

Software Design Document For Gam3ya

Version 1.1 approved

Prepared by:

Mohammed Hesham Riad, 900192833

Rafik Yacoub, 900194127

Amr Sallam, 900196011

George Bassem, 900181047

CSCE Department, The American University in Cairo

1 May 2022

		Software Design Document
TABLE OF CONTENTS		
1.	INTRODUCTION	3
1.1	Purpose	3
1.2	Scope	3
1.3	Overview	4
1.4	Reference Material	4
2.	SYSTEM OVERVIEW	5
3.	SYSTEM ARCHITECTURE	6
3.1	Architectural Design	6
3.2	Decomposition Description	9
3.3	Design Rationale	11
4.	DATA DESIGN	12
4.1	Data Description	12
4.2	Data Dictionary	13
5.	COMPONENT DESIGN	20
6.	HUMAN INTERFACE DESIGN	21
6.1	Overview of User Interface	21
6.2	Screen Images	28
6.3	Screen Objects and Actions	41
7.	REQUIREMENTS MATRIX	49
8.	APPENDICES	50

1. INTRODUCTION

1.1 Purpose

This software design document explains the architecture and system design of Gam3ya, a service that aims to use existing payment service providers like Fawry, VF, and others along with online resources to globalise the cash collecting process, which is essentially a peer-to-peer interaction. It explains the system's architectural, structural, and behavioural viewpoints, which are used to implement the functional and non-functional requirements.

This paper is written for a wide range of people. The following are some of them:

1. **DEVELOPERS:** Developers can apply their knowledge to examine the project's architecture and coding techniques needed in order to improve the development process in the future. They can help improve the product by coming up with new ideas for improving existing features and adding new ones.
2. **TESTERS:** For project testers, this document can give a more efficient technique for discovering issues; bugs are easier to find on the document.
3. **PROJECT MANAGERS:** The document can be used by project managers as a guide for managing the project and acquiring a better knowledge of its purpose, goals, and functioning. It is also essential for them to make sure that the product meets their expectations and needs.

1.2 Scope

The product's goal is to make peer-to-peer lending secure and efficient for a large number of people at once. The goal of this product is to assist people who are in financial need with little amounts of money, particularly those who require extra income sources but do not have access to a bank account or interests. Gam3ya's long-term goal is to eventually replace the Egyptian traditional gam3ya with an online and cashless system that provides consumers with accessibility, convenience, and security. It also aspires to be a social network that is interactive, similar to forums, by integrating and supporting text chat, audio, and video calls to enable social interactions between the users.

1.3 Overview

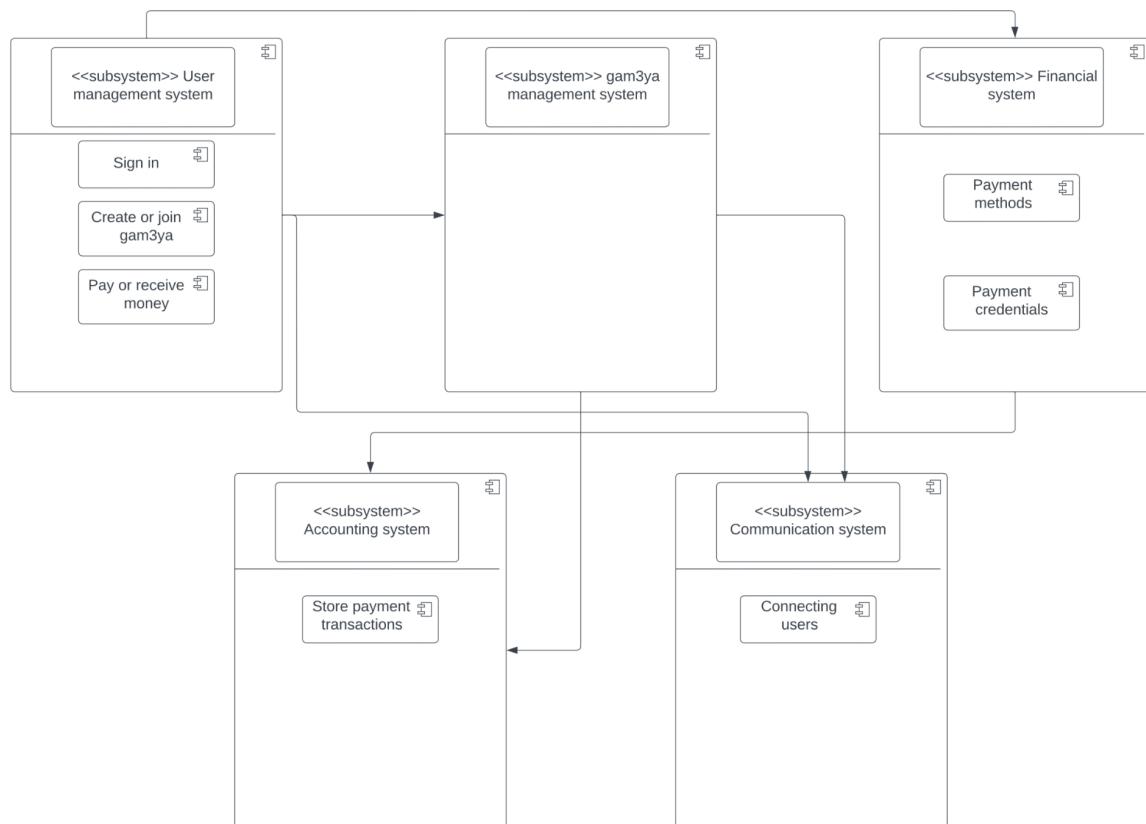
This document is divided into four sections. The architectural structure of the system is described in the first part, which includes a detailed description of the architectural model, the system's subsystems, and how they interact with one another and with the environment. The second section describes the structural design by explaining the system's class diagram, which includes each class, its properties and methods, as well as how they interact with one another via various controllers. The Gam3ya subsystems and functionalities are described in the third section of the text. The final section shows screenshots of the screen and how its items interact with each other and with end-users to demonstrate how the user interface was designed.

1.4 Reference Material

- Component Diagram Explanation link:
<https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-component-diagram/>
- Deployment Diagram Explanation link:
<https://www.visual-paradigm.com/guide/uml-unified-modeling-language/what-is-deployment-diagram/>
- Sequence Diagram Explanation link:
<https://docs.google.com/presentation/d/1DRDAXU9wAtyhnUrtYpOttYB61pZ-2FaN4eHTHqUGkM/edit#slide=id.p>

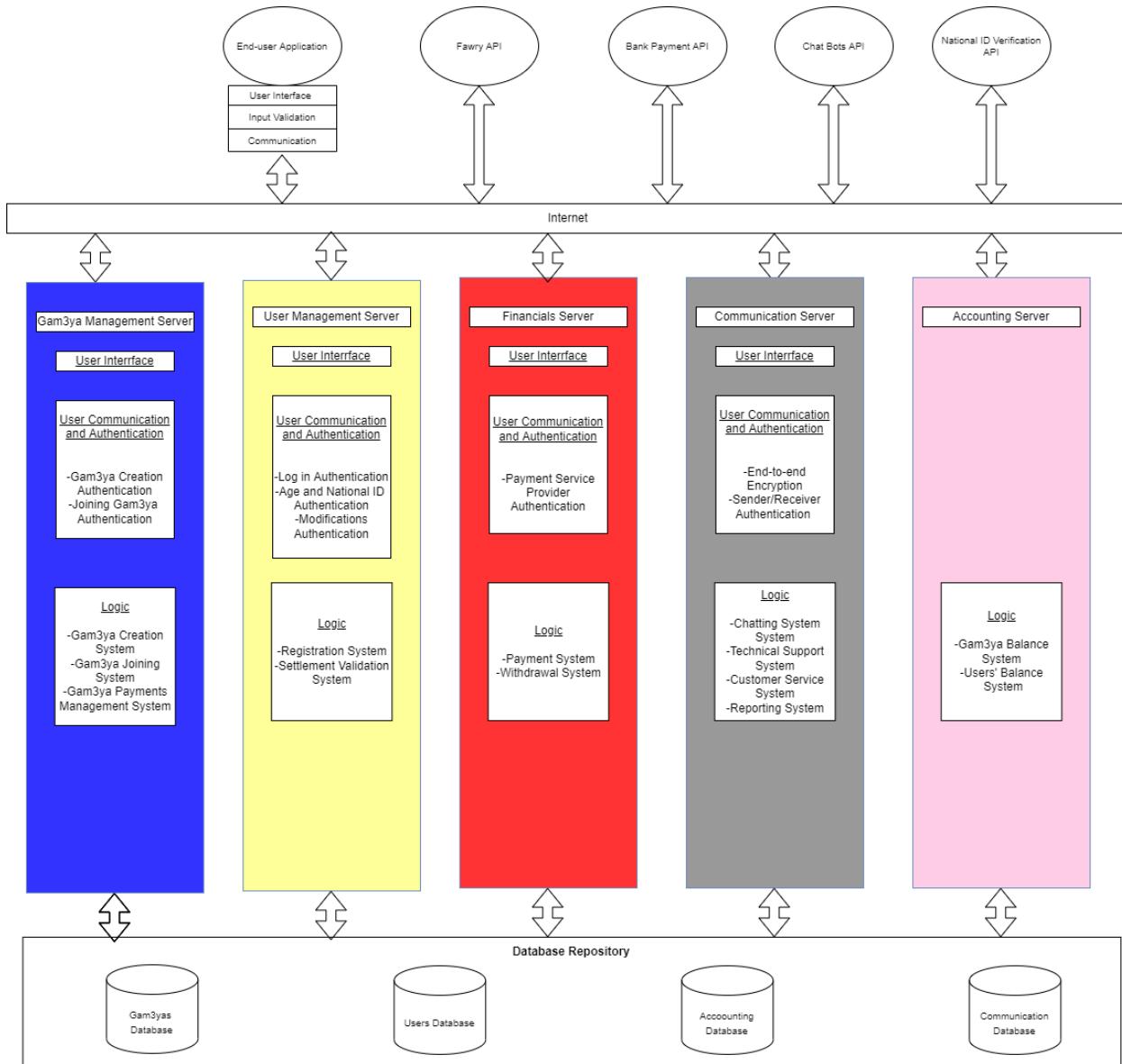
2. SYSTEM OVERVIEW

COMPONENT DIAGRAM



3. SYSTEM ARCHITECTURE

3.1 Architectural Design



Note: the application has a big bank account, in behalf of of gam3yas balances, that is involved in all transactions, then the system allocates the corresponding balance amount for each gam3ya balance. Therefore, we do not need to open an account for every created gam3ya.

We designed our architecture to have multiple layers, for better organization. The system is composed of 4 layers; the subsystems, data bases, servers and user interfaces. Firstly, the user interfaces, which aims to provide most of the systems functionalities to the user. User interface provides the following functionalities:

- Sign in/ out
- create/modify user account
- create/modify a gam3ya
- Search for a gam3ya, using designed filters
- Make a payment
- Withdraw money from own balance
- Convert currency
- Request to join a gam3ya
- Chat with other users
- Add friends
- View recent notifications
- View previous transactions
- View other users profile
- Add new payment method
- Contact customer service/technical support
- Report another user
- Remove a member from a gam3ya
- Accept/reject friend request
- Accept/reject a join request
- Leave a gam3ya
- Leave a chat
- Give permissions (microphone, camera, etc)

Most of the functionalities are provided in the user interface and that is because our application is designed to be user interactive.

