

Graduation Project

In order to obtain

The license in Information Technologies.

Option: Information Systems Development

Entitled

"BIO MARKET"

**Design and implementation of a sales platform for organic
almonds & pistachios**

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General introduction

Local farmers in Gafsa who specialize in selling bio pistachios and almonds face significant challenges in marketing and selling their products. Similarly, buyers from different regions of Tunisia encounter difficulties in sourcing the desired quantities of these products. Furthermore, even if they manage to find the desired quantity, ensuring that the products they acquire are genuinely organic and of high quality poses a considerable obstacle. Additionally, both farmers and buyers struggle with the burden of high costs associated with production and transportation. These collective challenges contribute to a complex landscape for the local agricultural industry in Gafsa, impacting both farmers and consumers alike.

In addition to the aforementioned challenges, one major obstacle faced by buyers is the inability of a single farmer to meet the demand for large quantities of bio pistachios and almonds. The limited production capacity of individual farmers makes it exceedingly difficult for buyers to locate the required volume of products in one place. This scarcity of large quantities further exacerbates the challenges faced by buyers in their quest to source the desired amount of bio products. The fragmented availability of these goods adds another layer of complexity to the already intricate process of procuring bio pistachios and almonds, making it a formidable task for buyers across Tunisia.

Moreover, due to the relatively small sizes of their farms, farmers often find themselves providing only limited quantities of bio pistachios and almonds. This limitation can lead to a sense of shame or hesitation among farmers when it comes to marketing and selling these smaller quantities. They may perceive their small offerings as inadequate compared to the demand, which further hinders their ability to promote and sell their products confidently. This emotional aspect adds an additional layer of difficulty for farmers who already face challenges related to quantity and market access.

Chapter I:

State of art

This chapter deals with examples of platforms similar to the one that we should perform in our project. We will set up their advantages and disadvantages. So that we keep good practice for our future work. In the following, we illustrate some of these platforms.

I. Platforms of

1) "La ruche qui dit oui"

Link: <https://laruchequiditoui.fr/fr>

"La Ruche qui dit Oui" is a French platform. It aims to connect consumers with local food producers. It allows them to purchase fresh and high-quality products directly from the producers.

The platform works by creating local online marketplaces where consumers can order food products from a range of producers in their area. The producers then bring the products to a central location, or "pickup point," where the consumers can collect their orders.

"La Ruche qui dit Oui" is used in several countries around the world, including France, Belgium, Spain, Italy, Germany, the United Kingdom, and the United States. The company has created a network of local communities, which includes both consumers and producers, who use the platform to connect with each other.

Consumers who use "La Ruche qui dit Oui" are typically people who are interested in buying fresh, local, and seasonal produce directly from farmers and small-scale producers. These consumers may be concerned about the environmental impact of industrial farming, and they may be looking for ways to support local farmers and reduce the distance that their food travels before it reaches their plates.

Producers who use "La Ruche qui dit Oui" are typically small-scale farmers, artisans, and food producers who are looking for new markets to sell their products. These producers may be located in rural areas or small towns where it can be difficult to access traditional retail markets. By using "La Ruche qui dit Oui," they are able to sell their products directly to consumers in their local communities, without having to rely on intermediaries.

- **Advantages**

There are several advantages to using "La Ruche qui dit Oui" platform:

- Locally-sourced products: "La Ruche qui dit Oui" allows consumers to purchase fresh and locally-sourced products directly from the farmers and producers in their area. This promotes sustainable and ethical food production practices while reducing the environmental impact of food transportation.
- High-quality products: The platform's focus on locally-sourced products means that consumers can access high-quality and fresh food products that have been produced using sustainable and ethical practices.
- Support for local producers: The platform helps support local farmers and producers by providing them with a direct channel to market their products to consumers. This can help to promote small-scale and sustainable agriculture and support local economies.

- **Disadvantages:**

There are some potential disadvantages to using "La Ruche qui dit Oui" platform:

- Limited product selection: As "La Ruche qui dit Oui" focuses on locally-sourced products, the product selection may be limited compared to larger supermarkets or online retailers. Consumers may not be able to find certain products or may have to wait for seasonal availability.
- Pickup point limitations: The pickup point system used by "La Ruche qui dit Oui" may not be convenient for all consumers, especially those who live far from the designated pickup locations or who have limited transportation options.
- Higher prices: As locally-sourced and sustainably-produced products can be more expensive to produce, the prices on "La Ruche qui dit Oui" may be higher compared to mass-produced products in larger supermarkets or online retailers.

- **Rating:**

It is difficult to provide a rating for "La Ruche qui dit Oui" as it can be subjective and depend on individual experiences. However, the platform has generally received positive reviews and has been well-received by consumers who appreciate the opportunity to purchase fresh and locally-sourced food products. Additionally, the platform has received recognition for its efforts to promote sustainable and ethical food production practices.

- **Value:**

according to their website, as of 2021, there are more than 1,300 local communities or "Ruches" in France, with over 1,800 farmers and producers selling their products on the platform. The website also states that millions of products have been sold through the platform since its inception in 2010.

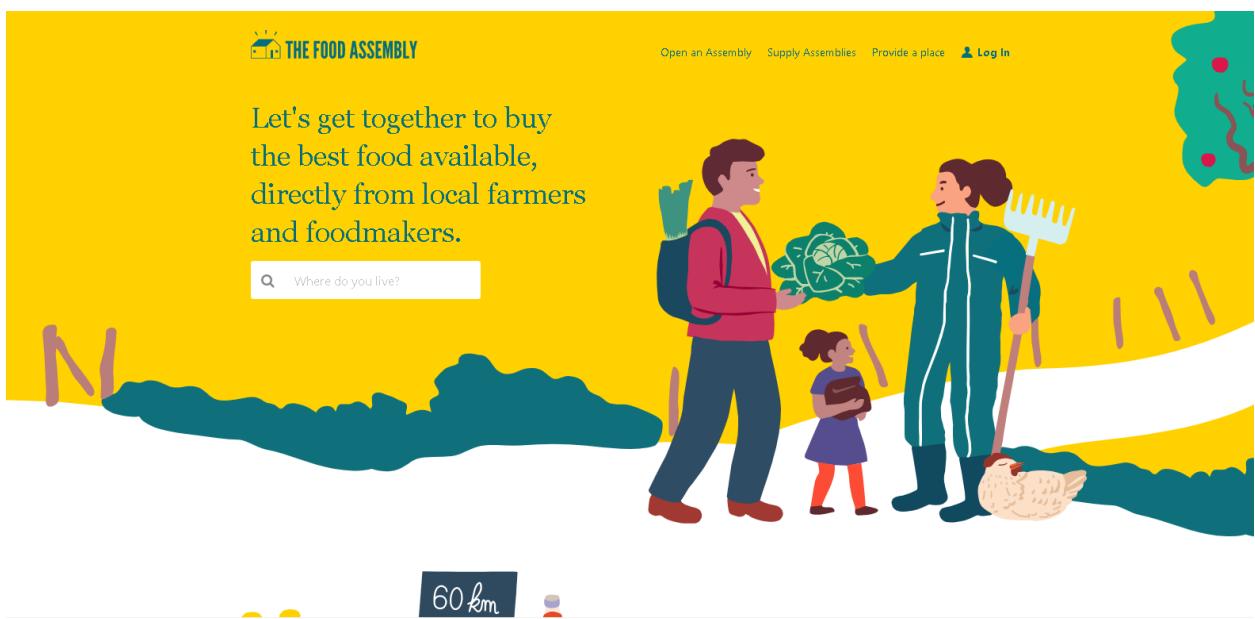


Figure 1: La Ruche qui dit oui

2) Agrivi:

Agrivi is a cloud-based farm management platform that helps farmers manage their agricultural operations more efficiently and effectively. The platform provides a range of tools and features that enable farmers to track and manage their crops, livestock, and farm inputs such as fertilizers and pesticides.

Agrivi allows farmers to plan and schedule their farm activities, monitor crop growth and yield, and identify potential issues that may affect their crops. The platform also provides data analytics and insights to help farmers make better decisions about their farming practices.

Agrivi can be accessed through a web browser or mobile app, making it easy for farmers to use the platform on the go. The platform supports a wide range of crops and livestock, including fruits, vegetables, cereals, and dairy and beef cattle.

Overall, Agrivi is designed to help farmers improve their yields, reduce costs, and optimize their farming practices to achieve better results.

- **Advantages**

There are several advantages of using the Agrivi platform for farm management:

- Comprehensive farm management features: Agrivi provides a wide range of features and tools that can help farmers manage their crops, livestock, and farm inputs more effectively. This includes crop planning and tracking, inventory management, production analytics, and financial tracking.
- User-friendly interface: Agrivi's interface is designed to be user-friendly and intuitive, making it easy for farmers to use and navigate the platform. This can help reduce the learning curve for new users and enable them to start using the platform more quickly.
- Cloud-based platform: Agrivi is a cloud-based platform, which means that farmers can access their data from anywhere with an internet connection. This can be particularly useful for farmers who need to monitor their farms remotely or who travel frequently.

Overall, the Agrivi platform can help farmers improve their efficiency, productivity, and sustainability, leading to better outcomes for their farm businesses.

- **Disadvantages**

While there are several advantages to using the Agrivi platform for farm management, there are also some potential disadvantages to consider:

- Cost: The Agrivi platform is a subscription-based service, which means that farmers will need to pay a recurring fee to use the platform. This cost may be prohibitive for some farmers, particularly those with smaller operations or limited budgets.
- Limited customization: While the Agrivi platform provides a range of features and tools, some farmers may find that the platform does not fully meet their specific needs or requirements. The platform may not be customizable enough to accommodate unique farming practices or workflows.

Overall, it is important for farmers to carefully consider their specific needs and circumstances before deciding whether the Agrivi platform is the right fit for their farm business.

- **“COOPÉRATIVES” section:**

The "COOPÉRATIVES" section in Agrivi is most likely a feature that allows farmers who belong to agricultural cooperatives to collaborate and share information on the platform. Agricultural cooperatives are organizations that are owned and operated by a group of farmers who work together to achieve common goals, such as improving their bargaining power with suppliers or increasing their access to markets.

The Agrivi platform may allow these cooperatives to create a shared account where members can access and update information on their farming activities, such as crop plans, production data, and input usage. This can help cooperative members to better coordinate their activities, optimize their production processes, and share best practices with one another.

The "COOPÉRATIVES" section may also provide additional features specifically designed for cooperatives, such as tools for managing membership and governance, as well as features for organizing joint marketing and sales activities. Ultimately, the goal of this feature is to help

agricultural cooperatives operate more efficiently and effectively, leading to better outcomes for their members.

- **Rating:**

Agrivi has generally received positive reviews from users and industry experts for its comprehensive farm management features, user-friendly interface, and helpful customer support.

The platform has been recognized by various organizations, such as the European Commission and the United Nations, for its innovative approach to improving agricultural practices and sustainability. Agrivi has also won multiple awards for its technology and impact in the agriculture industry.

Ultimately, the usefulness and effectiveness of the Agrivi platform will depend on the specific needs and requirements of individual farmers or agricultural organizations. It may be helpful to evaluate the platform's features and capabilities in the context of one's specific farming operation, and to consider feedback from other users or industry experts before making a decision about using the platform.



Figure 2: Agrivi

3) FarmMatch:

FarmMatch is an online platform that connects farmers, food producers, and consumers in their local community. It was created to provide a simple and efficient way for consumers to find and purchase fresh, healthy, and sustainable food from local farmers and food producers.

FarmMatch allows farmers and food producers to create a free profile where they can list their products, pricing, and location. Consumers can then search for products by location, product type, and other criteria, and place orders directly with the farmer or food producer.

One of the unique features of FarmMatch is the ability to create "farm-to-table groups". These are groups of consumers who come together to collectively purchase food from a specific farmer or food producer. This allows farmers to sell larger quantities of products at once and provides consumers with access to fresh, local food at a lower cost.

FarmMatch also provides tools for farmers and food producers to manage their orders, track inventory, and communicate with customers. This makes it easier for small-scale farmers and food producers to sell their products directly to consumers, without the need for expensive marketing and distribution channels.

Overall, FarmMatch helps to support local agriculture, promote sustainable food production practices, and provide consumers with access to fresh, healthy, and locally sourced food.

- **Advantages :**

There are several advantages to using FarmMatch as a farmer, food producer, or consumer:

- Direct access to local food: FarmMatch connects consumers directly with local farmers and food producers, allowing them to purchase fresh, healthy, and sustainable food without the need for intermediaries.
- Increased visibility for farmers and food producers: By creating a profile on FarmMatch, farmers and food producers can increase their visibility and reach a wider audience of potential customers.
- Cost-effective marketing: FarmMatch provides farmers and food producers with a free platform to market their products, reducing the need for expensive advertising and distribution channels.

Overall, FarmMatch provides a range of benefits for farmers, food producers, and consumers, promoting sustainable agriculture practices and building stronger local food systems.

- **Disadvantages :**

While FarmMatch has many advantages, there are also some potential disadvantages to consider:

- Inconsistent product quality: The quality and availability of products may vary depending on factors such as weather, seasonality, and other conditions beyond the control of farmers and food producers.
- Limited geographic coverage: FarmMatch may not be available in all geographic areas, which could limit its usefulness for consumers or farmers and food producers in certain regions.
- Cost: While creating a profile on FarmMatch is free for farmers and food producers, there may be costs associated with managing orders, shipping, and other aspects of the sales process.

Overall, while FarmMatch offers many benefits, it is important to consider these potential disadvantages when deciding whether to use the platform.



Figure 3: FarmMatch

4) Conclusion:

We have to resume the different platforms in one table and then conclude to go forward the solution that we suggest.

Platform	Advantages	Disadvantages	Note
“La ruche qui dit oui”	<ul style="list-style-type: none"> - Locally-sourced products. - High-quality products. - Support for local producers. 	<ul style="list-style-type: none"> - Limited product selection. - Pickup point limitations. - Higher prices. 	<p>We need to consider the values this platform is giving. About disadvantages, we cannot avoid that we will start just with pistachio and almond as a start but we will provide more products in the future.</p>
“Agrivi”	<ul style="list-style-type: none"> - Comprehensive farm management features. - User-friendly interface. - Cloud-based platform. 	<ul style="list-style-type: none"> - Cost. - Limited customization. 	<ul style="list-style-type: none"> - we will think in adding farm management features. - and of course, our prices are going to be lower than prices in the market.
FarmMatch	<ul style="list-style-type: none"> - Increased visibility for farmers. - Cost-effective 	<ul style="list-style-type: none"> - Inconsistent product quality. - Limited geographic 	<ul style="list-style-type: none"> - we have to make sure that products have a very good

	marketing	coverage. - Cost	quality. - our delivery services will cover all Tunisia.
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II. platform VS website

A website and a platform are distinct digital entities with different purposes and characteristics.

While both exist in the digital realm, they serve unique functions.

A website refers to a collection of web pages that are hosted on a server and can be accessed through the Internet. These pages typically provide information, present content, or enable communication. Websites are commonly utilized for promotional or informational purposes, displaying various types of content like text, images, videos, and links. Users interact with website content using a web browser.

On the other hand, a platform is a more comprehensive concept that encompasses a variety of services, tools, and technologies. It acts as an intermediary, facilitating interactions and transactions between different parties. Platforms often comprise multiple components such as websites, applications, APIs (Application Programming Interfaces), and databases.

Platforms offer diverse functionalities, including but not limited to:

- a) **E-commerce platforms**, which facilitate online buying and selling by providing features like product listings, shopping carts, and payment gateways.
- b) **Social media platforms**, which allow users to create profiles, share content, connect with others, and engage in communication and networking activities.
- c) **Service platforms**, which connect service providers with customers, enabling users to request services, find professionals, and conduct transactions.
- d) **Development platforms**, which offer developers tools, frameworks, and resources to create applications, websites, or software solutions.

To summarize, while a website is a specific type of online presence primarily focused on delivering content or information, a platform is a broader concept that encompasses a range of

services. Platforms go beyond content delivery and provide various functionalities through a combination of websites, applications, and other tools.

So in order to achieve all these services our solution is going to be a platform.

III. Solution

Our solution combines the advantages of previous samples and solve the disadvantages.

Here we will set the advantages that we took in consideration and how we are going to deal with the troubles that we may face.

1) High-quality products:

As a first step, we need to verify that all products that a farmer will provide are 100% bio. So we will add a verification that a farmer cannot use all platform services without providing the platform with a bio certification from a national or international company or organization.

There are several international quality standards that may apply to bio (organic) pistachios and almonds. Some of the most widely recognized standards include:

1. USDA Organic: This certification ensures that the pistachios and almonds are grown without the use of synthetic fertilizers, pesticides, or genetically modified organisms (GMOs). It also requires that the crops are rotated to maintain soil health and that no irradiation or sewage sludge is used.
2. European Union Organic: Similar to the USDA Organic standard, this certification requires that the crops are grown without synthetic fertilizers, pesticides, or GMOs. It also mandates that animal welfare and environmental sustainability are taken into account.
3. Global Organic Textile Standard (GOTS): This certification is specific to textile products made from organic crops, including fabrics made from pistachio and almond fibers. It ensures that the products are made using environmentally friendly processes and that workers are treated fairly.

4. Fairtrade: This certification is focused on ensuring fair prices for farmers and workers, as well as promoting sustainable farming practices. It also requires that no forced or child labor is used.
5. Non-GMO Project Verified: This certification ensures that the pistachios and almonds have not been genetically modified and that the crops are free from genetically modified organisms.
6. Kosher: This certification ensures that the pistachios and almonds meet specific dietary restrictions for Jewish dietary laws.

The specific standards that apply to bio pistachios and almonds will depend on the country of origin and the intended market. It's important for producers to research and comply with the relevant standards to ensure that their products meet the highest international quality requirements.

Body certifications available in Tunisia

In Tunisia, the organic pistachios and almonds may be certified according to the EU Organic standards or the USDA Organic standards, as these are two of the most widely recognized organic certifications in the world.

It's best to consult with Tunisian organic certification bodies, such as Ecocert Tunisia or Bureau Veritas Tunisia, to determine the specific certification options available for organic pistachios and almonds in Tunisia.

Ecocert Tunisia and Bureau Veritas Tunisia

Ecocert Tunisia and Bureau Veritas Tunisia are two of the main certification bodies in Tunisia that provide certification services for organic products, including pistachios and almonds.

Ecocert Tunisia is a subsidiary of Ecocert, an international certification body that specializes in the certification of organic and fair trade products. Ecocert Tunisia provides certification services for organic products according to the EU Organic standards, as well as other international standards such as Natrue, Cosmos, and Fair for Life. The certification process involves a detailed

audit of the production process to ensure that it meets the standards for organic certification, including the use of organic farming methods and compliance with social and environmental criteria.

Bureau Veritas Tunisia is part of the Bureau Veritas Group, a global certification body that provides services related to quality, health, safety, and the environment. Bureau Veritas Tunisia provides certification services for organic products according to the USDA Organic standards, as well as other international standards such as Fairtrade and Rainforest Alliance. The certification process involves a comprehensive audit of the production process, including the inspection of farms and facilities, testing of products, and documentation review to ensure compliance with the relevant standards.

Both Ecocert Tunisia and Bureau Veritas Tunisia are accredited by the relevant accreditation bodies and are recognized internationally for their certification services. They play an important role in ensuring the quality and authenticity of organic products in Tunisia and promoting sustainable production practices.

Guide to having a bio certification :

If you're a Tunisian farmer who wants to prove that your pistachios or almonds are organic (bio), here are the general steps you should follow:

1. Choose a certification body: The first step is to choose a certification body that is accredited to certify organic products in Tunisia. As I mentioned earlier, Ecocert Tunisia and Bureau Veritas Tunisia are two of the main certification bodies in Tunisia that provide certification services for organic products.
2. Contact the certification body: Once you have chosen a certification body, you should contact them to learn about the certification process and the specific requirements for organic certification. They will provide you with information on the application process, fees, and what you need to do to prepare for the certification audit.
3. Prepare your farm for the audit: The next step is to prepare your farm for the certification audit. This may involve implementing organic farming practices, such as using natural fertilizers and avoiding synthetic pesticides and herbicides. You may also need to keep

detailed records of your farming practices and provide documentation to support your compliance with the organic standards.

