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University of Bahrain

College of Information Technology

Department of Computer Science

ITSE 305: Software engineering project  
BSc in Software Engineering

**Balagh System**

**Project**

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# Introduction

Balagh is an application designed to help citizens and residents report problems or errors that may occur, as well as to provide inquiries and suggestions. To use the application, users must register with a CPR and then submit their complaints or invitations. The complaints are then sorted by the number of employees in each ministry, so they can be responded to by the most suitable person. This system will provide users with contact information to follow up on their demands, and employees with a content management system (report management) to manage user complaints, inquiries, and suggestions. The main components of the system are Accounts, Services, Contact, and Report Management. The application will have a huge effect on different sectors by reducing costs.

Balagh System is an ambitious project that aims to provide better connectivity between the user and the system. The project will be implemented in collaboration with the manager and other team members and will involve gathering requirements through interviewing, brainstorming, observation, workshops, questionnaires, and surveys. The project has a budget of 2,005,400 USD, and the app is set to run on both IOS and Android OS. The development will be done using native languages for each platform to achieve high compatibility and efficiency. All stakeholders must provide signatures for the project charter to ensure that everyone agrees. Therefore, a management strategy must concern all stakeholders. The scope statement must be followed carefully, and any deviation from it must be approved by the manager/sponsor. Additionally, the duration of each activity and the start and finish date must be specified, to avoid any delays in the project submission. MS and WhatsApp tools will be used to manage the tasks, and the team members must be trained to ensure that the system is easy to use and has good usability.

# Pre-initiation and initiation

## 2.1 Introduction

Pre-initiation is task that we will lay groundwork and it’s have several steps starts from its including the following:

* Determine the scope, time, cost estimate for our project.
* Identify project sponsor.
* Identify project manager.
* Develop a business case for our project.
* Meet the project manager to negotiate the process and expectations for our project.
* Identify whether our project should be divided into smaller projects or not.

## The initiation phase of the project includes holding a kick-off meeting to negotiate expectations and outputs for the project, as well as developing a stakeholders registration charter that contain the names and contact information of the stakeholders. Additionally, the initiation phase involved developing a management strategy, which would outline the roles and responsibilities of each of the stakeholders, as well as the processes and procedures to be followed.

## Balagh System’s Business Case

Table :Balagh System’s Business Case

|  |
| --- |
| *1.0 Introduction/Background*  **Balagh's primary objective is to assist report any issues or errors that may appear in accordance with each ministry and to offer guidance and inquiries. As a result, users will be contacted through the application to handle their proposals, inquiries, and even complaints. This platform will support citizens, resident’s users, and ministry employees.** |
| *2.0 Business Objective*  **Balagh system's primary strategic goals are to:**  **-Maintain the client side's ease of use and improve communication with them, as well as the backend side's ability to engage with the system in a convenient manner.**  **-To increase the effectiveness of management-side activities.**  **-Assist the business to generate a sizable profit.**  **Our system's objective is to generate a new application that facilitates citizen and resident services and improves interactions with government entities. By starting to provide the primary firm functionalities of the system inside this mobile application, The Balagh's system will support these objectives. Giving the client access to these functionalities is a significant step toward achieving the first goal, and using the mobile application base would also enable the company to stop spending on outdated standard tools, methods, and frameworks.** |
| *3.0 Current Situation and Problem/Opportunity Statement*  **Lots of governments do not have a system to deal with citizens and residents’ complaints (report problem). Governments currently use the traditional way for receiving complaints which is the citizens and residents have to go to the ministry if they have and problem, but the government see that it is difficult for citizens and residents of the country when they face any harm or problem to follow the traditional way, and it always takes time spicily we are in the era of speed , or they are hindered from completing their lives or their work. So, it was decided that we needed to develop a new system to report problems or errors that may occur, as well as to provide inquiries and suggestions to make their life easier.** |
| *4.0 Critical Assumptions and Constraints*  **The proposed system must be an asset for our company and for the government as well. it must pay for itself within one year by increasing profit and generating new business since the government considered as an important and famous client therefore, it is expected that it will attract new customers to us after publishing the application. The Project Management Office manager must lead the effort, and the project team must include participants from several parts of the company, as well as from current client organizations. The new system must run on existing hardware, software, and for IOS and Android as well, it should require minimal technical support. It must be easily accessible by citizens, residents, and ministry employees, and be secure from unauthorized users.** |
| *5.0 Analysis of Options and Recommendation*  **There are three options for addressing this opportunity:**   1. **Do nothing. The government's way of reporting problems is doing well, and we can continue without this new project.** 2. **Contract with a third party to the system – security issue.** 3. **We need a new project to make the life of a citizen and a resident easier.**   **Based on discussions with stakeholders, we believe that option 3 is the best option.** |
| *6.0 Preliminary Project Requirements*  **The main features of Balagh system include the following:**   1. **Operating System: IOS and Android OS. The system will operate on IOS and Android in the native languages for each platform to achieve high compatibility and efficiency.** 2. **Users will register and login into the application using their CPRs. And they should provide their emails and phone numbers for necessary contacts. The system will show different windows, one for users and the other for employees. Because of that the app will provide the right services and functionality for each type of user.** 3. **Users will be able to make complaints, suggestions, and inquiries based on the ministry. The user will be able to submit any suggestions and ideas to any ministry he wants by writing the proposal and specifying the concerned ministry only and then submitting the proposal. And they also will be able to send any inquiries about laws of ministries that are not clear to him regarding violations, awareness campaigns, or if he wants to know more about common violations that have been resolved, and so on. And they also will be able to submit any complaint or report, and if they want attach pictures, videos, or documents that related to the complaint.** 4. **Users can contact employees from each ministry to follow their demand state. They will be able to communicate with the employee by two ways live chat between the user and the specialized staff appointed by the ministry, or by sending messages by choosing from the side menu contact team then the session will open to the user to message them. Also, the system will provide an audio call to make if needed.** 5. **Employees will have a content management system called report management to manage the user's complaints, inquiries, and suggestions. The system will provide a separate window for employees only. Therefore, they can use it to accept or reject complaints or even communicate with normal users to inform them of updates.**   **Other features suggested by users if they add value to the business.** |
| *7.0 Budget Estimate and Financial Analysis*  **The preliminary estimate cost for the project will be $2,005,400. The estimation will be based on the project manager that works over 80 hours per week for 9 months and other staff will work of total about 95 hours per week for 9 months. Our target is to involve consumers in the designing process and will not be paid for their assistance. The project manager will earn $75 per hour. The hourly rate for other team members will be $70 per hour. The initial cost estimate will be $1,550,000 for getting software licenses and purchasing services from suppliers. After the project completes the maintenance and updating cost of $20,000 will be included in each year. primarily for any changes to the system should be done by one of the experts who worked on the system to prevent errors.**  **for the government's side, the projected benefits will be based on a reduction of the total cost for each ministry to manage citizens' problems, such as road acceptance, housing problems, and waiting for queues to end ministerial transactions. and increasing overall profits. The projected benefit for our company is selling a license to use Balagh for different governments with $800,000 for each year. if we were able to sell a system license to one government, we can gain $780,000 each year after paying construction dues. A summary of projected costs and benefits is presented in Exhibit A, along with estimates of net present value (NPV), return on investment (ROI), and payback year. This preliminary financial analysis also lists assumptions made. All of the financial estimates are very encouraging. As requested by the sponsor, the payback is estimated to be within 4 years as minimum.** |
| 1. *Schedule Estimate*   **The CEO would like to see the project completed within 9 months,**  **The system will be working in the coming years with continuous development, and it will also be subject to updates. The system does not have a specific consumption time.**  **The team members can deliver the product to the customer on time as possible within the approved budget.** |
| ***9.0 Potential Risks***  **This project carries several risks. Since government considered as an important client so the foremost risk is the product cannot be delivered within the approved delivery date, also there are technical risks because the system must develop for both Android and IOS platforms. Scope creep is a risk that any project could be face it and our project is also exposed to this risk. The main business risk is investing the time and money into this project.** |
| *10.0 Exhibits* |

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| *10.0 Exhibits*   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Discount Rate | | | | 8% | | | | | | Assume project done within 9 months | | | **Year** | | | | | | |  | | 0 | 1 | 2 | 3 | 4 | Total |  | | Costs | | 2,005,400 | 20,000 | 20,000 | 20,000 | 20,000 |  |  | | Discount factor | | 1 | 0.93 | 0.86 | 0.79 | 0.74 |  |  | | Discount costs | | **2,005,400** | **18,519** | **17,147** | **15,877** | **14,701** | **2,071,644** |  | |  | |  |  |  |  |  |  |  | | Benefits | | 0 | 780,000 | 780,000 | 780,000 | 780,000 |  |  | | Discount factor | | 1 | 0.93 | 0.86 | 0.79 | 0.74 |  |  | | Discount benefits | | **0** | **722,222** | **668,724** | **619,189** | **573,323** | **2,583,458** |  | |  | |  |  |  |  |  |  |  | | Discount benefits - costs | | (2,005,400) | 703,703 | 651,577 | 603,312 | 558,622 | **511,814** | NVP | | Cumulative benefits - costs | | (2,005,400) | (1,301,697) | (650,120) | (46,808) | 511,814 |  |  | | Payback in 4 Years | | | | | | | | | | Discount life cycle ROI | | 24.7% | | | | | | | |  | |  | | | | | | | | Assumptions | |  | | | | | | | | Costs | # Hours |  | | | | | | | | PM (2880 hours, $75/hour) | 216,000 |  | | | | | | | | Staff (3420 hours, $70/hour) | 239,400 |  | | | | | | | | Outsourced software and services | 1,55,000 |  | | | | | | | | Total project costs (all applied in year 0) | 2,005,400 |  | | | | | | | | Benefits |  |  | | | | | | | | # Governments | 1 |  | | | | | | | | Benefits from buying licensee | 800,000 |  | | | | | | | | Total project benefits | 780,000 |  | | | | | | | |

## 2.3 Stakeholders register.

Table : Stakeholders register.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Position | Internal/external | Project Role | Contact Information |
| XXX Company | Manager | External | Sponsor | XXX@gmail.com Information |
| Maha Mohammed | Data Analyst | Internal | PM | Maha@gmail.com |
| Fatema Salman | Software tester | Internal | Team member | Fatema@gmail.com |
| Musherah Moqbel | Programmer | Internal | Team member | Musherah@gmail.com |
| Abdallah Aktham | Software architecture | Internal | Team member | Abdallah@gmail.com |
| Noor Jaafar | Designer | Internal | Team member | Noor@gmail.com |

## 2.4 Stakeholder management strategy

Table : Stakeholder management strategy

|  |  |  |  |
| --- | --- | --- | --- |
| Name | Level of interest | Level of influence | Potential Management strategies |
| Government | High | Low | The government has a low impact on this project, but it is interested in it because it will solve big problems for it and will save a lot of effort and money for it. |
| Maha Mohammed | High | High | Maha is the essential project manager and the key to its success. She offers guidance and notes at every stage of the project and regularly tracks the project's development, which is shared by many of the participants. She also has a persistent desire to fulfill all tasks within the scope of the project. Since this is her first project as manager and it will have an impact on her resume, she is indeed interested in the project. |
| Musherah Moqbel | High | High | Musherah is excited to execute this project because she believes that this app is different from the other apps that she programs it before, and it will add a new feature for her knowledge. And she is knowledgeable so she will increase the value of the project. |
| Abdallah Aktham | Low | High | Abdallah has a lot of things on his plate, and he does not seem excited about this project. He may be looking at other job opportunities. Show him how this project will help the company and his resume. |

## 2.5 Project-Charter

Table : Project Charter

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **Project Charter**   |  | | --- | | **Project Title:** Balagh Application  **Project Start Date:** 27 Feb 2023 **Project Finish Date:** 29 Oct 2023 | | **Budget Information:** The company has allocated 2,005,400 USD for this project. distributed to several categories. Changes may happen in case the distribution was not efficient for a category. | | **Project Manager:** Maha Mohammed Maha@gmail.com | | **Project Objectives:** Developed a new application that provide facilitate citizen and resident services and better deal with government agencies increase our company profits by selling the license of balagh system. | | **Main Project Success Criteria:**   * Project should complete within 9 months and with budget no more than 2,005,400 USD. * The project should increase the demand. * Project should pay for his development within 4 years (if only one government bay license). * If the project takes a little longer to complete or costs a little more than planned, the firm will still view it as a success. * System must satisfy the requirements. | | **Approach:**   * A weekly meeting is held to discuss progress of application development. * Survey containing will be conducted and given to all primary stakeholders to gather enough information to develop system functionality. * Involve stakeholders in all project phases. * The data collected during every meeting will be document. * A prototype of the application shall be developed and shown to primary stakeholders to get feedback and discover any additional modifications. * MS project will be used in managing this project. * System will have frequently test to minimize changes and avoid risks. * System must get an overall maintenance every year. | | **Roles and Responsibilities:**   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Name** | **Position** | **Internal/external** | **Project Role** | **Contact Information** | | XXX Company | Manager | External | Sponsor | XXX@gmail.com Information | | Maha Mohammed | Data Analyst | Internal | PM | Maha@gmail.com | | Fatema Salman | Software tester | Internal | Team member | Fatema@gmail.com | | Musherah Moqbel | Programmer | Internal | Team member | Musherah@gmail.com | | Abdallah Aktham | Software architecture | Internal | Team member | Abdallah@gmail.com | | Noor Jaafar | Designer | Internal | Team member | Noor@gmail.com | | | **Sign-off:** (Signatures of all above stakeholders.) | | **Comments:**  “If anyone has a wonder, do not hesitate to ask.” -Maha Mohammed  “For any technical questions, I’m glad to answer it all.”- Abdullah Aktham  “I would like to focus on quality attributes especially useability” - Fatema Salman | |
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| --- |
| 2.6 Summary of First Part In summary, the initiation phase of the Balagh application included identifying the business case and its classifications, registering stakeholders, and understanding their management strategies, and holding a kick-off meeting. This phase was completed when all the necessary information was gathered, and the second phase of the Balagh application was ready to begin. |