Secondly, the subsystems. Our application consists of 5 main subsystems: user management system, gam3ya management system, financial system, accounting system, communication system. The functionalities we provided in the SRS are categorized and divided between these 5 subsystems, for better and concise performance.

The user management system provides the following functionalities:

- Modify the logged in account
- Verify the national id of new user.
- Check credentials while in sign in request.
- Create a gam3ya
- Search for a gam3ya
- Request to join a gam3ya
- Leave a chat or a gam3ya
- Chat with another user
- Send add request to another user
- View previous transactions
- View list of completed gam3yas
- Make a payment
- Withdraw from user's balance

- Change application settings
- Contact customer service or technical support
- Establish a text, voice, or video chats
- View recent notifications

The gam3ya management system provides the following functionalities:

- Add new members to a gam3ya
- View the current gam3ya members
- Modify a gam3ya attributes
- View the current status of a gam3ya (open, closed, pending)
- Send the gam3ya value to the user whose turn has come
- View who paid the due amount or not
- Remove a member from a gam3ya

The financial system provides the following functionalities:

- Select an existing transaction method (credit, fawry)
- Add new transaction method
- Make a payment
- Make withdrawal
- Verify the selected method related information

The accounting system provides the following functionalities:

- Update a user's balance according to a completed transaction.
- Update the system's balance according to a completed transaction.
- View transactions history

The communication system provides the following functionalities:

- Establish a chat with another user (text, voice, video)
- Send messages
- Exit the chat
- View the chat members list

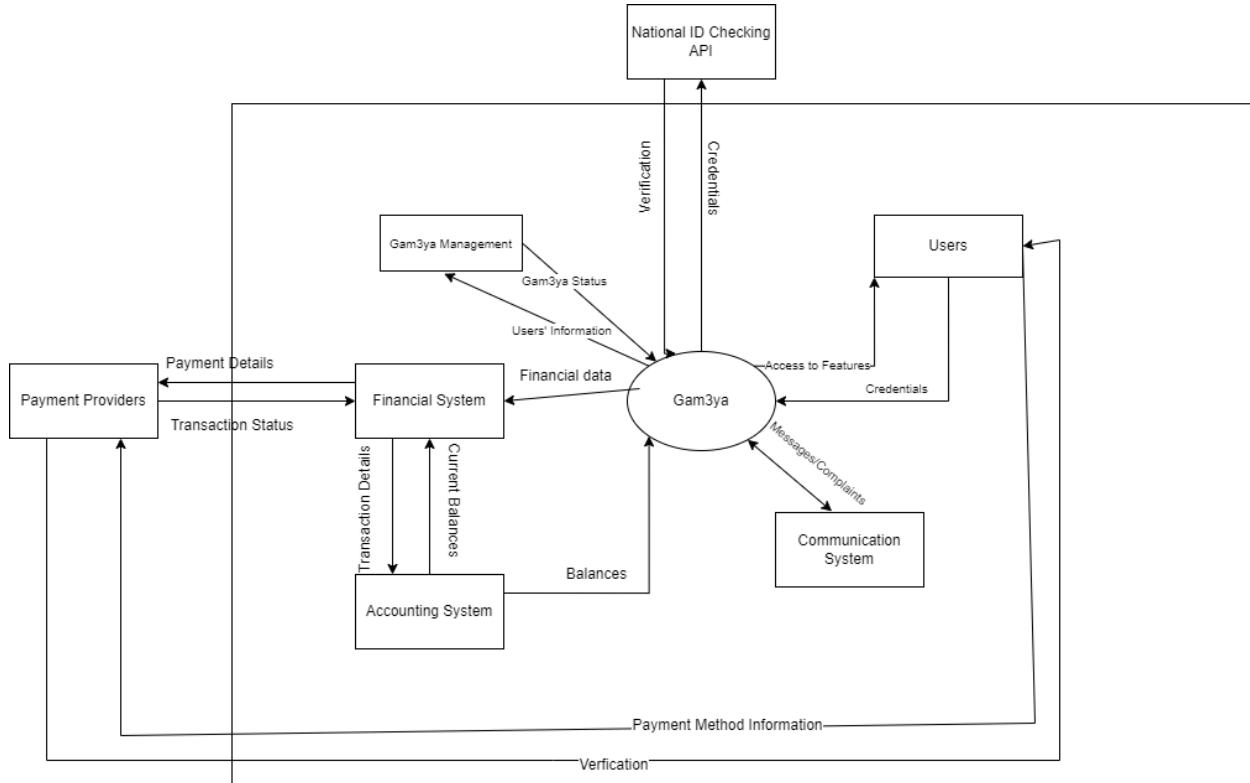
There are some functionalities that are common between two or more subsystems, that means that these subsystems must communicate with each other to perform such a functionality.

The next layer is the servers layer; here connections to external API are established. The application depends on a payment provider API (fawry, banks) and national ID API. The payment provider API is connected to the financial system. The financial system receives the transaction's details and supplies the necessary information to the accounting system, which in turn updates the balances of the users and the system, as well. Furthermore, the user management system is connected to the national ID API which is used to verify an inputted national ID. The national ID API is used to minimize fraud practices and provide more security to the application system.

Lastly, the database layer; here the system's related information is stored. We have a database for the related information to both the user and gam3ya, a database for the communication related data and another database for the transactions. The first database is also used in the login or sign up requests; if it is a log in request, the system checks whether the entered credentials match with existing ones in the database. The system acts according to the response of the database. If it is a sign up request, the system does the same. Communication system uses the database of users and gam3yas, as well. Whenever a chat request is raised, the communications system checks the database for the intended user and directs the request to them. Adding, whenever a search is performed, the system accesses the users and gam3yas database and performs the search.

3.2 Decomposition Description

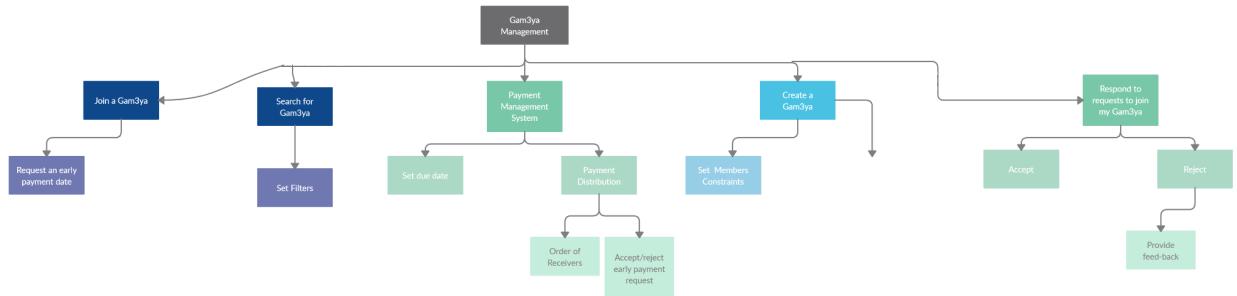
3.2.1 Top-level Data flow



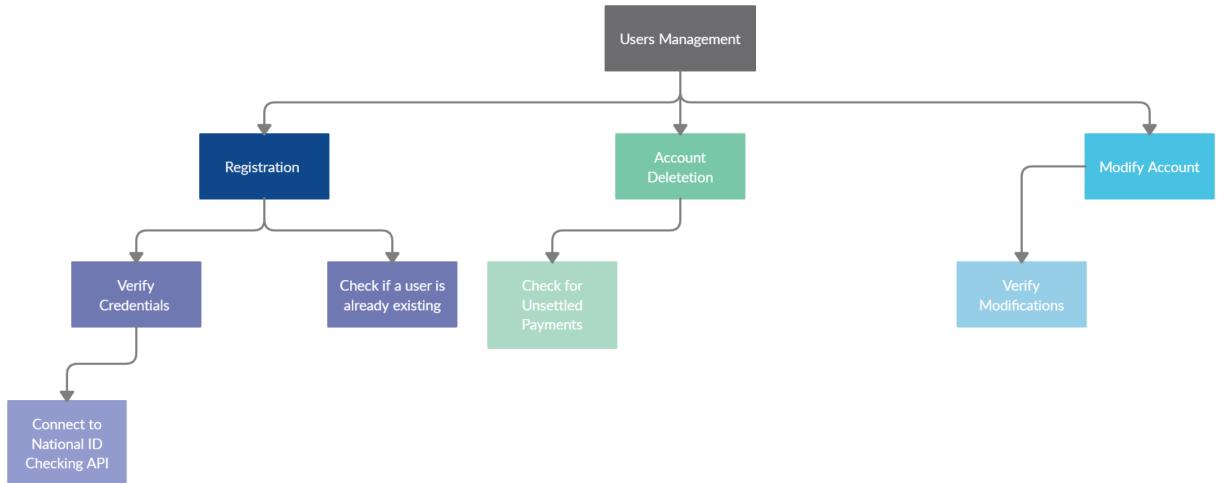
This graphic depicts how each subsystem interacts with the Gam3ya platform and how data flows across systems. At first, the user provides the platform with their credentials. The Gam3ya verifies the entered national ID with the help of “national ID checking API”. Given that the user credentials are valid and verified, the user is given access to all features of the application. At the same time, this user information is added to the users’ database. The platform sends the users’ information to the “Gam3ya Management System”; this system is responsible for handling the Gam3ya search and creating/joining Gam3yas. Through this system, the platform gets access to Gam3ya status information (Size, Balance, Schedule, etc). The Communication System handles the social interaction between users, in addition to their complaints. The “Financial System” is responsible for managing the platform’s financials. The platform sends the users’ and Gam3yas’ financial data (Balances, Payment Methods, Amounts Due, etc). The Financial System handles the payments and withdrawals by connecting to the payment providers and sending the payment details to them. Before any transaction, the financial system retrieves the current balances from the accounting system; it uses these balances to decide whether to proceed or not. If the balances indicate a valid transaction, the payment service provider process the payment. When the financial system receives a successful transaction, it sends the transaction details to the accounting system to update the balances and document the payment. At any point in time, the accounting system reports the current balances to the platform and to the financial system.