4. Schedule the certification audit: Once you have prepared your farm for the audit, you can schedule the certification audit with the certification body. The audit will typically involve an on-site inspection of your farm and facilities to verify your compliance with the organic standards.
5. Receive your certification: If your farm passes the audit and meets the requirements for organic certification, you will receive your organic certification. You can then use this certification to prove that your pistachios or almonds are organic.

It's important to note that organic certification requires a significant commitment to sustainable farming practices and compliance with the relevant organic standards. However, the certification can provide you with a competitive advantage in the market and help you access premium prices for your organic pistachios and almonds.

how much this certification can cost

The cost of organic certification from Ecocert Tunisia can vary depending on several factors, such as the size and complexity of your farm, the number of products being certified, and the specific services required.

However, as a general estimate, the cost of organic certification for a farm with 500 pistachio trees in Tunisia could range from approximately 1,000 to 2,500 Tunisian dinars (TND) per year. This estimate includes the application fee, annual certification fee, and inspection fees.

It's important to note that this is just a rough estimate and the actual cost may be higher or lower depending on your specific situation. Additionally, you may also need to factor in the cost of implementing organic farming practices and other requirements for organic certification, such as record-keeping and documentation.

I would recommend contacting Ecocert Tunisia directly to get a more accurate estimate of the costs involved. They can provide you with information on the certification process, fees, and requirements, and help you determine if organic certification is the right choice for your farm.

In order to make this process of having a bio certification easier and faster we contacted “Ecocert Tunisia” to look after having APIs that we can access to verify the state of our farmers’ certifications but unfortunately, they did not provide us with it so we will work in developing these APIs in the future.

The screenshot shows the homepage of Ecocert Tunisia. At the top, there is a green header bar with the Ecocert logo, navigation links for Certification, Training, Consulting, Client Portal, Contact, and a search icon. Below the header, the main title "Organic agriculture Tunisia" is displayed, followed by the text "Tunisian organic law TN 99-30". A teal button at the bottom of the header says "QUOTATION REQUEST IN 5 MIN". The main content area features a question "What is the purpose of organic certification?" on the left and its answer on the right: "Certification enables your organic products to be commercialised within Tunisia and the European market". There is also a small circular icon with an envelope symbol.

Figure 4: Ecocert Tunisia

Link : <https://www.ecocert.com>

2) Support for local producers:

The implementation of bio market platform holds the potential to address the challenges faced by local pistachio and almond producers in Gafsa. By leveraging the power of collaboration and collective efforts, small farmers with limited land can actively participate in fulfilling larger orders. The platform can facilitate connections and partnerships among these farmers, enabling them to pool their resources, combine their produce, and collectively meet the necessary quantity requirements. This collaborative approach not only ensures that buyers can access the desired volumes of bio products but also opens up new opportunities for small farmers to be part of larger transactions. By supporting these local producers and providing them with a platform to showcase their goods, the bio market platform empowers and uplifts small farmers, enabling them to compete on a larger scale and establish a stronger presence in the market. This symbiotic

relationship between the platform and local producers creates a mutually beneficial ecosystem that fosters growth, sustainability, and success for all involved stakeholders in the Gafsa region.

In the innovative bio market platform, when a buyer requests a specific quantity of pistachios or almonds, a collaborative opportunity arises for farmers. Within the platform, a collaboration option is displayed, inviting farmers to join by indicating the available quantity they can contribute. The platform ensures that farmers cannot offer a quantity exceeding the buyer's requirements, maintaining transparency and efficiency in the collaboration process. Once a farmer adds their available quantity, it becomes a committed contribution that cannot be undone. However, farmers have the flexibility to provide additional quantities beyond their initial commitment if they choose to do so. This collaborative feature not only streamlines the process of meeting buyer demands but also fosters a sense of cooperation among farmers, promoting collective growth and a more cohesive agricultural community. By leveraging the power of collaboration, the bio market platform creates a dynamic ecosystem that empowers farmers and enables them to efficiently participate in fulfilling orders while meeting the specific needs of buyers.

3) Pickup point limitations:

The bio market platform also incorporates a robust delivery service to further enhance the overall experience for both buyers and farmers. Recognizing the importance of timely and efficient product delivery, the platform integrates a dedicated logistics system that ensures smooth and reliable transportation of bio pistachios and almonds.

Through the platform's delivery service, buyers can conveniently specify their desired delivery location and schedule, allowing them to receive their orders promptly. The platform collaborates with trusted delivery partners who specialize in handling perishable goods and maintaining their quality during transit. This ensures that the bio products reach the buyers in optimal condition, preserving their freshness and nutritional value.

For farmers, the delivery service offers a streamlined approach to shipping their products to buyers. By leveraging the platform's logistics network, farmers can access cost-effective shipping options, eliminating the need to handle the intricacies of transportation themselves. This

convenience saves farmers valuable time and resources, allowing them to focus on their core expertise of producing high-quality bio pistachios and almonds.

The delivery service provided by the platform acts as a bridge, connecting farmers and buyers efficiently and securely. It contributes to a seamless and reliable transaction process, promoting trust and confidence between all parties involved. This aspect of the platform eliminates logistical barriers and expands market reach, ensuring that bio pistachios and almonds from Gafsa can reach buyers across Tunisia and beyond.

Overall, the incorporation of a dedicated delivery service within the bio market platform underscores its commitment to facilitating a comprehensive and end-to-end solution. By offering a reliable and efficient logistics network, the platform enables farmers to focus on their agricultural expertise while ensuring that buyers receive their orders in a timely and satisfactory manner.

4) Inconsistent product quality:

In addition to the delivery service, the bio market platform introduces a unique packaging system that enhances traceability and accountability. Each shipment of bio pistachios and almonds is carefully organized into separate boxes, while all the boxes are consolidated within a larger container for convenience.

What sets this packaging system apart is that each individual box represents a farmer's commitment. To ensure transparency and facilitate effective communication, each box is labeled with a QR code that contains the specific farmer's data. In the event that a buyer encounters an issue or wishes to provide feedback about a particular box, they can easily scan the QR code, pinpointing the exact farmer responsible for that specific portion of the order.

By utilizing the QR code system, the buyer can generate a detailed report and submit it directly to the platform's administration. This report will include relevant information about the specific box, allowing the administration to efficiently address the matter with the respective farmer. This approach ensures that any concerns or complaints can be promptly dealt with at the source, enabling appropriate actions to be taken to resolve the issue.

The implementation of this packaging system with individualized QR codes reinforces the platform's commitment to accountability, quality control, and customer satisfaction. It empowers buyers to provide feedback while establishing a direct channel for communication between buyers, farmers, and the platform's administration. This level of traceability fosters trust among all stakeholders and promotes a sense of responsibility and accountability within the bio market ecosystem.

5) User-friendly interface:

The bio market platform will be designed with a user-friendly interface that caters to the needs and preferences of both farmers and buyers. With a focus on simplicity, intuitiveness, and accessibility, the platform ensures a seamless and enjoyable experience for all users.

For farmers, the platform offers an easy-to-navigate interface that allows them to showcase their bio pistachios and almonds effectively. They can create detailed product listings, including information about farming practices, certifications, and quality standards. The platform provides intuitive tools for inventory management, enabling farmers to update product availability, quantities, and pricing effortlessly. Additionally, farmers have access to real-time analytics and sales data, empowering them to make informed decisions regarding their products and pricing strategies.

Buyers, on the other hand, benefit from a user-friendly interface that facilitates smooth and efficient purchasing experiences. The platform offers intuitive search and filtering options, enabling buyers to explore and discover bio pistachios and almonds that meet their specific requirements. Detailed product descriptions, accompanied by high-quality images, provide buyers with a comprehensive understanding of the products they are considering. The platform also integrates secure payment gateways, ensuring a seamless and secure transaction process.

Furthermore, the platform incorporates personalized features to enhance user experiences for both farmers and buyers. Farmers can customize their profiles, farming practices, and values, thereby establishing a stronger connection with potential buyers. Buyers can create personalized accounts, save their preferences, and receive tailored recommendations based on their interests and past purchases.

The user-friendly interface of the bio market platform is designed to minimize complexities, reduce learning curves, and ensure that both farmers and buyers can navigate the platform effortlessly. By prioritizing usability and accessibility, the platform fosters a positive and engaging environment, promoting stronger connections, trust, and long-term relationships between farmers and buyers.

6) Consequences:

- High-quality products: The platform's focus on locally-sourced products means that consumers can access high-quality and fresh products that have been produced using sustainable and ethical practices so it makes sure that products listed on it are have a high-quality.
- Convenience for consumers : The online marketplace allows consumers to easily browse and purchase products from multiple producers in one place, saving them time and effort.
- Support for local producers: The platform helps support local farmers and producers by providing them with a direct channel to market their products to consumers. This can help to promote small-scale and sustainable agriculture and support local economies.
- Community-building: local communities where consumers and producers can connect and build relationships. This can promote a sense of community and social interaction, which can be valuable in promoting healthy and sustainable products practices.
- Low prices: the fee of using the platform as a farmer will be related to your sells and it will not be large so it will be acceptable.
- independence on local producers: as a start the platform will depend on Gafsa's pistachio and almond producers but step by step it will be provided by producers from all over the country such as different and variant products.
- unlimited geographical coverage: everyone will be able to use the platform and order products directly from farmers and the strong third-party partner will provide a good delivery service.
- Direct access to local food: it connects consumers directly with local farmers and food producers, allowing them to purchase fresh, healthy, and sustainable products without the need for intermediaries.
- Increased visibility for farmers: By creating a profile, farmers and food producers can increase their visibility and reach a wider audience of potential customers.
- Cost-effective marketing: it provides farmers with a free platform to market their products, reducing the need for expensive advertising and distribution channels.
- Improved profitability: By eliminating intermediaries, farmers can sell their products at a higher price, improving their profitability and enabling them to invest in their businesses.

7) Resume:

The bio market platform plays a pivotal role in revolutionizing the bio-agriculture industry by connecting farmers and buyers, providing innovative solutions to their challenges. It enables small farmers in Gafsa to overcome limitations by facilitating collaborations and participating in larger orders, ensuring that buyers can access the required quantities of bio pistachios and almonds. The platform offers a dedicated delivery service, incorporating a unique packaging system with individualized QR codes for enhanced traceability and accountability. With its user-friendly interface, the platform provides an intuitive experience for both farmers and buyers, fostering stronger connections and trust. Overall, the platform's principal role is to empower farmers, expand market reach, and ensure the availability of high-quality bio products while delivering a seamless and enjoyable experience for all users.

chapter II:

Requirement captions & specification

INTRODUCTION :

The "Requirement Capture and Specification" chapter is a crucial phase in the software development process where we focus on capturing and specifying the functional and non-functional requirements of the system. In this chapter, we delve into the detailed documentation of use cases, providing textual descriptions that outline the desired behavior and interactions of the system. Additionally, we explore global sequence diagrams that illustrate the sequence of messages exchanged between system components. Furthermore, we delve into defining the system architecture, establishing the high-level structure and organization of the software solution. Through this chapter, we ensure clear and comprehensive requirements that serve as a foundation for the subsequent stages of system development.

I) Functional requirements:

Functional requirements refer to the specific features and functions that developers need to incorporate into a product to help users achieve their goals. Clear communication of these requirements is essential for the development team and. Typically, functional requirements describe how a system will behave in specific circumstances.

In the following we will exhibit the functionalities to produce using the platform

1) Functionalities of the platform:

- log-in and registration of user (farmer, ...)
- Farmers collaborate to achieve customers commands.
- Farmer participate in a collaboration with a specific quantity of a specific product.
- Follow a collaboration status and details. (buyer & farmer)
- Subscribes to newsletter.
- Farmer receives notifications about new collaborations.
- Farmer verifies his bio certification so he can have access to all our features.

- Manage his account (changing cover, profile pictures and personal information...)[Farmer& buyer]
- See his history (buyer, farmer & Admin).
- Chat: buyers can communicate with farmers that committed to their collaboration.
- Buyer Creates a Collaboration by providing the requested quantity of a requested product (pistachio or almond)
- Once collaboration is ready Buyer can track his order's state.
- Manage feedback messages (Admin).
- Manage Users (Admin)
- Manage dashboard analytics (Admin).

2) Actors :

Here are the actors that intervene with the system:

- Farmer
- Buyer
- Admin
- Payment system
- Tracking system

Use cases identification:

- Farmer:
 - Authenticate.
 - Manage account.
 - Chat with buyers.
 - Manage history.
 - Manage collaborations
 - Join collaboration.
 - subscribe to newsletter
- Buyer:
 - Authenticate.

- Feedback.
- Track the order's state.
- Get tracking information.
- Chat with farmers.
- subscribe to newsletter.
- Create a collaboration.
- Admin:
 - Manage Collaborations.
 - Get feedback messages.
 - Manage users & block.
- Tracking system:
 - Provide traceability.
- Payment system:
 - Offer money transactions.

II) Non-functional requirements:

Nonfunctional requirements are a set of criteria that describe how a system should perform, as opposed to what it should do. These requirements may be related to the system's performance, security, usability, or other aspects. For example, a nonfunctional requirement could specify that website pages should load within three seconds, even when there are up to 5,000 simultaneous users. Another nonfunctional requirement could specify that the system should be capable of handling up to 20 million users without any performance degradation. These requirements play a critical role in ensuring that a system meets the needs and expectations of its users.

Here are non-functional requirements of our platform:

- User-friendly interface: the interface will be designed to be user-friendly and intuitive, making it easy for farmers to use and navigate the platform. This can help reduce the learning curve for new users and enable them to start using the platform more quickly.
- Language support: it will support multiple languages. This could make it easier for farmers in certain areas to use the platform effectively.
- Information are securely stocked in the database with a hashed password.

III) Use case textual description

Table 1: Register Textual Description

Use case name		Register
Actors		Farmer, Buyer
Pre-conditions		Register page is running and user doesn't exist in the database.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The user accesses the registration page. 2. The user enters the required information, such as name, email, password, and additional details. 3. The system validates the entered information. 4. If the information is valid, the system creates a new account for the user. 5. The user is logged in automatically. 6. The user is redirected to the main page of the platform.
	Post-conditions	User have an account and logged in.
Alternative Flows and Exceptions		<ol style="list-style-type: none"> 1. Wrong or invalid inputs: <ol style="list-style-type: none"> a. If the user enters incorrect or invalid information, an error message is displayed. b. The "Sign-up" button is disabled until the user corrects the information. 2. User already has an account: <ol style="list-style-type: none"> a. If the user's email is already registered, an error message is displayed. b. The user is redirected to the login page. 2. redirect to login page.
Non functional requirements		The entered information is securely stored in the database, and the password is hashed to ensure data security.

Table 2: Login Textual Description

Use case name		Login
Actors		Buyer, Farmer
Pre-conditions		User have an account and not logged in.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The user accesses the login page. 2. The user enters their email and password. 3. The system validates the entered credentials. 4. If the credentials are valid, the user is logged into their account. 5. The user is redirected to their personalized dashboard or the main page of the platform, depending on their role (farmer or buyer).
	Post-conditions	The user successfully logs into their account and gains access to the platform.
Alternative Flows and Exceptions		<ol style="list-style-type: none"> 1. Incorrect credentials: <ol style="list-style-type: none"> a. If the user enters incorrect or invalid credentials, an error message is displayed. b. The user is prompted to re-enter the correct credentials. 2. Forgotten password: <ol style="list-style-type: none"> a. If the user forgets their password, they can click on the "Forgot password" link. b. The user is redirected to a password recovery page where they can reset their password using their registered email.
Non functional requirements		User credentials and sensitive information are securely stored and transmitted using encryption protocols to ensure data privacy and

	protection.
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Table 3: Manage Account Textual Description

Use case name		Manage Account
Actors		Farmer, Buyer
Pre-conditions		The user is logged into their account.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The user navigates to the account management section within the platform. 2. The user can view and edit their personal information, such as name, email, contact details, and profile picture. 3. The user can update their password or change other account settings. 4. The user can manage their communication preferences, such as opting in or out of notifications or newsletters. 5. The user can view their order history, transaction details, and any relevant activity related to their account. 6. The user can update their profile information, such as adding a bio, specifying farming practices, or showcasing certifications. 7. The user can save and apply changes to their account.
	Post-conditions	The user's account information and preferences are updated and saved successfully.
Alternative Flows and Exceptions		<ol style="list-style-type: none"> 1. Invalid inputs: <ol style="list-style-type: none"> a. If the user enters invalid or incorrect information, appropriate error messages are displayed. b. The user is prompted to correct the information. 2. Profile picture update: <ol style="list-style-type: none"> a. The user can upload a new profile picture by selecting an image from their device or providing a URL. b. The system verifies the image format and size to ensure

	<p>compatibility.</p> <p>3. Security measures:</p> <ul style="list-style-type: none"> a. The user may be required to re-enter their password or provide additional verification for certain sensitive actions, such as changing the password.
Non functional requirements	<p>The platform ensures data privacy and security by storing and transmitting user information using encryption techniques.</p> <p>Changes made to the account settings are reflected in real-time and stored securely in the database.</p>

Table 4: Chat Textual Description

	Use case name	Chat
	Actors	Buyer, Farmer
	Pre-conditions	The user is logged into their account and has an active collaboration with farmers.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The buyer navigates to the chat section within the platform. 2. The buyer can view a list of collaboration farmers they are associated with. 3. The buyer selects a specific farmer from the list to initiate a conversation. 4. The platform opens a chat interface where the buyer can send messages to the selected farmer. 5. The buyer can type and send text messages, ask questions, provide instructions, or discuss specific details related to the collaboration. 6. The farmer receives the messages and can read, respond, and engage in a conversation with the buyer. 7. Both parties can exchange messages, updates, and clarify any

		concerns or requirements.
	Post-conditions	The buyer and collaboration farmers can communicate effectively through the chat feature.
	Alternative Flows and Exceptions	<p>1. Unavailable farmers:</p> <ul style="list-style-type: none"> a. If a collaboration farmer is currently unavailable or offline, the buyer may see their status as "offline" or "unreachable." b. The buyer can leave a message for the farmer, and the farmer can respond when they are available. <p>2. Message notifications:</p> <ul style="list-style-type: none"> a. The platform may provide notifications to inform the buyer about new messages from collaboration farmers. b. The buyer can opt to receive email or in-platform notifications for message updates. <p>3. Multimedia messages:</p> <ul style="list-style-type: none"> a. The chat interface may support the exchange of multimedia content, such as images or files, allowing the buyer and farmer to share relevant information easily.
	Non functional requirements	The chat feature ensures real-time communication between the buyer and collaboration farmers. Messages are transmitted securely using encryption protocols to protect sensitive information. The platform provides a user-friendly interface for convenient and efficient messaging, promoting effective collaboration and communication.

