Project Title

CCSW 223 Lab Project Report

YBL

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NOTE: Remember to number tables and figures and show me your creativity

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Problem Definition

Malls are the most common place tourists visit, even local citizens go there every once in a while. However, many of them spend hours above their staying time because they don't know where a specific store is, losing their car in the mall's parking, and finding a preferred restaurant or bathrooms. Sometimes, people go to malls only for one store, and they spend a lot of time trying to find that store which maybe isn't available in the first place in that mall. Also, a mall is big place in which parents can easily lose their children or a family member.

The mall navigation application solves all listed problems by providing a digital map that contains all information that users can use such as determining whether a store is available in the mall and its directions, parked car directions, finding the nearest mosque or bathroom, tracking a family member or children with the same app or via a watch that can be purchased individually, and finding a preferred restaurant and its directions.

Essential Functionalities

- This application is inclusive, it contains a digital map of all malls in the selected city.
- The application can be used to check for a certain store opening times, or whether it's closed for maintenance.
- Also, it provides a service to indicate whether a certain store is crowded or not.
- It provides a service to indicate whether there are discounts for the preferred store.
- The application provides a car tracking service, it provides the mall's parking directions.
- It contains the phone numbers of all restaurants, so the user can call and have the order prepared before they arrive.
- It shows the locations of restaurants and bathrooms and their directions.

3 Information Gathering

1. Interview Description

The aim of conducting the interviews is to collect information regarding the potential users of the application and what they experience when visiting malls. Also, to take suggestions and recommendations for what they would like the application to include. In addition, to record the most trouble or inconvenience potential users face when going to malls to take advantage of and implement the suitable solutions in the application.

The five questions that will be asked in the interviews:

- How do you rate the mall staff to help you find a specific store?
- Are you able to find what you're looking for easily?
- How was your experience in visiting the mall at the weekends and holidays?
- What are the features that you aspire to be in an application for the mall that can facilitate your experience as a customer?
- What is something you don't like about shopping in malls?

3.2 Interview Analysis

Interviewer	Interviewee	*Analyst Comment*
Shahad Kulaibi	Jory Alghrably, Student, 24 December 10:30 am	Jory took a long time to get to the store she was looking for, and she mentioned that it happens often when she can't find the mall map, so this app will help her locate any store that she would like to visit easily and spare her the time and effort spent looking for shops and finding their location.
Shahad Kulaibi	Lujain Maddah, Business, 25 December 6:00 pm	Lujain gave me some suggestions about how to make the app easier for the users, where she said it should be divided into categories to help the

		customers find the stores with ease, and she gave me examples of the sections, which were technology stores, toy stores, clothing stores, grocery stores, and accessory stores.
Razan Alghanmi	Alanoud Altuarqi, Law Student, 24 December 12:00 pm	Alanoud mentioned that she doesn't like to go to malls because she always takes longer staying time than she planned, she said that the application would extremely help her in time management aspects. Also, she recommended that the application should be special needs friendly, for example it should contain a voice annunciating feature for visually impaired people. She expressed happiness when I showed her the application that we are developing mainly because how helpful it would be to assist her in many aspects of time management and efficiency.
Razan Alghanmi	Johara Alnemari, Shop Owner, 24 December 8:30 pm	Johara said that the application would greatly help her to get more customers since her shop is at a mall and have customers interested in buying from her shop instead of asking for directions. In addition, she suggested that the application should also include shop items and their availability to further facilitate the customer's experience. However, she doesn't like when she can't find her car in the mall parking, so the car tracking feature would be of great help. Johara was very delighted when I told her the application we're

		currently developing. She said it would greatly be beneficial in keeping her business running smoothly and maybe even get her more customers that are interested in buying from her shop instead of asking her for directions all the time, which she said really annoys her.
Maria Jawah	Nour al-Amoudi, architecture student, 24 December 4:30 pm	Nour expressed how difficult it is to find a particular store when the mall is big especially when it gets crowded on special occasions such as holidays or on weekends. It also very challenging to find a parking spot. Therefore, she suggested a digital map on the phone that would locate and lead her to the desired place
Maria Jawah	Dina al-Sayed, accountant, 25 December 11:00	"Sometimes when malls are very crowded, mall employees are not the best guide." said Dina. She explained that it's entirely possible to get lost during weekends and holidays when it's expected to be very busy, and the clothing stores can run out of clothing sizes. She suggested adding a feature that could report how many people are in the mall at the moment to avoid crowding. Also, a feature that you can view the available sizes in the required clothing store in a particular mall.
Jana Bakhalqi		Walaa was facing some obstacles, and the most prominent difficulties that she faced was not knowing the places of mosques and stores that lead to a waste of time and effort, and at that time I showed her our application, and that it

	Walaa Ahmed, Accounting 23 December 2:40 pm	was equipped with maps and directions feature to reach the store or the desired place easily. She also expressed to me her annoyance when she arrived at the store and was surprised that it was closed, so I showed her this feature in our application, which is that it displays if the store is closed for maintenance or otherwise. Also, Walaa's experience when she went to the mall during the holidays was very disturbing! The situation was chaotic, and the store was very crowded. Also, the corridors are full of people, which makes the buying process very difficult. She suggested that there should be a feature that shows the status of each store, is it crowded or not? This proposal was beautiful.
Jana Bakhalqi	Jory Saleh student,24 December 5:00 pm	Her experience in finding the desired store quickly and easily was difficult, especially when she went to a shopping center that she was not used to, and in addition, the speed of going to the place she wanted decreased as the shopping center grew and the distance increased, and at that time we showed her our application and that it was equipped with maps and the feature of directions to reach the store or place. What is meant is the ease and availability of golf car reservations, which reduces distance and effort. as she told me, I hope that there will be an explanation of the festivals held and where they are located in the mall. The most prominent of her problems when she finished shopping was not knowing where she

		parked her car, and I showed her that our application has this wonderful feature, which is knowing the location of your car and accessing it easily.
Fay Alshareef	Nouf alshareef, Bank employee, 25 December 6:30pm	Nouf doesn't go to the malls in her city anymore because of her fear of wasting time and not getting what she needed from the center. In terms of the difficulties, she mentioned to me that they are mainly finding parking lots, overcrowding, frequent walking, and many corridors and shops. I told her about our application, and you only have to install it to solve all of the problems mentioned above. She was very surprised and said she is willing to go to malls again because of how helpful and efficient it would be because of our application.
Fay Alshareef	Njoud alshareef, Student, 25 December 8:50pm	Njoud told me It was difficult for her to find a specific thing in a large mall, and that it is hard to find things quickly compared to online shopping, and that is why she prefers to shop online. Then I showed her the idea of our application, and that it would make it easier for her to shop without difficulties, and she told me that she preferred if the application contains a map of the mall, a list of stores, locations of stores in the mall, and parking services in the application. And she explained to me the things that she does not like the most when she visits the mall, which are wasting a lot of time, limited parking, crowded stores, and long walks.