# Planning

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| 3.1 Introduction In this phase we will start to plan our project which considered a guide of the execution. To guide execution, we need to make our plan realistic, useful, and executable. However, a fair amount of time and effort should be put in planning since it’s considered the most crucial part in the project management processes. People who knowledgeable about the work need to plan the work. The most important documents to focus on this part are:   * A team contracts. * A project scope statement. * A work breakdown structure (WBS), a key part of the scope baseline. * A project schedule, in the form of a Gantt chart with all dependencies and resources entered. * A list of prioritized risks (part of a risk register).   All these documents should be available for all team members especially the project manage. 3.2 Team contract Refers to an agreement among team members regarding the rules and standards to be followed during the project process. This contract outlines approaches for teamwork and identifies the channels of communication to be used during execution. Many of the rules and guidelines are determined by the project manager, though opinions and suggestions from all team members are also considered in this contract, along with individual time schedules. It serves as a tool for reviewing our progress throughout all phases of the project. |

Table : Team contract content

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| ***Code of conduct:*** as a project team, we will:   * We put possibilities for problems that may occur and develop appropriate solutions to them. * Keeping the work team in constant contact with all project developments. * Selecting the best solutions for the entire project team. |
| ***Participation:*** we will:   * Work honestly and completely during all project activities. * Respect the opinions of others in group work. * Give everyone a chance to participate. * Keep track of all recent developments and think of new ideas. * Have one discussion at a time. * Make the project manager aware if a team member is going to miss a meeting or might have trouble meeting a deadline for a particular task. |
| ***Communication:*** we will:   * We decide as a team on the best way to communicate, which is Microsoft Teams, WhatsApp, and other technologies to help communicate since few team members cannot meet face to face often. * The project manager will hold a meeting via Microsoft Teams and discuss the rest of the tasks in the WhatsApp program. * Hold the meeting together to divide the tasks among the team members, and upon completion of the tasks, the project manager will hold another meeting for discussion every Thursday at 9 pm. * Discussing members' ideas, listening to different opinions, and presenting them clearly and accurately. * Continue to discuss ideas on the right track. |
| ***Problem solving:*** we will   * Encourage everyone to participate in solving problems. * Only use constructive criticism and focus on solving problems, not blaming people. * Strive to build on each other's ideas. * Hold each other accountable for meeting the standers. * Make inquiries to outside resources if needed. |
| ***Meeting guidelines:*** we will:   * Meet more frequently in the first month. * Hold 2-3 other meetings every week. * Record meeting minutes and send them via e-mail within 24 hours of all project meetings, focusing on decisions made and action items from each meeting. |

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| 3.3 Project Scope Management Scope management in project management involves defining and documenting the project's goals, tasks, deliverables, and deadlines, and is considered a critical part of the planning process. It helps to establish clear boundaries for the project and prevent scope creeps, while also ensuring efficient resource management. 3.3.1 Software Process model After analyzing many system models, we came to the conclusion that the iterative model is the best model for our system. This model enables us to concentrate on continuous development and testing cycles, guaranteeing that we get better with each iteration. Our system is huge and complicated, with changing requirements, therefore the iterative model gives us the flexibility to make adjustments and updates as necessary. With the help of this method, we are able to successfully manage the development of our system. 3.3.2 Collecting Requirements Reviewing comparable systems and gaining client input via surveys has shown to be the most efficient method for gathering requirements and advancing our knowledge in this area. We also seek advice from specialists who may have worked on related projects in order to understand the difficulties they encountered during the early stages of development. Our team members can use the requirements we summarize in documents for system development, design, and management. We may acquire insightful feedback and information using this cutting-edge methodology to direct our project in the right direction. 3.3.3 Scope Baseline The scope baseline is an integral part of the project management plan and encompasses the scope statement and work breakdown structure (WBS). It represents the approved version of these components and can only be modified through formal control procedures. The scope baseline serves as a benchmark for comparison throughout the project lifecycle. 3.3.3.1 Scope Statement The scope statement provides a comprehensive overview of the project's deliverables, describing the characteristics and requirements of the final product. It also outlines measurable success criteria and provides a summary of the project. A well-crafted scope statement should capture the overall vision of the project in broad terms. |

Table : Scope Statement Content

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| --- |
| **Project Title:** Balagh Application  **Project Start Date:** 27 Feb 2023  **Prepared by:** Maha Alzouba, Project Manager, [Maha@gmail.com](mailto:Maha@gmail.com) |
| **Project Summary and Justification:**  This project has been approved by the CEO of the company because this project will help to assist the company in meeting its strategic goals. Since our client is a well-known client so his satisfaction will attract more clients for us in the future, which will increase the demand. The budget for the project is $2,005,400. An additional $20,000 will be included in each year for the maintenance and updating after the project is completed. Estimated benefits are $780,000 each year. It is important to focus on the system paying for itself within 4 years of its completion. Profit should increase by 15% after the stakeholder deploys the app. |
| **Product Characteristics and Requirements:**  • Programming Languages: Java for Android and C# for OS systems.  • Interactive System: Allows users to submit inquiries and suggestions through various channels based on the chosen ministry.  • User Submission: Users can submit their inquiries or suggestions and receive email notifications confirming receipt.  • Tools and Benefits: The system includes a content management system to help employees efficiently handle a large number of inquiries and suggestions.  • Language Support: English and Arabic.  • Daily Links Refresh: All links to the ministry systems are refreshed daily.  • System Monitoring: Main data.  • Ministry Employee Accounts: Ministry employees can create separate accounts tied to their respective ministries.  • User Registration and Login: Users can register and login using their CPRs.  • Complaints, Suggestions, and Inquiries: Users can submit, and track complaints, suggestions, and inquiries based on the relevant ministry.  • Contact Ministry Employees: Users can contact employees from each ministry to follow up on their demands.  • Report Management: Employees have access to a content management system called "Report Management" to manage user complaints, inquiries, and suggestions.  • User-Friendly Interface: The system has an intuitive and easy-to-use interface.  • Ease of Learning: Users can quickly learn and understand all functionalities within 2 hours of training, such as watching a how-to-use video.  • Search Feature: The system allows users to search for the relevant ministry to obtain more information or submit a complaint. |
| **Summary of Project Deliverables:**   * Business case. * Project Charter. * Team contract. * Scope statement. * WBS. * Schedule. * Cost baseline. * Progress reports. * Final project presentation. * Final project report. * Lessons-learned.   Report, and any other documents required to manage the project.  The project deliverables are what you want to get from it. It is the result of objective-focused work completed within the project process, All of these deliverables effect in project details investment appraisal, milestones& key dates, Expected benefits, risks, reasons for the project and solution options considered. to get our stakeholders to agree on why we're doing the project, what's in scope at a high level with the project charter, The WBS then provides an overall plan so that the project manager can see how the project should progress and manage the workflow appropriately. we use cost baseline to compare actual expenses to projected expenses at the same point in the project, and evaluate the overall cost performance, also were using weekly progress reports, Gant charts and network diagram. |
| **Project Success Criteria:**   * Project should complete within 9 months and with budget no more than 2,005,400 USD. * The project should increase the demand. * Project should pay for his development within 4 years (if only one government bay license). * If the project takes a little longer to complete or costs a little more than planned, the firm will still view it as a success. * System must satisfy the requirements. If the project takes a little longer to complete or costs a little more than planned, the firm will still view it as a success. * System must satisfy the requirements. |

#### 3.3.3.2 Prepare WBS

Deliverable oriented grouping that works involve defining the total scope. Since the project involves many people and many different deliverables it’s very important to divide the work into logic parts based on how work will be performed. It’s very important because it’s considered as foundation for basis for planning and managing project schedule.

|  |  |
| --- | --- |
| |  | | --- | | 1. **Pre-initiation and initiation**     1. Business Case    2. Stakeholders Register    3. Stakeholders Management    4. Project Charter 2. **Planning**    1. Team Contract    2. **Project Scope Management**       1. Software Process Model and Justification       2. Collecting Requirements Plan       3. **Scope Baseline**          1. Scope Statement          2. Prepare WBS          3. WBS dictionary    3. Statement of Work    4. Project Schedule    5. **Project Time management**       1. Gantt Chart       2. Network Diagram       3. Critical Path Analysis    6. Risk Management Plan    7. Project Communication Management 3. **Execution**    1. **System Requirements**       1. Clarification of Design Purpose       2. Define Quality Attribute Scenarios       3. Define Primarily Functionality       4. List Architectural Concerns       5. Catalog Constraints    2. **Design Process**       1. **Attribute Driven Design**          1. Step 1: Review Input          2. Step 2: Establish The Iteration Goal by Selecting Drives          3. Step 3: Choose One or More Elements of The System to Refine          4. Step 4: Choose One or More Design Concepts That Satisfy the Selected Drivers          5. Step 5: Instantiate Architectural Elements, Allocate Responsibilities, and Define Interfaces          6. Step 6: Sketch Views and Record Design Decisions          7. Step 7: Perform Analysis of Current Design and Review Iteration Goal and Architecture of Design Purpose          8. Iterate    3. **Application Prototype** 4. **Monitoring and Controlling**    1. Progress Report    2. Milestone Report    3. Request for Proposal    4. Team Performance Assessment    5. Change Requests 5. **Closing**     1. Lessons Learned | |

#### 3.3.3.3 WBS dictionary

The WBS dictionary is a detailed document that complements the WBS, providing information about each work package in the project. It is a component of the scope baseline in project management and includes details such as work package ID, name, description, responsible party, dates, resources, dependencies, risks, cost estimates, quality requirements, and acceptance criteria.

Table : WBS Dictionary for item number 3.3.1

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| WBS Dictionary Entry October 26 |
| **Project Title:** Balagh Citizen Management System |
| **WBS Item Number**: 3.3.1 |
| **WBS Item Name:** Interface Design and Development |
| **Description:** interface design and development are a crucial component of our project's Work Breakdown Structure (WBS). In this phase, we prioritize designing the user experience (UX) and user interface (UI) using the powerful Figma tool. With its latest features and functions, we aim to develop a modern and user-friendly interface for our system.  Our design approach follows reputation design principles and consistency, ensuring that the system is visually appealing and easy to use for citizens of different ages. We leverage Figma's collaboration features to facilitate efficient communication and feedback loops during the design and development process. This allows us to create interactive prototypes, conduct usability testing, and iterate on the design until it meets the highest standards of usability and aesthetics.  Our goal is to create an intuitive and efficient user experience that instills trust and confidence in our system. By prioritizing reputation design principles and consistency, we aim to create an interface that is visually appealing, user-friendly, and accessible to all users. With Figma as our tool of choice, we are equipped to design and develop an interface that meets the needs of our diverse user base. |

## 3.4 Statement of Work

The statement of work (SOW), which describes a project's scope, goals, deliverables, and deadlines, is an essential document. It acts as a legal contract between the parties involved in the project, supplying a structure for project planning, execution, and monitoring. By setting up shared understanding among stakeholders, managing scope, and outlining clear expectations, a well-written and thorough SOW is crucial for guaranteeing project success. Being clear, succinct, and explicit, employing measurable objectives and deliverables, and outlining roles and duties are all best practices for developing an effective SOW.

|  |
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| Statement of Work (SOW)   1. **Scope of Work:** Our solution will be made to work on mobile devices running the iOS and Android operating systems. Java and C# will be used as programming languages. To improve the system's usability and engagement, we will also hire an expert designer. As a result, both ministry employees and regular citizens will use the system. 2. **Location of Work:** Our work will be carried out on desktop computers equipped with the necessary resources for system development, such as an Intel Core i5 CPU or higher. As our system is designed for mobile platforms, we do not require a high-end GPU, and the infrastructure needed for development is not extensive. 3. **Period of Performance:** Our work will be done at the firm facility, which is furnished with all the tools that our developers and designers need. During the following 9 months, up until October, the weekly work hours will be set at 50, and each team is expected to adhere to its work plan as laid forth in the calendar. 4. **Deliverables Schedule:**  * **Initiation Stage –** complete within 10 days * **Project Scope Management –** complete within two months * **Project Time Management –** complete within two weeks * **Risk Management Plan –** complete within one week * **Project Communication Management –** at the beginning of planning phase  1. **Applicable Standards:**  * Code of Conduct: Staff members are expected to abide by the company's code of conduct, which establishes standards for moral conduct, professionalism, and integrity at work. * Workplace Safety: Workers are required to abide by all corporate safety policies, such as emergency protocols, correct equipment usage, and adherence to occupational health and safety laws. * Data Privacy and Confidentiality: Workers are accountable for maintaining the privacy and confidentiality of client and corporate data, which includes adhering to information security guidelines and data handling practices. * Work Hours and Attendance: Workers must follow the company's work hours, punctuality, and attendance regulations, as well as the processes for requesting time off and taking leave. * Effective communication and collaboration are expected of employees, including the use of company communication tools, professional communication, and teamwork standards.  1. **Acceptance Criteria:** To ensure user satisfaction, several acceptance criteria need to be considered for our system. Firstly, as our system will be used by governments to facilitate application processes for citizens, it must be compatible with different devices and deliver high performance. Additionally, the system must support scalability to accommodate a large number of users, given the high population it will serve. 2. **Special Requirements:** To ensure effective development and avoid potential issues, our team must have a minimum of 5 years of experience in mobile development. Additionally, our team members must have workstations with Windows 10 and at least an Intel Core i5 CPU. These requirements are crucial for the successful development of our system and ensuring that our team has the necessary expertise and resources to deliver a high-quality end product. |