Table 5: Subscribe to newsletter Textual Description

Use case name	Subscribe to Newsletter
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Actors		Buyer, farmer
Pre-conditions		The user is logged into their account or has access to the platform's website.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The user navigates to the newsletter subscription section within the platform or website. 2. The user provides their email address in the designated field. 3. The user confirms their subscription by clicking on the "Subscribe" button. 4. The system validates the email address and adds it to the newsletter subscription list. 5. The user receives a confirmation message or email acknowledging their successful subscription.
	Post-conditions	The user's email address is successfully added to the newsletter subscription list.
Alternative Flows and Exceptions		<ol style="list-style-type: none"> 1. Invalid email address: <ol style="list-style-type: none"> a. If the user enters an invalid or incorrectly formatted email address, an error message is displayed. b. The user is prompted to enter a valid email address. 2. Existing subscription: <ol style="list-style-type: none"> a. If the user's email address is already subscribed to the newsletter, a message informs them that they are already subscribed. b. No duplicate entry is made in the subscription list. 3. Unsubscribe option: <ol style="list-style-type: none"> a. The newsletter emails may include an option for the user to unsubscribe from the newsletter. b. If the user decides to unsubscribe, they can click on the provided link or follow the instructions to opt-out.
Non functional requirements		The platform ensures the privacy and security of user information, including email addresses. The newsletter subscription process is

	designed to be user-friendly and straightforward, minimizing the steps required to subscribe. Users have the option to unsubscribe at any time, and the system promptly processes their request to stop receiving newsletters.
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Table 6: Manage Collaboration Textual Description

Use case name		Manage Collaboration
Actors		Farmer
Pre-conditions		The farmer is logged into their account and has access to collaboration details.
Normal Flow	Description	<p>This use case allows farmers to participate in a collaboration by contributing a specific quantity of a product, even if it is less than the required quantity. Collaboration involves farmers working together to achieve the necessary quantity collectively.</p> <ol style="list-style-type: none"> 1.The farmer navigates to the collaboration management section within the platform. 2.The farmer selects the specific collaboration they want to participate in. 3.The platform displays the collaboration details, including the required product, total quantity, and remaining quantity to be fulfilled. 4.The farmer enters the quantity they can contribute, ensuring it is more than 0 and less than or equal to the remaining quantity. 5.The farmer submits their participation with the specified quantity. 6.The system validates the quantity provided by the farmer, ensuring it meets the necessary criteria. 7.The farmer's contribution is added to the collaboration, and the

	<p>remaining quantity is updated accordingly.</p> <p>8.The farmer receives a confirmation message indicating their successful participation in the collaboration.</p>
Post-conditions	The farmer successfully participates in the collaboration by contributing a specific quantity of the product, contributing to the collective goal of achieving the required quantity.
Alternative Flows and Exceptions	<p>1.Quantity provided is less than required:</p> <ul style="list-style-type: none"> a. If the quantity provided by the farmer is less than the required quantity, the system allows the submission as long as it meets the minimum criteria (more than 0 and less than or equal to the remaining quantity). b. The collaboration continues with the contributed quantity, and the remaining quantity is adjusted accordingly. <p>2.Farmer wishes to increase their contribution:</p> <ul style="list-style-type: none"> a. If the farmer wishes to increase their contribution after the initial submission, they can access the collaboration management section, select the collaboration, and update their contributed quantity. b. The system validates the new quantity and adjusts the collaboration details accordingly.
Non functional requirements	The collaboration management feature enables farmers to collaborate and contribute to achieving the required quantity collectively. The platform ensures a user-friendly interface for easy participation, allowing farmers to provide any quantity above 0 and within the remaining quantity. The system accurately tracks and updates the collaboration details, maintaining transparency and progress monitoring for all participating farmers.

Table 7: Create Collaboration Textual Description

Use case name		Create Collaboration
Actors		buyer
Pre-conditions		The buyer is logged into their account and has access to the collaboration creation feature.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The buyer navigates to the collaboration creation section within the platform. 2. The buyer initiates the creation of a new collaboration by clicking on the "Create Collaboration" button. 3. The platform presents a form or interface where the buyer can enter the details of the collaboration. 4. The buyer specifies the product for the collaboration, such as pistachios or almonds, and the desired quantity. 5. The buyer may provide additional information or instructions related to the collaboration, such as quality requirements, delivery preferences, or specific product specifications. 6. The buyer submits the collaboration details for creation. 7. The system validates the entered information and creates a new collaboration with the specified details. 8. The collaboration is added to the list of available collaborations, making it visible to farmers who can participate and fulfill the order.
	Post-conditions	The buyer successfully creates a collaboration with the specified product and quantity, making it available for farmers to join.
Alternative Flows and Exceptions		<ol style="list-style-type: none"> 1. Invalid inputs: <ol style="list-style-type: none"> a. If the buyer enters invalid or incorrect information, such as an invalid quantity or incomplete details, an error message is displayed. b. The buyer is prompted to correct the information before submitting the collaboration.
Non functional requirements		The collaboration creation feature ensures that buyers can easily initiate new collaborations by specifying the desired product and

	quantity. The platform validates the entered information to maintain data accuracy. The user interface provides a seamless and intuitive experience for buyers to create collaborations, promoting efficient communication and coordination between buyers and farmers.
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Table 8: Track Collaboration State Textual Description

Use case name		Track collaboration State
Actors		Buyer
Pre-conditions		The buyer is logged into their account and has created a collaboration.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The buyer navigates to the collaboration/tender management section within the platform. 2. The buyer selects the specific collaboration/tender they want to track. 3. The platform displays the details of the collaboration/tender, including the required product, quantity, and any additional information. 4. The buyer can view the current status of the collaboration/tender, indicating the number of farmers who have joined and the quantity remaining to be fulfilled. 5. The platform provides real-time updates as farmers join the collaboration/tender or modify their contributed quantities. 6. If desired, the buyer can communicate directly with the participating farmers or send reminders to ensure a smooth collaboration process.
	Post-conditions	The buyer is informed about the current state of the collaboration/tender, including the number of participating

	farmers and the remaining quantity to be fulfilled.
Alternative Flows and Exceptions	<p>1. No farmers have joined yet:</p> <ul style="list-style-type: none"> a. If no farmers have joined the collaboration/tender, the platform indicates that the collaboration/tender is still open for participation. b. The buyer can take appropriate actions to encourage more farmers to join or extend the collaboration/tender's duration if needed. <p>2. Changes in farmer participation:</p> <ul style="list-style-type: none"> a. If farmers modify their contributed quantities or withdraw from the collaboration/tender, the platform reflects the updated state. b. The buyer can view these changes and assess the impact on the collaboration/tender's progress.
Non functional requirements	The platform ensures that the buyer has access to real-time updates on the collaboration/tender's state, allowing them to monitor the participation of farmers and the remaining quantity to be fulfilled. The user interface provides clear and concise information, enabling the buyer to make informed decisions and take necessary actions based on the collaboration/tender's progress. The system ensures accurate tracking and timely notifications to facilitate effective collaboration management.

Table 9: Provide Feedback Textual Description

Use case name		Provide Feedback
Actors		Buyer
Pre-conditions		The buyer has completed a transaction with farmers and has access to the feedback feature.
Normal	Description	1. The buyer navigates to the feedback section within the platform.

Flow	<ol style="list-style-type: none"> 2. The buyer selects the specific transaction or collaboration they want to provide feedback for. 3. The platform presents a form or interface where the buyer can compose their feedback message. 4. The buyer writes a review message, expressing their experience with the farmers and the quality of the products received. 5. The buyer may rate the farmers and their products using a predefined rating system or by providing specific feedback criteria. 6. The buyer submits the feedback message. 7. The system records the feedback and associates it with the respective farmers and transaction details.
Post-conditions	The buyer successfully provides feedback about the farmers and their products, helping to build a reputation system and provide valuable insights for future buyers.
Alternative Flows and Exceptions	<ol style="list-style-type: none"> 1. Incomplete feedback: <ul style="list-style-type: none"> a. If the buyer submits the feedback form without providing all the required information, an error message is displayed. b. The buyer is prompted to complete the missing fields before submitting the feedback. 2. Edit or update feedback: <ul style="list-style-type: none"> a. If the buyer wishes to edit or update their feedback after submission, they can access the feedback section and make the necessary changes. b. The system updates the feedback record accordingly.
Non functional requirements	The feedback feature allows buyers to share their experiences and provide valuable information to farmers and future buyers. The platform ensures a user-friendly interface for composing and submitting feedback messages. The system securely stores and associates the feedback with the respective farmers and transactions, facilitating transparency and accountability. The feedback system helps build a reputation system within the

	platform and fosters continuous improvement among farmers.
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Table 10: Manage FeedBack Messages Textual Description

Use case name		Manage Feedback Messages
Actors		Admin
Pre-conditions		The admin is logged into their account and has access to the feedback management feature.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The admin navigates to the feedback management section within the platform. 2. The platform displays a list of feedback messages received from buyers regarding farmers and their products. 3. The admin can view the details of each feedback message, including the buyer's name, date of submission, and the content of the message. 4. The admin can sort and filter the feedback messages based on various criteria, such as date, rating, or specific farmers. 5. The admin can mark feedback messages as read or unread to keep track of the ones that have been reviewed. 6. The admin can take appropriate actions based on the feedback received, such as providing guidance to farmers, addressing quality issues, or making improvements to the platform based on recurring feedback themes.
	Post-conditions	The admin effectively manages the feedback messages received from buyers, ensuring timely responses and taking necessary actions to address any issues or improve the overall user experience.
Alternative Flows and Exceptions		<ol style="list-style-type: none"> 1. No feedback messages: <ol style="list-style-type: none"> a. If there are no feedback messages available, the platform

	<p>indicates that there are no messages to display.</p> <p>b. The admin can continue to monitor the feedback section for new messages.</p> <p>2. Urgent or critical feedback:</p> <p>a. If the admin identifies urgent or critical feedback that requires immediate attention, they can prioritize and address those messages promptly.</p> <p>b. The admin may collaborate with relevant stakeholders, such as farmers or technical support, to resolve any issues raised.</p>
Non functional requirements	The feedback management feature provides the admin with a comprehensive overview of feedback messages from buyers. The platform ensures an organized and user-friendly interface for efficient message management, including sorting, filtering, and response capabilities. The system securely stores and tracks feedback messages to facilitate effective communication and action-taking. The admin plays a vital role in addressing feedback and driving improvements within the platform and the overall user experience.

Table 11: Manage Users and Block Textual Description

Use case name		Manage Users and Block
Actors		Admin
Pre-conditions		The admin is logged into their account and has access to the user management feature.
Normal Flow	Description	<ol style="list-style-type: none"> 1. The admin navigates to the user management section within the platform. 2. The platform displays a list of registered users, including farmers and buyers. 3. The admin can search, sort, and filter the user list based on

	<p>specific criteria, such as username, role, or activity.</p> <ol style="list-style-type: none"> 4. The admin can view the details of each user, including their name, contact information, and account status. 5. If the admin identifies a farmer or buyer who requires blocking, they can select the user and choose the "Block" option. 6. The system prompts the admin to confirm the blocking action, ensuring that it's intentional and necessary. 7. Upon confirmation, the system blocks the user's account, restricting their access to the platform and its features. 8. The admin may provide a reason or note for the blocking action to maintain a record of the decision.
Post-conditions	The admin effectively manages users within the platform, including the ability to block farmers or buyers when necessary, ensuring a safe and secure environment for all users.
Alternative Flows and Exceptions	<ol style="list-style-type: none"> 1. Unblock a user: <ol style="list-style-type: none"> a. If the admin decides to unblock a previously blocked user, they can select the user and choose the "Unblock" option. b. The system removes the account block, restoring the user's access to the platform. 2. User dispute or conflict resolution: <ol style="list-style-type: none"> a. In case of a dispute or conflict involving a user, the admin may need to initiate a separate resolution process or investigation. b. The blocking action serves as a temporary measure until the dispute is resolved.
Non functional requirements	The user management and blocking feature provides the admin with the ability to control user access and take necessary actions to maintain a safe and trustworthy platform environment. The system ensures a user-friendly interface for efficient user management, including search, sort, and filtering capabilities. The blocking action should be handled securely and logged for

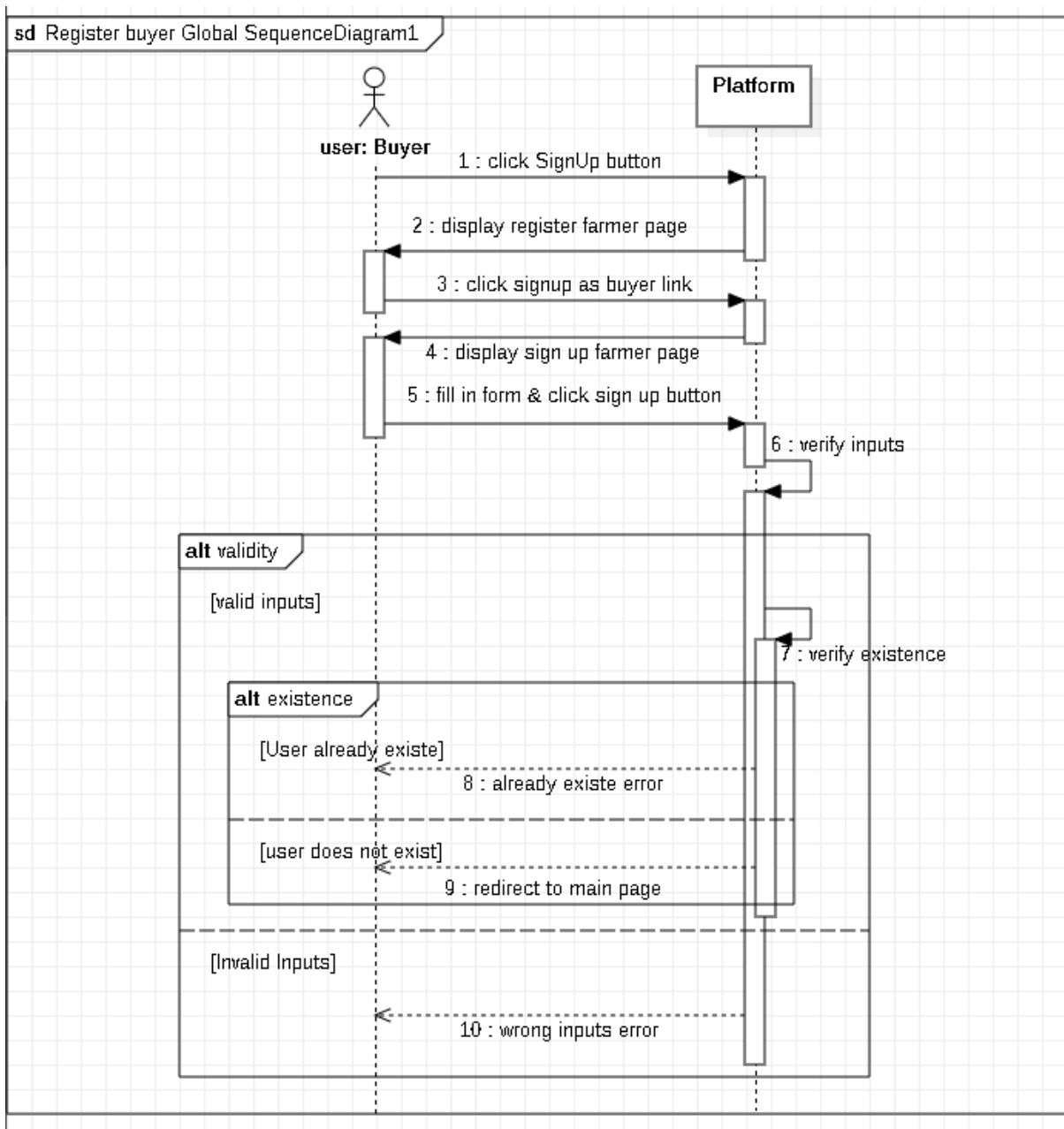
	reference. The admin plays a critical role in ensuring the platform's integrity and addressing any user-related issues effectively.
--	---

IV) Global Sequence Diagrams:

Global sequence diagrams, also known as system sequence diagrams or high-level sequence diagrams, provide an overview of the interactions between various components or actors in a system. Unlike detailed sequence diagrams that focus on specific scenarios or use cases, global sequence diagrams capture the broader interactions at a high level.

These diagrams depict the sequence of messages or events exchanged between different components, actors, or external systems in a system. They showcase the order and flow of these interactions, helping to identify the major steps or stages in a process. Global sequence diagrams provide a visual representation of the system's behavior, allowing stakeholders to understand the overall system architecture and the key interactions between its components.

1) Register Buyer GSD:



2) Register Farmer GSD:

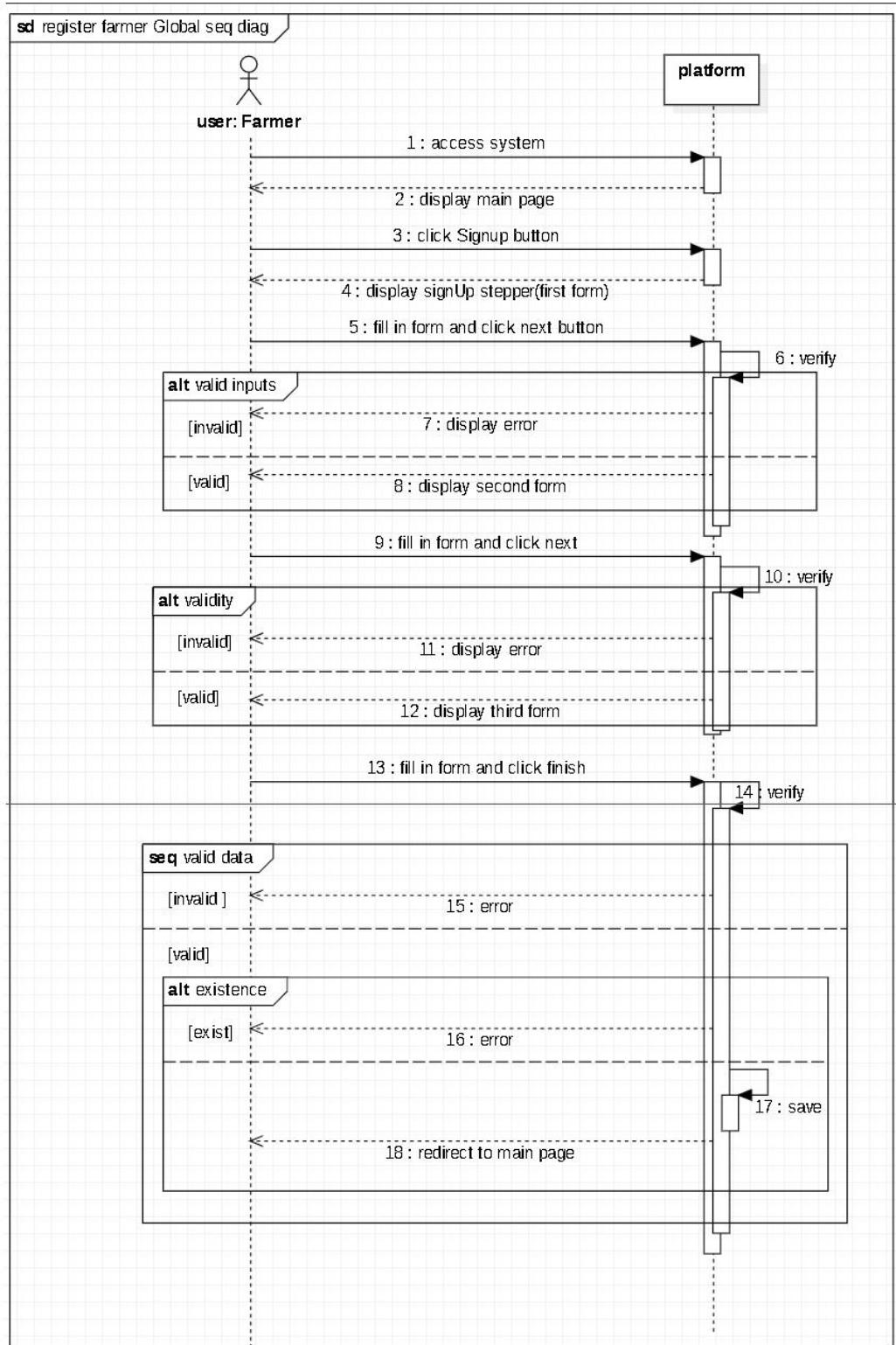


Figure 5: Register farmer GSD

3) Login GSD:

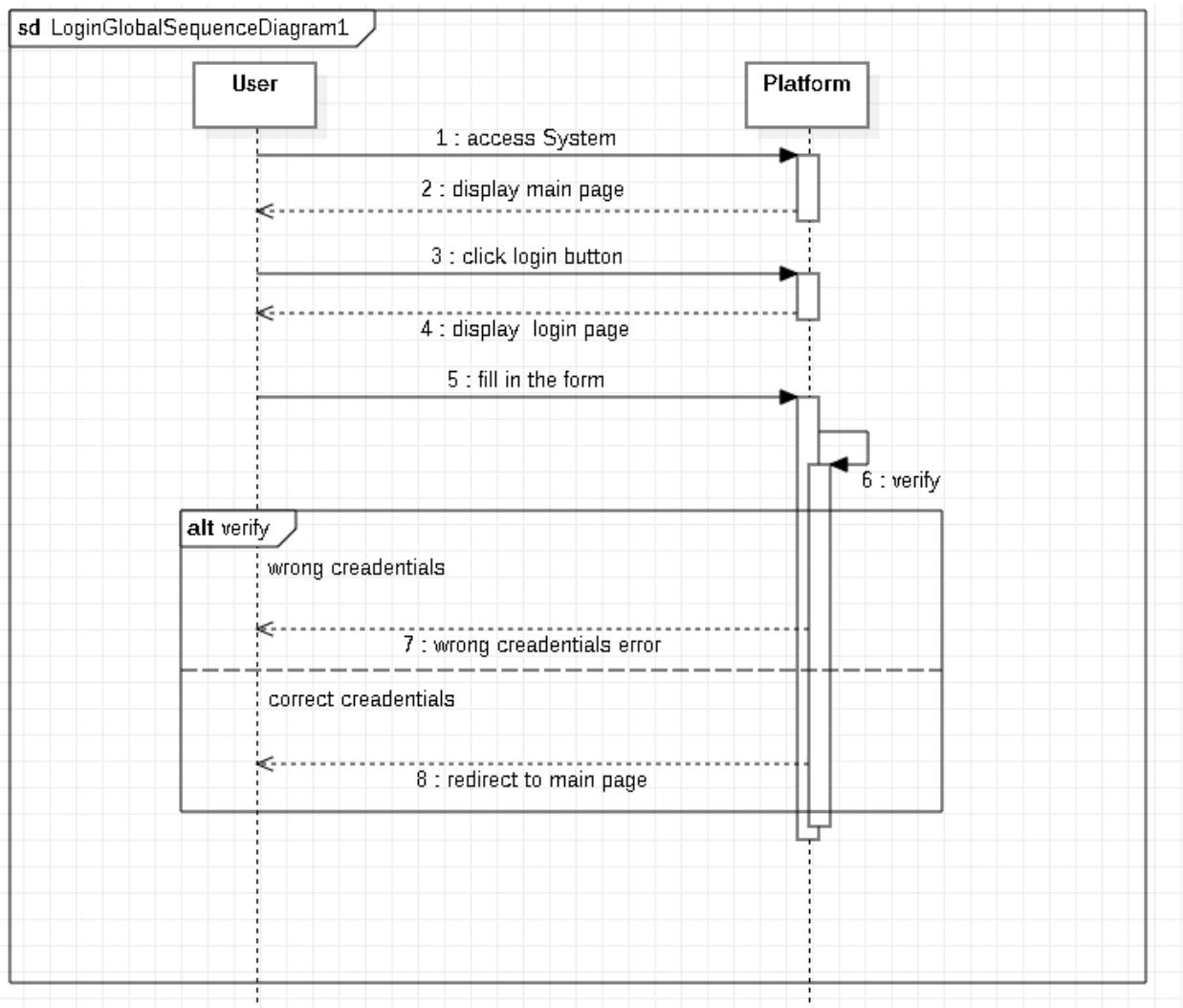


Figure 6: Login GSD

4) Subscribe to newsletter GSD:

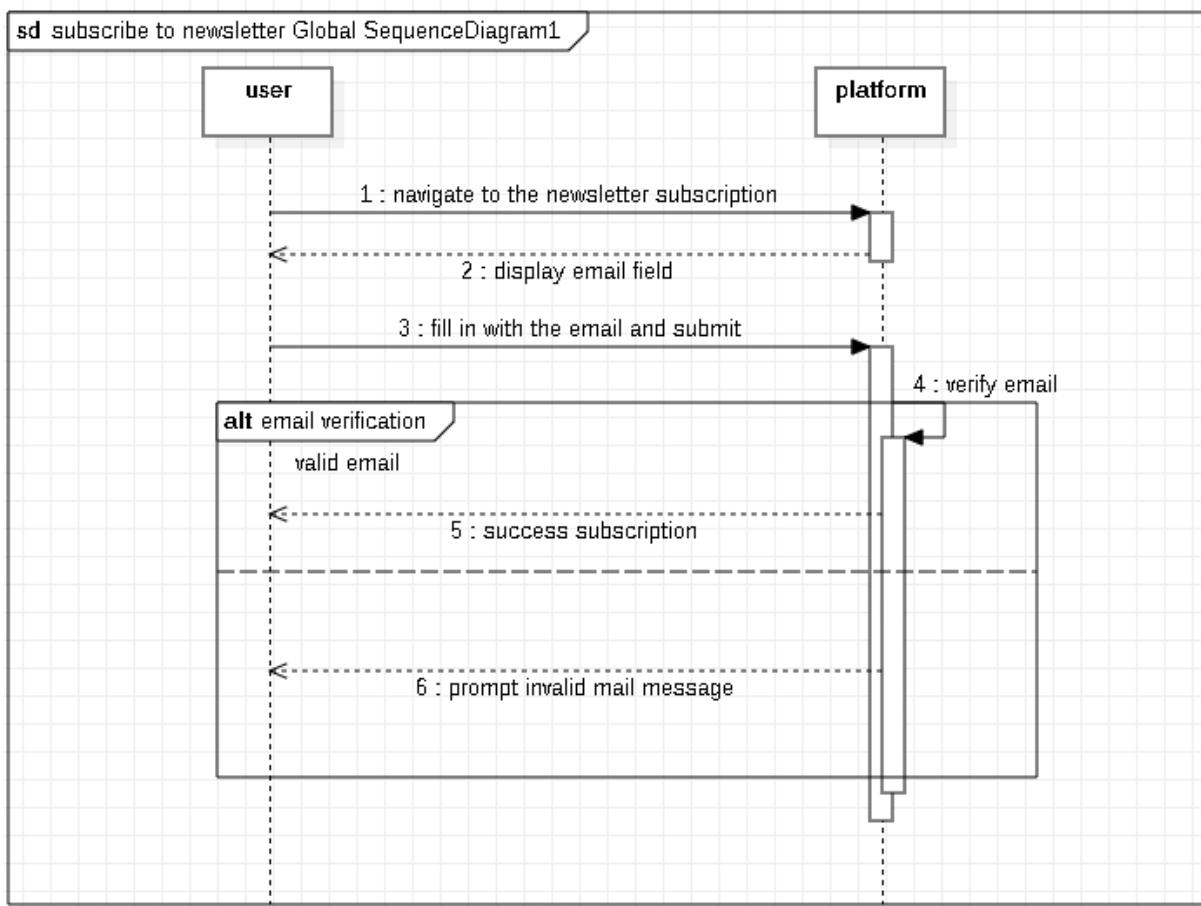


Figure 7: subscribe to newsletter GSD

5) Join Collaboration GSD:

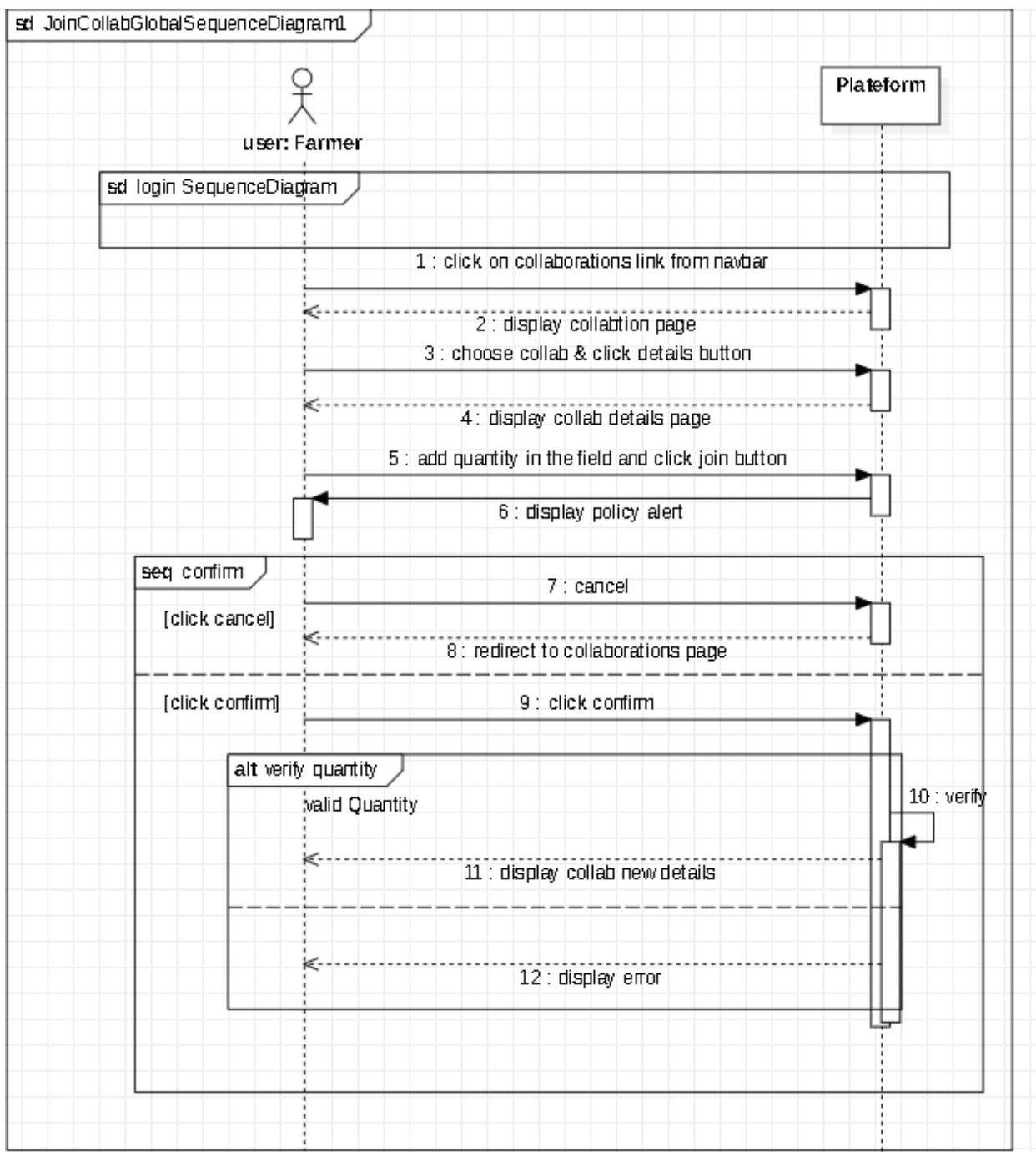


Figure 8: Join Collab GSD

6) Create Collab GSD:

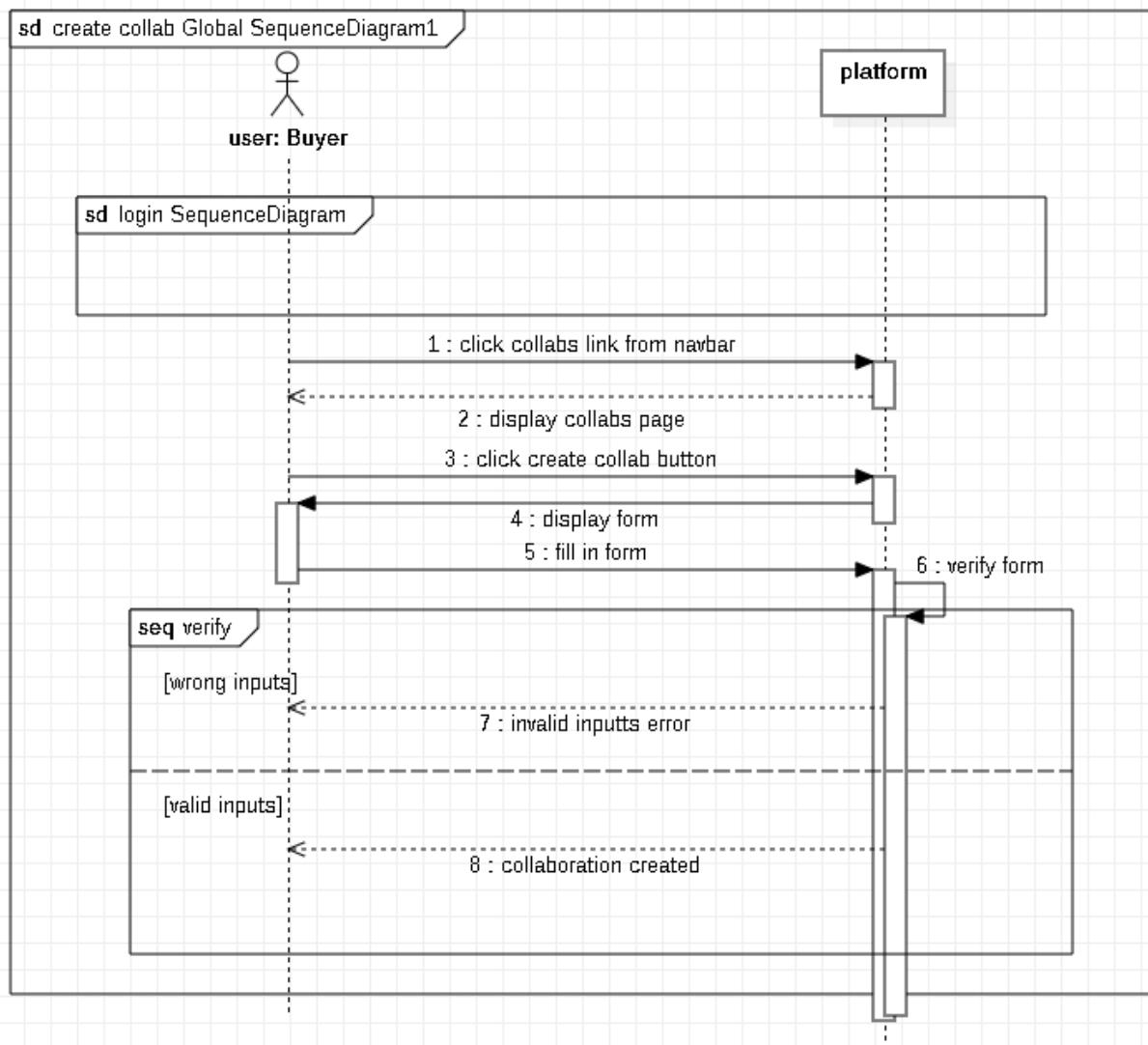


Figure 9:Create Collab GSD

7) Chat GSD:

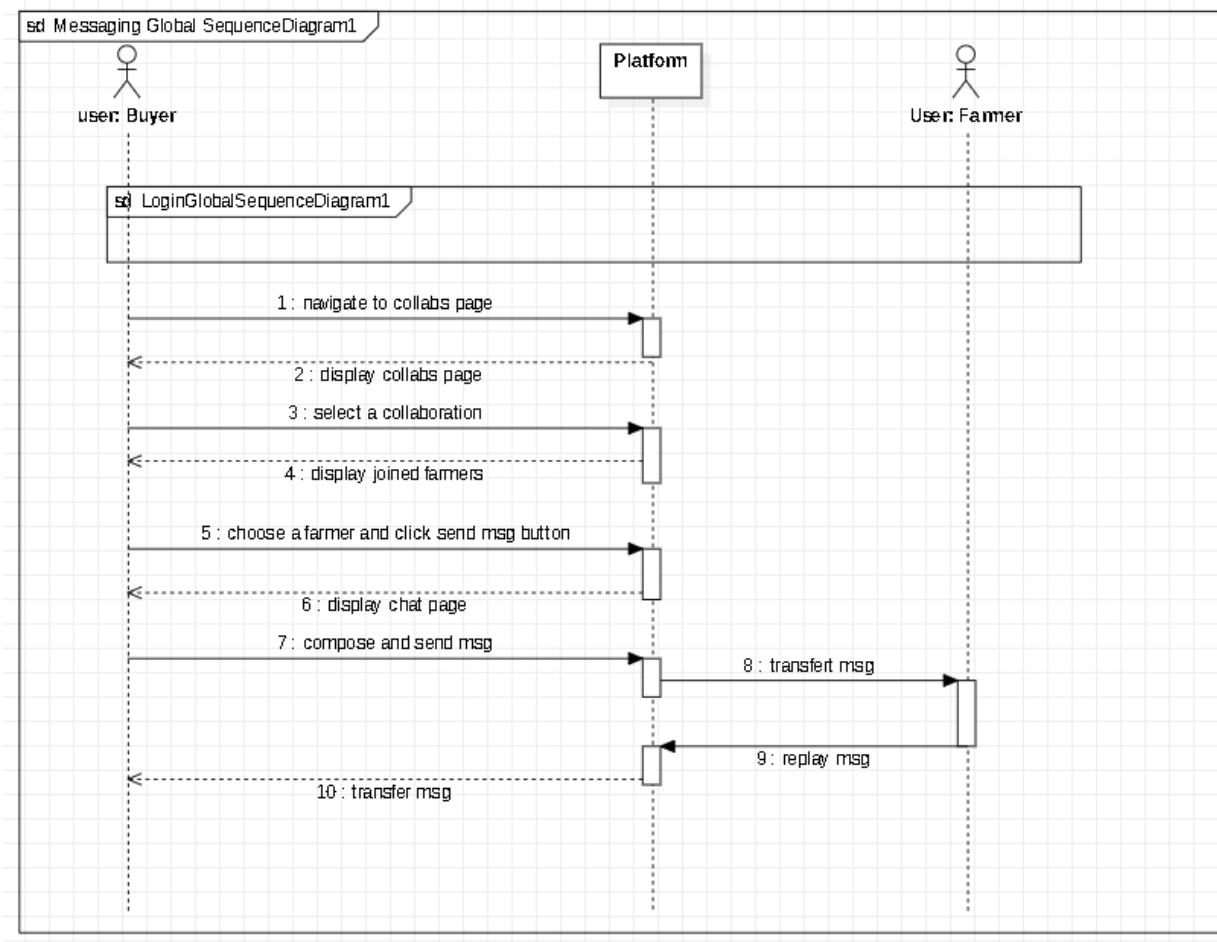


Figure 10: Chat GSD

8) Feedback GSD:

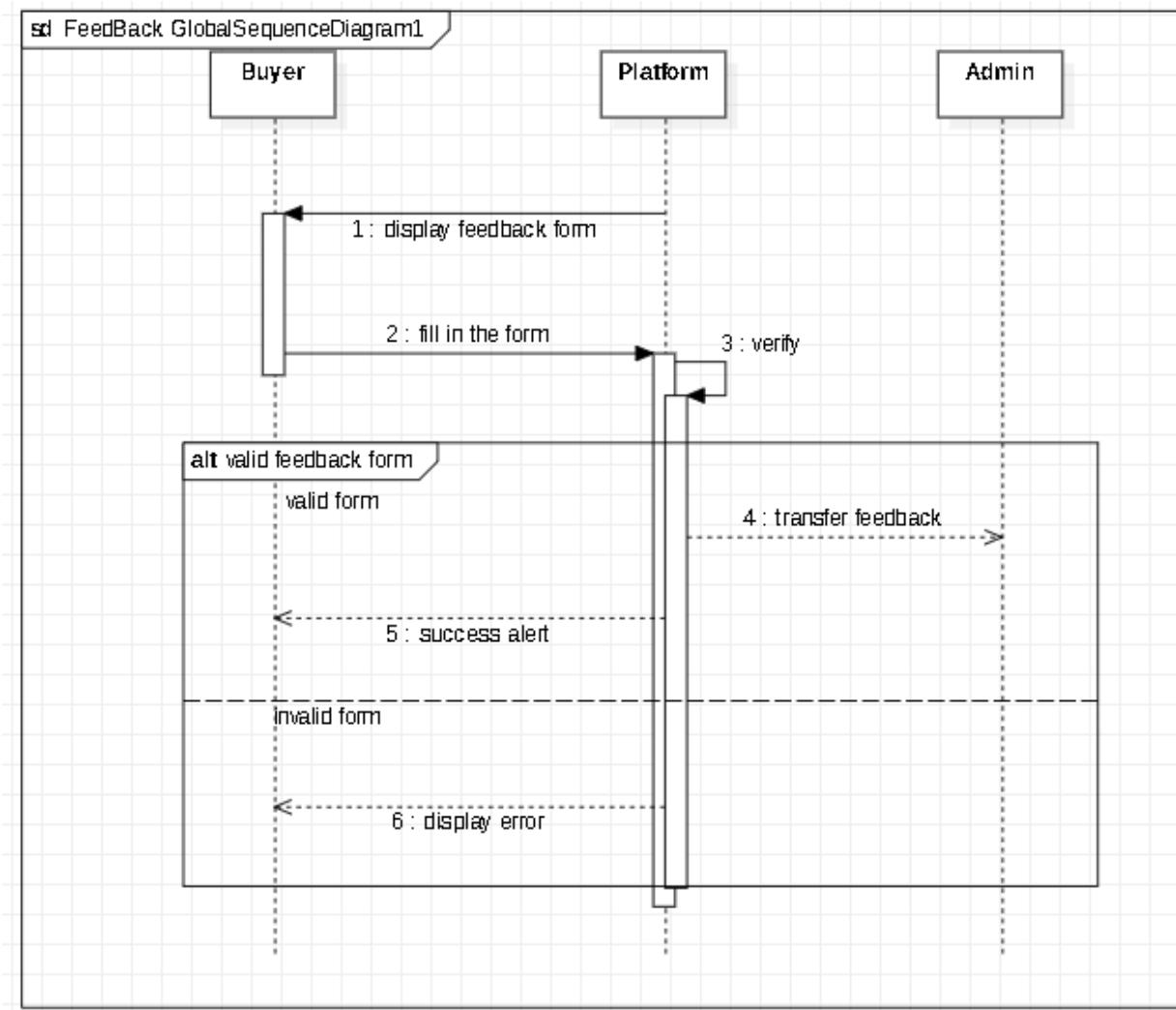


Figure 11: Feedback GSD

9) Track Collab State GSD:

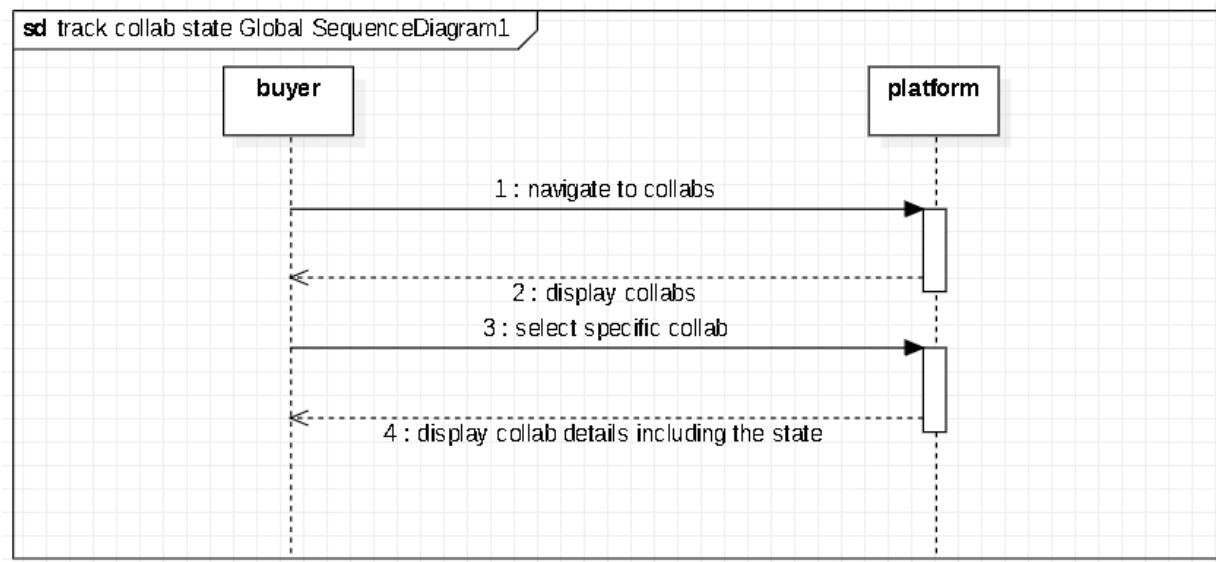


Figure 12: Track Collab State GSD

10) Manage Account GSD:

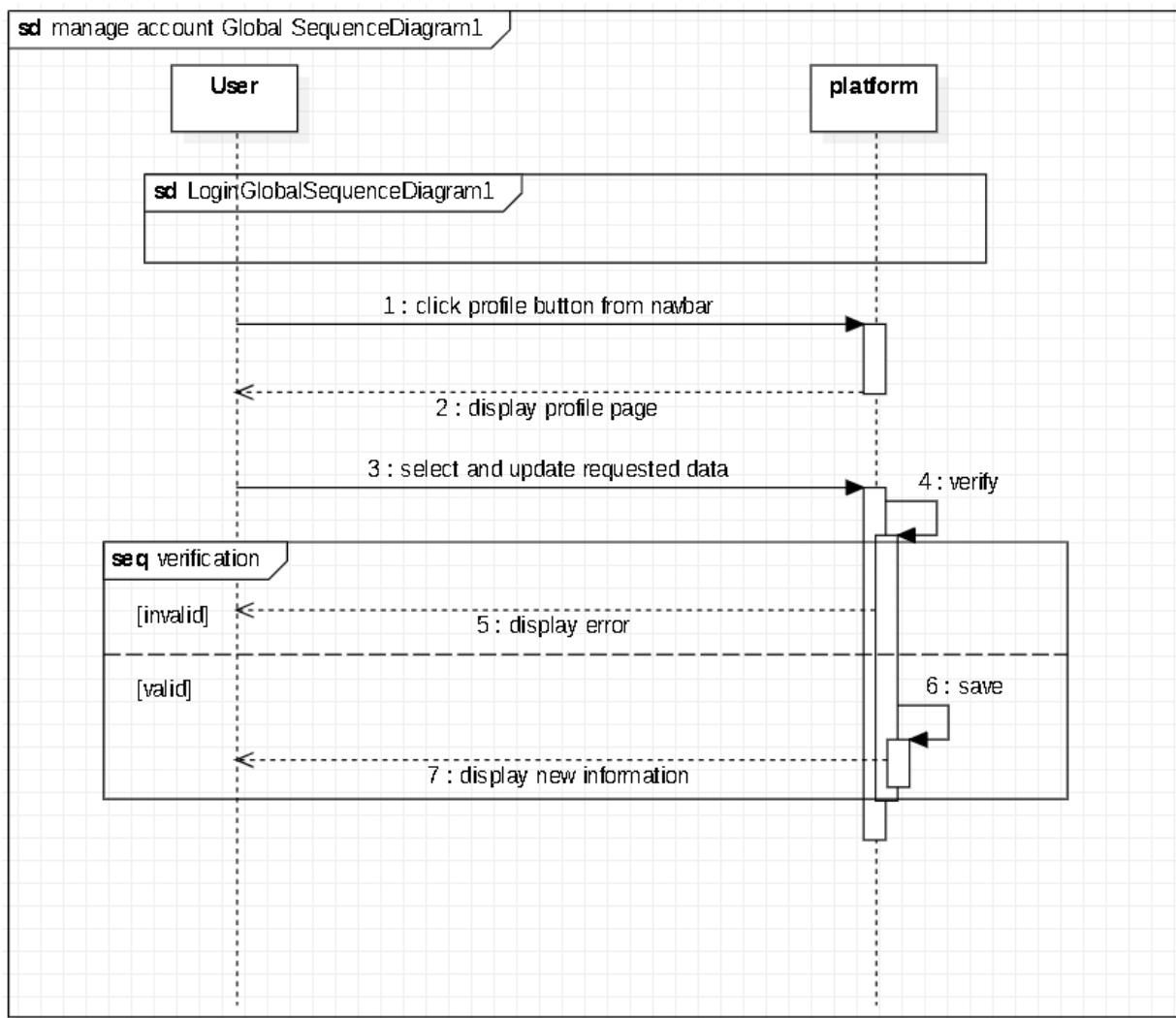


Figure 13: Manage account GSD

11) Manage Feedback GSD:

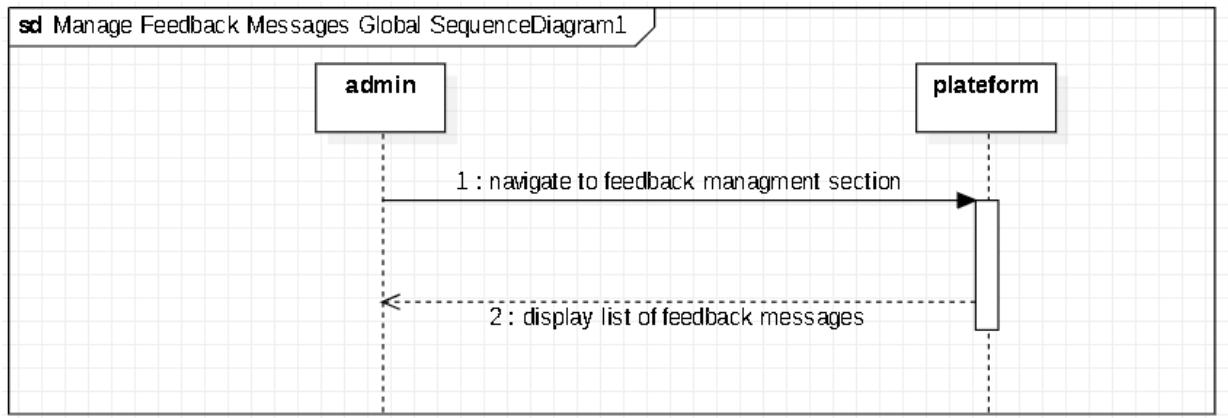


Figure 14: Manage Feedback GSD

12) Manage Users GSD:

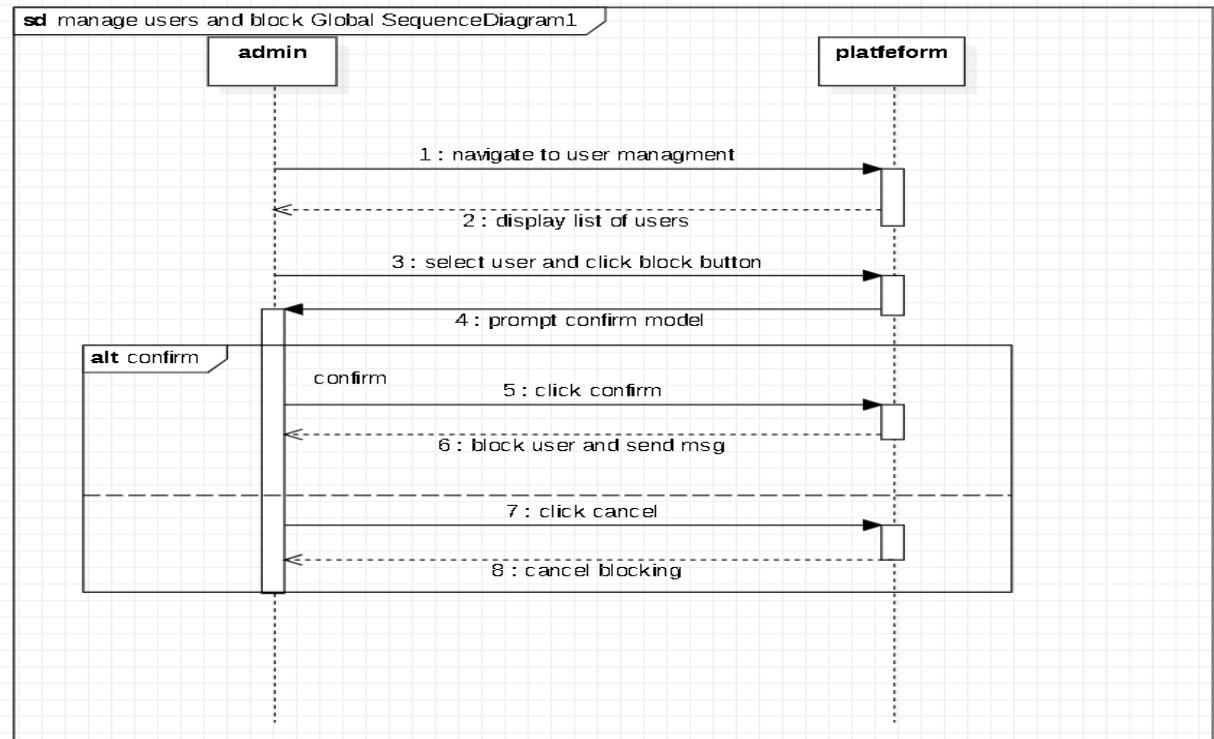


Figure 15: Manage Users GSD

V) Architecture (MVVM):

MVVM (Model-View-View-Model) is an architectural pattern used in software development to separate the user interface (View) from the business logic (Model) and the application logic (View-model). The Model represents the data and the business rules, the View represents the UI components, and the View-model acts as a mediator between the View and the Model, providing data and commands to the View and updating the Model based on user interactions.

One of the main advantages of MVVM is that it allows for a clear separation of concerns, making the code easier to maintain and test. The ViewModel is responsible for implementing the business logic and exposing it to the View, while the View is responsible for displaying the data and handling user input. The Model represents the data and the business rules, which can be tested independently of the View and the ViewModel.

Another advantage of MVVM is that it facilitates the development of large and complex applications, as it provides a clear structure and organization to the code. It also allows for better collaboration among developers, as each component can be developed independently and tested separately.

However, there are also some disadvantages to using MVVM. One of the main drawbacks is that it can increase the complexity of the code, as there are more layers and components to manage. Additionally, it can be more difficult to debug, as there are more moving parts and dependencies between components.

Overall, the MVVM architecture is a popular choice for building modern applications, particularly those that require a high degree of separation between the UI and the business logic. It provides a clear structure and organization to the code, making it easier to maintain and test, and is well-suited for large and complex applications. However, it may not be the best choice for all projects, but it's going to be a perfect choice in our case.

So, we are going to have a project divided into three big parts:

- View:

The components will represent the user-friendly interface and the more this view is divided into components the more code is better, maintainable, reusable, and testable.

- Model:

The model will contain the business logic, the functions or scripts that runs the different functionalities of the application which have to be also separated as maximum as possible in order to have a clean code with a good quality.

- View-model:

This part is about the application's functionalities or logic that will control navigation and handling view events.

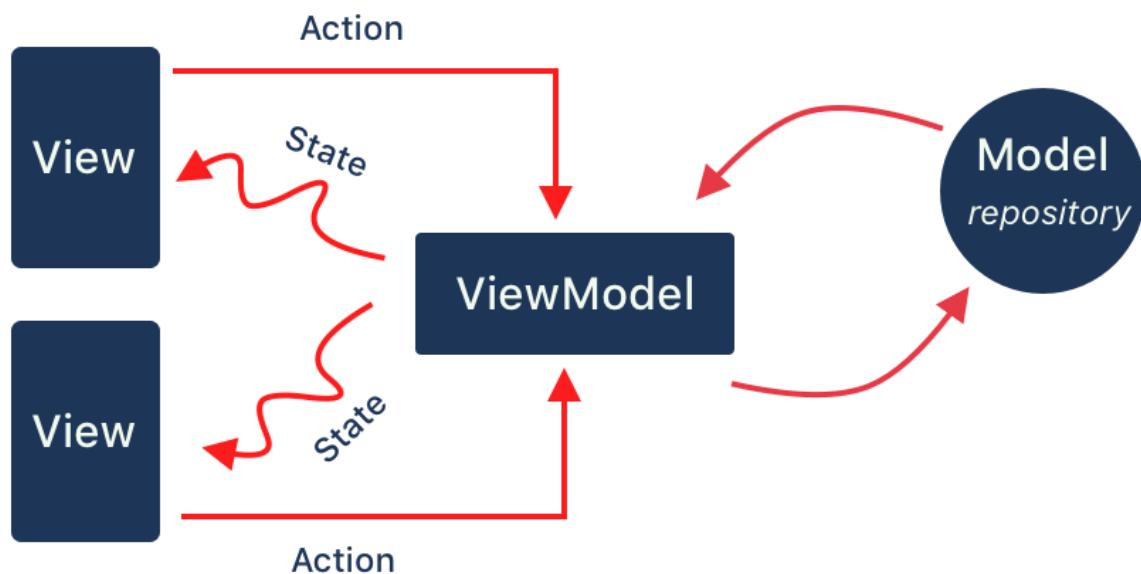


Figure 16: MVVM architecture

Chapter III:

Analysis & Software Design

INTRODUCTION:

The "Analysis and Software Design" chapter focuses on the crucial steps of understanding system requirements and translating them into a well-designed software solution. This chapter delves into the process of analyzing user needs, defining system functionality, and creating an effective software design. Through careful analysis and thoughtful design, this chapter lays the foundation for developing a robust and user-friendly software application.

Throughout this chapter, we will utilize the powerful tool **StartUML** to facilitate the software design process and ensure a comprehensive and visually appealing representation of the system architecture.



Figure 17: StarUml

I) Use Case Diagram:

1) Definition:

A use case diagram is a visual representation that depicts the interactions between actors (users or external systems) and a system under consideration. It is a type of behavioral diagram in Unified Modeling Language (UML) that showcases the various use cases, or functionalities, of the system. Use case diagrams illustrate how actors and the system interact to achieve specific goals or execute certain actions. They provide a high-level overview of the system's functionality, helping to identify user roles, system boundaries, and the flow of interactions between actors and use cases.

