performance or security.

**Objective 6:** Provide user support and documentation to ensure the platform is easy to use and accessible to a wide range of users and fulfills user satisfaction.

**Objective 7:** giving public Muslims easier access to waqf documents which would enrich waqf in Muslim’s communities and enable collaboration between different communities.

## Current and existing systems

### Current Systems

The current system for preserving Waqf documents varies across different regions and countries. In some areas, Waqf documents are stored in libraries or archives, while in others, they are kept in private collections or with Waqf institutions themselves. These documents are often handwritten on paper, and their preservation can be challenging due to their fragility and susceptibility to damage from natural disasters, wars, or simply from aging.

Several efforts have been made to preserve Waqf documents, including digitization and microfilming. Digitization involves scanning the documents and converting them into digital format, while microfilming involves photographing the documents and storing the images on microfilm. These methods have the advantage of creating a backup copy of the original documents, but they also have their limitations.

One of the main limitations of the current system for preserving Waqf documents is the risk of data corruption and manipulation. Digitized or microfilmed documents can be altered or deleted, either intentionally or accidentally, resulting in the loss or distortion of the information they contain. Additionally, these methods require significant resources and infrastructure to implement, which may not be available in all areas.

Another limitation of the current system is the lack of transparency and accessibility. Waqf documents are often stored in libraries or archives that may not be easily accessible to the public or researchers. This can limit the ability of stakeholders to monitor the preservation process and access the information they need.

In conclusion, the current system for preserving Waqf documents has limitations that can affect the integrity, accessibility, and transparency of these important documents. The use of blockchain technology has the potential to address these limitations by providing a decentralized, immutable, and transparent system for preserving Waqf documents.

### Existing Systems

**National unified portal (KSA’s national source for government services and information)**

A portal that provides electronic services, including a request to register a waqif, and it is an e-service provided by the General Authority for Endowments, which allows the receiving of endowment registration requests and processing them as necessary by the procedures enforced by the Authority, in addition to the service of the endowment or the beholders registration in endowment.

This service enables the issuance of an endowment certificate through the receipt of applications for issuance, renewal, and amending the endorsement in the Kingdom of Saudi Arabia and processing it as required by the procedures of GAA. Applications are received and followed up through the official and allocated channels.

Service implementation steps:

* Registration.
* Proccing Request.
* Return the request to the customer when there is feedback on the customer's request.
* Application Review
* Audit and certification

**The website of the General Authority of Islamic Affairs and Endowments for the United Arab Emirates**

The website that provides electronic waqf services, including:

* Taking care of waqf assets during endower’s life of and after their death - request waqf report:

The Awqaf Department takes care of the Waqf revenues in coordination with the donor or his/her heirs in addition to maintaining the Waqf assets. It also provides each donor with periodic financial reports relating to the endowment revenues (villa, building, farm, piece of land) and disbursement channel(s) selected in compliance with the request of donor or his/her heirs.

* Establishing new endowment:

This service allows those who wish to donate or establish an endowment to register their Waqf.

Service implementation steps:

* Issue Waqf establishment from court.
* Visit the nearest Awqaf branch to register the waqf.

E Donation:

This service allows individuals to make electronic donations through one of the following channels:

GAIAE’s App on smartphone and tablets (AWQAF) where the donor can register his/her data and select the type of disbursement channel and make the payment either using dirham or credit card.

Online via GAIAE’s website where the donor can register, select disbursement channel, and make payment either using dirham or credit card.

Waqf Coupons:

Waqf disbursement channels coupons are sold through sales representatives. Coupons are printed with the type of disbursement channel marked on them (like: Healthcare, orphans, holy Quran printing…etc.). The service allows the donor to choose the amount to be donated and the disbursement channel.

**FINTERRA WAQF CHAIN**

The Finterra ecosystem offers an inclusive platform to consumers through various verticals that support Islamic Social Finance. Finterra’s flagship products, the Islamic Social Finance Suite has been developed to revitalize the Islamic Social Finance system for the digital age using Blockchain technology. With relevant regulatory compliance built into the products and services, it helps solve core challenges in unlocking and integrating options for Capital raise, Waqf management, and Asset management while offering robust reporting capabilities.