3.2.2 Functional Decomposition Diagrams

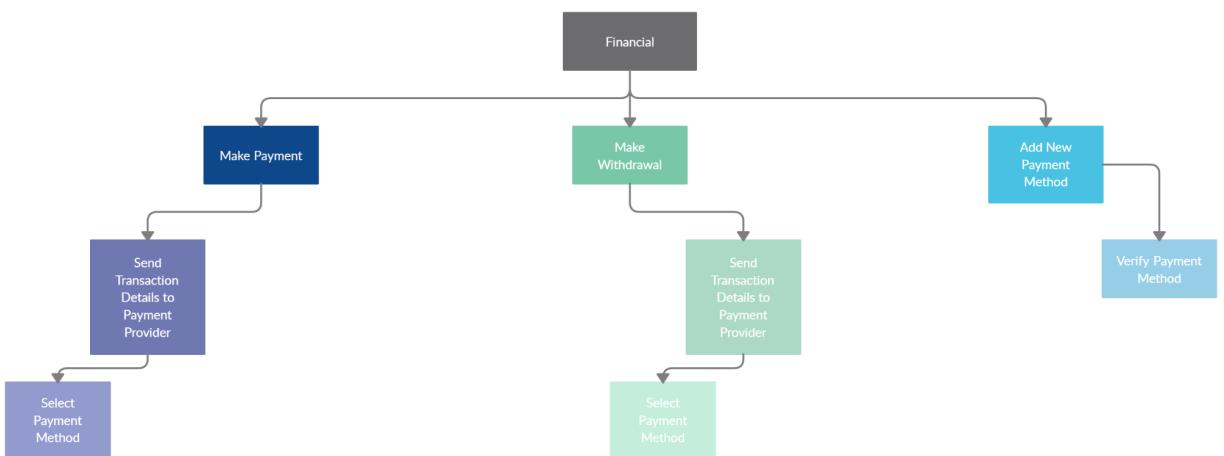
3.2.2.1 Gam3ya Management System



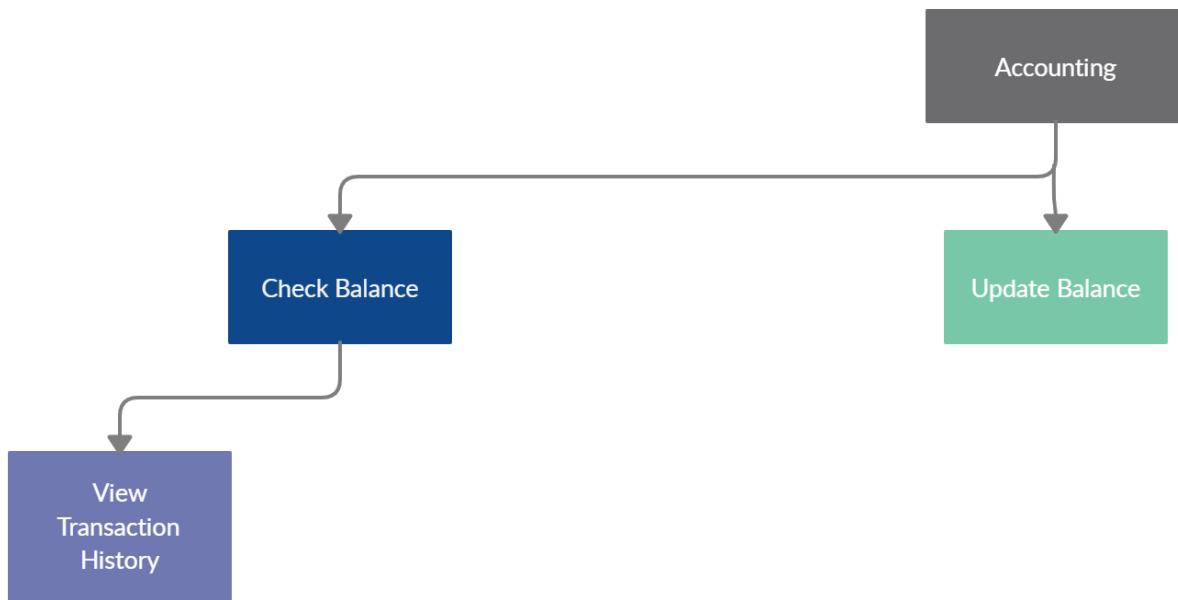
3.2.2.2 Users Management System



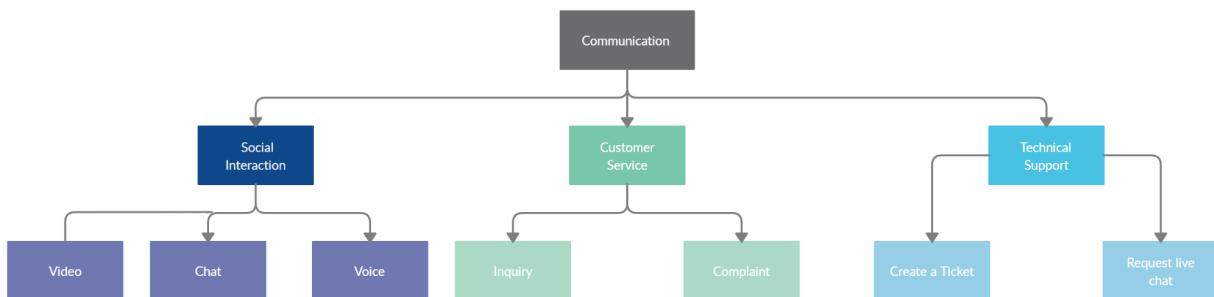
3.2.2.3 Financial System



3.2.2.4 Accounting System



3.2.2.5 Communication System

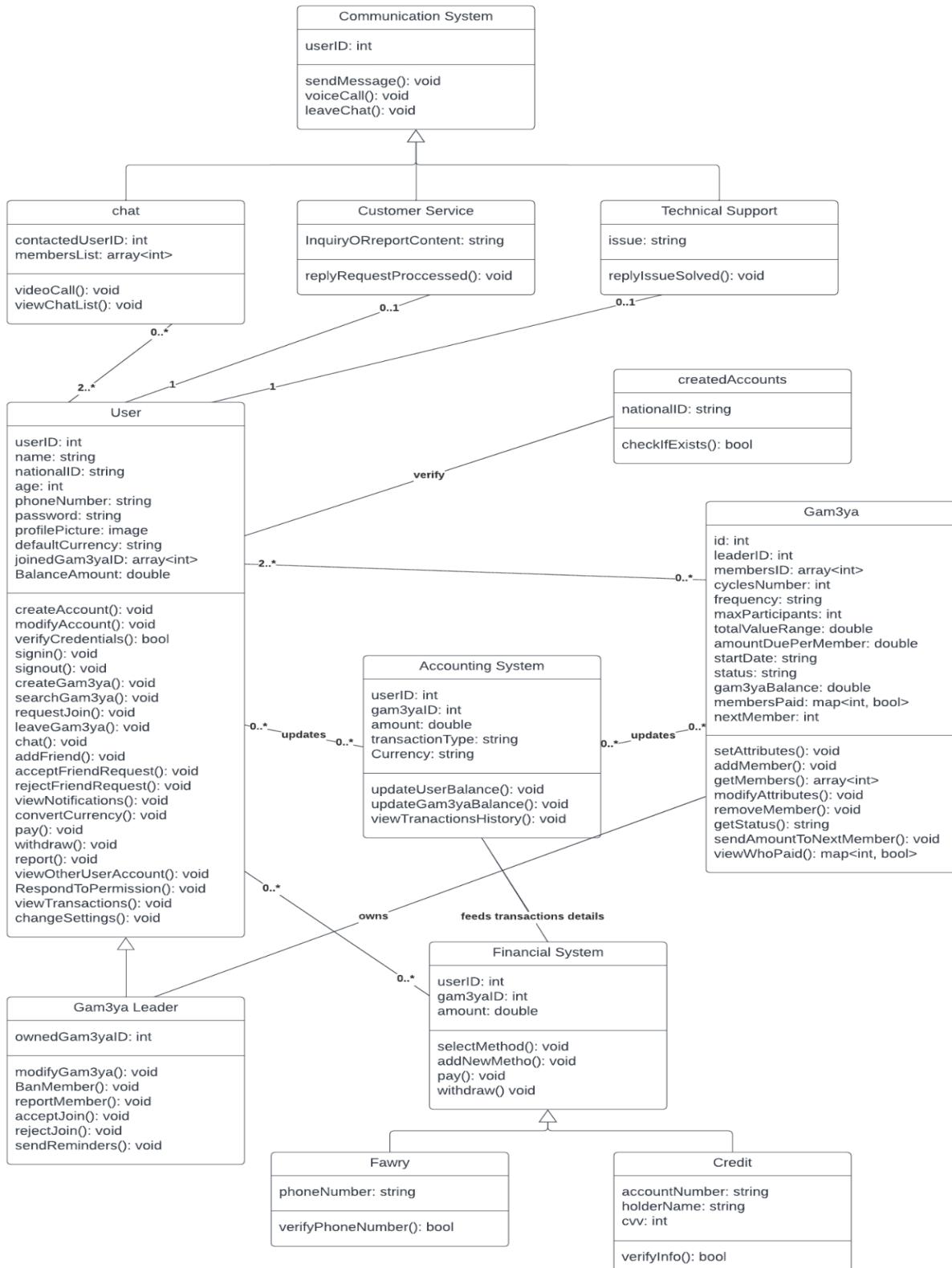


3.3 Design Rationale

The software is designed with an object-oriented approach in order to make the product easily maintainable. The object-oriented design helps to classify the objects of the software so that a new object can easily be added to the design or an existing component can be easily deleted. In this way, we were able to separate models, views, and other functionalities. Moreover, the object-oriented design will help us encapsulate the server connections. We also made a separate server for each system to be able to achieve the highest level of security and reliability. We also relied on trusted external payment service providers to offer the users with comfort and convenience, given the availability and ease of access of these providers.

4. DATA DESIGN

4.1 Data Description



4.2 Data Dictionary

Class Name	Accounting System	
Attributes	userID: int	The id of the user involved in the transaction
	gam3yaID: int	The id of the gam3ya involved in the transaction
	amount: double	The mount of money in the transaction
	transactionType: string	Whether it is a payment or withdrawal transaction
	Currency: string	Currency in which the amount is reflected
Methods	updateUserBalance(): void	Update the balance of the user whose id="userID" whether by deducting or adding "amount"
	viewTransactionsHistory(): void	Display the previous transactions details of the user
	updateGam3yaBalance(): void	Update the balance of the gma3ya whose id="gam3yaID" whether by deducting or adding "amount"

Class Name	Chat	
Attributes	contactedUserID: int	The id of the user who is contacted
	membersList: array<int>	List of user IDs who are in the chat
Methods	videoCall(): void	Send a video call request to the contacted user, then establish a connection
	viewChatList(): array<int>	Return the list of users in the chat

Class Name	Communication System	
Attributes	userID: int	The id of the user who established the communication
Methods	sendMessage(): void	Send a message to the connected user
	voiceCall(): void	Send a voice call request to the contacted user, then establish a connection
	leaveChat(): void	Exit the chat

Class Name	Created Account	
Attributes	nationalID: string	The id of the user involved in the transaction
Methods	checkIfExists(): bool	Check whether “nationalID” is associated with an existing account or not.

Class Name	Credit	
Attributes	accountNumber: string	Bank account number of the credit
	holderName: string	Holder name of the credit to be used
	Cvv: int	The 3-digit cvv code of the credit
Methods	verifyInfo(): bool	Check whether the entered information is associated with a real bank account or not

Class Name	Customer Service	
Attributes	inquiryORreportContent: string	Content entered by the user for an inquiry or a report of complaint.
Methods	replyRequestProcessed(): void	Send back to the user that their request is being processed.

Class Name	Fawry	
Attributes	phoneNumber: string	Phone number of the user involved in the transaction
Methods	verifyPhoneNumber(): bool	Check whether the phone number is associated with an existing gam3ya account or not.