To conclude, the group of people that were interviewed were asked a number of comprehensive questions regarding their experiences when going to malls. To better understand their point of view and to also get helpful feedback to determine the approach that will be used to create the application in a way that ensures its inclusivity of all aspects and its ability to meet all expectations.

Based on the findings, it was clear that many of the interviewees faced a lot of problems when going to the mall. Such as taking a lot of time to find a specific store, not finding the car in the mall's parking, and not knowing if the mall is crowded or not in advance. So, we will take into consideration all of their suggestions and inconveniences to create a high-grade application that meets every user's expectation and needs.

4 Planning Phase

4.1 Project Goals

The purpose of the project

*a. The User Business or **Background** of the Project Effort*

Content

The mall navigation application solves all problems that shoppers face, by providing a digital map that contains all information that users can use such as determining whether a store is available in the mall and its directions, parked car directions, finding the nearest mosque or bathroom, tracking a family member or children with the same app or via a watch that can be purchased individually, and finding a preferred restaurant and its directions.

Motivation

A lot of tourists and local citizens struggle while visiting malls. From wasting too much time to find what they're looking for, to losing their cars in the mall's parking car. Therefore, we are inspired to develop an application that solves all of the mentioned problem and making their experience more pleasant.

Considerations

The problem is only serious for people who have critical time to spend such as employees, students who are on break, and people who have other commitments. But with regular people it might not be as serious, but it will help them spend their time more efficiently and for the sake of making their experience more pleasant.

b. Goals of the Project

our main goal is developing an application that makes its users mall visiting experience more efficient and pleasant.

Preliminary report

The problem:

These days, shopping centers and malls are expanding constantly. When customers don't know the region well, don't always have access to the internet, or use an unreliable location navigator, it is more difficult for them to pinpoint where the store is. The floor plans and maps in certain shopping centers can be extremely complicated. Even within the mall, customers may become disoriented, and those with poor spatial awareness may struggle to read a map and locate the store they're looking for. In addition to the large parking lot, it could be difficult for the consumer to recall where they parked. Some of them may even know where their automobile is, but they may still not know how to get there.

Findings:

According to these interviews, many of them like to shop online rather than going to the mall because of the loss of time and long walking time. Also, not finding their car in the parking is a prominent problem many of the interviewees face. It is also difficult to find some shops and restaurants without asking for directions or wasting a lot of time trying to find it. We also find that the number of shoppers increases at the end of the week, and a lot of them would like a feature that tells them if the mall is crowded or not.

Recommendation or proposed solution:

Our recommended solution is to create an application that locate its users and lead them to their desired destination inside the mall or at the parking lot. Additionally, it would provide statistics on the number of people within the mall to show its users how crowded it is. Moreover, it displays the available sizes in clothing stores, similar like online shopping, therefore if a customer is specifically looking for a particular clothing piece they would know which mall they attend to.

4.2 Cost and schedule estimation

Project Estimated Costs

Resources	Estimated cost
Software & hardware	Up to 50,000 SR
Project managers	Up to 25,000 SR
Developers	Up to 20,000 SR
Security analysists	Up to 30,000 SR
Staff	Up to 15,000 SR per employee
Marketing team	Up to 20,000 SR
Future updates & maintenance	Roughly 70,000 SR yearly

Project Estimated Schedule:

Tasks	Estimated duration	Start date	End date
Project management	30 days	26/12/2022	3/2/2023
Research	12 days	24/12/2022	5/1/2023
Determine project scope	5 days	6/1/2023	11/1/2023
Team kickoff meeting	1 day	13/1/2023	14/1/2023
Determine audience target	2 days	14/1/2023	15/1/2023
Determine content hierarchy	10 hours	15/1/2023	15/1/2023
Task analysis	1 days	16/1/2023	16/1/2023
Identily program vulnerabilities	7 days	17/1/2023	24/1/2023
Divide software Information modules	7 days	25/1/2023	2/2/2023
Design the project	12 days	3/2/2023	15/2/2023
Design interface	2 days	16/1/2023	18/2/2023

Interview of client	3 days	19/2/2023	22/2/2023
Develop prototype based on functional specifications	7 days	23/2/2023	30/2/2023
Deliver the last version of the software to the final user	1 day	1/3/2023	1/3/2023
Test system specification and bugs	3 days	2/3/2023	5/3/2023

4.3 The Feasibility Study

1 Problem Definition:

Malls are the most common place tourists visit, even local citizens go there every once in a while. However, many of them spend hours above their staying time because they don't know where a specific store is, losing their car in the mall's parking, and finding a preferred restaurant or bathrooms. Sometimes, people go to malls only for one store, and they spend a lot of time trying to find that store which maybe isn't available in the first place in that mall. Also, a mall is big place which parents can easily lose their children or a family member.

2 Scope Objectives of "new system":

"lead & shop" is a comprehensive application that aims in making the mall visit experience a more pleasant and efficient. It incorporates several features that supports its purpose and help people with all problems that they face when visiting the malls.

It solves all listed problems by providing a digital map that contains all information that users can use such as determining whether a store is available in the mall and its directions, parked car directions, finding the nearest mosque or bathroom, tracking a family member or children with the same app or via a watch that can be purchased individually, and finding a preferred restaurant and its directions.

What distinguishes our system is that it will be special-needs friendly by using a voice annotation feature for visually impaired induvial. As well as a digital mall map for every mall in the country, which makes it more inclusive.