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| 3.5 Project Schedule In project scheduling we break our project into five phases: pre-initiation, initiation, planning, execution, monitoring and controlling, and finally closing. For each stage we are required to perform some tasks and process in order to manage our project and achieve progress within a given timeframe while we are working on our system. However, for each stage we require some deliverables in order to move for the next phase.  **Pre-initiation**: system idea chosen within this stage of project management we try to use different techniques such as brainstorming session including all teams’ members and project sponsor. on other word, we try to develop a high-level of understanding for the system and conduct a feasibility study.  **Initiation**: a kick-off meeting was conducted with team members and stakeholders. Roles and responsibilities were assigned, and the project charter was developed. Additionally, the stakeholder registry and management were confirmed to ensure proper stakeholder engagement throughout the project.  **Planning**: a team contract was established, and project scope management and time management were defined through the creation of a statement of work and project schedule estimation. Project communication management and risk management plans were developed, and a comprehensive project work plan was formulated.  **Execution**: The system requirements, design process, and application prototype are the three primary stages of this phase. System-level criteria, quality attribute scenarios, core functionality, cataloging limitations, and a clear design goal are all part of the system requirements stage. The design stage is organized into seven steps by the Attribute Driven Design (ADD) methodology. These steps are reviewing inputs, setting iteration goals, selecting system components to improve, choosing design concepts, instantiating architectural elements, assigning responsibilities and defining interfaces, sketching views and recording design decisions, analyzing the current design, and reviewing iteration goals.  **Monitoring and Controlling**: This phase involves tracking progress, comparing actual progress with planned progress, identifying deviations, and taking corrective actions as needed. It also includes monitoring risks, managing changes, and maintaining communication with stakeholders.  **Closing**: This phase involves formalizing project completion, conducting final reviews, documenting lessons learned, and archiving project information. It also includes celebrating project success and conducting post-project evaluations. |

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## 3.6 Project Time Management

The project time management process is crucial for tracking time and money, though it can be lengthy. For this project, we utilized MS Project to generate the Gantt Chart and Network Diagram using WBS data. Task durations were determined based on past projects and a team meeting where assignments were discussed and decided upon. The ultimate goal is to provide instructions on how to manage the project schedule throughout its lifecycle.

The team members came together to define and describe the digital tasks that need to be completed, which marked phase one of the process - identifying activities. As the team members are responsible for executing the tasks, it was agreed that all members should be involved in this process. Next, the team organized the tasks in the correct sequence to make the best use of project resources and deliver the project promptly to the sponsor. Finally, the schedule was developed as the last step, with the team integrating risks, scope, and other project-related elements into the schedule.

### 3.6.1 Gantt Chart

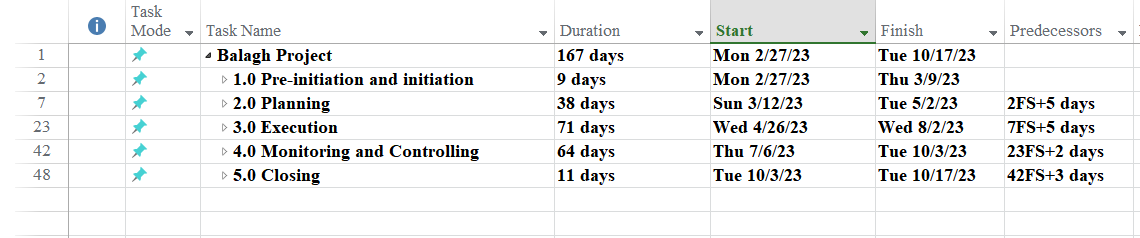
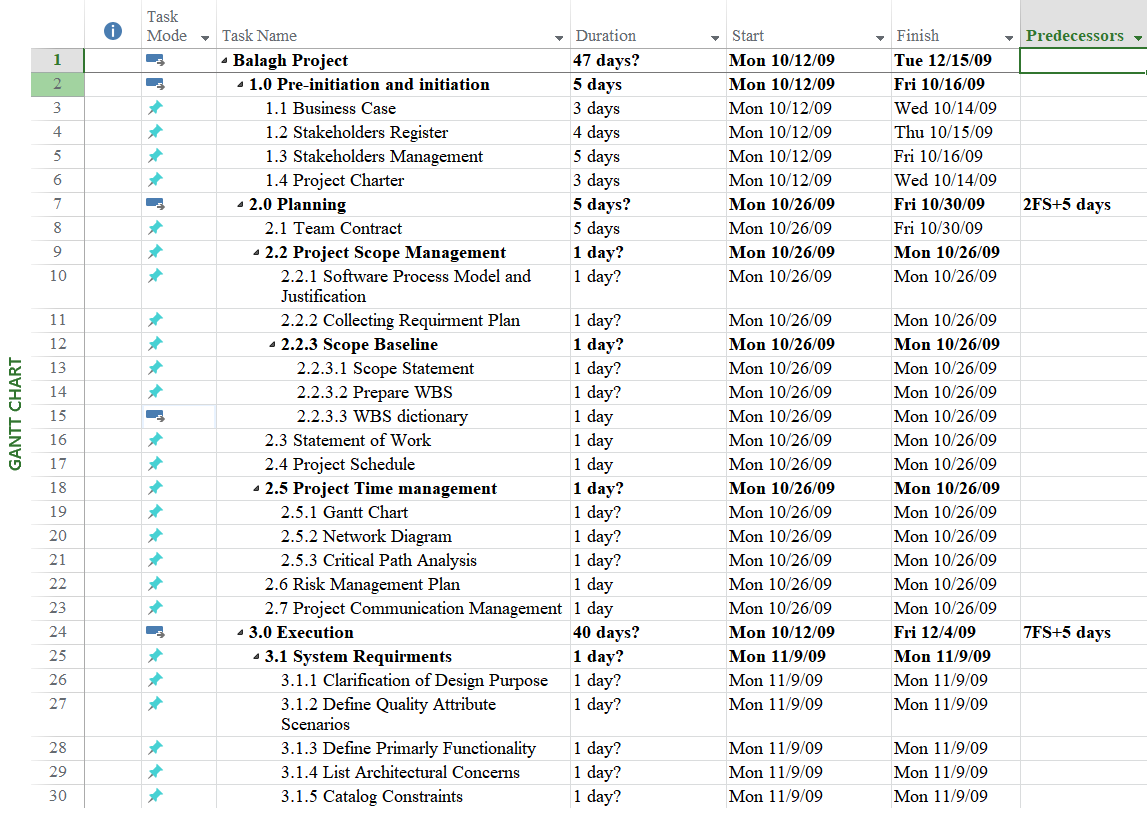


Figure : Gantt Chart showing all project phases and some details in general



Table

Description automatically generated

Figure : Gantt Chart showing all project phases and details

### 3.6.2 Network Diagram

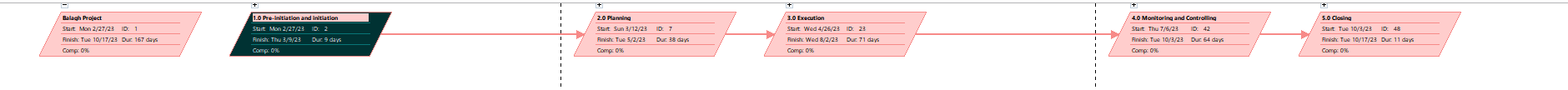


Figure : Network Diagram for Balagh System

A picture containing text

Description automatically generated

Figure : Detailed Network Diagram

## 3.7 Risk Management Plan

The main business risk is investing the time and money into this project.

Table : potential project risks

|  |  |
| --- | --- |
| **Ranking** | **Potential risk** |
| 1 | Can’t realizing the required profit. |
| 2 | Security of new system |
| 3 | Unclear requirements. |
| 4 | Cannot deliver the product within the approved delivery date. |
| 5 | Technical risks. |
| 6 | Scope creep. |
| 7 | Providing an efficient taking picture feature |
| 8 | Realizing the benefits of the new system within 4 years |

A risk management plan defines how the project's risk management process will be executed. That includes the funds, tools and approaches that will be used to perform risk identification, assessment, mitigation, and monitoring activities.

**Methodology**  
Risk management will be implemented by monitoring the details of the project's production, where small mistakes are screened to avoid any adverse impact on the project implementation process, Perform tests on a continuous basis for each execution process, and periodically set times for doing this process, Reporting progress to the project director and other team leaders in status report meetings, Maintaining the official project documentation using SWOT analysis, Probability and Impact Matrix and brainstorming.

**Roles and responsibilities**

Table : Roles and Responsibilities

|  |  |
| --- | --- |
| **Role** | **responsibilities** |
| Project Manager | Ultimately responsible for overseeing all aspects of the project, including risk management. Moreover, he is creating and maintaining risk management plan and tracking its progress. |
| Risk Manager | Responsible about identifying, analyzing, evaluating different risks may occurs during the development progress by putting strategies and monitor risk events. |
| Project Team Members | Team members who are assigned specific tasks related to risk management are responsible for implementing those tasks and providing deliverables. |

**Budget and schedule**

The level of importance for each risk varies, the budget for each risk will be estimated according to its level, The budget determines the expected cost of the risk management operations and the related risk response plans, including contingency reserves, The scheduling outlines how frequently and when within the project timeline risk management operations will be carried out.

**Risk categories**

Table : Risk Categories

|  |  |
| --- | --- |
| **Typical Risk Categories** | **Description** |
| Technical | Technology, quality requirement, performance. |
| Organizational | Project duration, cost. |
| External | Citizen interest or involvement |
| Environmental | Environmental laws, licenses, and permits |

**Risk probability and impact**

Probability and impact are independent variables, Methods for recording quantitative and qualitative risk analyses to avoid personal bias, establishing a common standard for determining different levels of risk likelihood and impact, and analyzing and responding objectively to risks should be predetermined, Risk impact is the effect on project objectives if the risk event occurs, This helps determine which risk events should be managed most aggressively, and the level of effort and investment that is justified, Using probability and impact matrix technique simplifies applying different policies (and hence effort and resources) according to the level of the risk's RS. For example, risks rated as "red" may require review at every weekly status meeting, while "green" risks may be reviewed only monthly, or on a less frequent, rotating basis.

**Revised stakeholders’ tolerances**

Stakeholders may be willing to revise their tolerance for risk when a windfall opportunity presents itself. By temporarily suspending normal risk thresholds, the organization will have the agility to respond. Such variances from the normal thresholds should be clearly decided and communicated.

**Tracking**

1. Communicating risks to all affected [Stakeholders](http://acqnotes.com/acqNote/stakeholdersprogram-manager),
2. Monitoring risk mitigation plans,
3. Reviewing regular status updates,
4. Displaying risk management dynamics
5. Tracking risk status within the [Risk Reporting Matrix](http://acqnotes.com/acqNote/risk-reporting-matrix)

The goal of the documentation is to make sure management has access to all the information it needs to make timely and informed choices. It includes all plans and reports for the PM, decision authority, and reporting forms that may be internal to the program. This enables resource allocation, consistent, disciplined strategy, and action coordination by the risk team.

**Risk documentation**

* Risk breakdown structure
* Risk register
* Templates

|  |
| --- |
| **Risk Register**  **• No.:** R1  **• Rank:** 1  **• Risk:** Required profit  **• Description:** The required profit was not achieved when completing the project  **• Category:** Organizational (Cost Management)  **• Root cause:** In the planning cost they didn’t estimate well  **• Triggers:** Lack of the cash flow.  **• Potential responses:** Borrowing to pay off the fiscal deficit and pay it within three months.  **• Risk owner:** Project manager  **• Probability:** Low  **• Impact:** High  **• Status:** Mitigated since it may occurrence due to lack of buyers that may choose our system.  **• No.:** R2  **• Rank:** 2  **• Risk:** Protect Security  **• Description:** The new system will be insecure for user data  **• Category:** Security  **• Root cause:** Personal usage on the system due to the unauthorized access to GUI  **• Triggers:** Lack of awareness of users and security information’s.  **• Potential responses:** perform some conferences to leverage the understand of the important of security and how you protect your information.  **• Risk owner:** Project manager  **• Probability:** Medium  **• Impact:** High  **• Status:** Depending on the user, if he has a enough information about security he will be secure.  **• No.:** R3  **• Rank:** 3  **• Risk:** Requirement.  **• Description:** Lack of clarity in requirements.  **• Category:** Technical.  **• Root cause:** Poor communication skills with the customer.  **• Triggers:** Due to the difficulty of communicating with the customer, it was difficult to collect and analyze the requirements, which led to unclear requirements and misunderstandings.  **• Potential responses:** Discussing the project manager to communicate with the client and arranging another meeting with him and discussing his requirements again in a clearer way and analyzing them.  **• Risk owner:** Project manager.  **• Probability:** Medium.  **• Impact:** High.  **• Status:** Mitigated since the project manager does not start working on the project until he is sure of the client's requirements.  **• No.:** R4  **• Rank:** 4  **• Risk:** Approval date.  **• Description:** The expected time for the project has expired without being completed.  **• Category:** Organizational (Time Management).  **• Root cause:** planning process.  **• Triggers:** There may be a problem in one of the phases of project management, such as a change in requirements, a problem in executing the project plan, a problem with one of the important team members, etc. Which will lead to a delay in delivering the project on time.  **• Potential responses:** The project manager holds a meeting with the client to discuss the delivery of the project and give the team additional time to complete the project and deliver it. Also, the project manager holds another meeting with the team members to divide the remaining tasks intensively among the team members to complete the project as soon as possible.  **• Risk owner:** Project manager and team members.  **• Probability:** Low.  **• Impact:** High.  **• Status:** Closed, as this risk is considered one of the biggest and most important risks that may occur. Therefore, the project manager and team members plan the project plan very accurately to deliver it on time and meet the needs of the client.  **• No.:** R5  **• Rank:** 5  **• Risk:** Resource constrain.  **• Description:** limited availability of skilled resources.  **• Category:** Human Resource  **• Root cause:** low qualified staff, lack of experience  **• Triggers:** Project team members leaving the project, resource unavailability.  **• Potential responses:** resource allocation planning, give training courses for new employees to keep up with new technologies.  **• Risk owner:** Project manager  **• Probability:** High  **• Impact:** High  **• Status:** The risk is currently happened and require solving in fastest way as possible since it will affect the due date of the overall project or may change the time completion. |

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## 3.8 Project Communication Management

One of the critical plans that must be developed during the project's planning phase is a communication management plan. The primary goal of this plan is to define the frequency and the way to communicate among project stakeholders. It is critical to maintain a direct communication with the project's sponsor every two weeks. The purpose of these meetings is to keep track of the project procedure, review the project status, and discuss any potential issues to ensure that the project meets the specified requirements and needs. Besides that, weekly meetings among project members are required to distribute tasks among the entire group members to continue working on the remaining phases of the project and avoid any potential delays.

