American International University-Bangladesh (AIUB)
Department of Computer Science
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Project Title : Online Clinic Management System
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Section : B

Project submitted
by

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1. Problem domain

1.1 Background to the Problem

The clinic's conventional paper-based control system has been replaced by a more advanced clinical management system. The patient who visits the clinic for the first time is enrolled in the system, according to the previous system. By filling out a questionnaire with the patient's personal information, the assistant assist the patient. The patient receives medication, and the details of the treatment are recorded in a file. The system oversees clinic operations, but the former system caused issues for the patient.

Problems of using paper to record down the records of patient:

- There is only one copy available, posing an immediate consult challenge.
- Searching for the record is a waste of time.
- Records are easily misplaced or duplicated.
- Spending money on paper is a waste of money.
- Storing records takes up a lot of space.

These issues are critical because they would have an effect on the clinic's service, resulting in less patient appointments, inefficiency, and expense increases. Clinic Management System was created to address the issues that have arisen. Patient identification, inventory, medical card, illness history, patient record check, consultation, billing, and monitoring are only a couple of the modules available in the system.

1.2 Solution to the Problem

The modern clinic management system makes it simple to keep track of the system's progress. The administrative staff, doctors, clinic receptionists and patients can use the Clinical Patient Management System. Any clinic requires a web system to store both employee and patient information. The users would find the system beneficial because it has incentives for effectively managing the clinic's operations. They will navigate the clinic system over the internet, which would be useful for those who find it tough to get to the clinic.

Among the users, any data can be added, edited, or deleted by the admin. This administrator would be solely responsible for the database management system's administration. The doctor will have access to the list of patients. Patients can be registered with separate physicians by the receptionist. In addition they'll also look to see if the patient has already visited this place. A discount may be given to patients who come back for a second checkup or audit review. They would then collect fees from the patients.

The method makes record-keeping more effective while still keeping it safe from unwanted access. For example in this scheme, only admin will be able to manipulate the stored data. However, their information may be kept in the computer system for a certain amount of time. Only allowed users have access to their personal data. This

will keep the details about the users secure. This method has also solved the problems associated with paper-based administration.

Aside from that, the system makes it simple for administrators to keep track of patients and supplies. In comparison to a manual, extracting the details required would take less time. This would make the clinic assistant's work easier.

In addition, the device aids in reducing data loss. For the designated details, the clinic assistant may display and produce reports.

2. Solution Description

2.1 System Features

In this clinic management system there will be four users : i)Admin ii)Doctor iii)Receptionist iv)Patient. All four users will have some common features in addition to particular features.

2.1.1 Functional Requirements

2.1.1.1 Common user class

2.1.1.1.1 Users can login to the system with their username and password.
2.1.1.1.2 Users can change their password if needed.
2.1.1.1.3 In case if users forget their passwords, they can retrieve it by proper authentication.
2.1.1.1.4 Website updates will be notified to the users.
2.1.1.1.5 Users can logout from the system

2.1.1.2 User class1-Admin

2.1.1.2.1 Admin can add employees.
2.1.1.2.2 Admin can update employee’s information.
2.1.1.2.3 Admin can search employees.
2.1.1.2.4 Admin can delete employees.
2.1.1.2.5 Admin can see all users information except their passwords.
2.1.1.2.6 Admin can see the amount of money deposited in the clinic.

2.1.1.3 User class2-Doctor

2.1.1.3.1 Doctor can see the patient list.
2.1.1.3.2 Doctor can search in the patient list.
2.1.1.3.3 Doctor can see the illness history of a patient if it is stored in the database.
2.1.1.3.4 Doctor can upload prescription to specific patient.

2.1.1.4 User class3-Receptionist

2.1.1.4.1 Receptionist can see the available doctor list.
2.1.1.4.2 Receptionist can assign a patient to a specific doctor.
2.1.1.4.3 Receptionist can search for available doctors.

2.1.1.4.4 If patient visited the clinic earlier or not can be checked by receptionist.
2.1.1.4.5 Receptionist will be able to print out the payment bill.

2.1.1.5 User class4-Patient

2.1.1.5.1 Patient can see the appointed doctor name.
2.1.1.5.2 Patient can download the prescription uploaded by the doctor.
2.1.1.5.3 Patient can see the appointment time and room number.
2.1.1.5.4 Patient can register to the system with valid mobile number.