Class Name	Financial System	
Attributes	userID: int	The id of the user involved in the transaction
	gam3yalD: int	The id of the gam3ya involved in the transaction
	amount: double	The amount of money in the transaction
Methods	selectMethod(): void	Select the transaction method, whether it is by fawry or credit.
	addNewMethod(): void	Add new transactions method, provide the related information
	pay(): void	Transfer the amount specified to the system's account and associate the payment to "userID"
	withdraw(): void	Withdraw the amount specified from the system's account by "userID"

Class Name	Gam3ya	
Attributes	gam3yaID: int	The unique id of the gam3ya
	leaderID: int	ID of the user who is the leader of the gam3ya
	membersID: array<int>	IDs of the current members of the gam3ya
	cyclesNumber: int	Number of cycles of the gam3ya.
	frequency: string	Indicates the time till the next due, whether it is weekly, monthly, etc.
	maxParticipants: int	Maximum number can be added to the gam3ya members list
	totalValueRange: double	Average amount of money to be received by each member
	amountDuePerMember: double	Average amount of money to be paid by each member
	startDate: string	The starting date of the gam3ya
	Status: string	Status of the gam3ya. Whether it is open, closed, pending.
	gam3yaBalance: double	The amount of money in the gam3ya balance
	membersPaid: map<int, bool>	Indicates whether each member has paid their due amount or not.
Method	nextMember: int	ID of the next member to receive the gam3ya value
	setAttributes(): void	Initiate the attributes of the gam3ya
	addMember(): void	Accept a new member and add their id to the members list
	getMembers(): array<int>	Return the IDs of the current gam3ya members

	modifyAttributes(): void	Modify attributes of the gam3ya.
	removeMember(): void	Remove a member from the gam3ya list and do not allow them to view its content.
	getStatus(): string	Return the current status of the gam3ya
	sendAmountToNextMember(): void	Send the gam3ya value to the user's balance, whose turn has come.
	viewWhoPaid(): map<int, bool>	Return list indicating which member has paid the due amount.

Class Name	Gam3ya Leader	
Attributes	ownedGam3yaID: array<int>	List of IDs of the gam3yas whose leader is the user
Methods	modifyGam3ya(): void	Modify the attributes of a gam3ya
	banMember(): void	Prohibit a member from viewing the content of a gam3ya
	reportMember(): void	Report a member to the customer service
	acceptJoin(): void	Accept the join request of some user to join a gam3ya
	rejectJoin(): void	Reject the join request of some user to join a gam3ya
	sendReminders(): void	Send reminders to all gam3ya members, as notific

Class Name	Technical Support	
Attributes	issue: string	Content entered by the user for the issue encountered
Methods	replyIssueProcessed(): void	Send back to the user that their issue is being processed.

Class Name	User	
Attributes	userID: int	The unique id assigned to the user
	name: string	Name of the user
	nationalID: string	National id of the user
	Age: int	Age of the user
	phoneNumber: string	Phone number of the user
	password: string	Password entered by the user. To be used to sign in
	profilePicture: image	Binary file, image, of the user to be displayed in their profile
	defaultCurrency: string	The chosen currency to reflect all money amounts in.
	joinedGam3yaID: array<int>	List of gam3yas the user is a member in
	balanceAmount: double	Amount of money in the user's balance
Methods	createAccount(): void	Create a new user account
	modifyAccount(): void	Modify the information of the user's account
	verifyCredentials(): bool	Check whether the credentials exist in the data base or not. Used in both sign in and sign out
	signin(): void	Sign in to a user account
	signout(): void	Sign out of a user account
	createGam3ya(): void	Create a new gam3ya by the user, as its leader.

	searchGam3ya(): void	Search for a gam3ya to join using filters in the search bar.
	requestJoin(): void	Request to join a gam3ya
	leaveGam3ya(): void	Leave a gam3ya
	chat(): void	Begin chatting request with another user
	addFriend(): void	Send an add request to another user
	acceptFriendRequest(): void	Accept a received friend request, so add each user to the other's friends list.
	rejectFriendRequest(): void	Reject a received friend request.
	viewNotifications(): void	Display the recent notifications ordered by the latest
	convertCurrency(): void	Convert the currency in which the money amounts are displayed
	pay(): void	Pay the due amount of a certain gam3ya
	withdraw(): void	Withdraw a specific amount from own balance
	report(): void	Send a report of some other user to the customer service, along with the description
	viewOtherUserAccount(): void	View the visible user information of another user's account
	respondToPermissions(): void	Accept or reject the permissions asked by the application, such as location, microphone, camera, etc.
	viewTransactions(): void	Display the information of a specific transaction.
	changeSettings(): void	Change the application settings

5. COMPONENT DESIGN

As shown in section 3.2, Gam3ya is mainly working with 5 subsystems, which are user management system, gam3ya management system, financial system, accounting system, and communication system.

1- User management system

Once the users create an account on gam3ya app, they gain access to all features.

They first follow the below steps to **create an account**:

- Download the app
- Click on create new account
- Inserts all the needed information to create an account (ex: name, age, ID photo, etc)
- Once the ID is approved, the account will automatically verify and the user gains access to all features of the app.

these features include joining an **existing gam3ya** or **creating a new one** from scratch.

For Joining a gam3ya:

- They choose first that they want to join an existing gam3ya
- Then search for the gam3ya based on their preferences, ex: users may search for a gam3ya based on the money they are willing to pay, a special gam3ya, etc...
- The user then click on request to join and enters the gam3ya

For creating a new gam3ya:

- The user chooses that he prefers to create a new gam3ya instead of joining an existing one
- Then he sets the criteria for this gam3ya (ex: no. of users, the amount of the gam3ya, etc...)
- Then he adds a small description of the gam3ya so other users can have a brief idea about this gam3ya
- He also controls who can enter the gam3ya

2- Gam3ya management system

The main aim for gam3ya management system is to gather the data about the users and make sure that all of them are 100% verified and reliable. It also checks the gam3ya statistics for all of the gam3yas available on the app.

3- Financial system

The financial system is mainly the system responsible for all of the monetary transactions that take place between the users in the app.

- The user first picks the preferred method of payment (ex: fawry, credit, etc...)
- Then the user chooses to which gam3ya he wishes to transact the money to
- Finally, the user receives a notification confirming that the money has been successfully transacted

4- Accounting system

The accounting system mainly keep record of all the financial transactions between the users that are done through the financial system

- When a user perform a transaction through the financial system, details of the transaction are automatically sent to the accounting system
- The accouynting system then stores the transactions details, and updates the payment accounts to avoid any miscalculations

5- Communication system

The communication system is mainly the system responsible for all the different methods of communication between the users of each gam3ya

- After the user enters his preferred gam3ya, he receives the option to contact any member or all of the members of this gam3ya
- The basic communication method is chatting and this is offered automatically in any gam3ya, and there is also an option for private chats if user wishes to contact another user privately
- If a user wishes another method of communication, he could audio or video call any of his gam3ya members at any time
- There is also an option for users to contact gam3ya admins if they wish to ask about anything in the gam3ya before entering it

6. HUMAN INTERFACE DESIGN

6.1 Overview of User Interface

The interaction between the end-users and the system will be through different user interfaces as the end-users will be allowed to utilize the system's functionalities through the following actions:

1. Create account
2. Sign in
3. Restore a forgotten password
4. Review terms and conditions
5. Create a Gam3ya
6. Search for a Gam3ya
7. Request joining a Gam3ya
8. Respond to another user's request to join a Gam3ya (accept/reject)
9. Search for a friend
10. Request to add a friend
11. Respond to another user's friend request (accept/reject)
12. Chat with other members (text chatting, audio or video calls)
13. File for a report/complaint
14. Pay the periodical installment
15. Receive due amount
16. Access personal profile

17. Edit personal profile information
18. Access notifications
19. View previous and current Gam3yas
20. Adjust settings of a Gam3ya (exclusive to the gam3ya leader)
21. Invite a friend to join a Gam3ya
22. Leave Gam3ya
23. Contact customer service
24. Add/edit payment method
25. Accessing the user guide (tutorials on how to use the app)
26. Converting currency

Action	System Feedback
1. Create an account	A screen will be shown for the user with blank space to fill in the required info and then submit them. Then the system will insert those data (entered by the user) into its database and display a success message for this process “You have successfully created your Gam3ya account” if the national ID they submitted is verified by the IDVS or else a message would be shown saying “Please enter a valid ID” or “This ID has been used before”.
2. Sign in	The system will compare the entered Email & password with the existing data in its database then one of two possibilities will occur: 1- redirect the user to the Gam3ya home screen in case of entering correct information 2- display an error message “Sorry. You have entered the wrong data. Please try again. Create an account if you are new”. The user will be on the same login page until they either enter the correct credentials, Create a new account, or reset their password..
3. Restore a forgotten password	The user will be prompted to forget password screen. They are asked to enter their registered email address. If correct (found to be registered in the database), an email with an OTP will be sent to the entered user’s email and the user will be asked to enter that OTP. If it matches the sent one, the user will

	their new password and the system will update the user's password in the database.
4. Review terms and conditions	The user is provided a hyperlink to the terms and conditions several times (creation of account, creation of new gam3ya, home screen) to allow the user to check them frequently and provide him with their legal right to know about the conditions they must abide to while using the gam3ya application.
5. Create a Gam3ya	The user will be taken to gam3ya creation screen where they must fill in the blank spaces for the required info to start a new gam3ya, like gam3ya value, frequency, start date,...etc. Then the system will insert these data into its database and display this new Gam3ya into his/her profile to be accessed whenever the user wants to see any info or details about that gam3ya they have just created.
6. Search for a Gam3ya	The interface will display a search bar in addition to a filter icon to allow the user to search by the amount they want to pay each month (default) or by applying specific search filters to narrow down the results and get the best fit for the user's needs. The system will receive the specific filters by the user and search in its database for Gam3yas that fit the entered filters and will display the best-matched results or a message "Sorry. We don't have Gam3yas that fit your requirements. Please, adjust the applied filters and search again".
7. Request joining a Gam3ya	After the user has been shown the results for their search for gam3ya, they can press the "request to join" button in order to request joining that gam3ya.
8. Respond to another user's request to join a Gam3ya (accept/reject)	After the user has applied to join a gam3ya, the system sends a notification to the leader of that gam3ya. The leader can tap on the notifications icon in the top left corner of the screen when seeing a number of unseen notifications on the bell icon. Then the user will be taken to the notifications screen where the notifications are sorted from the most recent to the oldest. The user can see a notification from the user requesting to join that gam3ya, then the leader can tap the accept button or reject button. According to

	the leader's decision, if accepting the new member, the system will insert these data into its database and display this new Gam3ya into the new member profile to be accessed whenever the user wants to see any info or details about that gam3ya they have just entered. If rejected, no further action will be taken from the system.
9. Search for a friend	The interface will display a search bar in addition to a filter icon to allow the user to search by the name of the friend they want to reach out (default) or by applying specific search filters to narrow down the results and get the best fit for the user's needs. The system will receive the specific filters by the user and search in its database for users (friends) that fit the entered filters and will display the best-matched results or a message "Sorry. We don't have users (friends) that fit your requirements. Please, adjust the applied filters and search again".
10. Request to add a friend	This functionality is quite similar to requesting to join a gam3ya the only difference is that the user sends that request to any other user not only the leader of the gam3ya they applied for.
11. Respond to another user's friend request (accept/reject)	This functionality is also similar to responding to join a gam3ya request the only difference is that the user receives that request from any other user and if they accepted, the new user data will store in the database as a friend and will appear in the friends screen.
12. Chat with other members (text chatting, audio or video calls)	In the top right corner of the screen, there is an icon for accessing the chats between the user and other friends. Also, when the user is on the friends screen and the list of the friends they have is shown, there are 3 icons beside each friend's user name. They are used to open the text chat or to call that friend audio-only or audio and video. In the case of calls, the system uses the 2 users IP addresses and connects them together and this is also with the help of another external software.
13. File for a report/complaint	This functionality allows the user to report any misbehaving or technical errors they face while using the application. The user is taken to file a report screen where they are required