1. **Stakeholder communications requirements:**

Effective stakeholder communication and requirements gathering are essential for the success of our project. After negotiating with our stakeholders, we discovered that they prefer to use MS Teams as the communication tool due to its user-friendly interface and ease of use. Additionally, MS Teams requires minimal resources, making it a practical choice for our project. For informal communication, we have chosen WhatsApp as the platform, while official work and meetings will be conducted on MS Teams. This strategic choice allows us to efficiently communicate with stakeholders, gather requirements, and ensure smooth collaboration throughout the project, while also providing a user-friendly experience for all involved parties.

1. **Communications summary:**

* Microsoft Teams for formal communication, WhatsApp for informal communication
* Stakeholder feedback and glossary for reference
* Revision procedures and version control in place
* Project manager overseeing communication and escalation procedures.

Table : Communication Methods and Tools

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Communication Goal** | **Communication Tool** | **Audience** | **Frequency** | **Owner** |
| Review the application development plan | In-person meeting | Project team sponsor, project team member and project manager | Every two weeks | Project manager |
| Team Standup | Virtual meeting (MS Teams) | Project team member, and project manager | Daily | Project manager |
| Project review | Email/call | Project team sponsor, project manager, and stakeholders | Monthly | Project manager |
| Project completion | In-person meeting | Project team sponsor, project manager, and stakeholders | Monthly | Project manager |

1. **Comments/Guidelines:**

* Official communication for the project will be conducted through MS Teams, which offers a user-friendly interface and efficient resource utilization.
* For informal updates and quick communication, we will use WhatsApp as the preferred platform.
* All stakeholders are encouraged to actively participate in communication channels and provide feedback to ensure smooth collaboration.
* Regular project updates, progress reports, and meeting agendas will be shared via email and MS Teams.
* Timely responses to communication threads and emails are expected to maintain effective communication flow.
* All stakeholders must contribute to the communication process to achieve project deliverables.

1. **Escalation procedures for resolving issues:**

* In case of any communication issues or conflicts, the parties involved should attempt to resolve them through direct communication and collaboration in a professional and respectful manner.
* If an issue cannot be resolved through direct communication, it should be escalated to the respective team leads or project manager for intervention.
* The project manager will review the issue, gather relevant information, and facilitate discussions among the stakeholders to find a resolution.
* If the issue remains unresolved at the team level, it will be escalated to the project sponsor or other relevant stakeholders for further assistance.
* If necessary, the project sponsor or senior management will provide guidance and take appropriate actions to resolve the issue in a timely manner.
* Regular follow-up and communication will be maintained until the issue is resolved, and all parties are satisfied with the outcome.
* Documentation of the issue, escalation, and resolution process will be maintained for future reference and improvement of communication practices.

1. **Revision procedures for this document:**

* This document on project communication will be reviewed and updated periodically to ensure its accuracy and relevance.
* The project manager or designated team member will be responsible for initiating and overseeing the revision process.
* Any feedback, suggestions, or comments from stakeholders regarding the document's content, clarity, or effectiveness are welcome and should be communicated to the project manager.
* The project manager will review the feedback and assess the need for revisions based on the project's evolving requirements, communication challenges, or stakeholder inputs.
* The revised document will be circulated to all relevant stakeholders for review and feedback.
* Any approved changes to the document will be documented and implemented promptly, and the updated version will be shared with all stakeholders.
* The project manager will ensure that all team members are aware of the revised procedures and comply with the updated guidelines in their communication practices.
* Documentation of revision history and version control will be maintained for reference and audit purposes.

1. **Glossary of common terminology:**

**Stakeholders**: Individuals or groups who have an interest or stake in the project, including sponsors, clients, team members, and other relevant parties.

**MS Teams**: Microsoft Teams, a collaboration platform used for online communication, file sharing, and virtual meetings.

WhatsApp: A popular instant messaging application used for informal communication and quick updates.

**Communication Channels**: The various methods and tools used for communication within the project, such as email, messaging apps, meetings, and documentation.

**Escalation**: The process of raising an issue to a higher authority or management level for resolution when it cannot be resolved at the team level.

**Project Manager**: The individual responsible for planning, executing, and controlling the project, including communication management.

**Revision**: The process of reviewing, updating, and modifying the document to ensure its accuracy and relevance.

**Version Control**: The practice of tracking and managing changes to a document to maintain a history of revisions and ensure the use of the latest version.

**Documentation**: Written records, reports, and other written materials related to the project, including communication logs, meeting minutes, and progress reports.

**Guidelines**: The set of rules, instructions, or recommendations that govern the project communication practices, ensuring consistency and effectiveness.

## 3.9 Summary of Second Part

During this project phase, the team has accomplished several key tasks. A team contract was established to define roles, responsibilities, and expectations. Project scope was effectively managed, ensuring that project objectives were met. Time management was implemented, including scheduling and tracking of project activities. A comprehensive risk management plan was developed to identify and mitigate potential risks. Project communication was managed through established channels and guidelines, promoting effective communication among team members and stakeholders. These accomplishments have laid the foundation for a successful project execution, with a focus on collaboration, efficiency, and risk mitigation.

# 4. Executing

The phase of execution is a cornerstone of the project management process where the project team must take essential measures to actualize the tasks defined in the project plan. This stage involves the creation of the tangible outputs, intangible services, or consequential results of the project, and usually necessitates the allocation of the most resources to achieve. The execution phase necessitates coordinating and guiding members of the project team, managing resources, and communicating with stakeholders to ensure that the project is advancing in alignment with the plan. To maintain the project's alignment and address any issues or modifications promptly, project managers must closely observe the execution phase.

Table : Executing Process and Outputs.

|  |  |  |
| --- | --- | --- |
| Knowledge Area | Executing Process | Outputs |
| *Project Integration Management* | Guide and manage project work | Deliverables  Work Performance Data  Change Requests  Project Management Plan Project document Updates |
| *Project Quality Management* | Perform Quality Assurance, Control Quality | Quality Management Plan  Quality Metrics  Quality Checklists  Work Performance Data  Change Requests |
| *Project Human Resource Management* | Acquire Resources, Develop Team, Manage Team | Project Staff Assignments  Resource Calendars  Team Performance Assessments  Change Requests  Project Management Plan Updates |
| *Project Communications Management* | Manage Communications | Project communications  Project documents updates Project management plan updates  Organizational process assets updates |
| *Project Procurement Management* | Conduct Procurements, Control Procurements | Procurement Management Plan  Resource calendars Change requests Project management plan updates  Project Management Plan Updates |
| *Project Stakeholder Management* | Manage Stakeholder Engagement, Identify Stakeholders | Stakeholder Register  Stakeholder Management Plan  Issue Logs  Change Requests  Project Management Plan Updates |

## 4.1 System Requirements

### 4.1.1 Design Purpose

As technology continues to permeate every aspect of our daily routines, it serves as an ever-increasing conduit between users and systems. Balagh System stands to revolutionize our lives, providing stiff competition to other systems. By enabling citizens and residents to report issues or errors, seek information, offer suggestions, and interact with decision-makers across various ministries, Balagh application offers significant potential to enhance our quality of life. User submissions are sorted based on the number of ministry employees, with designated staff handling each request, ensuring that the app offers custom made solutions to users.

The Balagh System is comprised of four primary components: Account, Services, Contact, and Complaints Management. Users can create accounts and register using CPRs, while basic users must provide their email addresses and phone numbers for contact purposes. The app interface provides dedicated windows for employees and users, offering customized services and functionalities for each user category.

The Services component encompasses the central functionalities the system provides to citizens and residents, empowering them to submit suggestions, seek information, and report complaints. Contact feature bridges communication between users and ministry employees, facilitating swift resolution of issues, provision of solutions, and responses to inquiries and suggestions.

Complaints Management feature is designed specifically for employees, enabling them to oversee and categorize a multitude of submissions based on demand status and type. In addition, employees can leverage the Report Management content management system to manage user complaints, inquiries, and suggestions efficiently.

### 4.1.2 UML Model

Diagram

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Figure : Balagh System UML Model

### 4.1.3 Define Quality Attributes Scenarios

|  |  |
| --- | --- |
| **UC-1 Login** | To ensure the security of the system, citizens and residents must provide their CPR and mobile number upon logging in. A one-time password (OTP) is then sent to their registered mobile number to authenticate their access. Once successfully authenticated, users can proceed to report issues, seek information, or avail any services offered by the app. On the other hand, Employees are required to enter their CPR and ID number for system access. |
| **UC-2 Register** | To access the system, end-users such as citizens, residents, and ministry employees must create an account by registering. The registration process requires employees and residents to enter their CPR number, email address, and mobile phone number. However, the specific registration requirements for ministry employees may vary. In such cases, they are required to enter their ministry name, CPR number, and mobile number to activate their account.  Once the account is activated, users can log in using their CPR number and password for citizens or their ID number and mobile number for employees. It is recommended that users remember their login credentials for future use. |
| **UC-3 Suggestions** | Users can submit their suggestions and ideas to any ministry of their choice by writing a proposal and specifying the relevant ministry. Once the proposal is complete, it can be submitted to the concerned ministry for consideration. |
| **UC-4 Inquiry** | Both citizens and residents can send inquiries through the system regarding unclear laws or regulations, violations, awareness campaigns, or any other related matter. To do so, users can click the "+" button, select the "Inquiry" option, and then proceed to write and submit their inquiry through the system. This feature enables users to seek relevant information and clarification from the concerned ministries. |
| **UC-5 Complaint** | Users can submit their complaints or reports to any ministry of their choice through the system. To do so, users must specify the relevant ministry, identify the location of the violation, and provide a description of the complaint. In addition, users have the option to attach pictures, videos, or documents to support their report. This feature enables users to report any violations or issues they encounter, ensuring that the relevant authorities can take appropriate action. |
| **UC-6 Live Chat Contact** | Users can engage in a live chat with the specialized staff appointed by the relevant ministry to discuss their complaint or suggestion and track its progress or status. To do so, users can select the relevant ministry and then choose the live chat option. This feature enables users to communicate directly with the designated employee and receive updates on the status of their complaint or suggestion. |
| **UC-7 Customer Services Contact** | If a user encounters any problems while using our system, they can easily contact our support team for assistance. Users can select the "Contact Team" option from the side menu, and a chat session will open where they can message us. Additionally, the system provides an audio call option to make it even easier for users to communicate with our support team and resolve any issues they may be experiencing. |
| **UC-8 Complaints management** | The system will have a dedicated window for employees of different ministries to manage various inquiries, complaints, and suggestions. This window will only be accessible to employees who are registered in the system. They can accept or reject complaints and inquiries, as well as communicate with normal users to provide updates or information. |

### 4.1.4 Quality Attribute List

Table : Quality Attribute List

|  |  |  |  |
| --- | --- | --- | --- |
| **QA-1** | Useability | Users can use the system with ease after only 15 minutes of training, and they can create complete complaints, suggestions, or inquiries without any help from trainers. Similarly, employees can understand the functionality of the system and how the CMS works in less than three hours. | **All** |
| **QA-2** | Performance | The system is capable of transferring and collecting user information within 3 seconds and presenting it to the relevant employee in the corresponding ministry. | **UC-8** |
| **QA-3** | Security | The system will utilize strong cryptography through the RSA algorithm to ensure that unauthorized individuals are unable to access the information of registered users. | **UC-1** |
| **QA-4** | Modifiability | The system has been designed with modularity in mind, which allows developers to easily add new functionalities in the future. Each portion of the system is independent, so any changes or modifications can be made quickly and cost-effectively without affecting the overall functionality of the system. | **All** |
| **QA-5** | Portability | The system will have a mobile application architectures designs, and will be run in Android OS and IOS to serve as many users as possible and the source code of the system was designed to move from one platform to another with small changes. | **All** |
| **QA-6** | Availability | The system will be able to work 24/7 because it has different backup servers, so when one has a problem the second one will work, and the first one will try to fix the problem and it will restart without losing any data. | **All** |
| **QA-7** | Scalability | The system was able to handle more than 4000 concurrent users, and the type of infrastructure accepts any development in hardware and software for next improvement. | **Uc-7** |
| **QA-8** | Safety | The system will display an error message if the user attempts to submit a duplicate report with identical information within the same week. This is to allow the ministries to address the issue, and if no response is received, the user will be able to submit the report in the following week. | **UC-3,**  **UC-4,**  **UC-5** |