2.1.2 Quality attributes

2.1.2.1 Usability

- The system should be user friendly and easy to use.
- The search bars should provide instructions to search with which information.
- The system should work in all displays like mobile, laptop, tablet etc.
- Easy and proper language should be provided for the users while validating.
- Components should be placed with proper spacing for easy navigation.

2.1.2.2 Reliability

- The system won't crash after implementing the system.
- Data manipulation work in database should work completely fine.
- Test items to run the system are done with testers.

2.1.2.3 Accessibility

- Users can easily access the system.
- System will provide Bangla language support for users easy accessibility.

2.1.2.4 Availability

- App will be available in both android and IOS operating system.
- Website shall support different type of web browsers like google chrome,safari, internet explorer etc.
- Users will be able to restart the system if it hangs.

2.1.2.5 Security

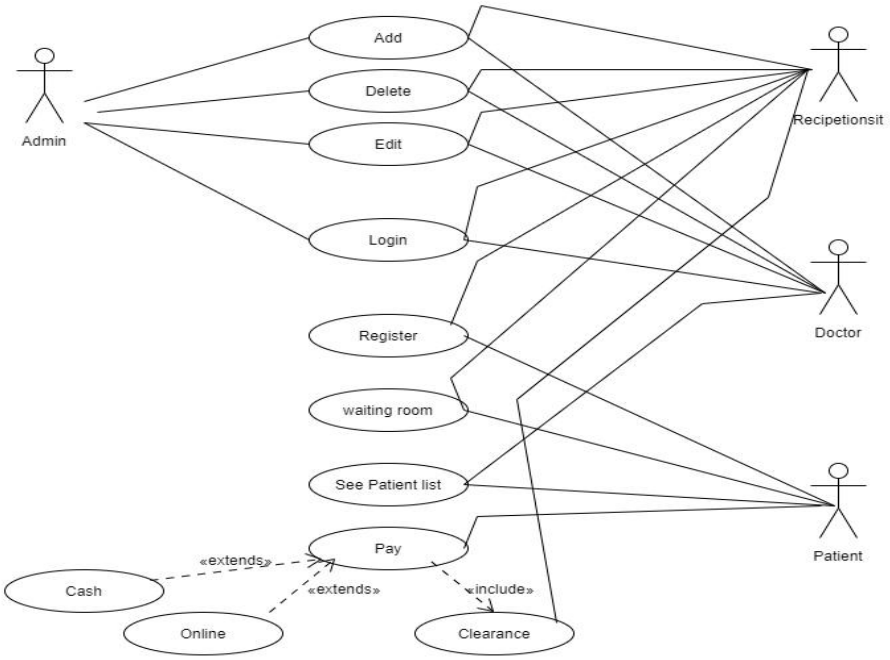
- The system shall use various cryptographic methods such as symmetric key cryptography or public key cryptography during transportation and storage of the data.
- The system shall keep specific log or history data sets.
- The system shall restrict communications between some areas of the program.