	<p>to fill the required data in order for the report or complaint to be submitted and reviewed. The report or complaint is reviewed by the technical support team member if the problem is technical or by the customer service team member if the problem is not a technical one.</p>
14. Pay the periodical installment	<p>At the periodic time of the due amount (the frequency of the gam3ya), the user pays the amount due by opening the gam3ya they are in and pressing the button “pay now”. Then the payment info will be displayed to the user and the instructions to pay according to the chosen payment method.</p> <p>After the payment is done, the system displays a success message “The transaction has been successfully completed.”</p> <p>The system updates its database to keep track of all the transactions done in order to maintain the integrity of the process.</p>
15. Receive due amount	<p>At the periodic time of the due amount (the frequency of the gam3ya), the user receives the amount due from the rest of the users by opening the gam3ya they are in and pressing the button “receive now”, only available when it's the user's turn to receive the money.</p> <p>Then the withdrawal info will be displayed to the user and the instructions to withdraw their money according to the chosen withdrawal method.</p> <p>After the withdrawal is done, the system displays a success message “The transaction has been successfully completed.”</p> <p>The system updates its database to keep track of all the transactions done in order to maintain the integrity of the process.</p>
16. Access personal profile	<p>This functionality's aim is to enable the user to access his profile and navigate through the entered info by them while creating their account.</p>
17. Edit personal profile information	<p>In case the user wants to change some (not any as some data can not be modified like the name or national ID) of the info they provided while creating the account, they can press the edit button right next to the specific info they want to change, like their email address for example. The updated info will be stored in the database by the system when the user verifies the new data if it needs</p>

	verification through sending an OTP to his email or on his mobile phone.
18. Access notifications	The user can tap on the notifications icon in the top left corner of the screen when seeing a number of unseen notifications on the bell icon. Then the user will be taken to the notifications screen where the notifications are sorted from the most recent to the oldest. The user can see different types of notifications, like join a gam3ya request, friend request, due amount is soon, warning for any late due amounts, unread message or missed calls from friends,...etc.
19. View previous and current Gam3yas	This functionality works by making the interface display the current gam3yas which the user is a member. This is done by tapping the gam3ya button on the bottom of the screen, then the user will be taken to the gam3yas screen where they can navigate through their gam3yas and see the details about each one of them.
20. Adjust settings of a Gam3ya (exclusive to the gam3ya leader)	This functionality enables the leader of the gam3ya to change some of its details by tapping on the gam3ya on the gam3yas screen and then tapping on the adjust button to display the details that are modifiable and apply the new changes. After that, the system stores the new info in the database and sends a notification of the change to all users who are part of that gam3ya to let them know about that change.
21. Invite a friend to join a Gam3ya	That functionality creates for each gam3ya a unique invitation link. It's available for the gam3ya members to copy and send over the chat tool to their friends who will be shown the details of that gam3ya then they can apply for joining.
22. Leave a gam3ya	This functionality gives the user the possibility to leave a gam3ya but it will result in some punishment for them in that case by making that user pay all of the left due amounts for the rest of the gam3ya duration in order not to cause harm for other users and some other punishment will be applied as well to make sure that this will not happen frequently from that user. The system will update its database with the updated gam3ya members.

23. Contact customer services	This function allows direct contact with one of the customer service team through text chatting. It can be accessed from the chatting icon in the top right corner of the screen.
24. Add/edit payment methods	This functionality is implicitly included in the adjusting personal info function as changing or adding a new payment method and verifying it is one of the modifiable personal info. The system will update its database with the updated payment methods.
25. Accessing the user guide (tutorials on how to use the app)	This function enables the user to access the user manual or guidance videos in order to teach the new users how to use the application properly. This function is represented by a button “user guide” in the home screen.
26. Convert currency	This functionality is implicitly included in the payment function as payment in a different currency than the default one used for a specific gam3ya will make the system automatically convert amount due to the currency the user is paying with through accessing the most up to date currency info from the central bank server to ensure fairness and integrity.

6.2 Screen Images

The user interface consists of multiple consecutive screens that are linked together through the buttons on each screen. There are more than 20 screens to cover all the screens that the application consists of but we provided screenshots for the most important ten (10) screens. And in the next subsections, we will provide a detailed description of each one of them and the functionality they represent.

6.2.1 Login Screen



The login screen is the first screen any user will see when using the application. It's very simple; it contains the application's logo and slogan (Your way to prosperity) which is included in all other screens. And it asks for the user's login credentials (Email and Password) then pressing "LOG IN" button to check the validity of the provided email and password. If correct, the user is moved to the Home screen and if not, a message "the entered credentials are not correct, please write them correctly" will appear to the user until they provide correct ones. It also provided the options of forgetting the password or being a new user to create a new account. To access these two features' screens, the user has just to click on the "Forget your password?" or "New User?" buttons to move to the next screens.

6.2.2 New User (account creation) Screen

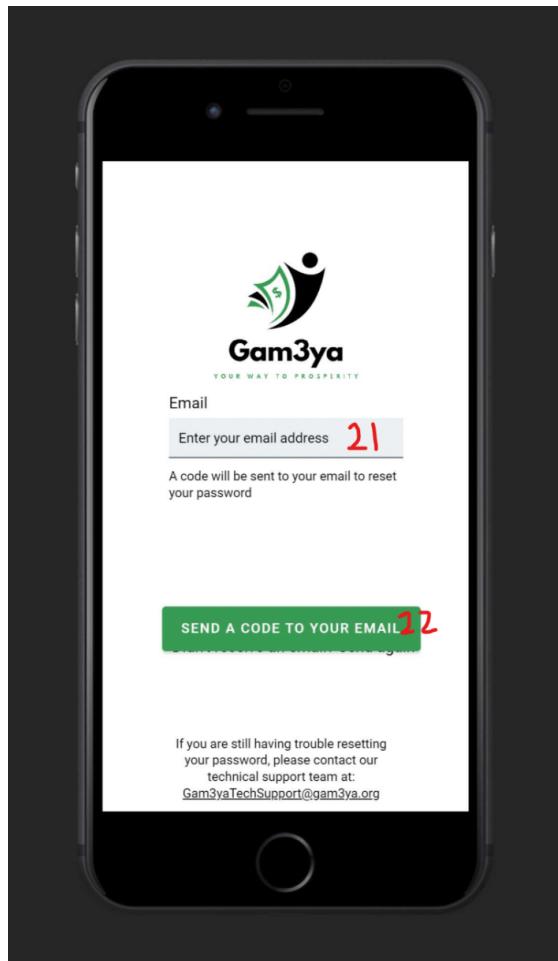
The form consists of the following fields and constraints:

- Full Name:** Enter your Full Name (6)
- Age:** Enter your Age (7)
- Email:** Enter your Email Address (8)
- Phone Number:** Enter your Phone number (9)
- National ID:** Enter your National ID (10)
- Password:** Enter your Password (11)
Password must be atleast 8 characters, including 1 Uppercase letter, number, and alphanumeric symbol.
- Re-enter your Password:** Re-enter your Password (12)
- Address:** Cairo (13) Address (14)
- Currency:** EGP (15)
- Preferred Method of Payment:** Fawry, Vodafone Cash, Credit Card, Other (16)
- Range of Payment:** 1000-2000 (17)
- Scan of your National ID:** Upload a photo (18)
- Terms & Conditions:** I have read and agreed (19)
- Create the Account:** CREATE THE ACCOUNT (20)

This screen is the next one when pressing the button “New User?” provided on the last “Login” screen. It is the screen responsible for creating a new account for the new users. It is like an application form that asks the user to provide some basic information about themselves and checks their credibility. First, the full name is required and then the user is required to input their age to check if they are above the age of 18, in order to be legally clear to enter those gam3ya's. Then the user is to provide their email address and phone number as the main means of communication between the Gam3ya's team and the user. Then their National ID is needed to be provided to recheck their age and credibility and this is done by comparing the provided National ID with the scan of it (required below) and by also comparing the provided age with the one on their National ID as it's the most credible document we can get from the user to verify the basic enough they provide. Then user is asked to choose a password with some constraints (at least 8 characters, at least 1 uppercase letter, and at least 1 alphanumeric symbol like @,#,...etc) and to re-enter it to make sure they typed the one they meant without any spelling mistakes. Then the user is to provide their city, address, currency they would like to deal with, the preferred payment

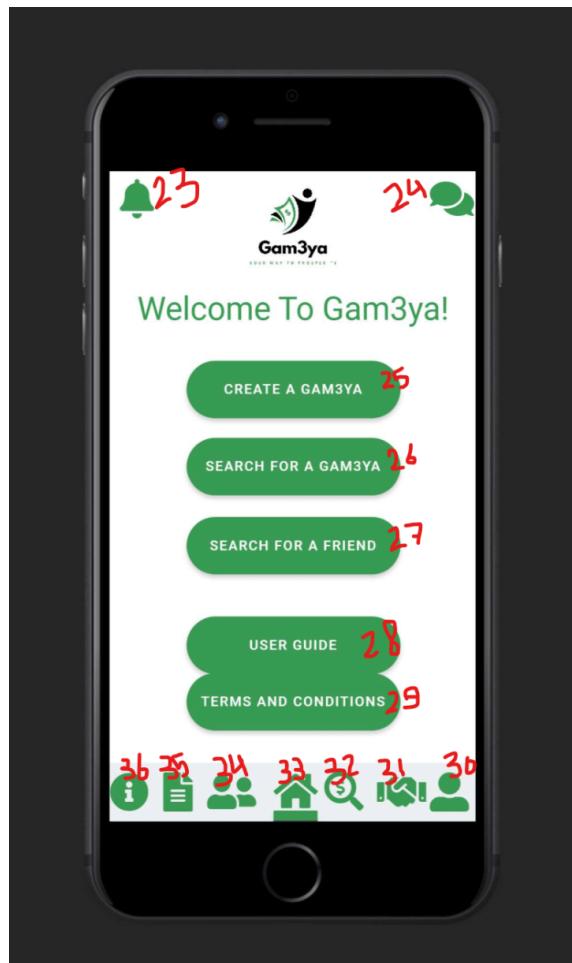
method (it allows more than one like Fawry, VF cash, credit card,...etc), and the initial range the user is willing to pay in any gam3ya (this is used to show initial suggestions for gam3yas to the user when they first search for a gam3ya). Lastly, a hyperlink to the terms and conditions agreement is provided for the user to check and read carefully, then their consent is required to create their account. After filling all the required info and agreeing to the terms and conditions, the user should press “Create The Account” button for the creation of new account and they will be redirected to the “Home” screen of the application.

6.2.3 Forget Password Screen



This screen is the next one when pressing the button “Forgot your password?” provided on the “Login” screen. It is the screen responsible for helping the user to reset their password. It asks the user to enter their email address and then an OTP will be sent to their email address which the user is required to enter in the space provided that will appear after pressing the “sent a code to your email” button. And the system checks if the written code by user matches the one sent to their email to proceed to a screen where they are to choose new password for their account. This screen also provides the option to resend the OTP to the user’s email address if, for any reason, they didn’t receive it. At the bottom, there is information about the technical support contact if the user still needs further assistance.