### 4.1.5 Catalog Constraints

Table : Catalog Constraints

|  |  |
| --- | --- |
| **ID** | **Constraint** |
| **CON-1** | Flutter will be used to develop the mobile application, which will support both iOS and Android operating systems. |
| **CON-2** | The system is designed to handle a large number of users, approximately 30,000 users simultaneously, and ensure they receive a good user experience. This will lead to improved system performance. |
| **CON-3** | The system will store all events from the last 30 days to ensure that any issues or errors can be handled effectively, even if a user's complaint or report has been lost. This data retention policy will ensure that important information is not lost and can be retrieved as needed. |
| **CON-4** | The system modifications will be carried out only during off-hours to avoid any disruption in user experience. Additionally, users will be informed beforehand of any maintenance work that needs to be done. |
| **CON-5** | The system will have multiple backup servers to ensure high availability and prevent any interruptions or data loss in case of errors or problems. This will help to maintain a seamless user experience and avoid any inconvenience for the users. |
| **CON-6** | The system should be designed to support cross-platform compatibility, meaning it should be accessible on various platforms including mobile, to provide the users with flexibility in accessing the system. |

### 4.1.6 Priority List

Table : Priority List

|  |  |  |
| --- | --- | --- |
| **Scenario ID** | **Importance to the customer** | **Difficulty of implementation according to the architect** |
| **QA-1** | high | medium |
| **QA-2** | high | high |
| **QA-3** | medium | low |
| **QA-4** | high | high |
| **QA-5** | medium | medium |
| **QA-6** | high | high |
| **QA-7** | high | high |
| **QA-8** | medium | low |

### 4.1.7 Concerns

Table : Concerns

|  |  |
| --- | --- |
| **ID** | **Concerns** |
| **CRN-1** | Interduce working hours for the development team within the first day of starting the project and allocate the work. |
| **CRN-2** | The development team assigned to the project must possess expertise in various programming languages and frameworks, such as, libraries, Java for Android, and C# for iOS platforms. This is necessary to meet the requirements of the project and develop the system effectively across multiple platforms. |
| **CRN-3** | We need to create a preliminary system structure, which will help us to quickly define the system requirements and provide stakeholders with a tangible system to test. |

## 4.2 Design Process

### 4.2.1 Attribute Driven Design

#### 4.2.1.1 Step1: Review Inputs

### 4.2.2 Iteration 1: Establishing an Overall System Structure

#### 4.2.2.1 Step 2: Establish Iteration Goal by Selecting Drivers

This is the initial design iteration of a new system, and the main goal is to address the architectural concern CRN-3, which is to establish the overall system structure as outlined in section 2.4. While the iteration is primarily focused on this architectural concern, the architect must also take into account all other factors that may impact the system's overall structure. This includes being mindful of the following:

Table : factors that may impact the system's overall structure

|  |  |
| --- | --- |
| **Category** | **Details** |
| Design purpose | This is a greenfield system from a mature domain. The purpose is to produce a sufficiently detailed design to support the construction of the system. |
| Primary functional requirements | From the use cases presented in Section 2.1, the primary ones were determined to be:  UC-3: Because it directly supports the core business.  UC-4: Because it directly supports the core business.  UC-5: Because it directly supports the core business.  UC-8: Because it directly supports the core business. |
| Quality attribute scenarios | The scenarios were described in Section 2.2 They have now been prioritized (as discussed in Section 2.2.1) as follows:   |  |  |  | | --- | --- | --- | | Scenario ID | Importance to the customer | Difficulty of implementation according to the architect | | QA-1 | high | medium | | QA-2 | high | high | | QA-3 | medium | low | | QA-4 | high | high | | QA-5 | medium | medium | | QA-6 | high | high | | QA-7 | high | high | | QA-8 | medium | low |   From this list, only QA-2, QA-4, QA-6, and QA-7 are selected as drivers. |
| Constraints | All the constraints discussed in Section 2.3 are included as drivers. |
| Architectural concerns | All the architectural concerns discussed in Section 2.4 are included as drivers. |

QA-2: Performance

QA-4: Modifiability

QA-6: Availability

QA-7: Scalability

CON-1: Flutter will be used to develop the mobile application, which will support both iOS and Android operating systems.

CON-4: The system modifications will be carried out only during off-hours to avoid any disruption in user experience. Additionally, users will be informed beforehand of any maintenance work that needs to be done.

CON-5: The system will have multiple backup servers to ensure high availability and prevent any interruptions or data loss in case of errors or problems. This will help to maintain a seamless user experience and avoid any inconvenience for the users.

CRN-2: The development team assigned to the project must possess expertise in various programming languages and frameworks, such as, libraries, Java for Android, and C# for iOS platforms. This is necessary to meet the requirements of the project and develop the system effectively across multiple platforms.

Diagram

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Figure : Overall System Structure

#### 

#### 4.2.2.2 Step3: Choose One or More Elements of the System to Refine

Once again, as this is a greenfield development effort, the element being refined is the entire Balagh system. Refinement in this case is achieved through decomposition.

#### 4.2.2.3 Step 4: choose one or more design concepts that satisfy the selected Drivers.

Table : Design Concepts

|  |  |
| --- | --- |
| **Design Decisions**  **and Location** | **Rationale** |
| Logically structure the client part of the system will be **Mobile application** reference architecture. | The mobile application reference architecture will help the client to access from different OS such as Android OS and IOS **(CON-1)** to have a rich client interface and it will help the poor devices to access to our system. Therefore, the application will be accessible everywhere through the internet. On the other hand, we can use mobile application architecture to handle devices that help different clients to access systems from different platforms.  This capability will help to archive **(QA-5).** |
|  | **Discarded alternatives:**   |  |  | | --- | --- | | **Alternative:** | **Reason for Discarding:** | | Rich Internet  applications  (RIA) | A rich user interface running inside a browser considers the role of this reference architecture, it very useful for loading time but the reason for discard them is that plug-in execution environments may not be available in all platforms which contradicts with our (CON-1). | | Rich Client Application (RCA) | Rich client application that downloads into user machine and this interface will provide high-performance, interactive rich user experience. Therefore, the reason for discarding this reference architecture is that the system works with no network connectivity, and this will affect user experience and availability **(QA-6)**, since client data is sent by internet connection in our system. | |
| Logically structure  the server part of  the system using the  **Service Application**  reference architecture | Reference architecture does not support interface and it is expose services for other applications, so it is very helpful to use it with our application.  No other alternatives were considered and discarded since this architecture is applicable to work with different reference architecture at the same time and it is considered by architect. |
| Physically structure  the application  using the **Load-Balanced Cluster** | Using the Load-Balanced Cluster pattern, the workload is distributed across multiple servers, client requests will be received by the load balancer which redirects them to the various servers according to their current load. Therefore, this deployment model will play an important role in **(QA-6)** and **(QA-2)** and distribute the load over different servers this will help achieve **(CON-2)(CON-4).** Moreover, reference helps in maintaining security since the data will be resident of the separate tires, so this will improve achieving of **(QA-3).** Other alternatives were discarded such as **two-tire** **three-tire** or **four-tire** deployment they support security, but they are not applicable with our solution because our system deal with a high amount of load and the same time our system must support availability, so we require deployment that oversee a high number of users. |
| Build the user interface of the client application using the **Dart Language** and other  **Dart libraries** and **flutter framework**. | Since dart language can be used to develop mobile applications, we can use it to develop our system to satisfy **(CON-1)** and **(CRN-2).**  Other alternatives were discarded because we would like to develop a system that is a cross platform which works on mobile applications **(QA-5)** and for this reason it was discarded**.** |
| Deploy the application  using the **mobile start technologies** | Access application will be obtained through mobile applications (Android OS and IOS) .Mobile will be able to run system with high portability **(QA-5)**, also since system is divided into portions this will support **(QA-4)** and **(CON-4).**  The alternative would be using of applets but the low capability of this type of architecture will negatively affect the system security, performance, and safety of our system. |

#### 4.2.2.4 Step 5: Instantiate Architectural Elements, Allocate Responsibilities, and Define Interfaces.

Table : Design Decision and Location

|  |  |
| --- | --- |
| **Design Decision and Location** | **Rationale** |
| Create a module dedicated to accessing the content management system **(CMS)** in the data layer of the service application reference architecture | This module will help ministry employees to manage access to complaints, inquiries, and suggestions and give them the needed tools and resources to oversee a minimum of 4000 simultaneous users **CON-2** and provide a simple interface that has necessary tools that support filtering complaints, inquiries, and suggestions. |
| Add an external infrastructure to the **mobile applications** reference architecture. | Some mobile devices do not have enough resources to manage a specific type of system processes, so adding external infrastructure (it may be an external server) will help to handle these processes then send the output to the mobile application to execute it directly. This will support **(QA-2)**, **(QA-6)** and **(CON-5)**. |

#### 4.2.2.5 Step 6: Sketch Views and Record Design Decisions.

Diagram

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Figure 7: Reference Architecture

|  |  |
| --- | --- |
| **Element** | **Responsibility** |
| **Presentation CS** | This layer contains the modules that control the client interface and describe the interaction between customer and system. |
| **Business CS** | This layer preforms business logic operation that can be executed locally on the client side or externally throw the server side. |
| **Data CS** | This layer contains modules that responsible of communication between customer side and server side in mobile system . |
| **Cross-cutting CS** | This layer will be responsible about managing the modules and their functionalities that goes across different layers, such as security, logging, and I/O this part will help in achieving **QA-3.** |
| **UI modules** | This module renders the user interface and receives their inputs. |
| **UI process module** | This module responsible for controlling the flow of all system use cases (include the navigation between screens). |
| **Business logic CS** | This part responsible for implementing business operation that can preformed locally in mobile application or expose business functionality from the server side in mobile applications. |
| **Business entities CS** | These entities make up the domain model. They may be less detailed than those on the server side. |
| **Communication modules CS** | These modules consume the services provided by the application running on the server side in mobile application. |
| **Services side server SS** | This layer contains modules that expose the services that are consumed by the clients in mobile application. |
| **Business login SS** | This layer contains modules that preform business logic operation that require processing on the client side. |
| **Data SS** | This part will be responsible about the data persistence and for communication with mobile system. |
| **Cross-cutting SS** | This layer will manage the interaction between different layers especially the modules that have functionality, such as security, logging, and I/O. |
| **Service interface SS** | These modules expose services that are consumed by the clients in mobile application. |
| **Business modules SS** | This module responsible about implementing business operations that pass by the client side in mobile application. |
| **Business entities SS** | These entities make up the domain model. |
| **DB access module** | This module responsible for persistence of business entities into relation database. By preforming object-oriented and shields the rest of application from persistence details. |
| **Business workflow SS** | This component responsible about managing (long-running) business process, involve executing multiple use cases in mobile application. |
| **Application façade SS** | These modules will provide simplified interface to the business logic component in mobile application. |
| **Helpers and utilities SS** | This modules in the data layer can use these components, but they do not have any specific functionality in mobile application. |
| **Service agents SS** | This part abstract communication mechanisms used to transfer data to external services in mobile application. |
| **Data access SS** | This component responsible about data retrieval and storage handle, which provide persistence mechanisms and common operations in mobile application. |
| **Data sources** | This component will be responsible of storing and managing the data that transfers by mobile applications. |

Table : Element and its Responsibility

The responsibilities of the elements are summarized here:

|  |  |
| --- | --- |
| **Element** | **Responsibilities** |
| **User workstation )Mobile(** | Users' devices will be able to access the application server to perform business logic. |
| **Application server** | The server will host the server-side logic for the mobile application, which will assist in performing the necessary business logic. |
| **Fire wall** | The component responsible for monitoring incoming and outgoing network traffic will permit or block data packets based on a set of security rules. Additionally, it will perform network-level encryption using RSA to ensure data security **(QA-3)**. |
| **Load Balancer** | The system should be able to manage the load between devices to ensure that if one server fails to handle the load of many users, the load balancer can transfer some users to another server. This capability is necessary to address the system's continuity concern **(CON-2).** |

Table : Summarization of The responsibilities of the elements

Also, information about the relationships between some elements in the diagram summarized in the following table.

|  |  |
| --- | --- |
| **Relationship** | **Description** |
| **Between application server and data sources** | Communication through HTTP protocol. |

Table : Relationships between some elements

Diagram

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Figure : Initial Deployment of Balagh System

#### 4.2.2.6 Step 7: Perform Analysis of Current Design and Review Iteration.

Table : Analysis of Current Design

|  |  |  |  |
| --- | --- | --- | --- |
| **Not Addressed** | **Partially Addressed** | **Completely Addressed** | **Design Decisions Made During the Iteration** |
|  | UC-1 |  | Selected reference architecture modules will support this functionality. |
|  | UC-2 |  | Selected reference architecture modules will support this functionality. |
|  | UC-6 |  | Selected reference architecture modules will support this functionality. |
|  | UC-7 |  | Selected reference architecture modules will support this functionality. |
| QA-1 |  |  | No relevant decision was made, that is necessary to identify the elements that participate in the use because that associated with the scenario. |
|  | QA-2 |  | Introduction to the content management performance model by identifying the load-balance cluster this will help achieving high performance of UC-8. Interface and details about the component not been defined yet. |
|  |  | QA-3 | Using a firewall in deployment model will help to encryption data that moves from one element to another. |
|  |  | QA-4 | By using two separated reference architectures this will reduce coupling in the system. So, the modifiability will achieve since there are no integrated components. |
|  |  | QA-5 | Using two different architecture we will achieve the portability of the system and using Draft programming language will serve moving system from one platform to another. |
|  | QA-6 |  | By using the deployment pattern, it will provide a backup server that will work if any problem happens with current servers. But still, we did not identify and demonstrate its components. |
| QA-7 |  |  | No relevant decision was made, that is necessary to identify the elements that participate in the use because that associated with the scenario. |
| QA-8 |  |  | No relevant decision was made, that is necessary to identify the elements that participate in the use because that associated with the scenario. |
|  |  | CON-1 | Using mobile reference architecture this will help achieving that system will be able to run in android, IOS software’s. |
|  | CON-2 |  | Physical structure by using balance load-balance-cluster help achieving the ability of managing many users at the same time because system will manage loads. Still, we did not define the related components that important to achieve this constrain. |
| CON-3 |  |  | No relevant decisions made. |
|  | CON-4 |  | Dividing the system into smaller portions can help with managing modifications. With multiple backup servers for the system, modifying a single portion will not affect the overall user experience. However, it is important to identify the necessary components associated with each portion before making any modifications. |
|  |  | CON-5 | Structuring the application physically using a load-balanced cluster can be beneficial in providing multiple backup servers. This can help in managing errors effectively without causing any disruption to the user experience. |
|  |  | CON-6 | Physical structure of system by defining mobile reference architectures will achieve this constrain and system will be a cross-platform. |
| CRN-1 |  |  | No relevant decision made. |
|  | CRN-2 |  | The selected technologies must meet the knowledge requirements of the development team. However, additional technologies must be chosen for communication with data sources. |
|  |  | CRN-3 | Selection of reference architectures and deployment pattern. |

### 4.2.3 Iteration 2: Identifying Structures to Support Primary Functionality.

This section outlines the outcomes of the activities performed in each step of the second iteration of the ADD design process for the Balagh system. In this iteration, we have progressed from generic and high-level functional descriptions used in the first iteration to more detailed decisions that will guide implementation and the formation of development teams. This process is inherent in the ADD method since it is not possible to design everything upfront, and disciplined decision-making is essential. In the first iteration, our objective was to establish the overall system structure, and now that goal has been achieved. In the second iteration, our objective is to consider the units of implementation, which will impact team formation, interfaces, and how development tasks can be distributed, outsourced, and executed in sprints.