3 Alternative Solutions:

Solution 1 (Do application) :
If the company decides to do the application that would result in a big cost for the company.
Gaining a clear insight into the cost of application and what that spending delivers to your business is critical. So that it will introduce us to new and happy customers with the new changes that will make their shopping more efficient. Many have pointed out that technology is no longer just an enabler of a business; technology is the business. In this scenario, making the right decisions is critical to get right.

Solution 2(Do nothing) :
If the company decides to not do the application,that would mean that the company would not suffer from her huge costs and maybe debt, but on the other hand the company would lose their loyal customers because of the inefficiency that they had to deal with while shopping at the mall also the customers would search for a better mall that would make their shopping experience better which means that the other malls would have a better competitive advantage.

4 Cost And Benefits of Alternatives:

Alternatives	*Cost*	*Benefits*	*Drawbacks*
Solution 1: Do application	*200,000 SR*	- Introducing a new and innovative idea. - More revenues. - Reduce the time and effort for visitors. - Increased turnout due to fast access to the store and easy knowledge of available places.	- Huge costs
Solution 2: Do nothing	*0 SR*	- To not go through long life debts. - To not suffer from huge costs.	- Losing potential visitors. - Take longer time at the mall for visitors.

5 Software Impacts:

“lead & shop” is a comprehensive application built from scratch that facilitates the user’s journey in malls, by only downloading our application to enjoy its advantages that save a lot of time and add fun to the trip. We are distinguished by everything that makes it easy for them to reach the store they want through digital navigation for shopping centers. Also use the feature that checks if the store is crowded or not, the ability to view the discounts offered by stores in certain seasons, and finding parked cars easily.

6 Potential Changes in the Organization:

When we finish our application, the income will be very high because all people need the advantages and characteristics of our application. Of course, it will be used by the big and the small. The cost is high, but we are very optimistic that our application will get great success, also on a level outside the application, which is the commercial centers, people will increasingly go to the malls and it will make it easier for them to shop and buy easily and quickly. Also, from the change that will occur, there will be an increase in very professional staff to maintain the application, amend it, and update it from time to time. Increasing the relationship between us and the managers of the commercial centers to provide the best benefits and information to customers and to quickly update the program when there is a change in one of the commercial centers.

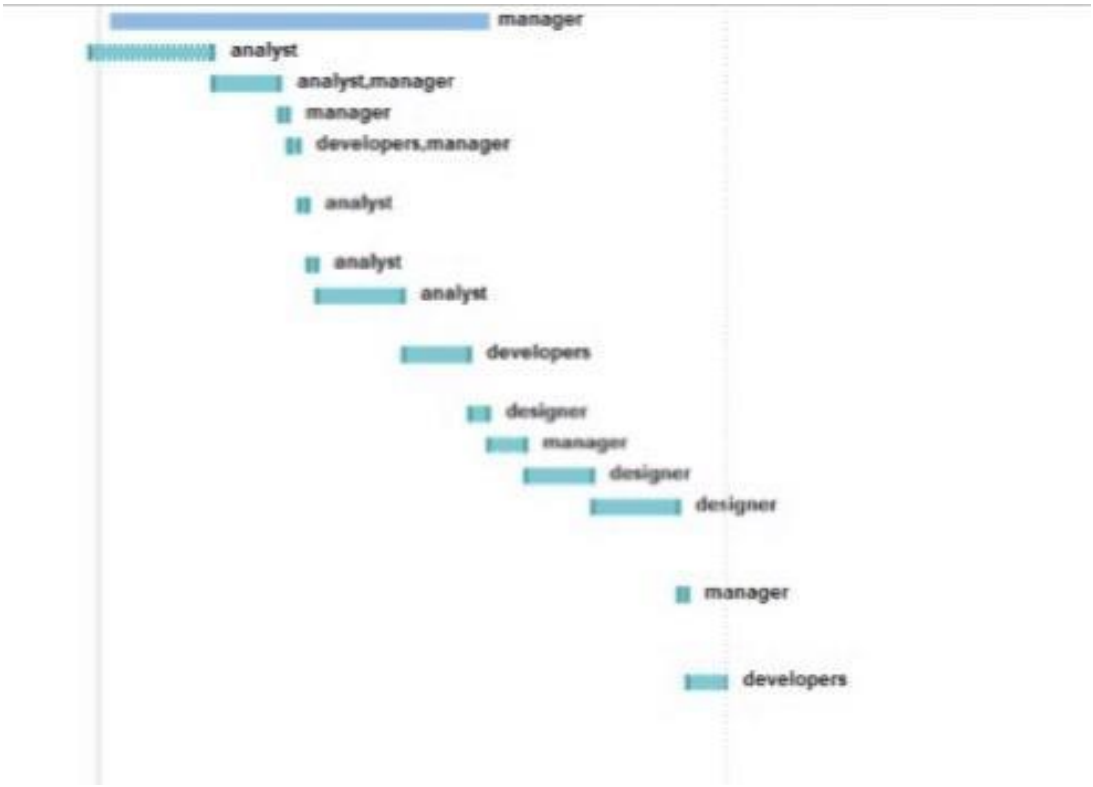
7 Recommended Alternative of the Course of Action:

Doing the application is best. Although that would cost the company money, there would be many benefits. These benefits can come in many forms such as increased revenue and improved customer loyalty. Gaining users would also be financially beneficial because more users means more income. That might occur through various means, including advertising and sponsorship. Users will get access to several features that will improve their mall experience. In addition, they will also have the choice to upgrade to the premium package to access more features.