2.1.2.6 Portability

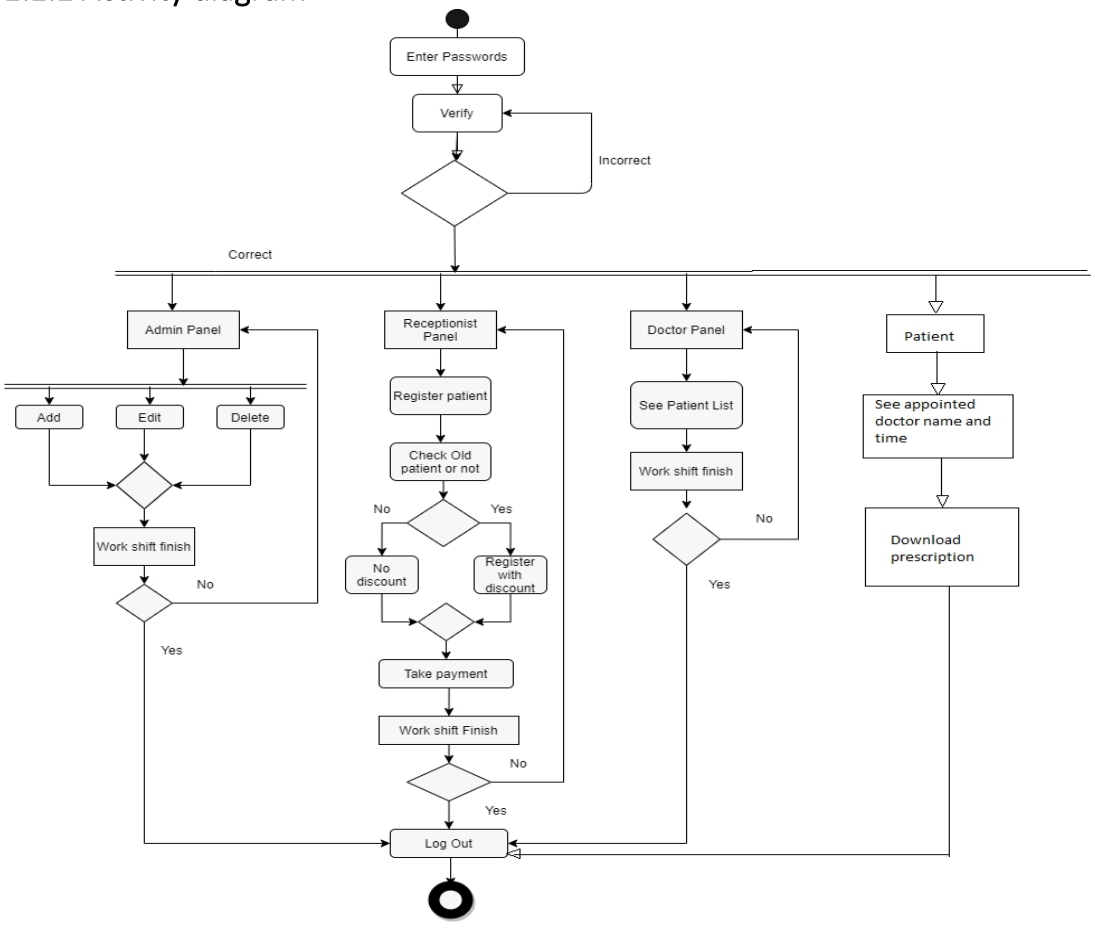
- The system will work same in all operating systems.
- Proven portable language will be used.
- Implementing the system in different operating system wont break the code.