How it Works:

* Cash Waqf

Their platform allows for anyone to make cash donations towards projects having social impact.

* Waqf Project

Their platform gives equal weight to social and environmental factors vis-a-vis financial returns.

## Literature Review

### Background

The preservation of Waqf documents is a critical issue, as these documents provide evidence of endowments that have been established for centuries. Waqf documents can be damaged or lost due to natural disasters, wars, or simply from aging. Therefore, several efforts have been made to preserve Waqf documents, including digitization and microfilming. However, these methods have their limitations, including the risk of data corruption and the possibility of manipulation.

Blockchain technology has emerged as a potential solution for preserving Waqf documents. Blockchain is a decentralized and immutable database that can store data without the need for intermediaries. It uses cryptography to secure data and prevent unauthorized access. The use of blockchain for preserving Waqf documents has several advantages, including:

* Data immutability: Once data is stored on the blockchain, it cannot be altered or deleted, ensuring the integrity of the Waqf documents.
* Decentralization: Blockchain is a decentralized system, which means that there is no central authority that can manipulate or alter the data.
* Transparency: The use of blockchain provides transparency in the preservation process, allowing stakeholders to monitor the preservation process.
* Security: Blockchain technology uses cryptography to secure data, making it highly resistant to hacks and cyber-attacks.

### Several studies have explored the potential of using blockchain for preserving Waqf documents.

* Use of Blockchain Applications in Developing Waqf: A Platform by Finterra Companies as a Modal Study (Sasse, 2019). The research tried to employ the experience of the Finterra Foundation in adopting the blockchain methodology in the endowment system, but it did not reveal the real relationship that this methodology could represent in the endowment performance, although the paper drew some points in general without detailing.

In addition, the details of what can be demonstrated from the application of this blockchain methodology to the reality of the work of the Awqaf Foundation were not discussed from the legal point of view.

* Endowment and blockchain technology: Invest and Finance from the Sharia Perspective (Al-Salahat, 2021). This research aims to define blockchain methodology and highlight the blockchain relationships in the framework of waqf system and its main processes. It also aims to show how blockchain methodology can facilitate developing the work of the waqf institution further, and it clarifies the legal framework of interests and/or corruption.

### Our Product Features

Through our website and mobile application, we provide a way for saving waqf documents permanently by using Blockchain & decentralized Web 3 technologies. Waqf documents will be more reachable and encourage people to invest in waqf and the ongoing charities.

## Stakeholders List

|  |  |  |
| --- | --- | --- |
| Stakeholder | Interest | Importance |
| Dr. Momtaz Alkholy | Team supervisor and guide of the development process | High |
| Project Team Members | Responsible for requirement gathering and analysis, designing, developing, testing, and deploying the platform | High |
| People (Users) | The people who will be using the application | High |
| Waqf Institutions | Secure and everlasting storage of their documents through the platform | High |

Table ‎1‑1:Stakeholders

## Proposed Scope & Process Model

### Proposed Scope

1. Research and analysis of the requirements for the platform, including the needs of the users and stakeholders.
2. Design and development of the web and mobile application for exploring the stored documents and applying documents to be stored.
3. Design and development of a web dashboard for entering documents and approving the applied documents.
4. Design and development of app database and API to handle requests from web, mobile application, and web dashboard.
5. Integration of Blockchain technology (Ethereum as an example) for storing the documents as NFTs.
6. Implementation of security measures to ensure the safety and confidentiality of the documents.
7. Testing and validation of the system to ensure its functionality and usability.
8. Documentation of the system, and data gathering for real examples.

### Process Model

The process model for the project will follow an agile approach, with iterative and incremental development cycles. The Agile approach is well suited to software development projects that require flexibility and adaptability to changing requirements and user feedback.

## Project excluded and Project constraints

### Project excluded

* The project does not involve the physical preservation of Waqf documents, such as restoration or repair of damaged documents.
* The project does not involve the development of a blockchain network from scratch, but rather the use of an existing blockchain technology.