6.2.4 Home Screen



The home screen is the most essential part of the application. It provides several buttons which will navigate the user through all of the program and represents the core functionality. In the middle, there are 5 main buttons, “Create a Gam3ya”, “Search for a Gam3ya”, “Search for a friend”, “User Guide”, and “Terms and Conditions”.

“Create a Gam3ya” button is the button that will redirect the user to the gam3ya creation screen where the user is to provide all the necessary information to begin a new gam3ya.

“Search for a Gam3ya” button is the responsible for moving the user to the searching for gam3ya screen where they will be able to search for a gam3ya to request joinin into through applying some specific search criteria (filters) that will enable the user to find the most suitable gam3ya for themselves.

“Search for a friend” button is responsible for enabling the user to search for other user and send them a friend request to be able contact them or to chat with them.

“User Guide” and “Terms and Conditions” button are both hyperlinks to two PDF two (2) documents. The user guide document is made to be like a tour guide for any user to help them navigate through the application and know all of its features. The terms and conditions document is the document provided by Gam3ya company to clarify the terms and conditions that represent a legal contract between them and the application’s users.

At the bottom of this screen, there are 7 icons that represent the main 7 screens. From right to left, profile icon, my gam3ya icon, searching for gam3ya icon, home screen icon, my friends icon, filling a complaint/report icon, information icon.

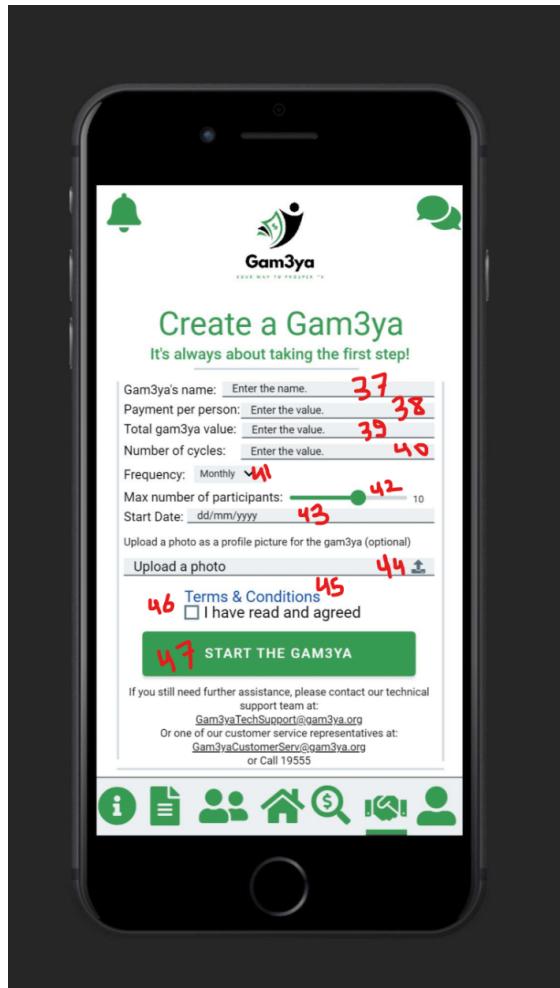
Each icon, when pressed, takes the users to a different screen.

info icon is to take the user to a screen where there is information about the application and its documentations. There are also copyright information and info about the Gam3ya company. Finally, some information about our company (the developer) and some important contacts. Other screens by the remaining screen is to be described shortly in the next subsections.

At the top left of the screen, there is a notification icon which takes the user, when pressed, to the notifications screen where they are able to see the newest and up to date notifications, reminders about due payments, or warnings about delayed ones.

At the top right of the screen, there is a chat icon which enables users to go to their chats with their friends. This is where users go to continue their conversation with people they added on their accounts as friends.

6.2.5 Create Gam3ya Screen



This screen is to enables users to be the leader of a gam3ya by creating it based on some specified info provided by the user.

First, the user needs to choose a meaningful name for the gam3ya, then they need to choose 2 of 3 important parameters of the gam3ya:

1-the amount which each participant will pay

2-the total amount of gam3ya value

3-the max number of participants

deciding on 2 of the above 3 parameters is enough to deduce the third one as:

$$\text{Total value of the gam3ya} = (\text{max number of participants} - 1) * \text{the amount paid by each user}$$

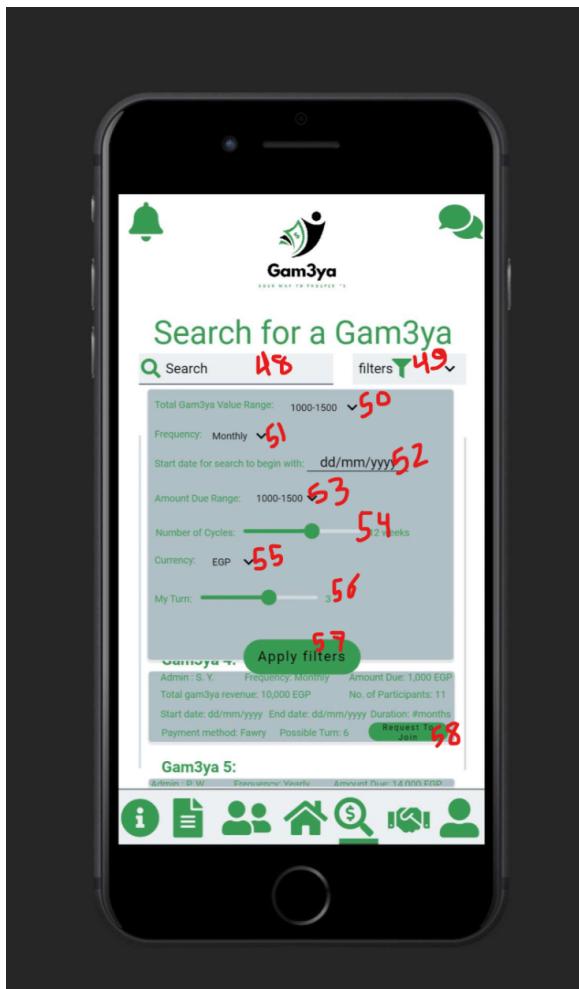
The user needs also to specify the frequency of the gam3ya (weekly, monthly, yearly,...etc) and the number of cycles that gam3ya will be running to determine the total duration of this gam3ya.

Then the user needs to set a starting date for the gam3ya and this date needs to be at least after 1 week after the creation date to ensure that the gam3ya contains the required number of participants.

There is an option to upload a photo to represent this gam3ya and to appear when searching for gam3ya. Lastly, the user needs to read and agree to the terms and conditions (hyperlink provided) concerning the creation and moderarting a gam3ya. Then they should press the “Create the gam3ya button” and they are done.

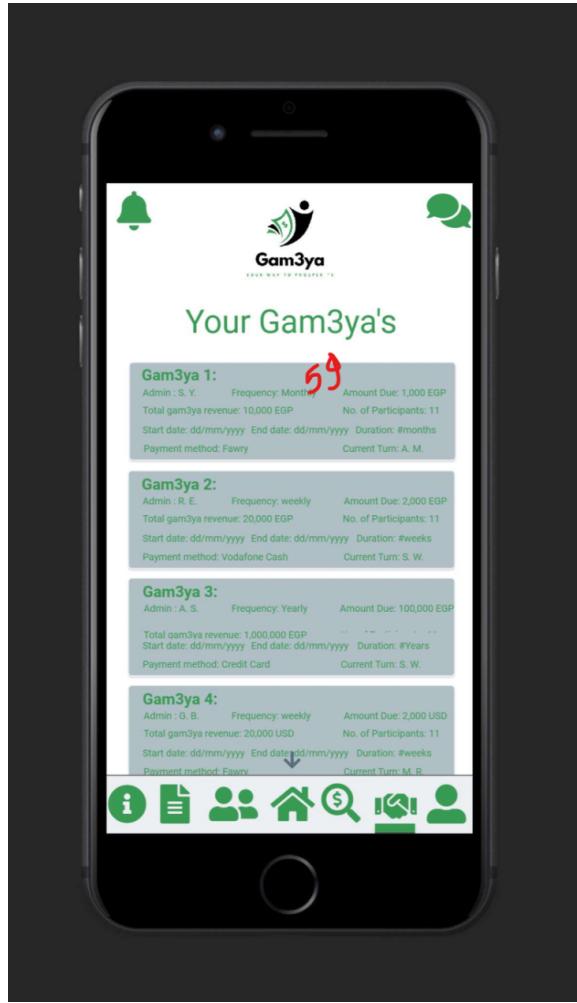
At the bottom, some info regarding getting technical support is provided to help the user if needed help or faced any problems while creating the new gam3ya.

6.2.6 Search for a Gam3ya Screen



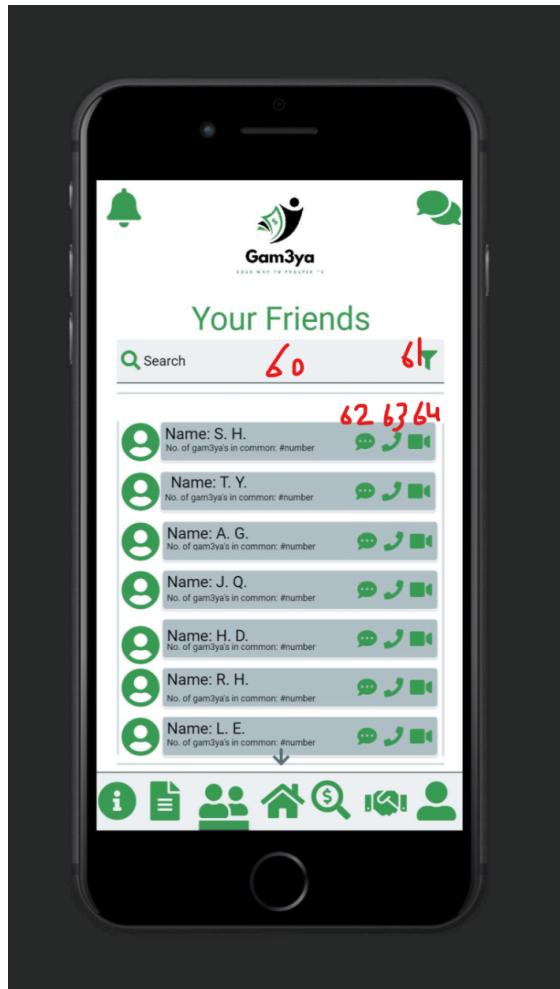
This screen is mainly for users who don't want to be the leaders (user who start a new gam3ya) of the gam3ya. This is where users can search for a suitable gam3ya that will provide their needs by applying some specific filters to enhance the search and get the best results. The filters consist of selecting a range value of the gam3ya filter, choosing the frequency, choosing an initial start date (the results will be gam3ya starting from that date and after it), the number of cycles, the currency of the gam3ya, and the initial turn (for example, you are the 4th user to join the gam3ya, then you are the 4th in turns). Then the user apply the filters by pressing "Apply Filters button". Behind the filters popup window, there are initial gam3ya suggestions by the application which will be replaced with the search results after applying the filters. The results contain the name of gam3ya, gam3ya value, frequency, number of participants, start date, end date, and other important parameters shown in the screenshot. Then the user decided whether this gam3ya suits them or not. If yes, they can apply to join and waits for the leader's approval or rejection.