#### 4.2.3.1 Step 2: Establish Iteration Goal by Selecting Drivers.

The goal of this iteration is to address the general architectural concern of identifying structures that will support the primary functionalities of the system. This identification will be useful not only for understanding how we will support the functionalities, but also in addressing CRN-1, which defines the work hours and work type. The architecture considered the primary use cases of the system, which include:

• UC-3

• UC-4

• UC-5

• UC-8

#### 4.2.3.2 Step 3: Choose One or More Elements of the system to Refine.

The element that we want to improve is located in different layers of two distinct reference architectures that we have defined. However, to support the system's functionalities, the collaboration of components associated with modules located in different layers is necessary.

#### 4.2.3.3 Step 4: Choose One or More Design Concept That Satisfy the selected Drivers.

In this iteration, several design concepts are selected, the following table summarizes the design decisions.

Table : Design Decisions and Location

|  |  |
| --- | --- |
| **Design Decisions and Location** | **Rational and Assumptions** |
| Create **Domain Model** for the application | Firstly, we need to define initial domain model for our application by identifying the major entities in the domain, along with their relationships. There are no alternatives, domain must be eventually created, or it will be presented in a bad fashion. Leading to use ad hoc architecture which is hard to understand and implement. |
| Identify **Domain Object** that map the functional requirements | Each individual function should be contained within a self-contained building block, which is known as a domain object. It is possible to decompose the layers into modules without considering domain objects, but this approach increases the risk of not meeting the requirements. |
| **Decompose Domain Objects** into general and specialized Components | This pattern represents a comprehensive set of functionalities, but these functionalities are supported by finer-grained components located within the layers. These components are what we refer to as modules. Modules are associated with specific layers, such as the business logic module. |
| **Use C# and Java** mobile frameworks. | Java and C# are two of the most used languages in developing mobile applications due to their high performance and productivity. While, we connect the required reference architectures, in order to achieving the goal outlined in (QA-2). Other frameworks were not considered as the development team is already familiar with and satisfied with the performance of Java and C# (CRN-3). |

#### 4.2.3.4 Step 5: Instantiate Architectural Element, Allocate Responsibilities, and Define Interfaces

Table : Instantiate Architectural Element

|  |  |
| --- | --- |
| **Design Decisions and Locations** | **Rationale** |
| Create only an initial domain | Entities that participate in primary use cases need to be identified and modeled but only initial domain models are created, to accelerate this phase of design. |
| Map the system use cases to domain objects | The initial identification of domain objects can be done by analysis the system’s use cases. To address (**CRN-1)** object domain are identified for all use cases in table 2. |
| Decompose the domain objects across the layers to identify layer specific modules with an explicit interface | This approach guarantees that all the functionalities defined are supported by the modules. The architecture is designed to handle tasks for the primary use cases, enabling other team members to identify the remaining modules. This helps in dividing the workload among team members. The architect has identified a concern related to CRN-5, which states that the main modules should be evaluated. This concern is specific to the main modules in the system since the modules related to the user interface are challenging to evaluate independently. |
| Connect components associated with modules using C# and Java. | These programming languages enables the control and optimization of the system's execution speed and productivity, which can be utilized in determining the critical aspects of the modules in terms of speed and execution. This will assist in addressing (CRN-5). |
| Associated frameworks with a module in the data layer | This programming language allows for the control and optimization of system execution speed and productivity. This feature can be leveraged to determine the critical aspects of modules in terms of speed and execution, which in turn can help address (CRN-5). |

#### 4.2.3.5 Step 6: Sketch Views and Record Design Decisions:

Diagram

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Figure : Displays the System's Initial Domain Model

Diagram

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Figure : Displays the Domain Objects Instantiated for The Use Case Model

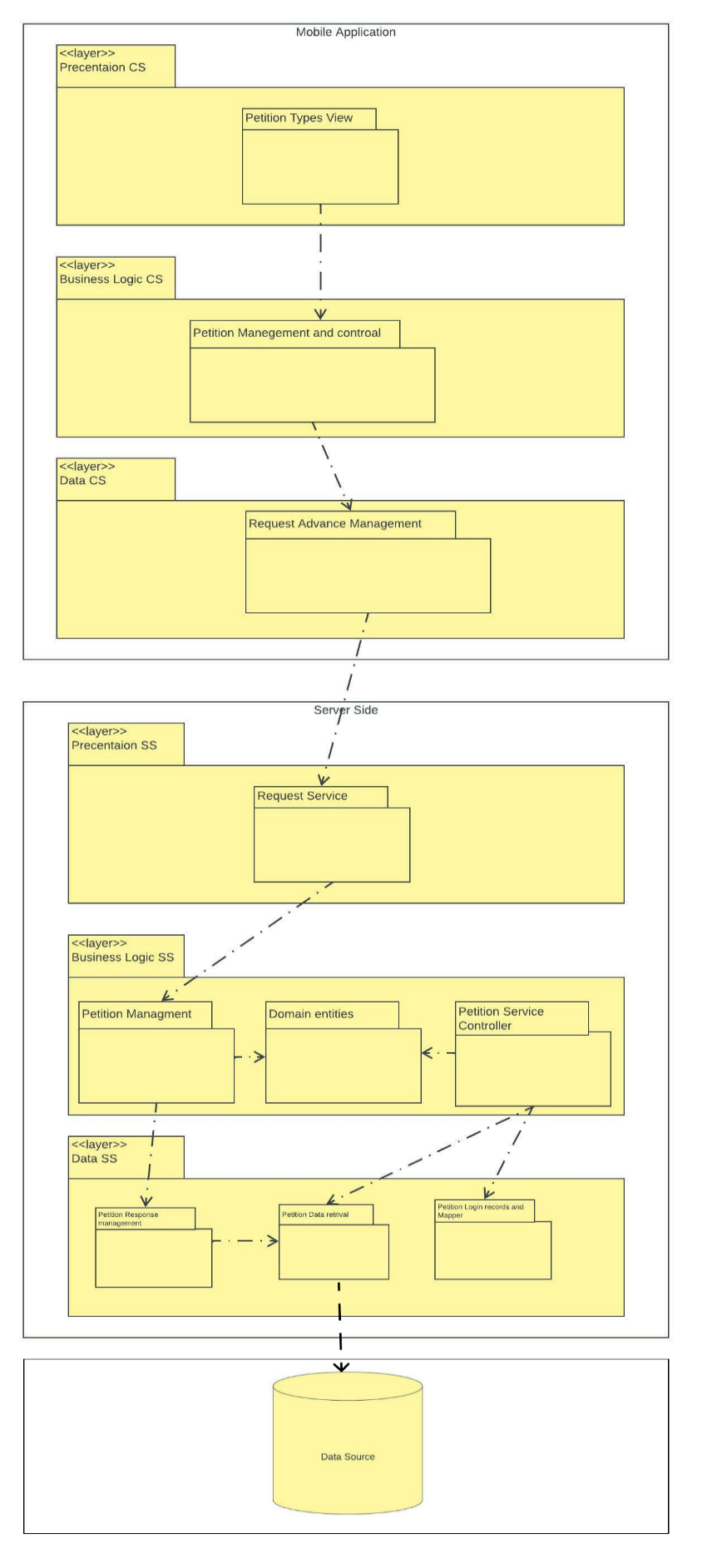
****

Figure : Mobile Application Architecture

Table : Record Design Decisions:

|  |  |
| --- | --- |
| **Element** | **Responsibility** |
| PetitionTypeView | Responsible of viewing different types of petitions such as complaints, inquiry, and suggestions. |
| PetitionManagementAndControl | Control and management complaints, inquiry, and suggestions of the users and present it to employee ministry. |
| DomainEntities | Contains the entities from the domain model. |
| PetitionServiceControl | Their responsibility includes controlling services related to petitions, such as accepting, deleting, forwarding, and sorting. |
| PetitionResponseManagement | Managed the response of petitions related to our system by ministry employee. |
| PetitionLoginRecordesAndMapper | This component is responsible for recording and processing petitions, sending them to the database, and mapping them based on type. |
| PetitionDataRetrival | This component is responsible for retrieving data related to petitions from data sources. |
| DataSource | Responsible for saving and reserving data of petitions. |

#### 4.2.3.5.1 UC-3, UC-4, UC-5: Petition

The sequence diagram created for UC-3, UC-4, and UC-5 illustrates how petitions are managed in the system after a successful user login. The system requests data retrieval from PetitionDataRetrieval, responsible for retrieving data from the DataSource and returning it to the client for viewing petitions with the Petition class.

Timeline

Description automatically generated with medium confidence

Figure : Mobile application sequence diagram for UC-3, UC-4, UC-5

Table : Methods and their Descriptions for UC-3, UC-4, UC-5

|  |  |
| --- | --- |
| **Method name** | **Description** |
| **Element**: PetitionTypeView | |
| *Initialize()* | Open petition representation so that user can interact with it. |
| *getPetitionRoot(): Petition* | Returns a reference to the root petition and the neighbors of this object |
| **Element**:PetitionManagementAndControl | |
| *RequestManagement()* | Request information about the petition. This method reference to the root petition data source to get the information. |
| **Element**:RequestAdvanceManagement | |
| *SendRequest(Request req)* | This method receives a request. Only this method is exposed in the service interface. This simplifies the addition of other functionality in the future without having to modify the existing service interface. |
| **Element**: RequestService | |
| *RequestPetition()* | This component is responsible for requesting the petitions from the dataSource within the server and managing the services that are associated with the petitions. |
| **Element**: PetitionManagement | |
| *RequestPetition()* | This component manages the petitions that are retrieved from the DataSource and requested by the RequestAdvanceManagement in the mobile application, and then sends them to the user's device. |
| **Element**: PetitionResponseManagement | |
| *RequestPetition()* | Manages responses from the petition data source and sends them to petition management for further analysis. |
| Element: PetitionRetriveal | |
| *RetrivePetiton(id): Petition* | Return response from its id. |

Timeline

Description automatically generated

Figure : Sequence diagram for mobile application UC-8 (key: UML)

Table : Methods and their Descriptions for UC-8

|  |  |
| --- | --- |
| **Method name** | **Description** |
| **Element**: PetitionTypeView | |
| *SelectPetitionType()* | Open the petition for employees to choose type of them for managing and replaying. |
| **Element**:PetitionManagementAndControl | |
| *RequestManagement andControl()* | Request information about the petition. This method reference to the root petition data source to get the information. |
| **Element**:RequestAdvanceManagement | |
| *SendRequest(Request req)* | This method receives a request. Only this method is exposed in the service interface. This simplifies the addition of other functionality in the future without having to modify the existing service interface. |
| **Element**: RequestService | |
| *RequestPetitionInf()* | Responsible about requesting the petition information that are inside the server from the DataRetrival. Also, responsible about services that within petition. |
| **Element**: PetitionServiceControl | |
| *RequestPetition()* | Responsible for services petition that retrieved from the dataSource that requested information by the RequestAdvanceMangement in mobile application then send it to user device. |
| *AddRecord()* | Function that responsible of adding new petition record to the PetitionRecordAndMapper. |
| **Element**: PetitionDataRetriveal | |
| *RetrivePetiton(id): Petition* | Return response from its id. |
| *ViewRecordsData()* | Viewed the data that saved in data mapper and record. |

#### 

#### 4.2.3.6 Step 7: Preform Analysis of Current Design and Review Iteration Goal and Achievement of Design Purpose

The decisions made in this iteration helped to establish a basic understanding of how the system's functionality is supported. The architect identified the modules associated with the primary use cases, while another team member identified the modules associated with the remaining functionality. This resulted in a comprehensive list of modules to address CRN-1.