### Project constraints

* There was difficulty finding documents as they were at Waqfs ministry under high security protection. We could only find some little examples through the internet and some books.
* It was not easy to find resources to study blockchain.
* Time was too short for studying new technology through the educational year.
* Cost of the server.
* Integration with Waqf ministry will not be delivered by the end of this project due to security issues and time limitation.

# Planning and Requirements

## Planning

### Scope Initiation (WBS)

### Gantt Chart

### Resource Sheet

|  |  |  |
| --- | --- | --- |
| Resource Name | Resource Type | Cost |
| Omnia Essam | Front-End | Free |
| Janna Ibrahim | Back-End | Free |
| Doaa Amin | Front-End | Free |
| Salma Ahmed | Mobile | Free |
| Mai Hassan | Front-End | Free |
| Hager Abubaker | Mobile | Free |
| Figma | Material | Free |
| Remix | Material | Free |
| VS Code | Material | Free |
| Visual studio | Material | Free |
| SQL Server Management Studio | Material | Free |
| Postman | Material | Free |
| Swagger | Material | Free |
| Android Studio | Material | Free |
| Microsoft Word | Material | Free |
| Laptop | Material | Free |
| Smartphone (Android Based) | Material | Free |

### System Development Requirements

The following table will demonstrate the resources that will be required throughout the development process of this project, including Human Resources, Software, and Hardware, in addition to a cost overview of the project.

|  |  |
| --- | --- |
| Resource Type | Resources |
| Human Resources | •Front-End Developer  •Back-End Developer  •Blockchain Developer  •UI/UX Designer |
| Software | • Figma  • Remix  • VS Code  • Visual studio  • Postman  • Swagger  • SQL Server Management Studio  • Android Studio  • Microsoft Word |
| Hardware | • Laptop  • Smartphone (Android based) |

### Cost Estimation and Budgeting

The following table will contain cost estimations for the different resources that will be used in the development process of this project:

|  |  |  |
| --- | --- | --- |
| Materials | | |
|  | Name | Cost |
| 1 | Figma | Free |
| 2 | Remix | Free |
| 3 | VS Code | Free |
| 4 | Visual studio | Free |
| 5 | SQL Server Management Studio | Free |
| 6 | Postman | Free |
| 7 | Swagger | Free |
| 8 | Android Studio | Free |
| 9 | Microsoft Word | Free |
| 10 | Laptop | Free |
| 11 | Smartphone (Android Based) | Free |
|  | Total Cost | 0 |

### Risk List

**Technical Risks**

1. Blockchain technology is still relatively new and evolving, which may lead to unexpected technical challenges and difficulties in development and implementation.
2. Integration with Ethereum blockchain may result in technical issues that could delay the project timeline.
3. The use of NFTs may result in unexpected technical challenges and can be difficult to implement.

**Time Risks**

1. The project timeline may be impacted by unforeseen technical challenges, which could result in delays.
2. A delay in one task may have a cascading effect on other tasks, which could result in a delay in the overall project timeline.
3. Changes in requirements or scope could result in delays in development and implementation.

**Resource Risks**

1. Limited availability of skilled blockchain developers and designers could result in a shortage of resources, which may impact project timeline.
2. Lack of funding may impact the project timeline and resources available for development and implementation.

## Requirements

### Information Gathering

**Brainstorming**

In this project, we decided to start information gathering with simple brainstorming sessions aiming to get to a better understanding of the problem we are set out to deal with in this project and the requirements that we need to implement during the development process, reaching a solid base of requirement specification that we could build on as we go.

**Research**

We reviewed academic papers, industry reports, and online resources to understand the challenges faced by the Waqf industry in managing its documents. We also researched the features and functionalities of existing Blockchain-based document management platforms to understand the best practices in the industry.

**Stakeholders Interviews**

We conducted interviews with stakeholders involved in the Waqf industry and Blockchain technology. These interviews aimed to gather insights into their needs, expectations, and specific requirements related to a platform that provides everlasting documents security using Blockchain technology.

**Expert Consultations**

Discussions and consultations were held with experts in Awqaf, Blockchain and UI/UX designer. These experts provided insights, recommendations, and best practices related to the technologies and methodologies to be employed in the project.