2.2 UML Design

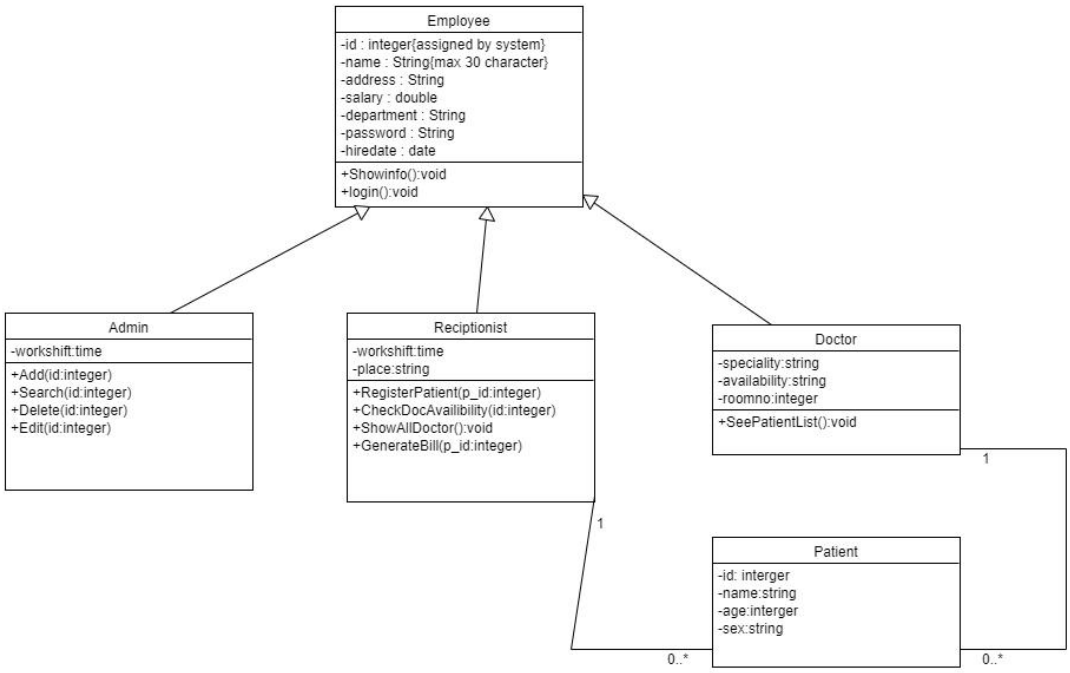
2.2.1 Use case diagram



2.2.2 Activity diagram



2.2.3 Class diagram



3. Social impact

This system will be beneficial to the society as every process will have transparency. From doctor appointment to prescription giving, every process will be done through this system. There is a common problem in our country is, patient cannot understand doctor's prescription because of bad handwriting. In this system, prescription will be type written and it will be given into patient's account. So there is no risk of getting lost or understanding problem. Another feature is, if a patient came earlier under the same doctor's supervision then the doctor can find it through the system. Because the system will store all the information details including checkup date. Also, a patient can know about the specialist doctor and their timing. This is the common problem in our country that people cannot choose specialist doctor according to their need. So, with this system, they will be benefited. Moreover, people can access the clinic system through the internet and those who have difficulties to go to the clinic will be able to take appointment from home. Sometimes patients lost their consulting prescription. With this system, there will be no use for paper and every information will be stored in the database. Therefore, clinic system will see a new future and medical infrastructure will be developed through this system.

4. Development plan

4.1 Project Organization

At first the team structure will be formed up to divide the work and make it arranged. After that, managers of the project will be assigned and their responsibilities will be

distributed. Managers will make their team as their wish and project manager will make the team where the team does not have any manager.

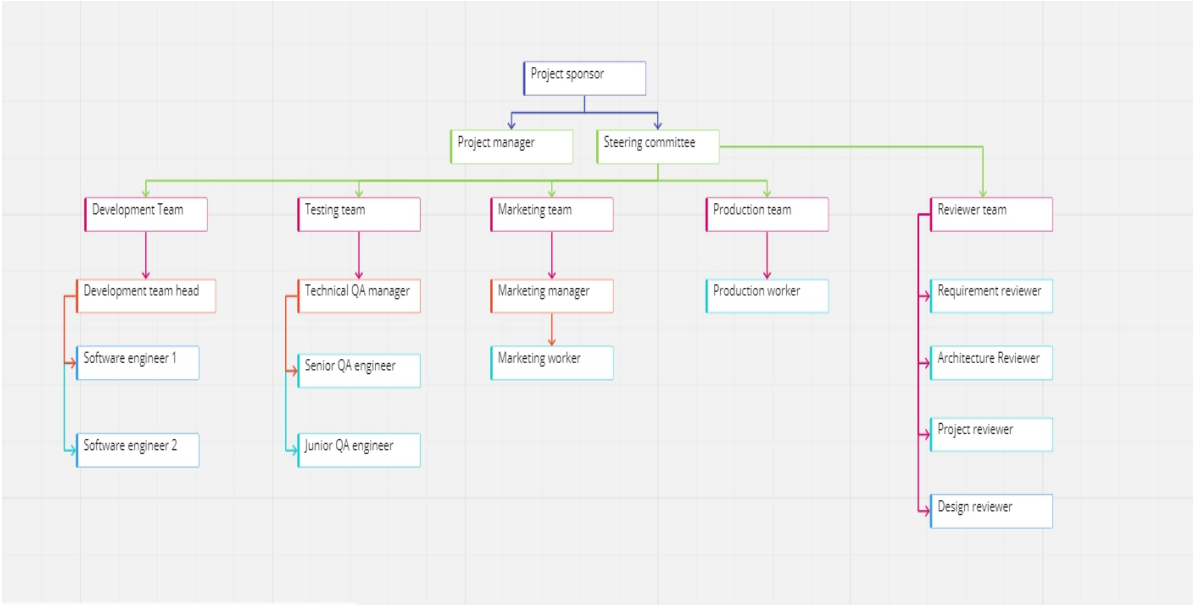


Figure : Project Organizational Chart [Tool Used : Miro]
(N/B : Please select the file and zoom to watch it clearly)

4.2 Project Management

In this segment, Project manager will define the stages of development, estimate the work load and provide estimations. This development plan will be revised continuously throughout the project. But steering committee will try their best to follow the schedule properly.