4.5 Project Plan

GANTT CHART

	Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names
1		project management	30 days	Mon 12/26/22	Fri 2/3/23		manager
2		research	10 days	Sat 12/24/22	Thu 1/5/23		analyst
3		determine project scope	5 days	Fri 1/6/23	Thu 1/12/23		analyst,manager
4		team kickoff meeting	1 day	Fri 1/13/23	Fri 1/13/23		manager
5		determine audience target	1 day	Sat 1/14/23	Sat 1/14/23		developers, manager
6		determine content hierarchy	1 day	Sun 1/15/23	Sun 1/15/23		analyst
7		task analysis	1 day	Mon 1/16/23	Mon 1/16/23		analyst
8		identify program vulnerabilities	7 days	Tue 1/17/23	Wed 1/25/23		analyst
9		divide software information modules	5 days	Thu 1/26/23	Wed 2/1/23		developers
10		design interface	2 days	Thu 2/2/23	Fri 2/3/23		designer
11		interview of client	3 days	Sat 2/4/23	Tue 2/7/23		manager
12		design the project	5 days	Wed 2/8/23	Tue 2/14/23		designer
13		develop prototype based on functional specifications	7 days	Wed 2/15/23	Thu 2/23/23		designer
14		deliver the last version of the software to the final user	1 day	Fri 2/24/23	Fri 2/24/23		manager
15		test system specification and bugs	3 days	Sat 2/25/23	Tue 2/28/23		developers
16							
17							



5 Analysis Phase

5.1 Stakeholders

Stockholder Definition

8 The Client

Many different malls are able to invest in the application. As it helps to bring more visitors and make profit.

9 The Customer

The local citizens of the city and tourists are the main customers in which the application is intended to service.

10 Other Stakeholder

1. The system developers

The developers are responsible for developing the software within the budget and delivering it on time. Also, depending on their expertise, they can provide the stakeholders with guidance on idea execution and quality assessment needed to determine the scope of work.

2. The project manger
   They lead the entire project and supervise its implementation and strive to provide the best product and be of high quality within a specific budget and time.

3. The designers
   The usage of a software system to solve a particular issue is acknowledged by designers. As a result, they guarantee that clients receive their requests effectively and efficiently. Additionally, they make an effort to make product design understandable and user-friendly.

4. The system maintenance team
   The system maintenance team are responsible for monthly system updates to ensure that things are running smoothly and to deploy new functionality for the sake of providing the best experience possible for the users. Also, to evolve the application based on changing business needs.

5. The system testing team
   They design and develop test procedures according to the requirements and analyze the testing results and submitting the report to the developing team.

6. The employees
   The employees arrange the items within the application, add items, determine and modify the available sizes, delete the unavailable items, and notify if there are discounts in their store. They provide the application with the status of the store, if it has maintenance or otherwise, the employees also add closing hours of the store in the application.

The scope of the work

1 The Current Situation

Malls are the most common place tourists visit, even local citizens go there every once in a while. However, many of them spend hours above their staying time because they don't know where a specific store is, losing their car in the mall's parking, and finding a preferred restaurant or bathrooms. Sometimes, people go to malls only for one store, and they spend a lot of time trying to find that store

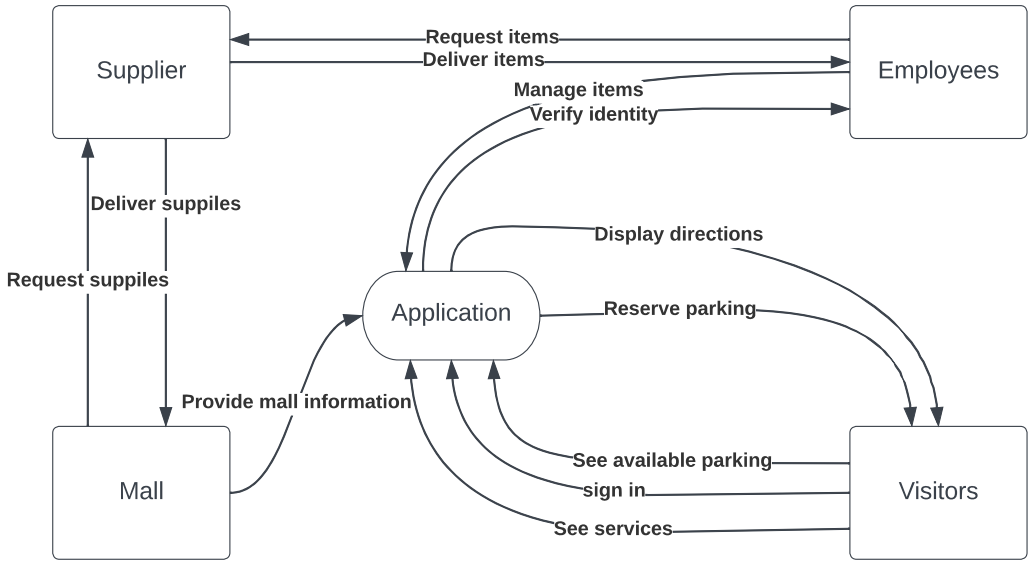
which maybe isn't available in the first place in that mall. Also, a mall is big place which parents can easily lose their children or a family member.

The mall navigation application solves all listed problems by providing a digital map that contains all information that users can use such as determining whether a store is available in the mall and its directions, parked car directions, finding the nearest mosque or bathroom, tracking a family member or children with the same app or via a watch that can be purchased individually, and finding a preferred restaurant and its directions.

5.2 Context Diagram

1 The Context of the Work

Context Diagram



5.3 Event Table

Business Event List

Event Name	Input and Output	Summary
1. Sign in	Application (in)	The user signs in into the application.
2. See available parking	Visitor (in)	The visitor selects available parking.
3. Reserve parking	Application (out)	The application reserves the parking slot.
4. See services	Visitor (in)	The visitor selects a service.
5. Display directions	Application (out)	The application displays the directions of the selected service.
6. Manage items	Employees (in)	The employees add, delete, update, etc. their store items.
7. Verify identity	Application (Out)	The application checks the employee's identity to see if they are authorized to make changes.
8. Request items	Employees (in)	The employees request their store items.
9. Deliver items	Supplier (out)	The supplier provides the requested items.
10. Request supplies	Mall (in)	The mall request items.

11. Deliver supplies	Supplier (out)	The supplier provides the requested items.
12. Provide mall information	Mall (in)	The mall provides its information such as closing hours, location, and so on.

5.4 Functional Requirements

FR1: The application shall be accessible to visitors via the app store.

FR2: The visitors shall have the option to select the language that the application will use, different languages like (French, Spanish, Swedish, Japanese, English).

FR3: The visitor's profile shall be available on the mobile application, such as the visitors name, phone number, and city.

FR4: The application shall show the visitors events available in the mall.

FR5*:* The application shall show visitors available places, number of existing pieces, and discounts.

FR6*:* The application shall display the nearest store based on the visitor's search.

FR7: The visitor shall be able to view the parked car location and its path.