### Functional Requirements

1. **Document storage:** The system should provide a secure and decentralized environment for storing Waqf documents. The system should allow for the storage of various document types, including text, images, and audio.
2. **Document management:** The system should allow for the management of Waqf documents, including adding, editing, and deleting documents. It should also allow for the tracking of document changes and the creation of a document history.
3. **Document authentication:** The system should provide a method for authenticating the Waqf documents stored in the system, ensuring that they are not tampered with or altered in any way. This can be achieved using digital signatures or other cryptographic methods.
4. **Access management:** The system should provide access management features, allowing for the control of who can access the Waqf documents stored in the system. This can be achieved using permissions and access controls.
5. **Transparency:** The system should be transparent, allowing for the tracking of changes to the Waqf documents stored in the system. This can be achieved using the transparency features of blockchain technology.
6. **Interoperability:** The system should be interoperable, allowing for the integration of various blockchain protocols and smart contracts. This will allow for customization of the system to meet the unique needs of Waqf documents.
7. **User interface:** The system should provide a user-friendly interface for accessing and managing the Waqf documents stored in the system. The interface should be intuitive and easy to use for both technical and non-technical users.

### Non-functional Requirements

1. **Security:** The system should provide a high level of security to ensure the confidentiality, integrity, and availability of the Waqf documents stored in the system. This can be achieved using encryption, access controls, and other security measures.
2. **Scalability:** The system should be scalable, allowing for the addition of new Waqf documents and the expansion of the system to accommodate growing storage needs.
3. **Performance:** The system should have high performance, allowing for fast and efficient access to the Waqf documents stored in the system. This can be achieved using optimized data structures and algorithms.
4. **Reliability:** The system should be reliable, ensuring that the Waqf documents stored in the system are always available and accessible. This can be achieved using redundancy and failover mechanisms.
5. **Compatibility:** The system should be compatible with existing technologies, allowing for the integration of existing Waqf document databases and other systems.
6. **Usability:** The system should be easy to use, with a user-friendly interface and intuitive features for accessing and managing the Waqf documents stored in the system.
7. **Compliance:** The system should comply with relevant legal and regulatory requirements, including data protection and privacy laws.

## Use cases

## Domain Diagram

A screenshot of a computer program

Description automatically generated with low confidence

Figure ‎2‑1:Domain Diagram

# Project Analysis and Design

## Actor-goal List

|  |  |
| --- | --- |
| **Actor** | **Goal** |
| **Admin** | * **AddWaqf** * **EditWaqf** * **ViewWaqf** * **AddNotes** |
| **Supervisor** | * **ConfirmWaqf** * **DeleteWaqf** * **EditWaqf** * **AddNotes** |
| **Researcher** | * **Login** * **SignUp** * **FilterInWaqf** |
| **Client** | * **RecieveMassege** |

Table ‎3‑1:Actor Goal List

## Use Case Diagram

The diagram shows the actors and use cases of the system extracted from the functional list in section ().

A picture containing text, diagram, sketch, line

Description automatically generated

Figure ‎3‑1:Use Case Diagram

## Activity Diagram

A picture containing text, diagram, screenshot, font

Description automatically generated

Figure ‎3‑2:Activity Diagram

## Sequence Diagrams

A blue lines on a black background

Description automatically generated with low confidence

Figure ‎3‑3:Sequence Diagram

## State Diagram

A screenshot of a computer

Description automatically generated with low confidence

Figure ‎3‑4:State Diagram

## Design Class Diagram

Design Class Diagram: Show’s all classes in our system, which aA screenshot of a computer program

Description automatically generated with low confidence

Figure ‎3‑5:Design Class Diagram

## Deployment Diagram

A picture containing text, diagram, plan, sketch

Description automatically generated

Figure ‎3‑6:Deployment Diagram

## Output & Input Design (Screens)

A screenshot of a computer

Description automatically generated with medium confidenceThe screen below shows adding Waqf Page

Figure ‎3‑7:Adding Waqf

# Implementation and Testing