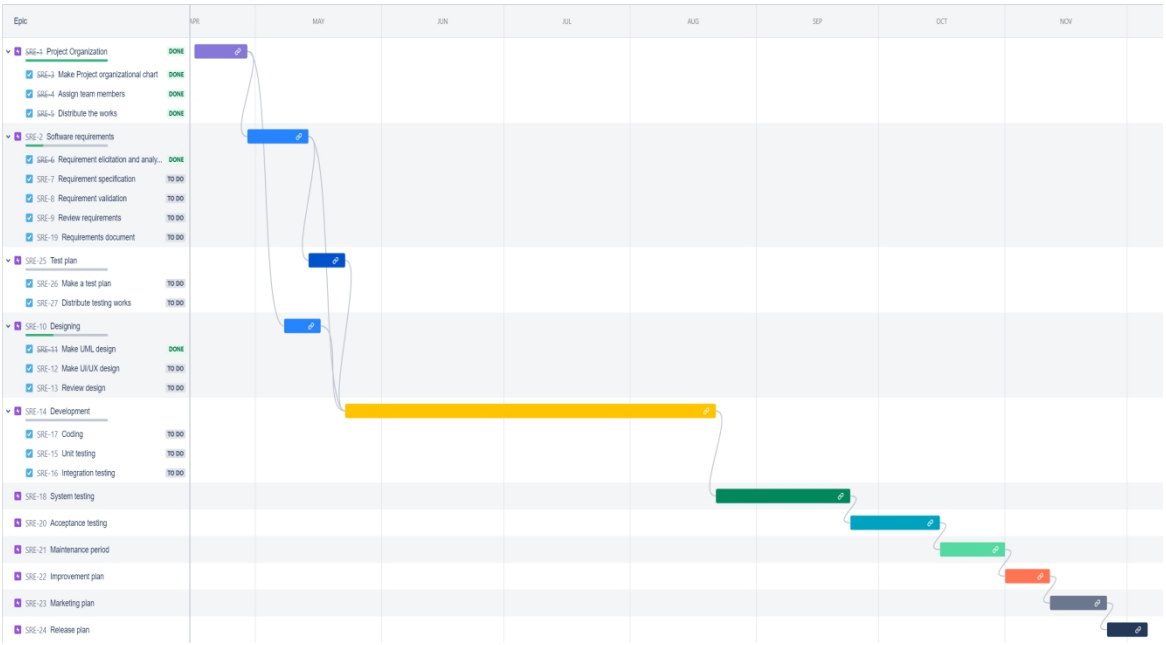


Figure : Project Schedule [Tool used : JIRA]
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4.3 Project Control

In this segment, the team and stakeholders will take actions and approaches to oversee the quality of the project and the team's efficiency. Mention-able actions and approaches are:

- Compliance with requirements

Strategies and plan will be made, tools shall be used by the developers to compliance with requirements.

- Budget monitoring

Budget constraint will be set up and everyone will be notified at the beginning of the project so that team can be aware of it.

- Schedule monitoring

Time constraint will be set up and everyone will be notified at the beginning of the project so that team can be aware of it.

- Quality assurance

Tools will be specified to assure the quality of the project.

- Management

Project manager will manage all the teams and set up a strategy plan to change the stakeholders depending on cooperation approaches, communication methods and teams methodology.

- Risk prevention

The team should have a backup of their work and should mention the name of the tools they used.

- Problem solving

Step by step algorithms will be offered by management section for resolving conflicting issues. If the problem goes beyond hand, project manager will decide what to do.

4.4 Maintenance and support

After the project is done maintenance period will start. QA team will provide a separate plan for testing and for any technical issues found in code, developers will be held accountable. They have to handle the tech debt and code quality control. Also, the development should provide proper documentation means the full list of all documents. Lastly, a development plan should be made for post release cooperation between the product owner and the vendor.

5. Marketing Plan

5.1 Analyze the market

Primary and secondary research will be done to understand if users use any other websites like this and what they want. In primary research, personal interview and group surveys will be done to understand the demand. And in secondary research, number if future user estimation will be done. After that, competitors will be listed down along with their features, facilities, website traffics and social network connectivity. These information will be helpful to analyze what other products have that our doesn't and understand how to position it. And a SWOT analysis grid will be made to use the strength and opportunities, cover up the weakness and avoid threats.