FR8: The application shall list all nearby malls based on the visitor's location.

FR9: The application shall generate detailed report of the visit.

FR10: The visitors shall be able to edit or update their profiles.

FR11: The application shall provide statistics on the number of people within the mall.

FR12: The application shall enable visitors to view the opening and closing hours of the mall.

FR13: The application shall inform visitors on nearby restrooms and mosques based on their location at the mall.

FR14: The visitor shall be able to scan store items codes to view their information.

FR15: The application shall allow visitors to rate their experience using the provided services and give feedbacks.

5.5 Non-Functional Requirements

NFR1: The application shall be able to process 99% of requests in less than 10 seconds.

NFR2: The application shall be able to support at least 40,000 visitors using the application at once.

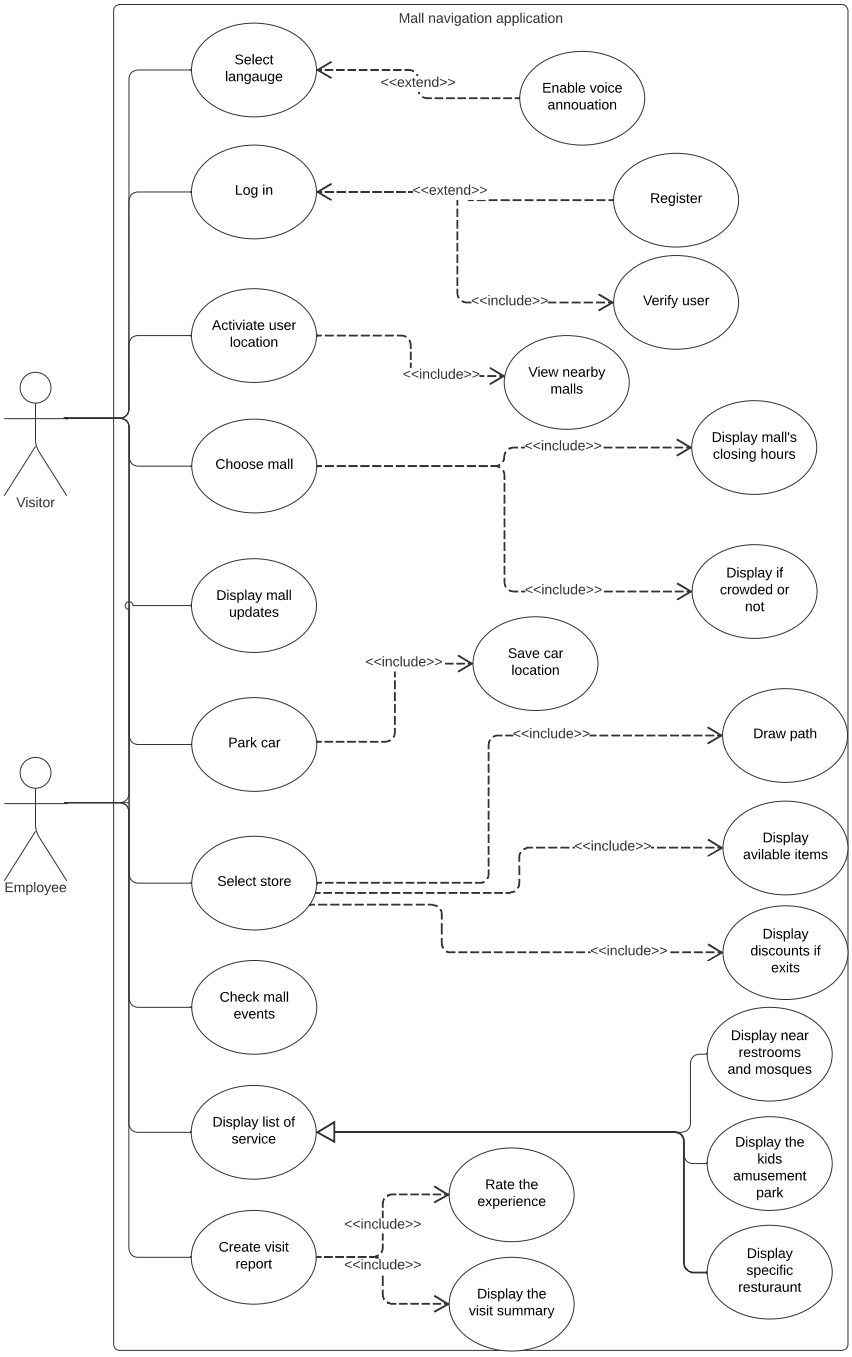
NFR3: The application's system shall be very secure, such as detecting and preventing attacks or exploits before it happens.

NFR4: The application shall be available and supported by most of the operating systems on all devices, whether mobile phones or laptops.

NFR5: Visitors shall be able to easily navigate through the application's interface.

NFR6: The application's system shall be updated at least once a month to ensure it runs smoothly and to fix errors or bugs, and also to ensure it continues to meet the visitors expectations.

5.6 Use case Diagram



5.7 Scenarios

Name	List of services
Id	UC9
Actors	Visitor, application
Precondition	The visitor must select the “services” icon in order to display the list of services.
Path	1. The visitor clicks the “services” icon. 2. The application will display the list of services. 3. The visitor clicks the wanted service. 4. The application will display the service and draw the path.

Name	Create visit report
Id	UC10
Actors	Application, Visitors
Precondition	The visitor must accept the message of allowing live location, access the mall and spend time.
Postconditions	At the end of their visit to the mall the application displays the visit summary.
Path	1. The visitor must activate the live location. 2. The visitor must spend time inside the mall. 3. When the visitor finishes from the mall visit, they click on the exit icon. 4. A screen shows the visitor all of their movements inside the mall. 5. At the end of the screen the visitor must rate the program and experience.