6.2.7 My Gam3ya's Screen



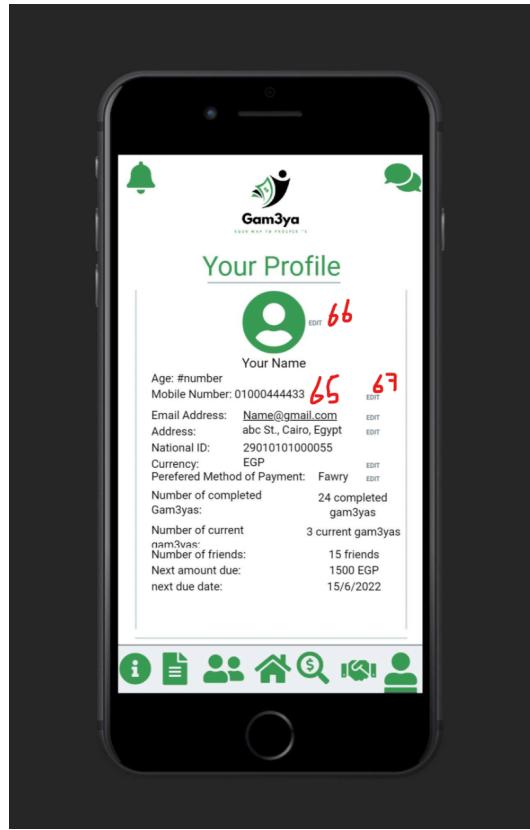
This screen shows all the gam3yas the user is a participant. It doesn't include any new information; it's just a quick summary and the user can click on any of them to see more detailed and specific information about that gam3ya clicked on.

6.2.8 Friends Screen



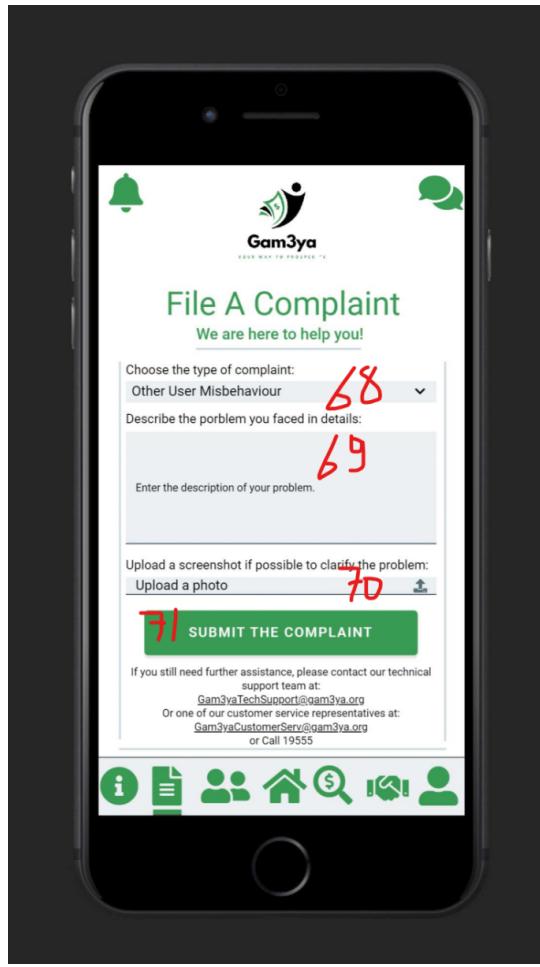
This screen shows all the friends of the user. It includes some information about those friends, the name, and a number of gam3ya in common between the user and that one friend. It also includes 3 buttons to enable 3 different ways of communication (text chatting, voice call, and video call) between the user and any of their friends. The user also can use the search bar to search through the existing friends to for new friends by applying some specific filters.

6.2.9 My Profile Screen



This is the user's profile screen. This screen provides the user with the information about themselves, and the info they entered when registering. Some of that information can be modified by pressing the edit button next to them (exists if applicable for this piece of information). There is a photo for the user (optional), Age, mobile number, email address, national ID, currency, the preferred method of payment, number of completed gam3yas, number of current gam3yas, number of friends, next amount due, and its date.

6.2.10 Complaint/Report Screen



This screen is the place where the user can file a complaint against for any problem they face whether it's from other users, or from the application itself (this is the function of the first dropdown menu, to choose the type of problem the user face). Then the user is asked to describe the problem in detail and to provide a screenshot of it if possible. Then they can submit the complaint and they will be contacted by the customer service or the technical support team on their email or mobile phones if needed. At the bottom, there is contact info for the technical support and customer service if the user still needs further assistance.

6.3 Screen Objects and Actions

Object name	Type	Description
1. Email address entry	Input field (text)	A blank space for the user to input/enter their email address.
2. Password entry	Input field (text)	A blank space for the user to input/enter their password.
3. Login	button	This button initiates the authentication process in which the system compares the entered credentials with the ones stored in the database. If correct, the user will be taken to the home screen.
4. Forgetting the password	hyperlink	This hyperlink takes the user to reset the password screen where they can request to change their password.
5. Creation of a new account	hyperlink	This hyperlink takes the user to create a new account screen where the user is asked to fill in some personal info in the process of signing up.
6. User's full name entry	Input field (text)	A blank space for the user to input/enter their full name.
7. User's age entry	Input field (text)	A blank space for the user to input/enter their age.
8. User's email address entry	Input field (text)	A blank space for the user to input/enter their email address.
9. User's phone number entry	Input field (text)	A blank space for the user to input/enter their Phone number.
10. User's national ID entry	Input field (text)	A blank space for the user to input/enter their national ID.
11. Password entry	Input field (text)	A blank space for the user to input/enter their password.

12. Re-Password entry	Input field (text)	A blank space for the user to reenter their password.
13. Governorate choice	Dropdown menu	This dropdown menu contains all of Egypt's governorates for the user to choose the one they live in.
14. User's address.	Input field (text)	A blank space for the user to input/enter their address.
15. User's currency	Dropdown menu	This dropdown menu contains the most known currencies for the user to choose their primary one to deal with in the application
16. Payment methods	Checkboxes	The user can check more than a checkbox to choose at least one payment method they will use to pay their due amounts/installments for the gam3yas they are part of.
17. Payment range	Dropdown menu	This dropdown menu contains multiple ranges of payment the user wish to receive. The user is asked to select one of them as it helps the system suggest a new gam3ya for the new users.
18. Upload a photo for personal profile	Button	The button will open a pop-up window for the user to choose from their device the photo they want to upload.
19. Agreement to the terms and conditions	checkbox	The user has to check this box, meaning that they are fully aware of the terms and conditions and they agree. Unless they do so, the user cannot proceed with the current process.
20. Creation of a new account	button	This button moves the user to the home screen and signals to the system to store the new user info in the database. This happens only if the user fills in all of the info required above. If not, the button won't be activated

		(cannot be pressed).
21. Email address entry	Input field (text)	A blank space for the user to input/enter their email address.
22.	button	This button moves the user to the OTP entry screen where the user enter the received OTP and the system compares the entered with the sent OTP. if they are matched the user will be asked to enter a new password, and it will be saved to the database. If not, the user will stay on that page. This happens only if the user entered a registered email. If not, the button won't be activated (cannot be pressed).
23. Notifications	Tab	This tap when pressed takes the user to the notifications page where the user gets various types of notifications from the app itself or other users.
24. Chats	Tab	This tap when pressed takes the user to the chats page where they can see their conversations with their friends and this is also where the user can send text messages or start a call.
25. Create a new gam3ya	Button	This button when pressed takes the user to the create new gam3ya page.
26. Search for a gam3ya to join	Button	This button when pressed takes the user to the search for a gam3ya page.
27. Search for a friend	Button	This button when pressed takes the user to the search for a friend page.
28. User guide	Button	This button when pressed takes the user to the guidance page where the

		user can find the user manual and other video tutorials for them to use the application properly.
29. Terms and conditions	Button	This button when pressed takes to the terms and conditions document.
30. Personal profile	Tab	This tap when pressed takes the user to the personal profile page where the user can see their personal info and edit some of them.
31. Your gam3yas	Tab	This tap when pressed takes the user to the gam3yas page where the user can see all the details of all the previous and current gam3ya they are part of.
32. Search for a gam3ya	Tab	This tap when pressed takes the user to the search for gam3ya page where the user can use multiple filters while searching for a gam3ya to join.
33. Home screen	Tab	This tap when pressed takes the user to the home page.
34. friends	Tab	This tap when pressed takes the user to the friends page where the user can communicate with other users (friends) or search for new friends.
35. Reports/complaints	Tab	This tap when pressed takes the user to the complaints page where the user can report any problem they face.

36. Info	Tab	This tap when pressed takes the user to the info page where they can see small documentation about the company and the application.
37. Gam3ya's name entry	Input field (text)	A blank space for the user to input/enter their chosen name

		for the gam3ya.
38. Payment per person entry	Input field (text)	A blank space for the user to input/enter the payment per person they choose for this gam3ya to create.
39. Total gam3ya value entry	Input field (text)	A blank space for the user to input/enter the total value for the gam3ya (the amount each member will receive when it is their turn) they choose for this gam3ya.
40. Number of cycles entry	Input field (text)	A blank space for the user to input/enter their preferred number of cycles for this new gam3ya to have. (in other words, how many turns each member will have)
41. Frequency selection	Dropdown menu	This menu is used to select the frequency of the gam3ya.
42. Max participants number selection	Slider	This slider is used by the user to select the maximum number of participants to join the gam3ya.
43. Start date entry	Input field (text)	A blank space for the user to input/enter the start date they choose for this gam3ya to create.
44. Upload a photo for the gam3ya profile	Button	The button will open a pop-up window for the user to choose from their device the photo they want to upload.
45. Terms and conditions	Hyperlink	This hyperlink when pressed takes to the terms and conditions document concerning the creation of new gam3ya.
46. Agreement to the terms and conditions	checkbox	The user has to check this box, meaning that they are fully aware of the terms and conditions and they agree. Unless they do so, the user cannot proceed with the current process.

47. Start the new gam3ya	Button	This button makes the system save the data for that new gam3ya in the database and make that new gam3ya visible for the other user in order to request joining it. And the new gam3ya will appear on the gam3yas page of the leader of the gam3ya immediately.
48. Search (for a gam3ya)	Input field (text) / search bar	A blank space for the user to input/enter the value of the gam3ya to search for.
49. Search Filters menu	Dropdown menu	This dropdown menu is used to show the user different filters they can use to narrow down their search results for a gam3ya.
50. Total gam3ya value	Dropdown menu	This menu is for the user to choose the total value for the gam3ya (the amount each member will receive when it is their turn). It works as a filter
51. Frequency of the gam3ya	Dropdown menu	This menu is for the user to choose the frequency of the gam3ya they want to search for. It works as a filter
52. Start date entry	Input field (text)	A blank space for the user to input/enter the start date of a gam3ya they search for. It works as a filter
53. Amount due range	Dropdown menu	This menu is for the user to choose the range the user wants to pay each (week, month, year,...etc). It works as a filter
54. Number of cycles	Slider	This slider is used by the user to select the number of cycles of the gam3ya the user wants to search for. It works as a filter.