Table : Analysis of Current Design and Review Iteration Goal

|  |  |  |  |
| --- | --- | --- | --- |
| **Not Addressed** | **Partially Addressed** | **Completely Addressed** | **Design Decisions Made During the Iteration** |
|  |  | UC-1 | Modules across the layers and preliminary interfaces to support this use case have been identified. |
|  |  | UC-2 | Modules across the layers and preliminary interfaces to support this use case have been identified. |
|  |  | UC-6 | Modules across the layers and preliminary interfaces to support this use case have been identified. |
|  |  | UC-7 | Modules across the layers and preliminary interfaces to support this use case have been identified. |
|  |  | QA-1 | The elements that support the associated use case (All) have been identified. |
|  |  | QA-2 | Introduction to the content management performance model by identifying the load-balance cluster this will help achieving high performance of UC-8. Also, by identifying models across layers this quality attribute has been completed. |
|  | QA-6 |  | No relevant decisions made. |
|  | QA-7 |  | The elements that support the associated use case (UC-7) have been identified. |
|  |  | QA-8 | The elements that support the associated use case (UC-3, UC-4, UC-5) have been identified. |
|  |  | CON-2 | Modules responsible for collecting data have been identified |
| CON-3 |  |  | No relevant decisions made. |
|  | CON-4 |  | No relevant decisions made. |
|  |  | CRN-1 | knowledge. CRN-2 Modules associated with all the use cases have been identified and a work assignment matrix has been created (not shown). |
|  | CRN-2 |  | Additional technologies were identified and selected considering the team’s knowledge. |
|  | CRN-4 |  | The architectural concern of unit-testing modules, which was introduced in this new iteration, is partially solved through the use of an inversion of control approach to connect the components associated with the modules. |

## 4.2.4 Iteration 3: Addressing Quality Attribute Scenario Drive (QA-6)

In this section, the outcomes of each step of the third iteration of the ADD design process are presented. Based on the basic structural decisions made in the previous iterations, the focus now shifts towards assessing the satisfaction of important quality attributes. The current iteration concentrates on addressing one specific quality attribute scenario.

#### 4.2.4.1 Step 2: Establish Iteration Goal by Selecting Drivers

In this iteration, the architect prioritizes the QA-6 quality attribute scenario, which ensures that the system can function continuously without downtime by implementing backup servers. If one server fails, the other server will take over, and the failed server will restart and resolve the issue without losing any data.

#### 4.2.4.2 Step 3: Choose One or More Elements of the System to Refine

To improve the system's availability as per QA-6 scenario, the focus will be on refining the physical nodes identified in the first iteration, namely the application server and database server.

#### 4.2.4.3 Step 4: Choose One or More Design Concepts That Satisfy the Selected Driver

The design concepts used in this iteration as follows:

Table : Choose One or More Design Concepts That Satisfy the Selected Driver

|  |  |
| --- | --- |
| Design Decision and Location | Rational and Assumption |
| Introduce the active **redundancy tactic** by replicating the application server and other critical components such as the database source. | By replicating critical elements, the system will be able to withstand the failure of one of the replicated elements without affecting its functionality. |
| Introduce **Petition double check** technology | Our system consists of various modules that process retrieved data to check for correctness or identify any issues. |

#### 4.2.4.4 Step 5: Instantiate Architectural Elements, Allocate Responsibilities, and Define Interfaces

The instantiation design decisions are summarized in the following table:

Table : The instantiation design decisions

|  |  |
| --- | --- |
| Design Decisions and Location | Rationale |
| Deploy message when error occurs | If there are any problems in retrieving data throughout the application runs the system will show the error message follows by the error code. |
| Use active redundancy and load balancing in the application server | To ensure efficient utilization of the three active replicas of the application server, load balancing is recommended. This can be implemented using the Load-Balanced Cluster pattern. |
| Implement load balancing and redundancy using  technology support | There are various mature and easily supportable technological options available for implementing load balancing and redundancy, rather than relying on immature and complex ad hoc solutions. |

#### 4.2.4.5 Step 6: Sketch Views and Record Design Decisions

The following diagram shows a refined deployment diagram that includes the introduction of redundancy in the system.

Diagram

Description automatically generated

Figure : Refine Deployment Diagram (key: UML)

Table : Elements and their responsibility for Deployment Diagram

|  |  |
| --- | --- |
| **Element** | **Responsibility** |
| *LoadBalancer* | Responds to client requests (and balances their load) and dispatches them to the application servers. Clients can also get a unique IP address from the load balancer. |
| *PetitonDoubleCheck* | Ensures that data about petitions transferred between a server application and a database is accurate. |

Diagram

Description automatically generated

Figure : Sequence Diagram Illustrating the Messages Exchanged Between the Physical Nodes to Support UC-8

#### 4.2.4.6 Step 7: Perform Analysis of Current Design and Review Iteration Goal and Achievement of Design Purpose

The design decisions made in this iteration focused on addressing QA-6, which also had an impact on QA-7. The table below summarizes the status of the different drivers and the decisions that were made during the iteration. Drivers that were fully addressed in the previous iteration have been excluded from the table.

Table : The status of the different drivers

|  |  |  |  |
| --- | --- | --- | --- |
| **Not Addressed** | **Partially Addressed** | **Completely Addressed** | **Design Decisions Made During the Iteration** |
|  | QA-6 |  | Redundancy in the application server reduces the probability of system failure, and a passive replica is activated if the load balancer fails within the required time. However, as specific technologies for "Petition double check" have not been chosen, this driver is marked as partially addressed. |
|  | QA-7 |  | In this latest iteration, a novel issue has arisen: the management of state across replicas. As of yet, no decisive action has been taken in regard to this matter. |
| CON-3 |  |  | No relevant decisions made. |
|  | CON-4 |  | No relevant decisions made. |
|  | CRN-2 |  | Additional technologies were identified and selected considering the team’s knowledge. |
|  | CRN-5 |  | This iteration introduces a new architectural concern: managing state in replicas. There has been no relevant decision made at this point. |

## 5.1 Milestone Report

Table : Milestone Report

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Milestone** | **Date** | **Status** | **Responsible** | **Issues/Comments** |
| **Initiating:**  - Business Case completed | 27 Feb | Completed | Maha and sponsor | Went very well |
| Stakeholders Register completed | 1 Mar | Completed | Maha |  |
| Project Charter completed | 7 Mar | Completed | Maha |  |
| **Planning:**  Team Contract signed | 12 Mar | Completed | Maha | Went very well |
| Software Process Model and Justification completed. | 16 Mar | Completed | Team members  stakeholders  customer |  |
| Collecting Requirements completed | 16 Mar | Completed | Maha | Issues:  some difficulties were faced in collect requirements because in the early phases the project was not clear for the team members. |
| Scope Statement completed. | 16 Mar | Completed | Maha |  |
| WBS completed. | 22 Mar | Completed | Maha | Reviewed with customer and team. |
| Project Schedule and cost completed. | 4 Apr | Completed | Maha |  |
| Risk Management Plan completed. | 19 Apr | Completed | Maha |  |
| **Executing:**  Clarification of Design Purpose completed. | 26 Apr | Completed | Fatema |  |
| Define Quality Attribute Scenarios completed. | 30 Apr | Completed | Abdullah |  |
| Define Primary Functionality completed. | 11 May | Completed | Musheera | Reviewed with customer and team. |
| List Architectural Concerns completed. | 11 May | Completed | Abdullah |  |
| Catalog Constraints completed. | 11 May | Completed | Abdullah |  |
| Review Input completed. | 28 May | Completed | Maha | Reviewed with customer |
| Establish the Iteration Goal by Selecting Drives completed. | 28 May | Completed | Maha |  |
| Choose One or More Elements of The System to Refine completed. | 28 May | Completed | Maha |  |
| Choose One or More Design Concepts That Satisfy the Selected Drivers completed. | 28 May | Completed | Noor |  |
| Instantiate Architectural Elements, Allocate Responsibilities, and Define Interfaces completed. | 8 Jun | Completed | Musheera |  |
| Sketch Views and Record Design Decisions completed. | 29 Jun | Completed | Fatema |  |
| Perform Analysis of Current Design and Review Iteration Goal and Architecture of Design Purpose completed. | 29 Jun | Completed | All |  |
| Application Prototype: Interface Design and Development completed. | 3 Jul | Completed | Abdullah | Went very well |
| **Monitoring and Controlling:**  Progress Report completed. | 6 Jul | Completed | All |  |
| Milestone Report completed. | 6 Jul | Completed | Maha |  |
| Request for Proposal completed. | 6 Jul | Completed | Maha |  |
| Team Performance Assessment completed. | 6 Jul | Completed | Maha |  |
| Change Requests completed. | 16 Aug | Completed | Maha |  |
| **Closing:**  Final project presentation completed. | 3 Oct | Completed | Maha |  |
| Sponsor sign-off on project completed. | 5 Oct | Completed | Sponsor |  |
| Final project report completed. | 10 Oct | Completed | Maha |  |
| Lessons Learned completed. | 17 Oct | Completed | All |  |

* **Some strategies that helped the team succeed**
  + - Reviews at the beginning of each project phase to discuss problems and develop solutions.
    - PM align with everything and communicate always.
    - Recognized and appreciate extra effort for the team (study the team needs)

## 6.1 Performance Report

Table : Performance Report

|  |
| --- |
| **Project Name**: Balagh System |
| **Reporting Period:** May 11nd, 2023 to July 3th, 2023 |
| **Work completed this reporting period:**   * Define Primary Functionality completed. * List Architectural Concerns completed. * Catalog Constraints completed. * Review Input completed. * Establish the Iteration Goal by Selecting Drives completed. * Choose One or More Elements of The System to Refine completed. * Choose One or More Design Concepts That Satisfy the Selected Drivers completed. * Instantiate Architectural Elements, Allocate Responsibilities, and Define Interfaces completed. * Sketch Views and Record Design Decisions completed. * Perform Analysis of Current Design and Review Iteration Goal and Architecture of Design Purpose completed. * Application Prototype: Interface Design and Development completed. |
| **Work to complete next reporting period:**   * Monitoring and Controlling: * Progress Report completed. * Milestone Report completed. * Request for Proposal completed. * Team Performance Assessment completed. * Change Requests completed. * Final project presentation completed. * Sponsor sign-off on project completed. * Final project report completed. * Lessons Learned completed. |
| **What’s going well and why:**  Overall, the development is progressing well due to the thorough planning phase we conducted. By taking the time to clearly define our requirements and establish a solid foundation for the project, we have been able to avoid significant changes or rework in the later stages. This has allowed us to stay on track with our timeline and budget and has ensured that our team is aligned and working towards the same goals. |
| **What’s not going well and why:**  Unfortunately, we have encountered some issues in the executing phase due to the inadequate design work. As our system is used by a diverse group of people, it is crucial that we prioritize user experience (UX) and ensure that the design is tailored to their needs. This requires a deep analysis and study of our users in order to produce a proper UX design. We recognize the importance of this phase and have determined that hiring a UX specialist designer is necessary to address these issues and ensure that our system is user-friendly and meets the needs of our stakeholders. |
| **Suggestions/Issues:**   * It would be helpful to have more frequent check-ins with team members to address any issues or concerns before they become major problems. * We should consider providing additional support to the team member who experienced personal issues to ensure they are able to catch up on missed work |
| **Project changes:**  After careful consideration, we have identified some changes that must be made to our project scope and schedule. The addition of the new feature during the execution phase requires a high level of performance and consistency to ensure that we achieve our desired results while minimizing costs and delays. To achieve this, we will need to adjust our project plan and allocate additional resources as necessary. We understand the importance of these changes and are committed to ensuring that our project stays on track and delivers the best possible outcomes for our stakeholders. |

# 5. Monitoring and controlling

The art of project management necessitates the careful monitoring and control of project performance, which involves comparing actual progress with planned management activities. This crucial function, essential at all stages of the project, acts as a form of oversight. Monitoring and controlling encompasses the regulation, reviewing, and tracking of progress towards project objectives. The goal is to evaluate the actual work done in relation to the planned work, assess performance, and determine if corrective or preventive actions are needed. Moreover, it requires the provision of information that supports status reporting, progress measurement, and forecasting, and the development of a plan that mitigates negative impacts on budget, time, and resources. The primary activities associated with the monitoring and controlling phase include utilizing essential documents such as progress reports and change requests, ensuring maximum efficiency in project management.