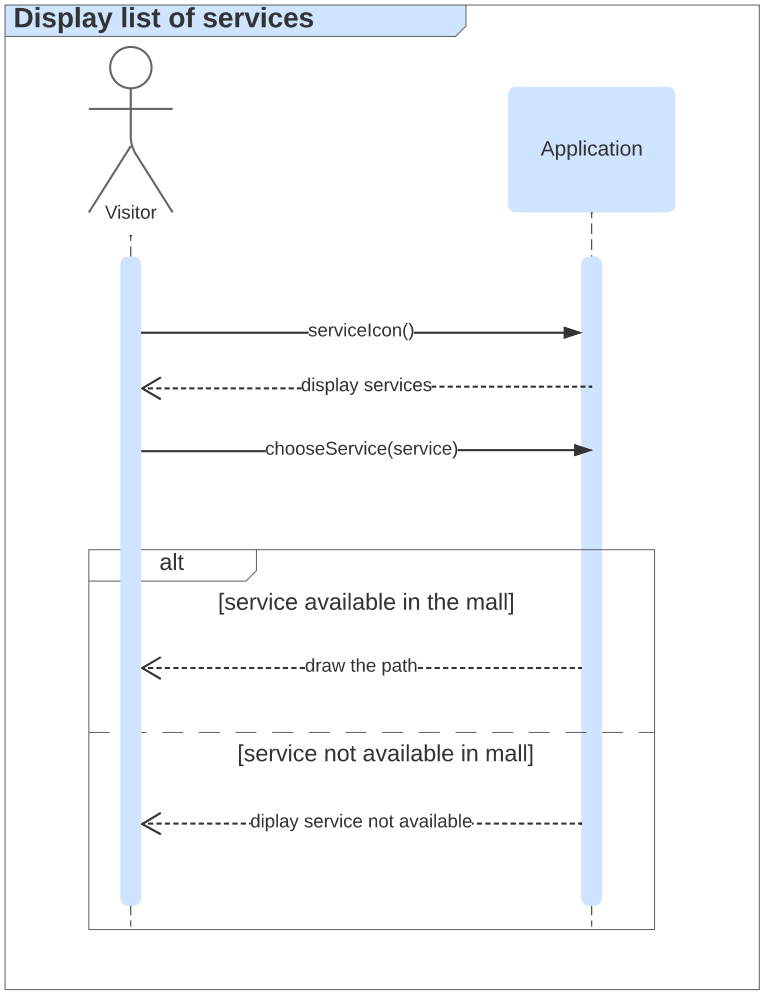
Name	Park car
Id	UC6
Actors	Visitors
Precondition	Availability of public parking in the selected mall, allowing the application to view the location.
Path	1. The visitor must specify the mall where they will park their car. 2. The visitor must choose a parking space for the car. 3. The visitor Reserves the car parking location. 4. The visitor must enter their number and write their data. 5. The visitor must enter the vehicle plate number and type of vehicle. 6. The application saves the visitor's car location on their device.

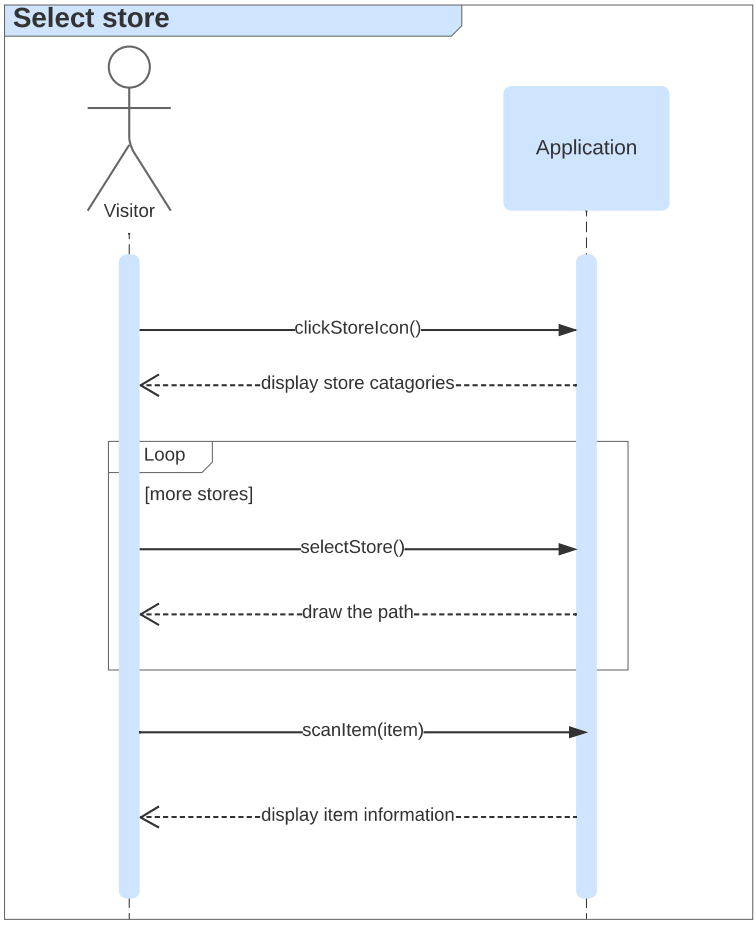
Name	Choose mall
Id	UC4
Actors	Visitor
Precondition	The visitor must select the city location and allow the application to view their location.
Path	1. The visitor chooses the mall from the list of malls displayed by the application. 2. The application shows the approximate time to reach the mall. 3. Also, the application shows the opening and closing hours of the mall. 4. The application shows if the mall is crowded or not.