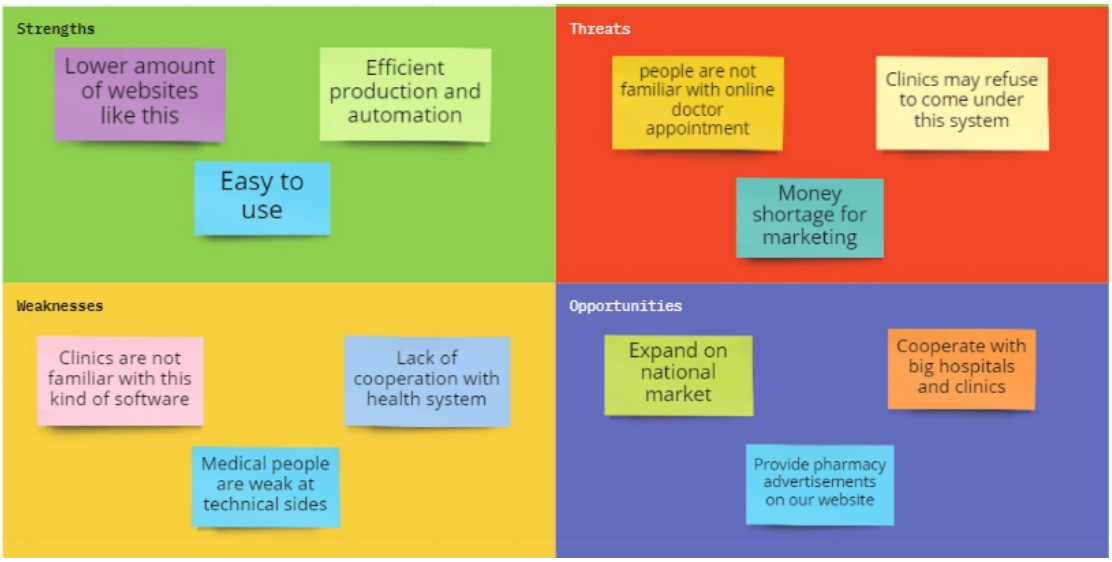

Figure: SWOT analysis [Tool used : Miro]

Later on, in the marketing phase this SWOT analysis will be updated and after analyzing it, strategies will be made for a better marketing.

5.2 Define target audience

Audience will be targeted according to age, gender, job title, location etc.At first, people from the city will be targeted, as village people wont be able to use internet or these kind of features. And the mid age people will be targeted like 25-40 as they are more familiar with technology. So, they will find it interesting to use it for them and their parents. And corporate people will find it useful as they need something time convenient so they should be targeted.

5.3 Develop positioning and messaging

A product message should be made by answering some questions for example, Who is this product for? What does this product do? Why is this product different? This product message will be used while giving ads on social media.

5.4 Promotion strategy

Promotion should be done in social media so that this software gets highlighted. Also using google ad sense, ads can be made to show it on youtube and other websites. If these is no money shortage then promotional TV ads can also be made. Another way is content creation as it remains the most effective marketing strategy. It allows to build brand loyalty and drive more organic leads. This results in earning TA trust by creating relevant and valuable content that drives the potential customers to action. It involves landing pages, blogs, video, podcasts, info graphics on topics, related to your product's industry. Also it entails search optimization and social media marketing.

Finally, marketing team will update the strategies, create a launch plan and keep abreast of product success.

6. Cost and Profit Analysis

The following assumptions can be made about the costs for the project application for the first year:

Items	Daily Cost (BDT)	No. of Days	Total Cost (BDT)
Requirement engineer	600	15	9000
Designer	500	7	3500
Planning	1000	7	7000
Front-end developer	650	80	52,000
Back-end developer	750	80	60,000
Testers	400	25	10,000
Total development cost			BDT 141,500
Overhead Cost (20%)			28,300
Safety net for spillover (10%)			14,150
Cloud Server		365	260,000

Warehouse storage for medicine		365	360,000
Total with safety			BDT 803,950
Marketing	500	365	182,500
Total cost			BDT 986 ,450

Profit suggestion and calculation :

If the online system is popular and the website is simple and user-friendly for people to communicate with, a large number of patients will register into the system. It is found that the profit margin from the clinic digital system is about 15%, but since patients will appoint doctors directly from the online platform in bulk, costs will be lower and therefore profitability chances will be high. As a result, our earnings could rise to 25% or higher taking into account that Dhaka's population in 2020, which has exceeded 21 million, up from 18 million in 2016. So, we would estimate a 1 million rise every year, and if we can catch at least 5% of the population this year, we can expect 1.05 million visitors to our website, assuming to lure them with exclusive offers. As a consequence, if we have decent care facilities, we would expect our patients to refer their friends and families to us in the future. Finally, if for each patient makes a profit of at least BDT 5 per month, we will make a net profit of at least BDT 5.25 million a month, which will help to increase as our patients grow and invest more on the website system as well as care. Finally, if the scheme works properly, a large number of patients will enroll in the system, downing our rivals in the industry. Costs will be kept down, so this will reduce the benefit from fees on the other hand as more people will be attracted with this profit will come through it. As a result of our low costs and superior discounts than most hospitals, we will have a permanent patient base that will continue to get care from us, and these faithful patients will be our primary source of revenue in the coming years.