55. Currency	Dropdown menu	This dropdown menu contains the most known currencies for the user to choose the primary one for the gam3ya they want to search for. It works as a filter.
56. My turn	Slider	This slider is used by the user to select the turn they want to have in the gam3ya they search for. It works as a filter.
57. Apply filters	Button	This button will apply the filters specified on that page and the system will search in the database for the closest match for the filters the user applied then it will display the results.
58. Request to join	Button	This button is used by a user who would like to join a particular gam3ya. The system will send a request to the leader of the gam3ya upon another's user press on that button.
59. Gam3ya details	Tab	Upon tapping on the name of the gam3ya, the user will be taken to the gam3ya page where they will be shown all of the details concerning that gam3ya.
60. Search (for a friend)	Input field (text) / search bar	A blank space for the user to input/enter the name of the user they are friends with or want to be friends with to search for.
61. Search filters menu	Dropdown menu	This dropdown menu is used to show the user different filters they can use to narrow down their search results for a friend.
62. Text chatting	Button	This button is used by the user to start a text chat with another user on the chats page.
63. Audio call	Button	This button is used by the

		user to start an audio call with another user on the chats page.
64. Video call	Button	This button is used by the user to start a video call with another user on the chats page.
65. My email address	Hyperlink	This is a hyperlink for my personal email address.
66. Edit profile photo	Button	This button is used to edit the personal profile photo by replacing it with another one, choosing an avatar, or deleting it.
67. Edit personal info	Button	This button is duplicated across that screen. It's used to edit the corresponding modifiable personal info and then save it in the database.
68. Type of the complaint	Dropdown menu	This dropdown menu shows different types of problems that the user may face during using the app. The user has to choose one of the options in the menu in order to proceed with the complaint.
69. Report/complaint description entry	Input field (text)	A blank space for the user to input/enter their detailed description of the problem they faced. (the body of the report or the complaint they want to submit)
70. Upload a photo for the report/complaint	Button	The button will open a pop-up window for the user to choose from their device the photo they want to upload.
71. Submission of the report/complaint	Button	This button will submit the report/complaint the user filed and the system will send it to the technical support of the customer service team according to the nature of the problem

7. REQUIREMENTS MATRIX

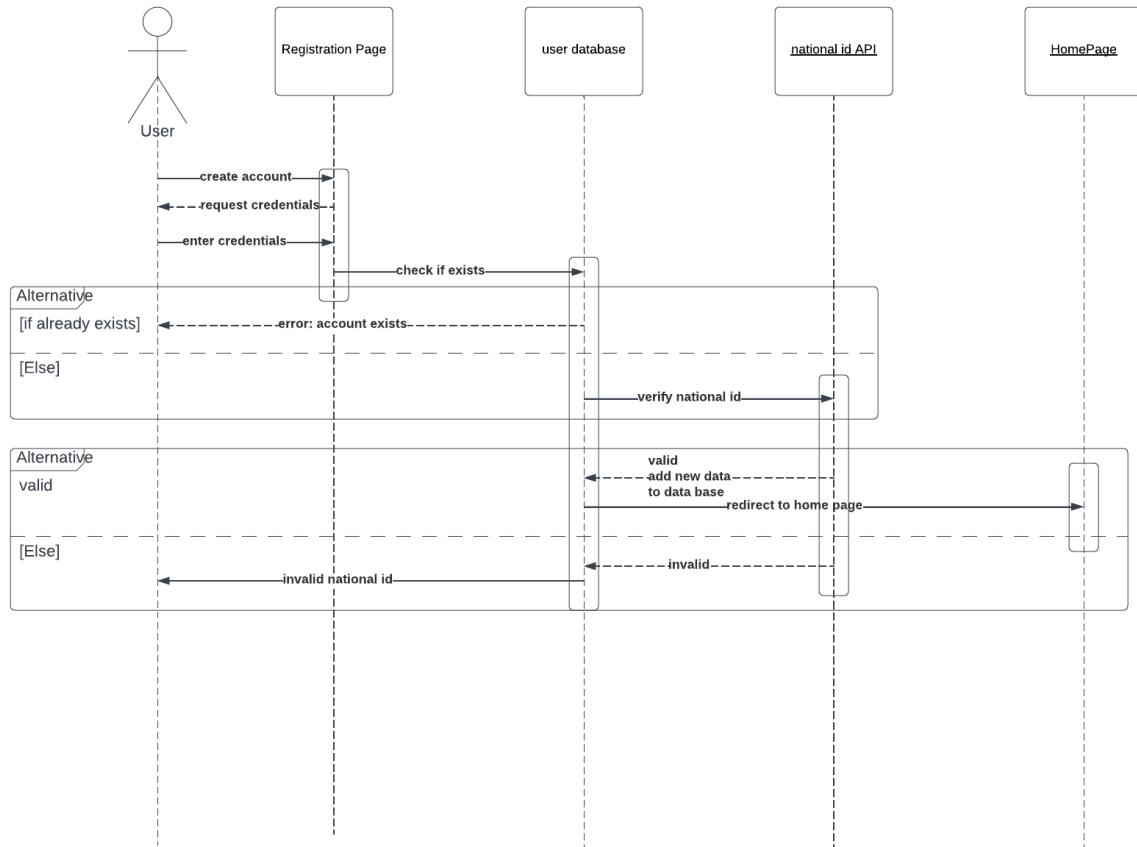
Components in SRS	Correspondence in SDD (components of the interface)
3.1 registration	5, 6-20
3.2 modify account	65,66,67
3.3 create a gam3ya	37-47
3.4 modify a gam3ya	31,59
3.5 search for a gam3ya	31,48-57
3.6 request to join a gam3ya	58
3.7 accept/reject join a gam3ya request	23
3.8 login	1-4
3.9 payment	23,30,31
3.10 withdrawal	23,30,31
3.11 chat	24,62-64
3.12 add friend	60-64
3.13 customer service	35
3.14 technical support	35
3.15 convert currency	23,30,31
3.16 file a complaint	35,68-71
3.17 notifications	24

8. APPENDICES

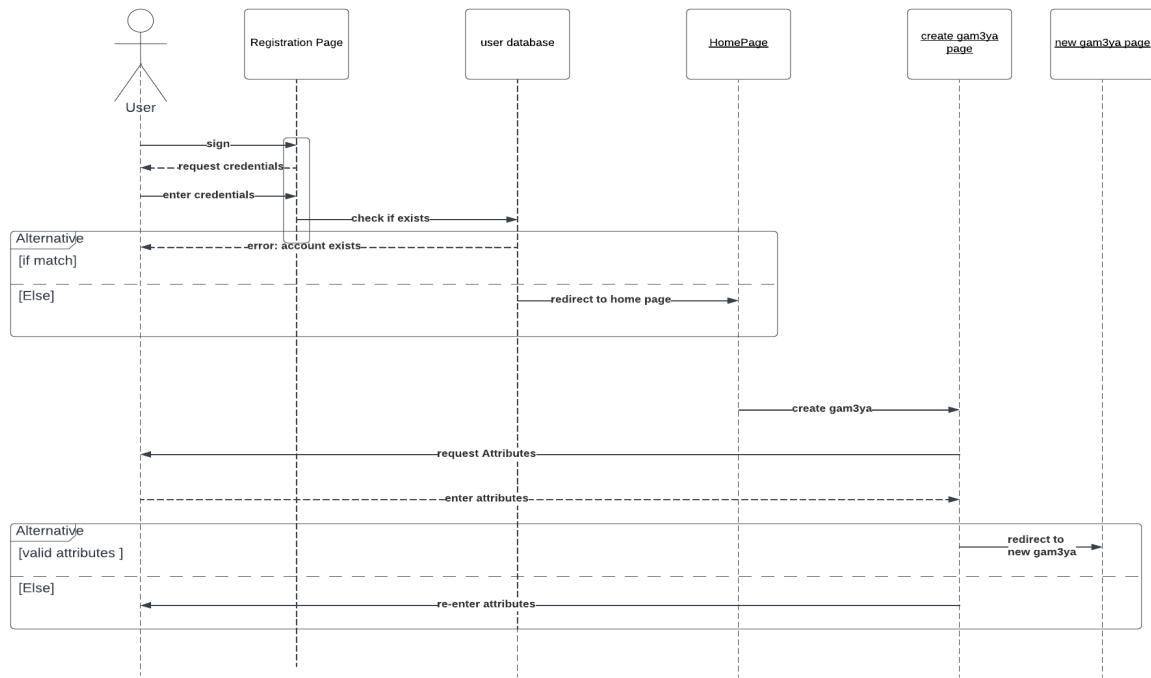
8.1 Sequence Diagrams

The following are sequence diagrams for some provided functionalities:

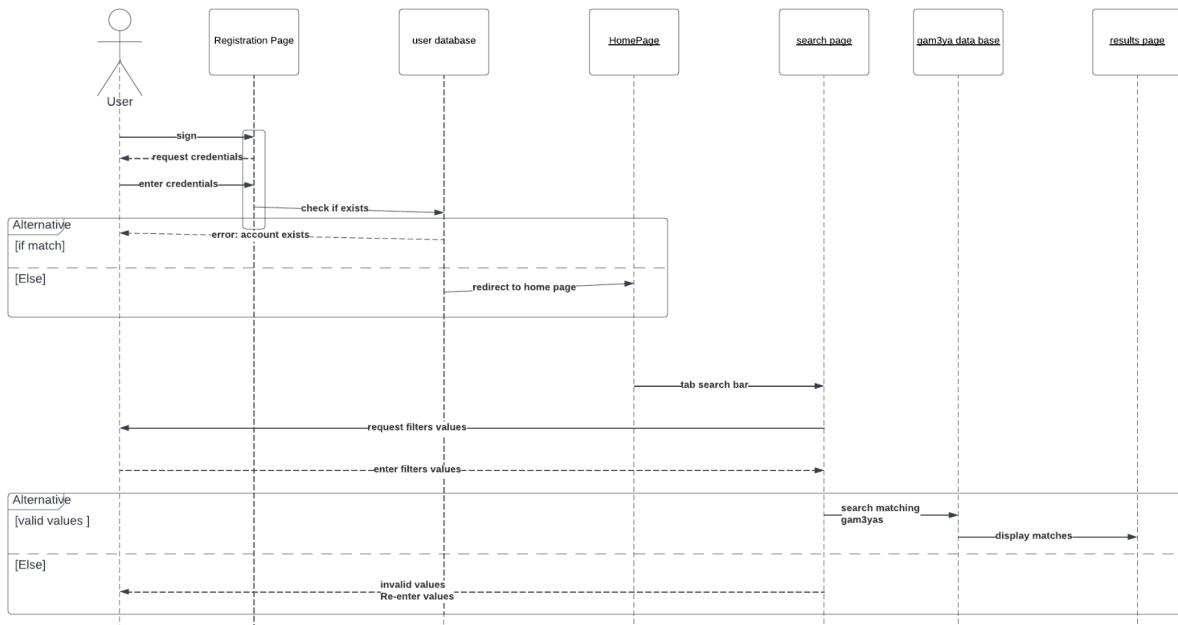
8.1.1 Create new account



8.1.2 Create new gam3ya



8.1.3 Search for a gam3ya



8.1.4 Make Payment