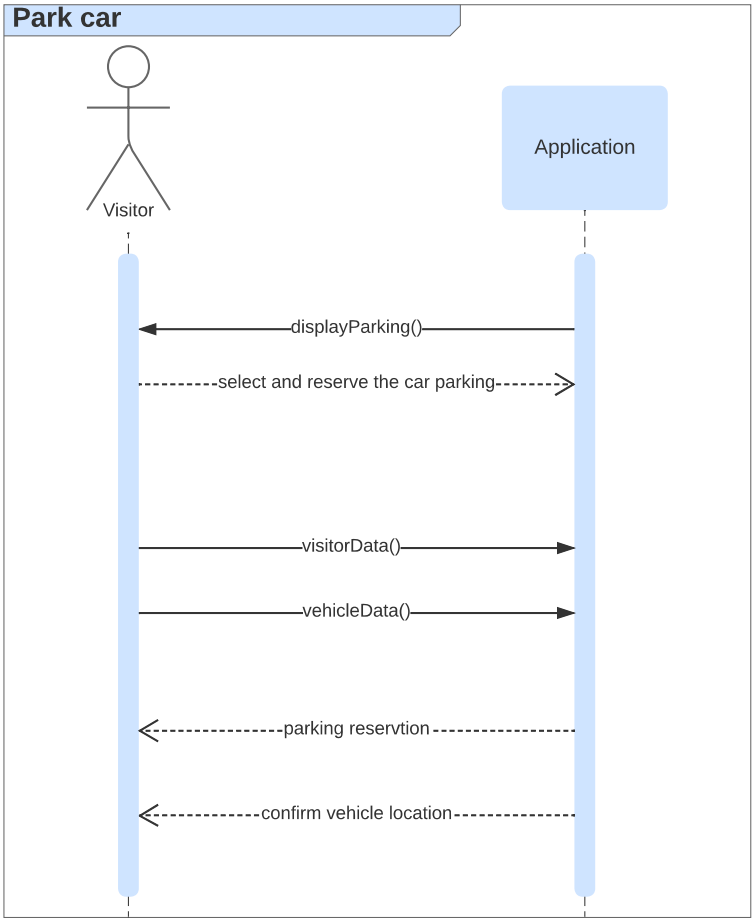
Name	Select store
Id	UC7
Actors	Visitor, Application
Precondition	The store must be open and available at the mall.
Path	1. The application will display all the stores into categories. 2. The visitor must select a particular store. 3. The application will draw the path to the store. 4. Inside the store, the visitor can scan an item code. 5. The application will display the item information, such as availability, size, material, ingredients, and discounts if any.