## 5.1 Request for Proposal

Table : Request for Proposal

|  |
| --- |
| **Date**: 6-july-2023 |
| **Project Name**: Balagh System |
| **RFP Name**: User experience designer (UX) |
| **Purpose of RFP:** We are currently seeking a highly skilled UX designer who is capable of creating a user-friendly digital experience for our system. Our system is intended to be distributed across multiple countries and cultures, and it will be used by a diverse group of individuals. As such, it is crucial that the designer has experience conducting research and analyzing user needs. They should also be proficient in developing and testing prototypes, as well as providing recommendations for improving our digital products. |
| **Background Information:** Balagh System Company is a fast-growing IT and data science company. Our new system has some design issues that need to be addressed. Due to the system's complexity, it is challenging to create a user-friendly interface, particularly for citizens and resident users. As we cater to a diverse group of people with different cultures, it is essential to ensure that our digital products are user-friendly. We are currently seeking a qualified UX designer who can conduct research, analyze user needs, develop and test prototypes, and provide recommendations to improve our digital products. |
| **Basic Requirements:**  - Minimum of 5 years of experience in UX design  - Demonstrated experience in conducting user research, developing and testing prototypes, and providing recommendations to improve digital products  - Strong portfolio showcasing past UX design work  - Proficiency in UX design tools such as Sketch, Adobe Creative Suite, and InVision  - Experience designing for diverse user groups across different cultures and countries  - Ability to work collaboratively with cross-functional teams, including product managers, developers, and other stakeholders |
| **RFP Process:**  - Interested UX designers should submit a proposal in response to this RFP by August 6, 2023  - Proposals should include a cover letter, resume, portfolio, and references  - Selected candidates will be invited for an interview, which will include a design exercise  - Final selection will be made based on the quality of the proposal, interview performance, and overall fit with the organization |
| **Statement of Work and Schedule Information:**  - Conduct user research to understand the needs and preferences of our target user groups  - Develop and test prototypes for new digital products and features  - Provide recommendations to improve existing digital products  - Work collaboratively with cross-functional teams to ensure design meets business requirements and technical constraints  - The expected duration of the project is 9 months, with a start date of September 1, 2023. |
| **Appendices:**  - Appendix A: Balagh System brand guidelines  - Appendix B: User personas and user journey maps  - Appendix C: Technical specifications and constraints |

## 5.2 Change Request

Table : Change Request

|  |
| --- |
| **Project Name:** Balagh System |
| **Date Request Submitted:** 15- August -2023 |
| **Title of Change Request:** New primary functionality |
| **Change Order Number:** 1 |
| **Submitted by:** Maha, Musherah |
| **Change Category:** Scope, Schedule, Cost, Technology |
| **Description of change requested:**  The project manager and programmer have recognized the importance of incorporating a payment function into our system. This feature will allow users to make online payments directly through the application, with options for selecting payment methods, tracking payment history, and receiving receipts and confirmations. As every user will have to pay government fees to complete certain transactions, this function will streamline the process and save time. |
| **Events that made this change necessary or desirable:**  The inclusion of the payment feature in our system is crucial in reducing queues, hassle, and time consumption associated with the payment process or receiving receipts and confirmations from any ministry. The increasing demand for online services has led to the need for such a feature, and feedback from users who tested the application prototype also highlighted the importance of incorporating features that facilitate the payment process. Moreover, governments nowadays require that all transactions related to certain services be conducted online, making the payment feature an essential aspect of our system. |
| **Justification for the change/why it is needed/desired to continue/complete the project:**  The decision to add a payment function to the system is crucial in achieving the project's overall goal of satisfying stakeholders. This feature will improve the system's usefulness and efficiency by providing users with a streamlined and convenient way to complete transactions. As a result, it is expected that the adoption of the system will increase, leading to its success. Additionally, the payment function will ensure compliance with government regulations regarding online payments for government services, thus avoiding any potential legal or regulatory issues that could disrupt the project. Overall, the addition of this feature will benefit both users and government officials and is a vital aspect of the project. |
| **Impact of the proposed change on:**  **Scope:** New feature will expand our scope in payment and transactions  **Schedule:** Feature will be added to execution process which may lead to delay in schedule  **Cost:** Total of 30,00$ for development  **Staffing:** Payment and Transaction engineers  **Risk:** Function may not fully be implemented as desired |
| **Suggested implementation if the change request is approved:**  If approved, the payment function will be fully integrated into the system, including all ministries of government. Implementation should start in the execution phase, with thorough testing and adequate training and support. Successful implementation will improve user experience and increase system adoption, contributing to the overall project success. |

**Required approvals:**

Table : Required approvals

|  |  |  |
| --- | --- | --- |
| **Name/Title** | **Date** | **Approve/Reject** |
| Maha Mohamed – Project manager | August 15, 2023 | Approve |
| Musherah Moqbel - Programmer | August 16, 2023 | Approve |
| Fatema Salman - Software tester | August 16, 2023 | Approve |
| Noor Jaafar - Designer | August 16, 2023 | Approve |

|  |
| --- |
| 5.3 Integration Integrating payment functionality into our system requires a few steps. The first step is to choose the right payment gateway for our application needs. After choosing a payment gateway, we need to set up an account with the provider, obtain an API key and other required credentials, and customize the gateway to work with our application. The next step is to design and implement a user interface that allows the user to enter payment details and submit the payment for processing. After a user submits a payment request, our application should initiate a payment transaction with the payment gateway and receive a response indicating whether the payment was accepted or rejected. Our application should also handle payment confirmations, update payment status for transactions, and notify users of payment results. Additionally, the application should provide users with the ability to view payment history and download receipts for each transaction. Finally, the integration should be secure and compliant with relevant data protection regulations, and regular security audits and vulnerability assessments should be performed. These procedures are usually associated with the execution phase of a project including the integration of payment capabilities into a system. The real work of executing the project plan occurs during the execution phase, and the actions stated in the paragraph would need to be completed to properly incorporate payment capabilities into the system. |

|  |
| --- |
| 5.4 Validation Validating a system involves ensuring that the payment functionality works correctly and meets user requirements, collaborate with stakeholders to clearly define the requirements for the new payment functionality. This includes identifying the desired payment methods, tracking payment history, generating receipts, and providing access to payment information history, develop a comprehensive test plan such as functional testing, Test the payment flow end-to-end by making payments using different payment methods (credit/debit cards, digital wallets), Verify that payment details are correctly captured, processed securely, and reflected in the system. Test the selection and management of payment methods, ensuring that users can add, edit, and remove payment methods as required. Verify that payment history is accurately recorded, including transaction details, payment amount, date/time, and associated user information. Test the generation and delivery of receipts to users after successful payments. Ensure that receipts contain relevant information, such as transaction ID, payment details, and timestamp. Evaluate the user experience during the payment process, conduct security assessments to ensure that payment transactions and user data are handled securely. Test for vulnerabilities such as data leakage, unauthorized access, and final step in the validation change request is sharing the validation report with relevant stakeholders, including the change requester, project manager, and decision-makers. Ask for their approval and sign-off on the new payment functionality. |

# 6. Closing

The closing process is the final stage of a project or project phase. Its main objectives are to obtain approval from stakeholders and customers for the final products and services and to bring the project to a proper conclusion. This involves confirming the completion of all deliverables and may also include a final project report and presentation. Despite the possibility of project cancellation, it is crucial to formally close every project and take time to reflect on lessons learned in order to enhance future endeavors.

## Lessons-learned report (abbreviated)

Table : Lessons-learned report

|  |  |
| --- | --- |
| Project Name: | Balagh System Project |
| Project Sponsor: | XXX Company |
| Project Manager: | Maha Alzouba |
| Project Dates: | Feb 27–Oct 29 |
| Final Budget: | $ 2,536,393 |
| 1. Did the project meet scope, time, and cost goals?  *We did meet scope and time goals, but we had to request an additional $530,993 which the sponsor approved*. | |
| 2. What were the success criteria listed in the project scope statement? *Below is what we put in our project scope statement under project $ 2,005,400. The project sponsor, XXX Company, has emphasized the importance of the project paying for itself within 4 years after the system is delivered to the customer. To meet this financial goal, the system must satisfy the requirements and the profit should increase by 15% after the stakeholder deploy the app. We must also develop a method for capturing the benefits while system is being developed and tested, and after it is rolled out. If the project takes a little longer to complete or costs a little more than planned, the firm will still view it as a success if it has a good payback and helps promote the firm’s image as an excellent consulting organization.”* | |
| 3. Reflect on whether you met the project success criteria.  As stated above, the sponsor was not too concerned about going over budget as long as the system would have a good payback period and help promote our firm’s image. We have already documented some financial and image benefits of the system. The company demand is increased after the app published and it’s brought more customers, the profit of the company was increased 24.7% after that project which consider a big success for the company. We have also received excellent feedback from several of our clients about the new intranet site. | |
| 4. What were the main lessons your team learned from managing this project?  The main lessons we learned include the following:   * Having a good project sponsor was instrumental to project success. We ran into a couple of difficult situations, and XXX company was very creative in helping us solve problems. * Teamwork was essential. It really helped to take time for everyone to get to know each other at the kick-off meeting. It was also helpful to develop and fol- low a team charter. * Good planning paid off in execution. We spent a fair amount of time developing a good project charter, scope statement, WBS, schedules, and so on. Everyone worked together to develop these planning documents, and there was strong buy-in. * Project management software was very helpful throughout the project. * Study the project and market needs very well before starting the project to avoid previous challenges and risks. * The project manager can bring the project up or down, depending on his management and capabilities. * Don’t ignore best practice. * Should Meet to solve conflict. * Focus more on technical / for the product. | |
| 5. Describe one example of what went right on this project.   * Collecting requirement was done successfully because the stakeholders was involved in the all-project’s phases. * The selection of team members was a successful choice. | |
| 6. Describe one example of what went wrong on this project.   * Analysis the challenges and risk. * Cost estimating of development process, because later we need *$530,993* extra. | |
| 7. What will you do differently on the next project based on your experience working on this project?   * The process of cost estimating should be done more carefully and reviewed with the stakeholders repeatedly. * Scope must be monitored throughout the life cycle of the project. | |

# 7. Appendixes

Table : Meeting NO. 01

|  |
| --- |
| Meeting NO. 01 |
| **Date:** 2/27/2023 |
| **Duration:** 50 min |
| **Attendance:**   1. Musherah Moqbel Ali - 202002276 2. Fatima Salman - 202005779 3. Maha Mohammed Ali - 202002565 4. Abdullah Aktham Khaleel - 202004678 5. Noor Jaafar Ali – 202007922 |
| **Apologies**: **None** |
| **Point to Discuss:**   1. Choose a project system. 2. Overall system view. 3. Work distribution. 4. Modifying existing system and adding more features to it. 5. Discuss phase one of the project. |
| **Decision Made:**   1. Continue the Balagh system. 2. Finishing phase one within a week. 3. Reading about the similar system to gain more ideas. |
| **Delegation**:   1. The business case will be divided into 10 steps. 2. The work division will be as follows:    * Introduction/background - Noor    * Business objective - Noor    * Current situation and problem/opportunity statement - Maha    * Critical assumptions and constraints - Maha    * Analysis of options and recommendation - Musherah    * Preliminary project requirements - Musherah    * Budget estimate and financial analysis - Abdullah    * Schedule estimate - Fatima    * Potential risks - Fatima    * Exhibits - All 3. Exhibits will be done by all team members. 4. Stakeholders’ registration and project charter should complete in one day |

## 

Table : Meeting NO. 02

|  |
| --- |
| Meet**ing NO.**02 |
| **Date:** 3/1/2023 |
| **Duration:** 10 min |
| **Attendance:**   1. Musherah Moqbel Ali - 202002276 2. Fatima Salman - 202005779 3. Maha Mohammed Ali - 202002565 4. Abdullah Aktham Khaleel - 202004678 5. Noor Jaafar Ali – 202007922 |
| **Apologies**: **None** |
| **Point to Discuss:**   1. Remaining phase parts exhibits, project charter, stakeholders registers and managements. 2. Work deviation between team members. 3. Number of hours to finish the remain part. |
| **Decision Made:**   1. Finish phase one today. 2. Creating exhibits by one member. 3. Project charter, stakeholders registers and management will done by other team members. |
| **Delegation**:   1. Abdullah will work on exhibits and finish it today. 2. Musherah, Maha, Fatima, Noor will work on project charter and other phase parts (stakeholder management strategy and stakeholder register. |

Table : Meeting NO. 03

|  |
| --- |
| Meeting NO. 03 |
| **Date:** 14/3/2023 |
| **Duration:** 20 min |
| **Attendance:**   1. Musherah Moqbel Ali - 202002276 2. Fatima Salman - 202005779 3. Maha Mohammed Ali - 202002565 4. Abdullah Aktham Khaleel - 202004678 5. Noor Jaafar Ali – 202007922 |
| **Apologies**: **None** |
| **Point to Discuss:**   1. What types of technologies we will use to develop Balagh system. 2. The approach we need to follow is to maximize the utility of the system. 3. How to perform executing phase. 4. Determine the features required to maintain the overall system. |
| **Decision Made:**   1. Perform the plan phase and start structuring the system. 2. Define the project changes as well as it’s characteristics. 3. Create the design purpose and perform three iterations to complete the system construction |
| **Delegation**:   1. Maha and Musherah will start the first iteration of the project and finishes the required. 2. Noor and Fatima will define the design purpose and system requirements. 3. Abdullah will conduct the performance report and finishes milestone report. |

Table : Meeting NO. 04

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| Meeting NO. 04 |
| **Date:** 19/4/2023 |
| **Duration:** 30 min |
| **Attendance:**   1. Musherah Moqbel Ali - 202002276 2. Fatima Salman - 202005779 3. Maha Mohammed Ali - 202002565 4. Abdullah Aktham Khaleel - 202004678 5. Noor Jaafar Ali – 202007922 |
| **Apologies**: **None** |
| **Point to Discuss:**   1. How we will monitor and control our project. 2. What is the tracking process that we will use to monitor our project. 3. Define the provision information to support status reporting. 4. Conduct the primary activities associated with monitoring and controlling phase. |
| **Decision Made:**   1. Define the change request and its following necessary information such as description, events, justification, etc. 2. Perform the integration and validation of the change request. |
| **Delegation**:   1. Maha an Musherah propose a new system functionality. 2. Fatima will design and implement the validation of the new functionality. 3. Noor will identify and plan the integration of the system functionality. |

Table : Meeting NO. 05

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| Mee**ting NO.**05 |
| **Date:** 17/5/2023 |
| **Duration:** 10 min |
| **Attendance:**   1. Musherah Moqbel Ali - 202002276 2. Fatima Salman - 202005779 3. Maha Mohammed Ali - 202002565 4. Abdullah Aktham Khaleel - 202004678 5. Noor Jaafar Ali – 202007922 |
| **Apologies**: **None** |
| **Point to Discuss:**   1. How to obtain acceptance of the project deliverables from the customer or sponsor. 2. How to document the lessons learned from the project. 3. What are the processes required to formalize the closure of the project by obtaining sign-off from the project sponsor and project manager. |
| **Decision Made:**   1. Produce and conduct the final report of the project that contain overall project phases. 2. Identify lessons learned from the project. 3. Design the prototype of the project and present the showcase. |
| **Delegation**:   1. Abdullah will be responsible for designing the UX/UI of the Balagh system including it’s all features. 2. Maha and Musherah will complete the lessons learned table. 3. Noor and Fatima will collect the appendixes and create final report. |

# 8. Product/prototype

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Description automatically generated with medium confidence