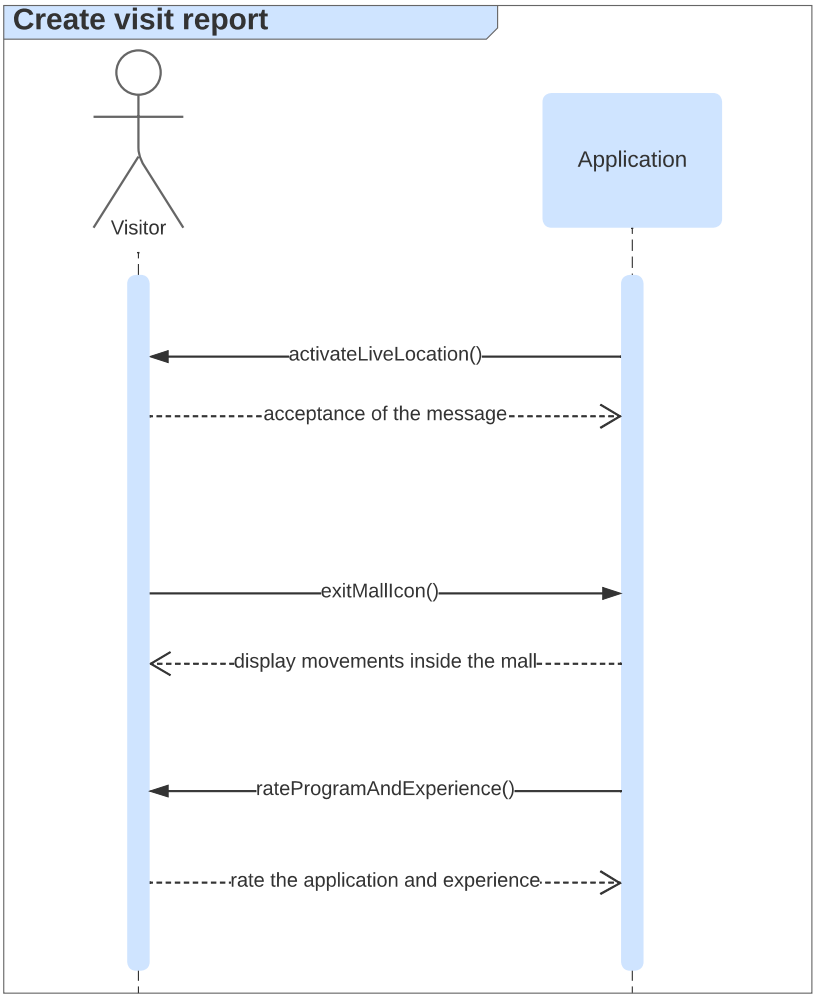
6 Design Phase

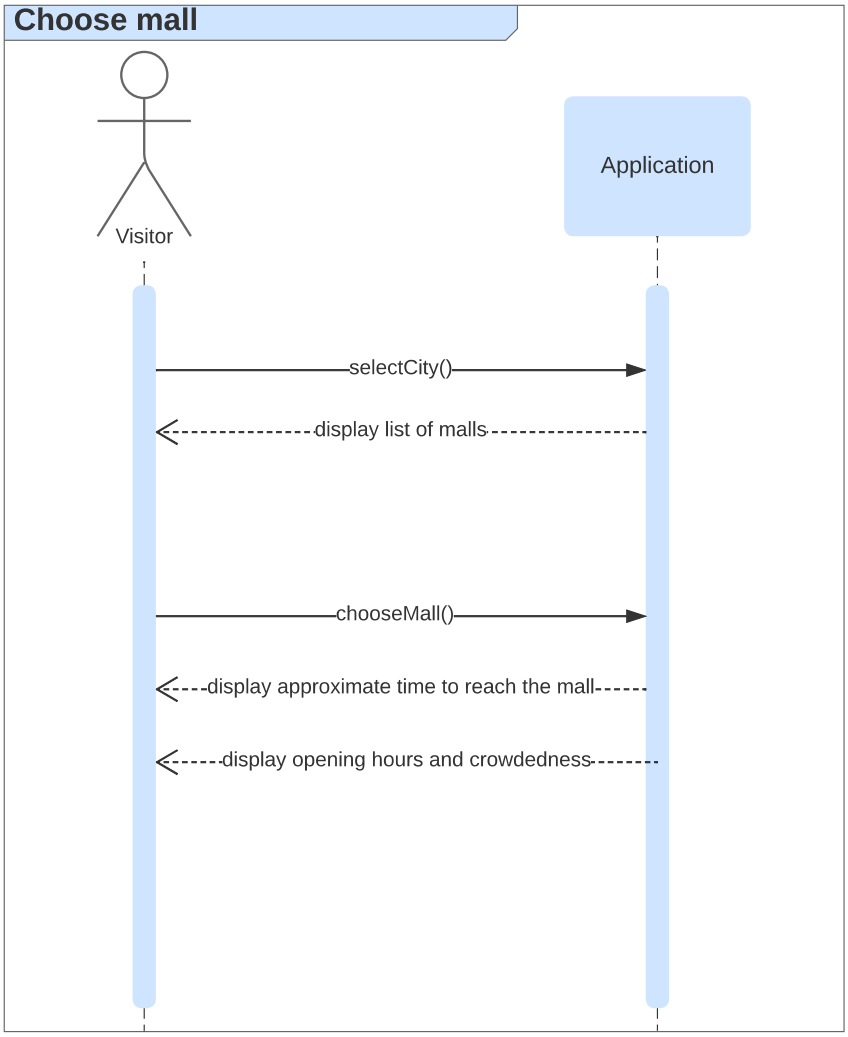
6.1 System Sequence Diagram




Select store
Visitor
Application
clickStoreIcon()
display store catagories
Loop
[more stores]
selectStore()
draw the path
scanItem(item)
display item information


Park car
Visitor
Application
displayParking()
select and reserve the car parking
visitorData()
vehicleData()
parking reservtion
confirm vehicle location


Create visit report
Visitor
Application
activateLiveLocation()
acceptance of the message
exitMallIcon()
display movements inside the mall
rateProgramAndExperience()
rate the application and experience



6.2 Class Diagram

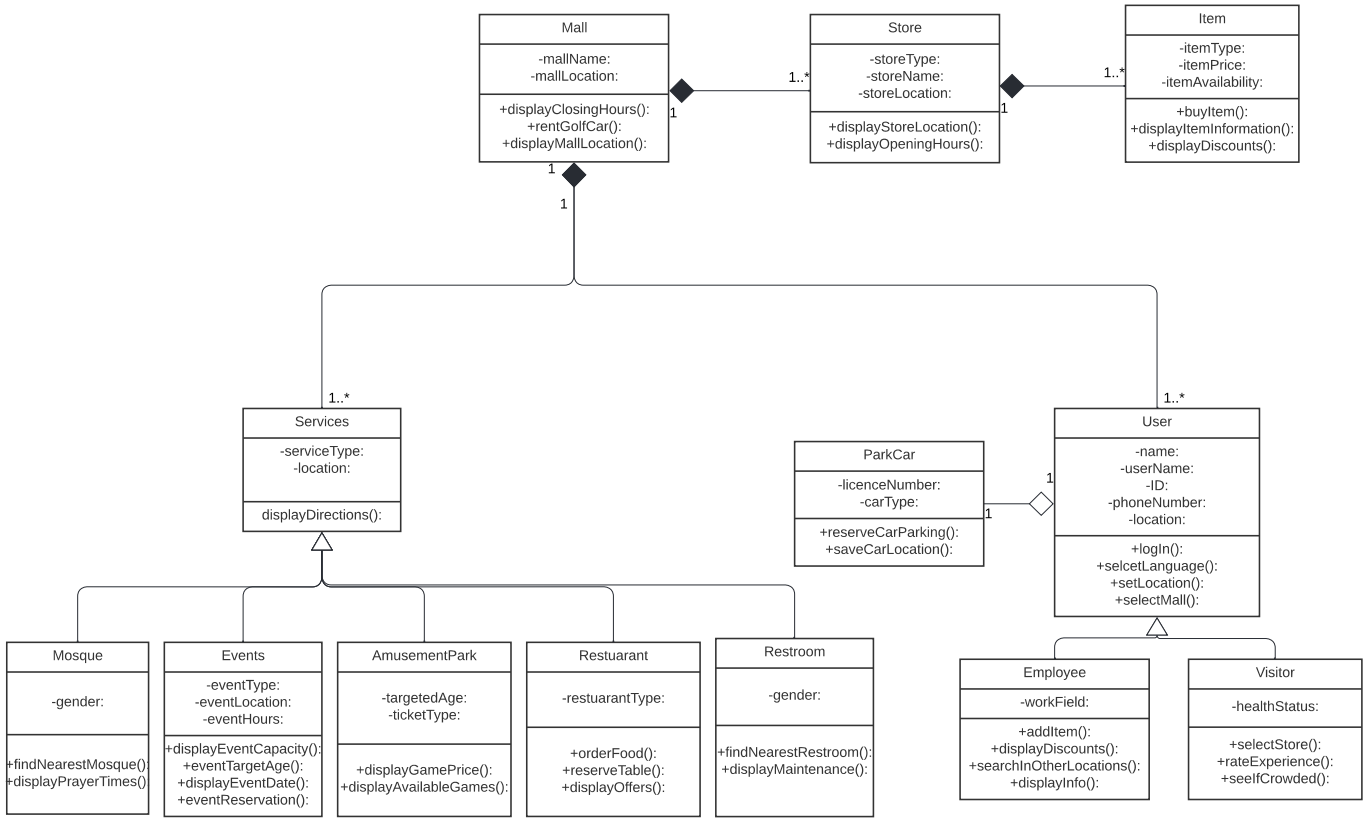
PART 1 SYSTEM CLASS ANALYSIS

Mall navigation application:

We are interested in designing a mall navigation application that have two types of users: visitors and employees.

- Both visitors and employees can
    - Park their car
    - View stores in malls
    - View mall events
    - Rent golf car
    - View services provided by the mall
    - Display directions to the required service
    - Select nearby malls
- A parked car can be reserved in any place the employee\visitor wants
- There are a number of stores available in the mall and their closing hours is also displayed
- Each store item belongs to one and only one store
- For each service their directions will be displayed (restrooms, restaurants, mosques, etc…)
- For each store their items will be displayed, their availability and sizes (if applicable)
- For each visitor/employee, a report will be generated of their movements and also will be able to rate the experience

PART 2 CLASS DIAGRAM



7 Conclusion

In conclusion this program is based on helping visitors access the desired places with ease and not wasting much time in the mall and knowing all the services available in it. We have learned how to think about the program and highlight in a good way and the way to work in a group and receive all ideas how to draw the program from the beginning before writing code. some of the difficulties we faced were due to time constraints.