2) Use cases Diagrams:

a. Global Use Case Diagram:

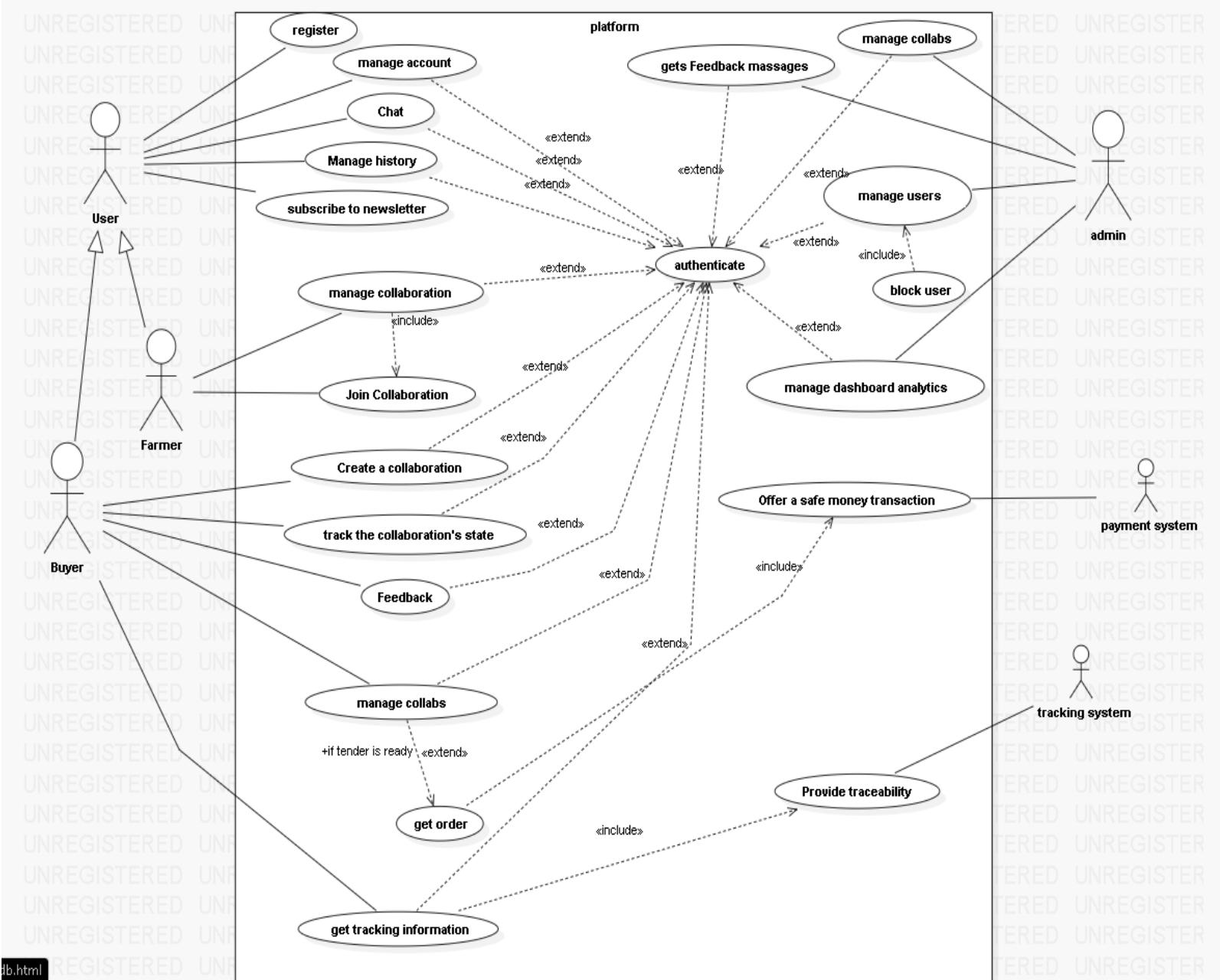


Figure 18: Global Use Case Diagram

b. Manage Account Use Case Diagram:

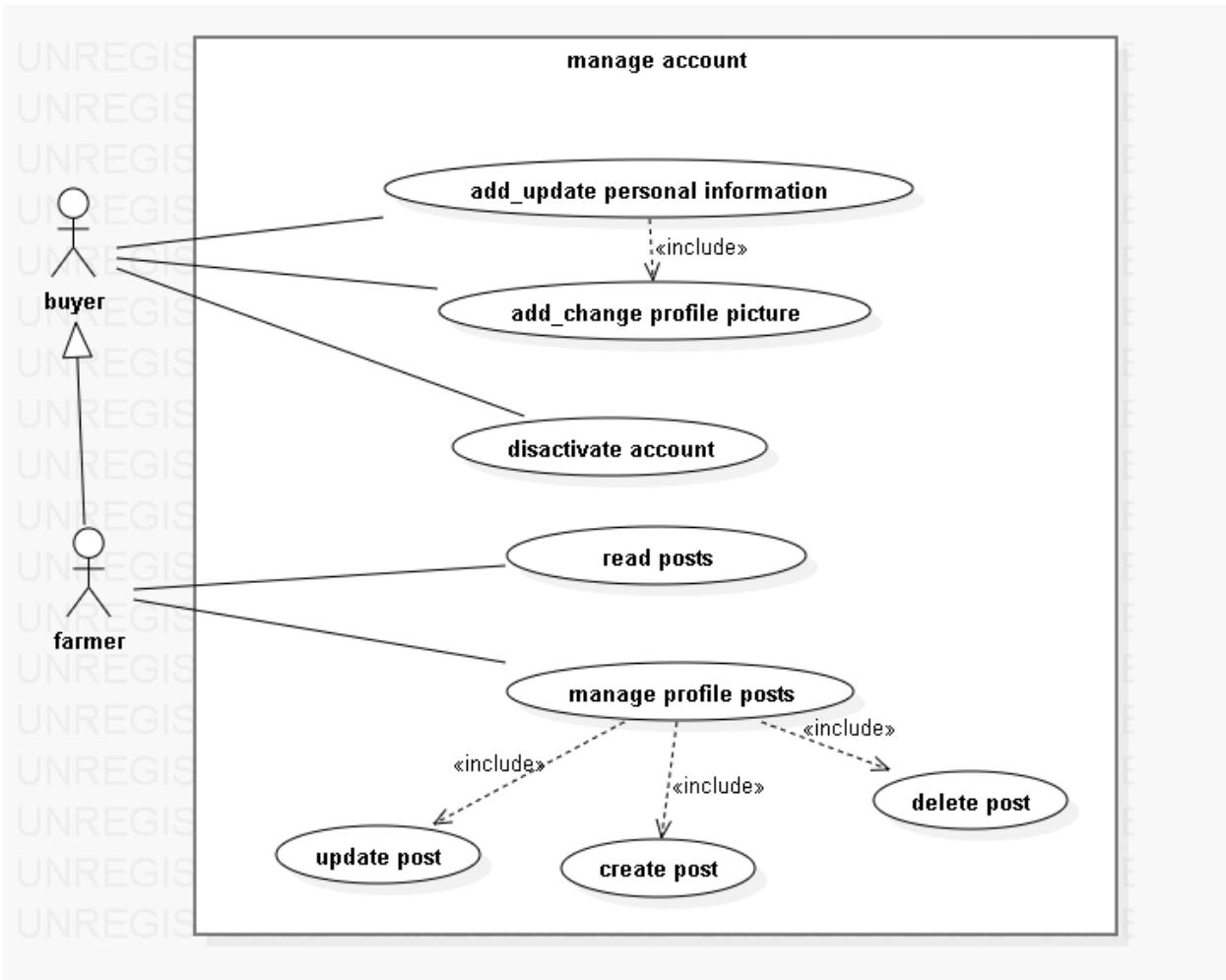


Figure 19:Manage account use case diagram

c. Chat Use Case Diagram:

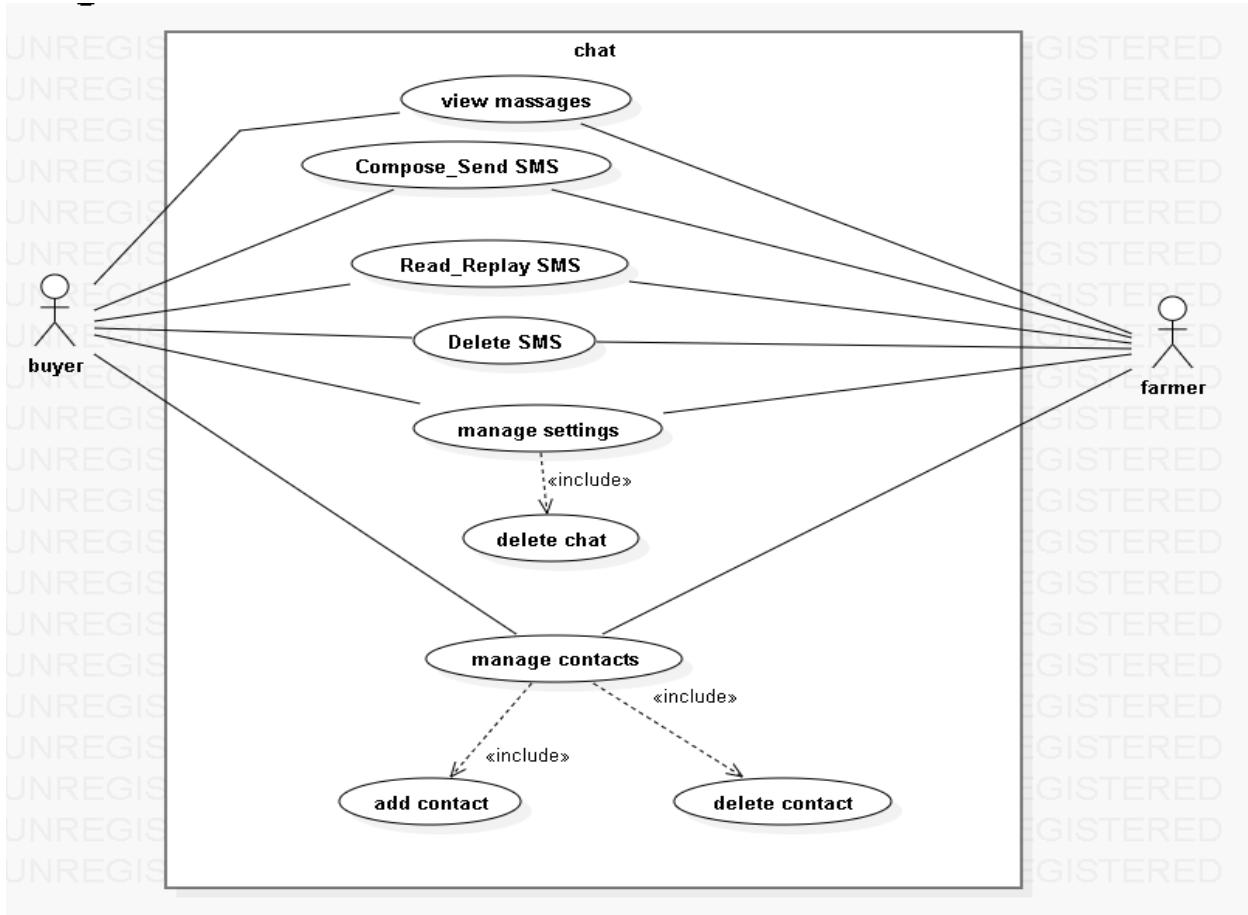


Figure 20: Chat Use Case Diagram

II) Class Diagram:

1) Definition:

A class diagram is a type of static structure diagram in Unified Modeling Language (UML) that illustrates the structure and relationships of classes in a system. It provides a visual representation of the classes, their attributes, methods, and the associations between them.

In a class diagram, classes are represented as boxes with three compartments: the top compartment contains the class name, the middle compartment includes the class's attributes (data members), and the bottom compartment lists the class's methods (member functions). The relationships between classes, such as inheritance, association, aggregation, and composition, are depicted using lines and arrows connecting the classes.

2) Global Class Diagram:

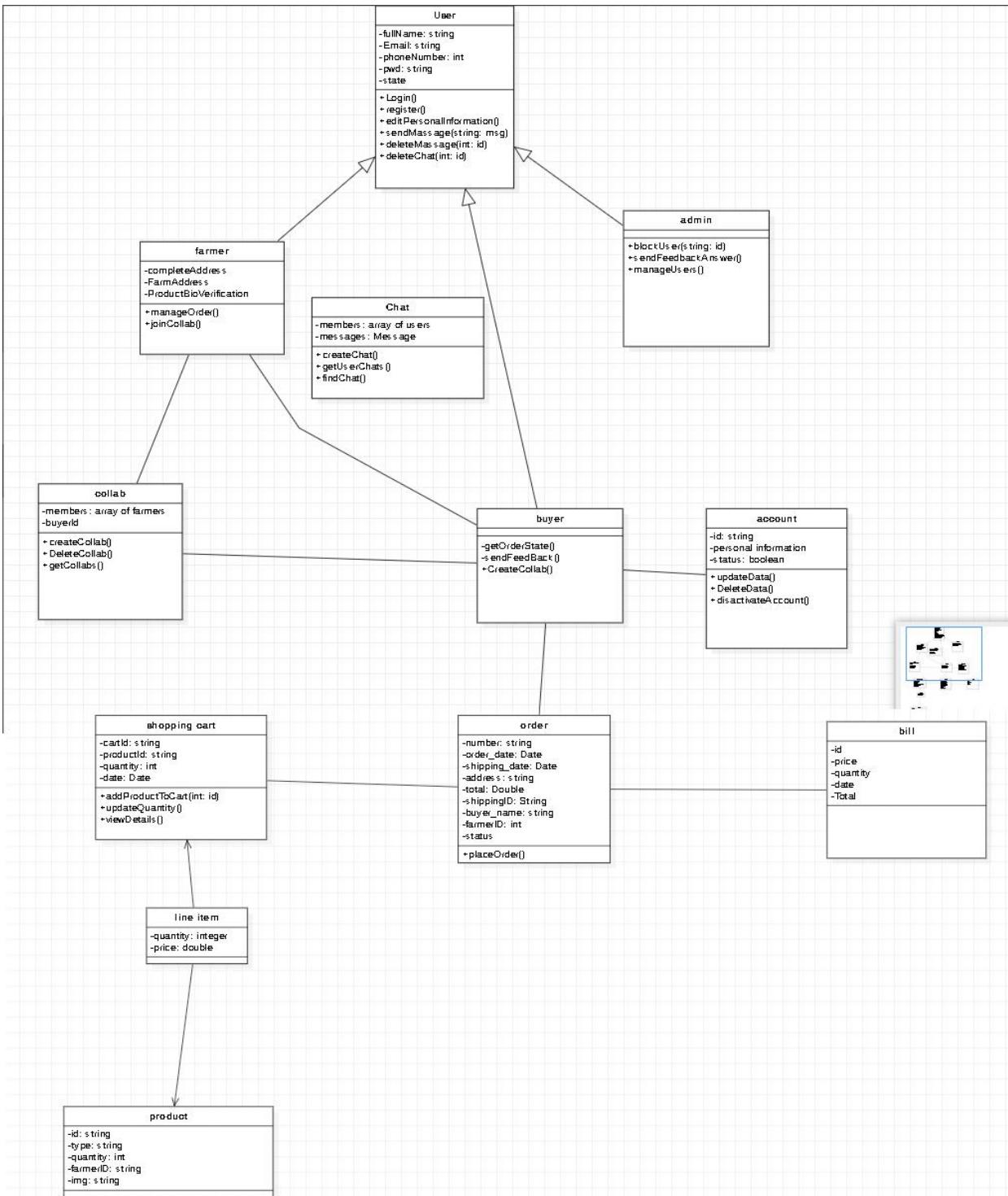


Figure 21: Global Class Diagram

III) Sequence Diagram :

1) Definition:

A sequence diagram is a type of behavioral diagram in Unified Modeling Language (UML) that illustrates the interactions and flow of messages between objects or components within a system over a specific period of time. It visualizes the sequence of actions and collaborations between different entities in a system to achieve a particular behavior or functionality.

In a sequence diagram, objects or components are represented as vertical lifelines, and the messages exchanged between them are shown as horizontal arrows. The sequence of messages is depicted in a chronological order from top to bottom, indicating the order in which interactions occur. Additionally, the diagram may include activations, which represent the period of time during which an object is performing an action.

2) Register buyer SD:

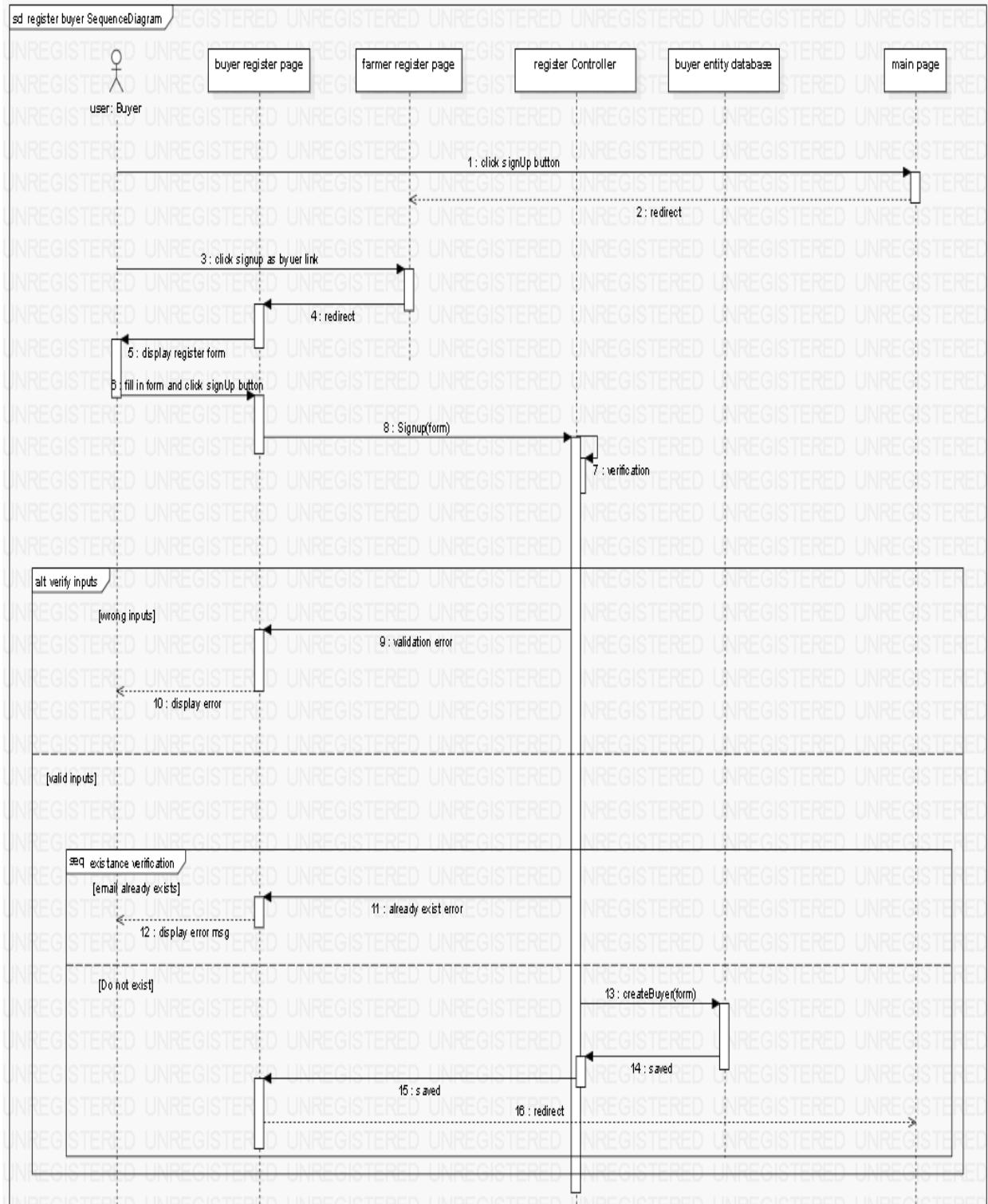


Figure 22: SD : Register Buyer

3) Register Farmer SD:

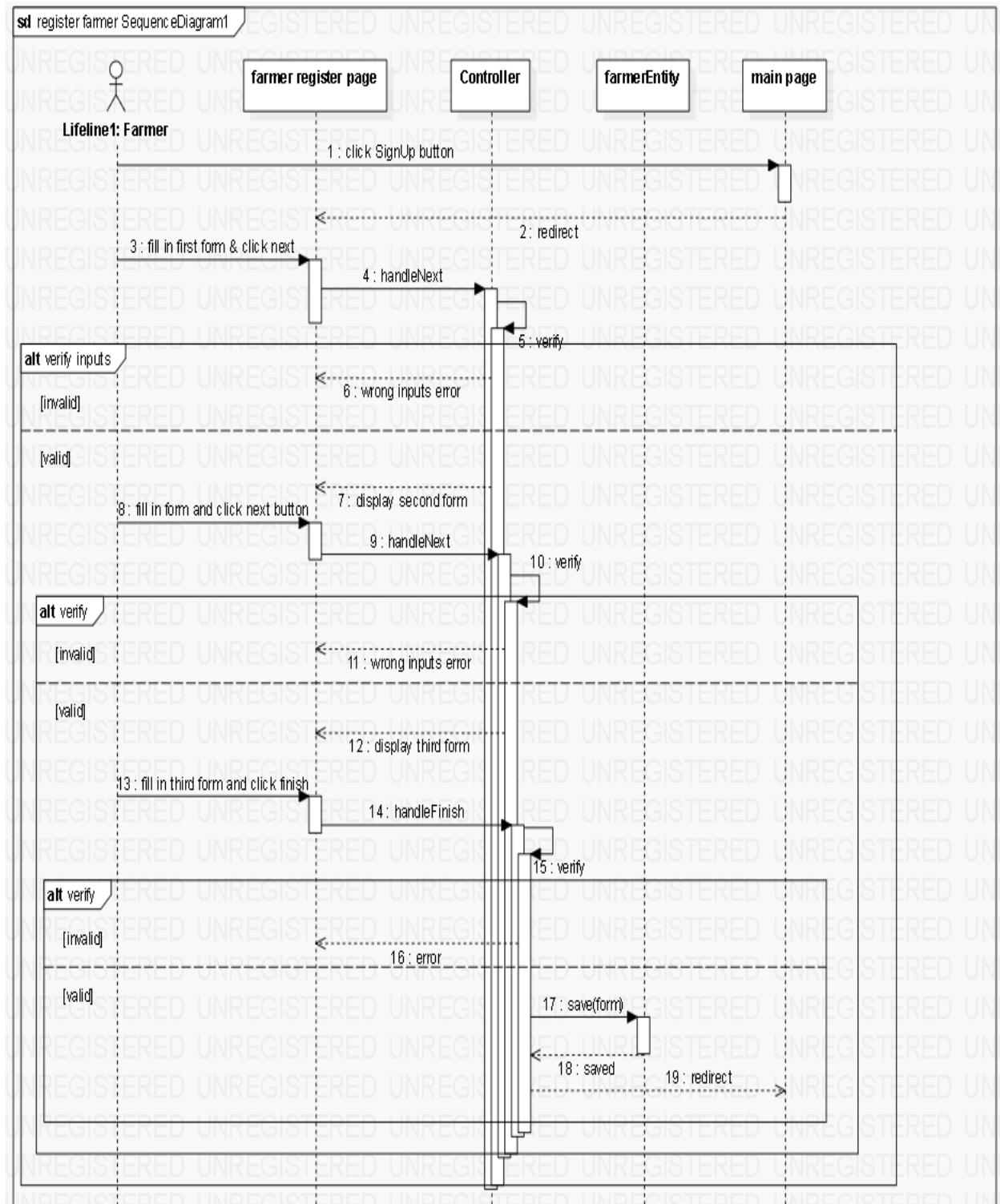


Figure 23: SD : Register Farmer

4) Login SD:

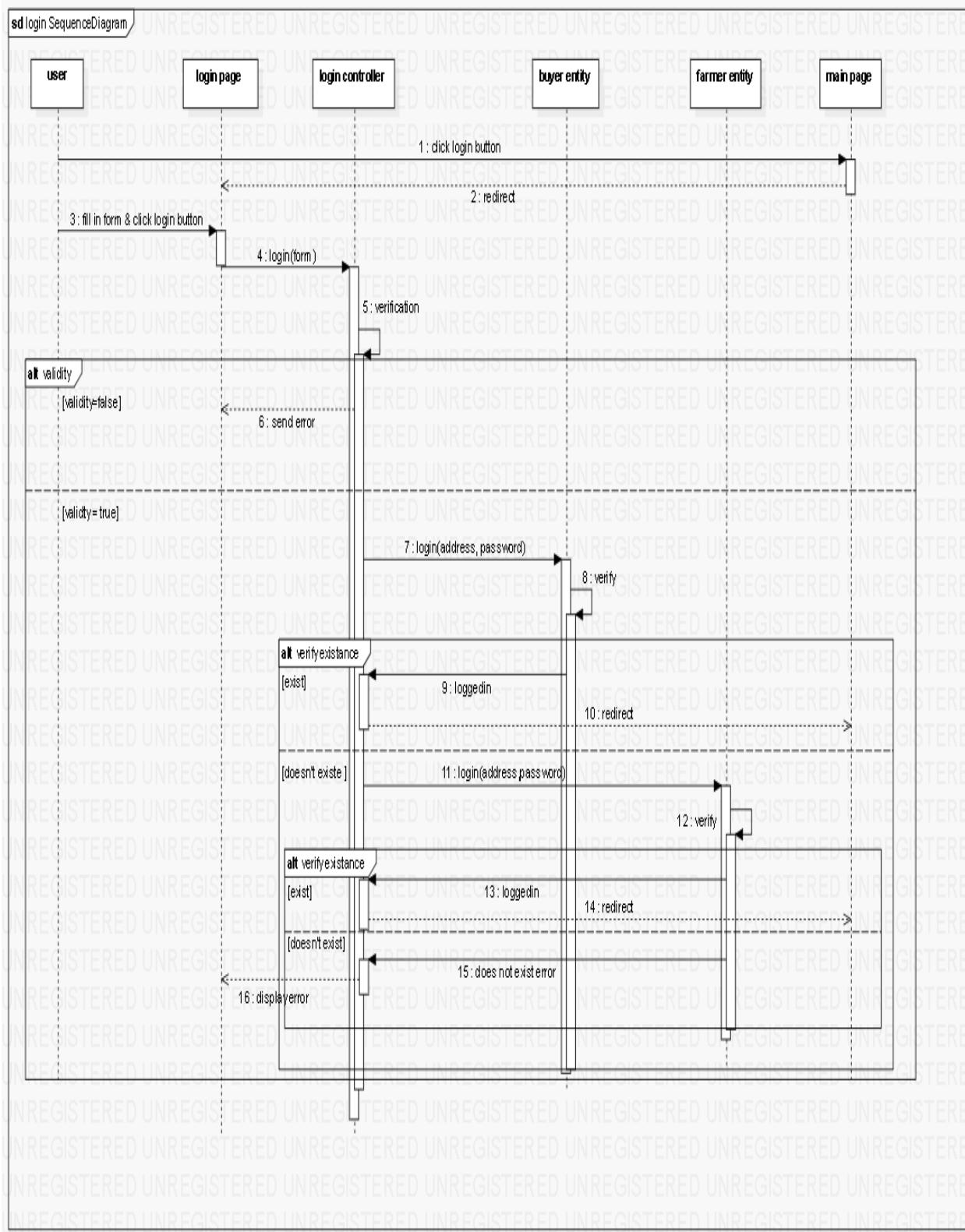


Figure 24: Login SD

5) Subscribe to newsletter SD:

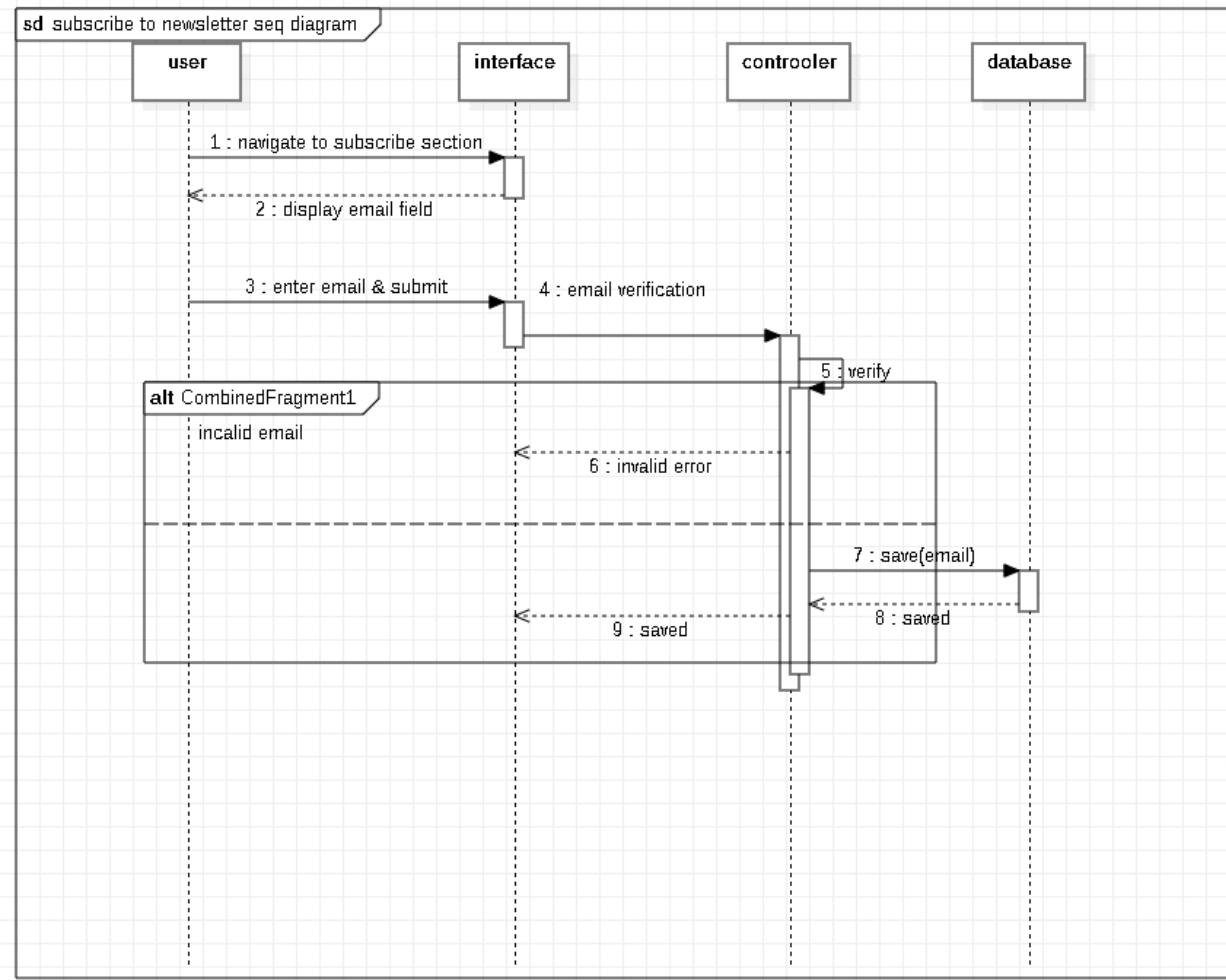


Figure 25: Subscribe to newsletter SD

6) Join Collab SD :

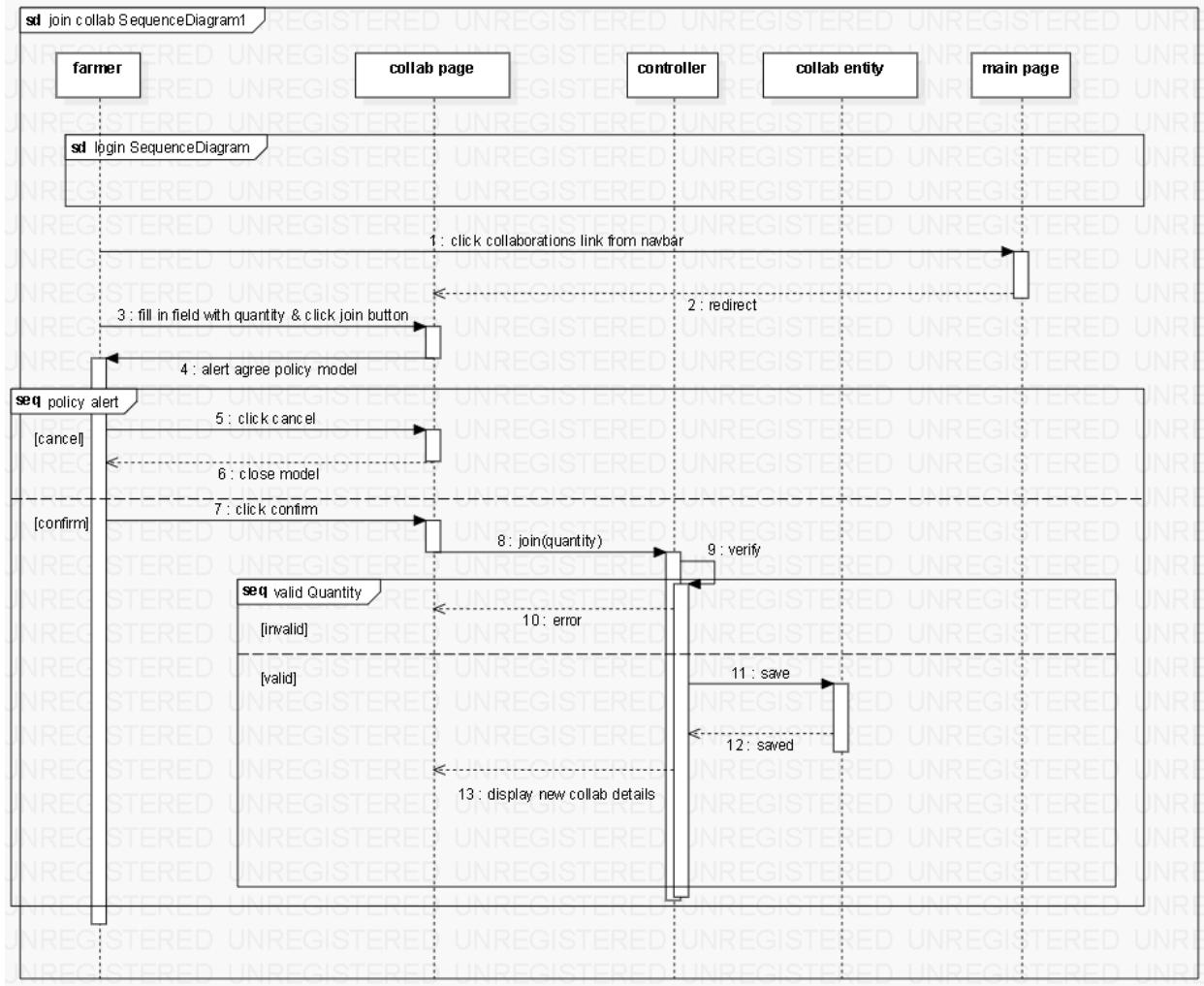


Figure 26: Join Collab SD

7) Create Collab SD:

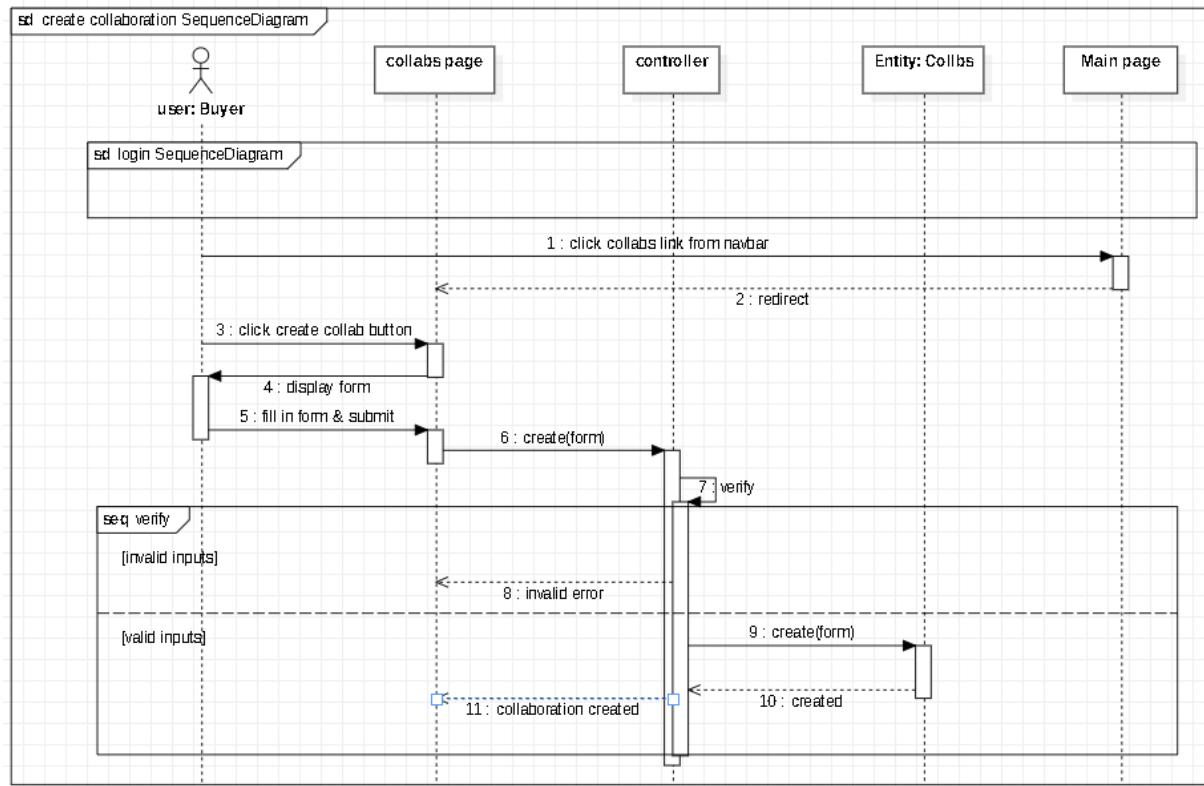


Figure 27: Create Collab SD

8) Chat SD:

a. Compose and send Msg SD :

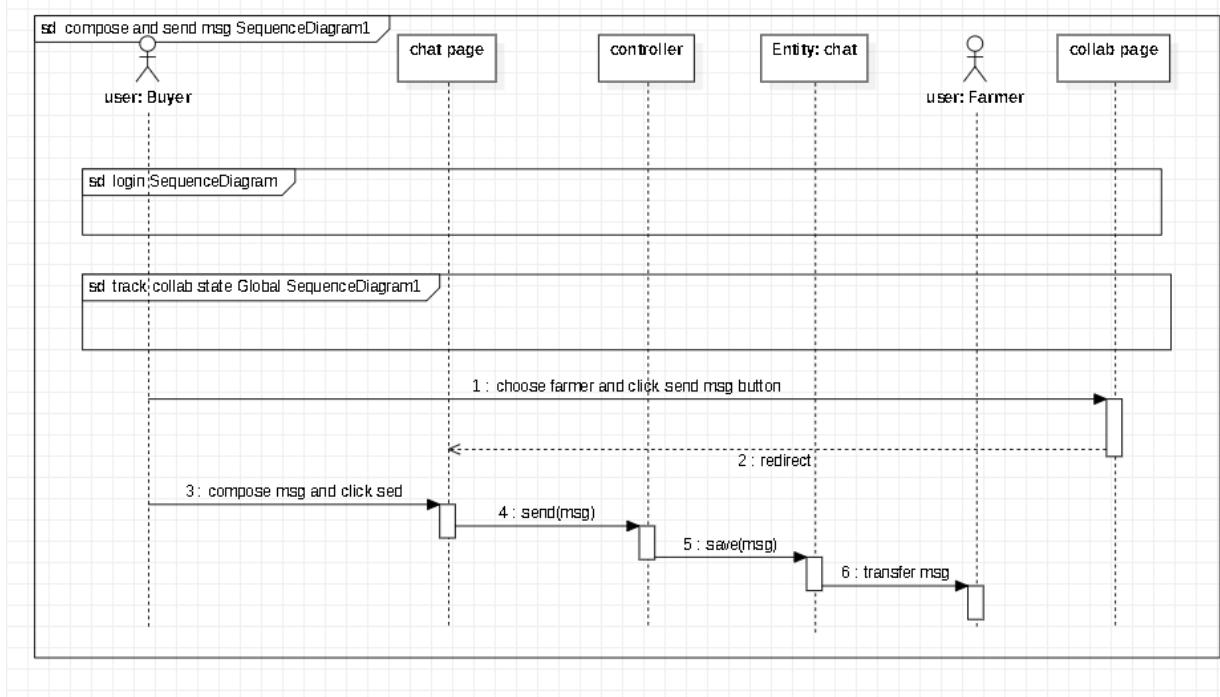


Figure 28: Compose and send msg SD

b. Delete Msg SD:

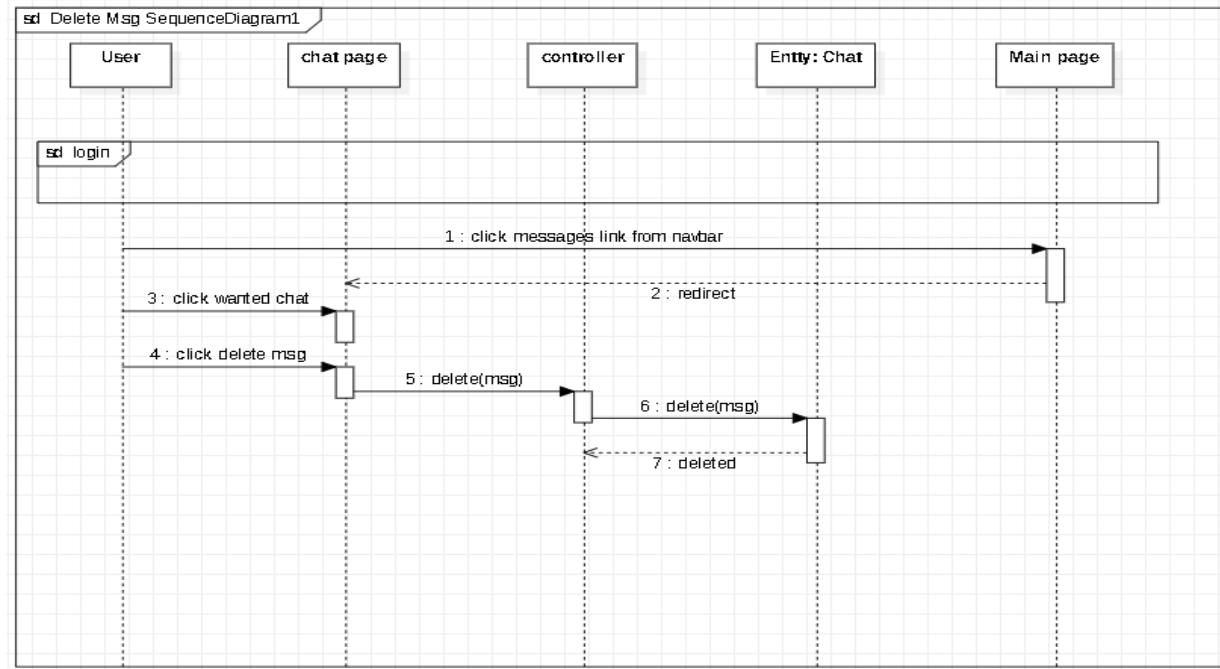


Figure 29: Delete Msg SD

c. Delete Chat SD:

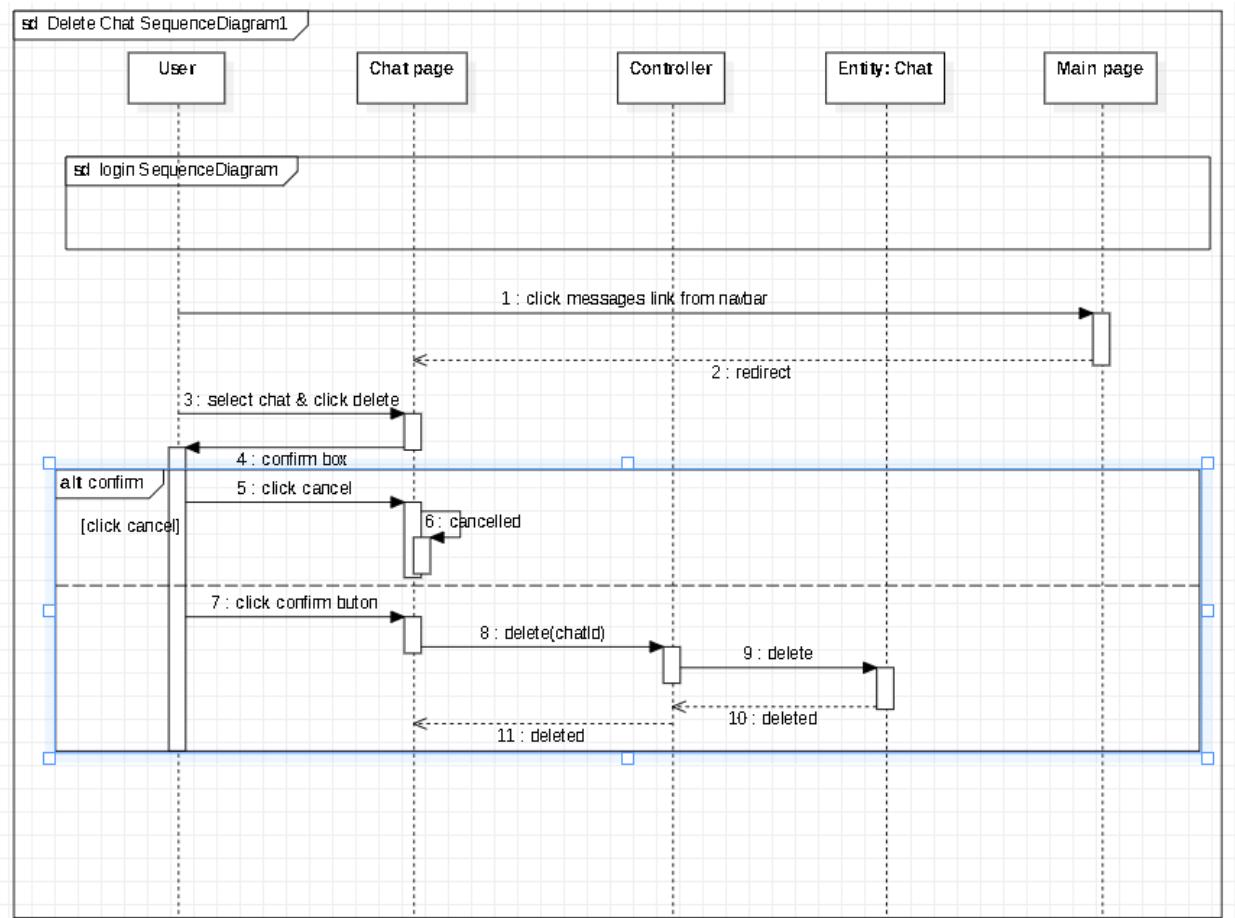


Figure 30:Delete Chat SD

9) Feedback SD :

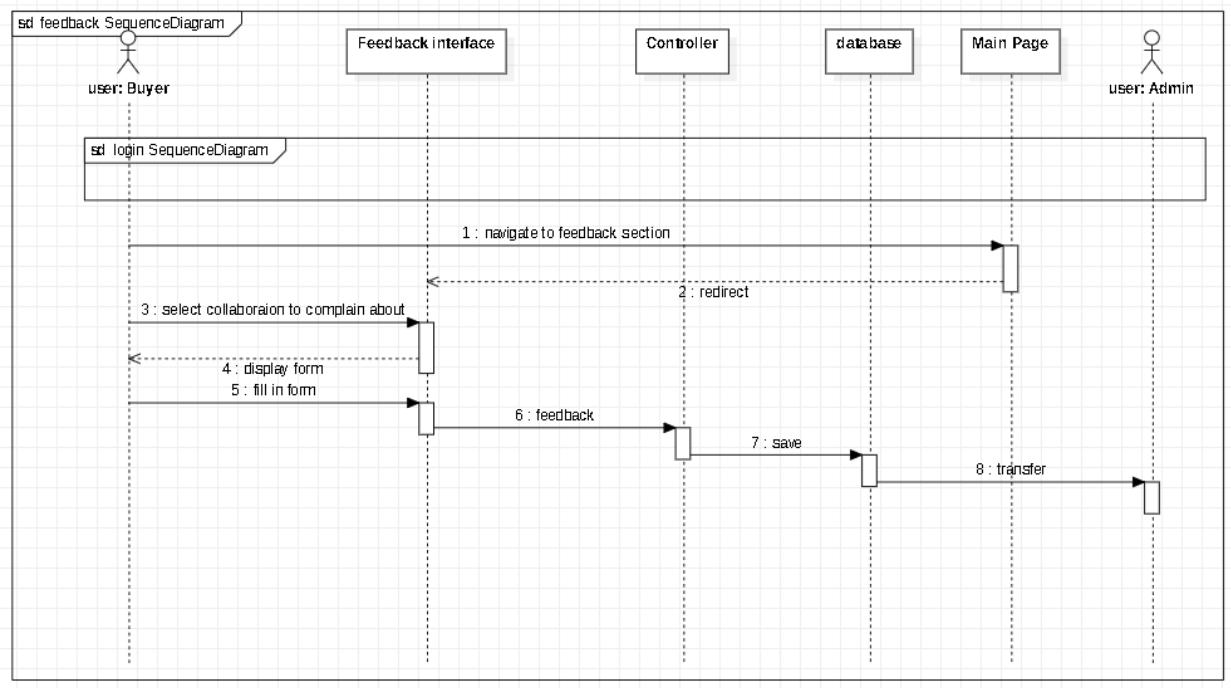


Figure 31: FeedBack SD

10) Track Collab State SD:

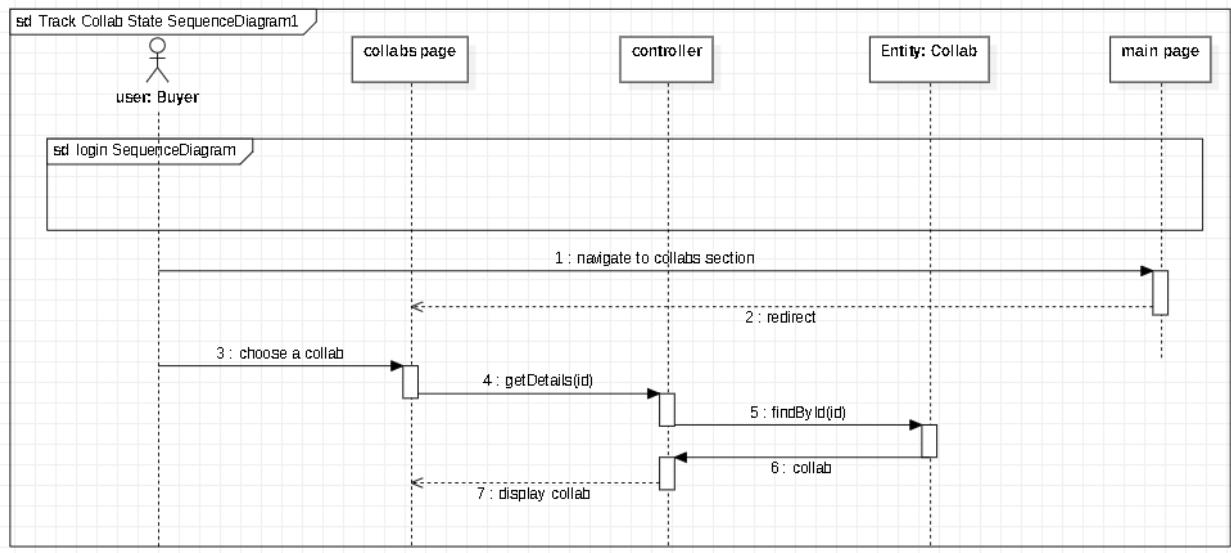


Figure 32:Track Collab State SD

11) Manage Account SD :

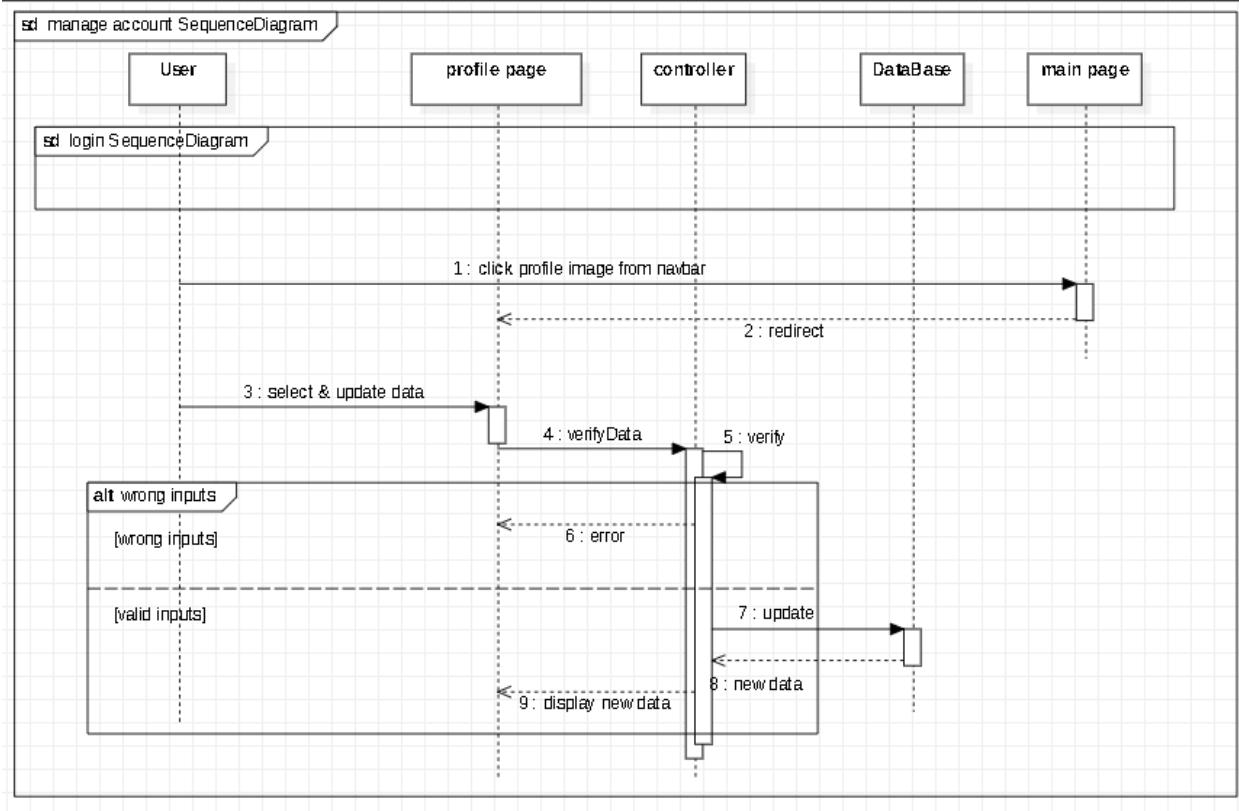


Figure 33: Manage account SD

12) Manage Feedback SD :

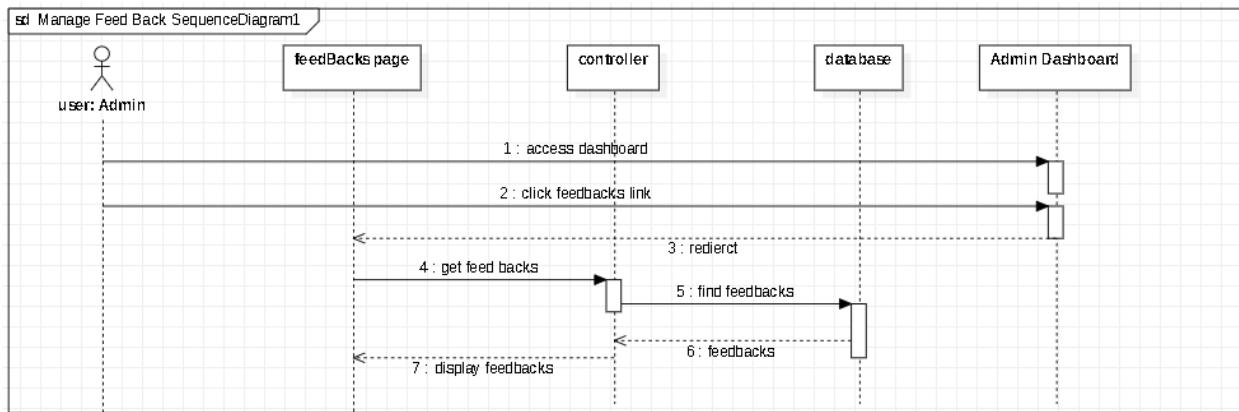


Figure 34: Manage Feedbacks SD

13) Manage Users SD :

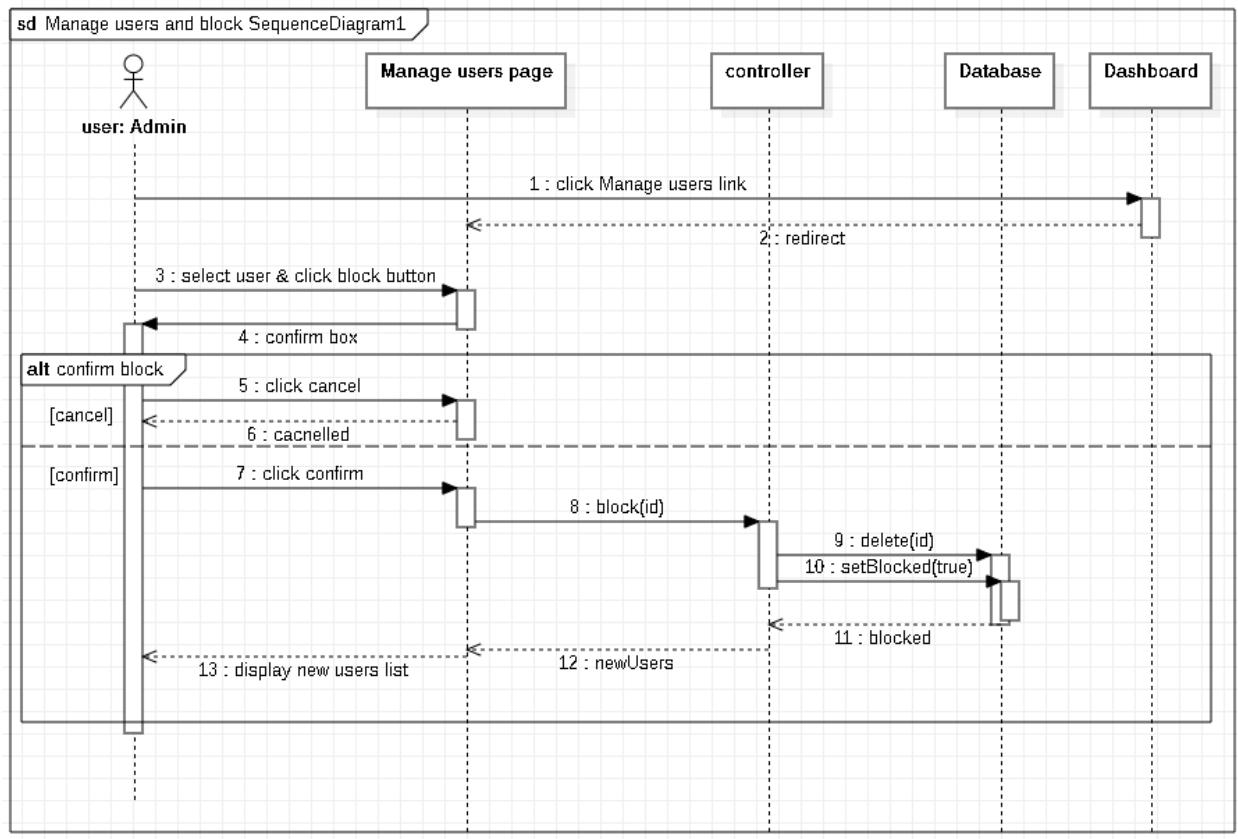


Figure 35: Manage Users & block SD

In conclusion, the "Software Design" chapter has explored and presented key artifacts that play a fundamental role in the design phase of software development. Use case diagrams have provided a visual representation of the interactions between actors and the system, capturing the system's functionalities and user roles. Class diagrams have depicted the structure and relationships between classes, showcasing the attributes, methods, and associations that define the system's static structure. Sequence diagrams have illustrated the dynamic behavior of the system, demonstrating the sequence of interactions and message exchanges between objects or components.

Chapter IV:

Deployment

INTRODUCTION

The deployment process is a crucial step in bringing a MERN (MongoDB, Express.js, React, Node.js) stack application from development to production. It involves setting up and configuring the necessary infrastructure, deploying the application code, and ensuring its availability to end-users. This chapter provides an overview of the deployment process for our MERN stack application, outlining the key steps and considerations involved in deploying our software solution.

The next step involves configuring the server to run the Node.js backend of the application. This includes installing Node.js and any required dependencies, setting up environment variables, and ensuring proper network configurations.

The next phase of deployment focuses on setting up the database component, MongoDB. This involves installing MongoDB on the server or utilizing a managed MongoDB service offered by cloud providers. Configuration settings such as database authentication, access controls, and data backup strategies should be carefully planned and implemented.

Throughout the deployment process, thorough testing is essential to ensure that the application works as expected in the production environment. This includes conducting functional tests, performance testing, and security assessments to identify and address any potential issues or vulnerabilities.

By following a well-defined deployment process for our MERN stack application, we aim to achieve a smooth transition from development to production, ensuring the reliability, security, and scalability of our software solution. In the following sections, we will delve deeper into the specific steps and strategies employed during the deployment process, highlighting the tools, techniques, and considerations that contribute to a successful deployment.

I) MERN Stack :

The MERN stack is a popular web development technology stack that consists of four key components: MongoDB, Express.js, React, and Node.js. Each component serves a specific purpose in the development of full-stack web applications

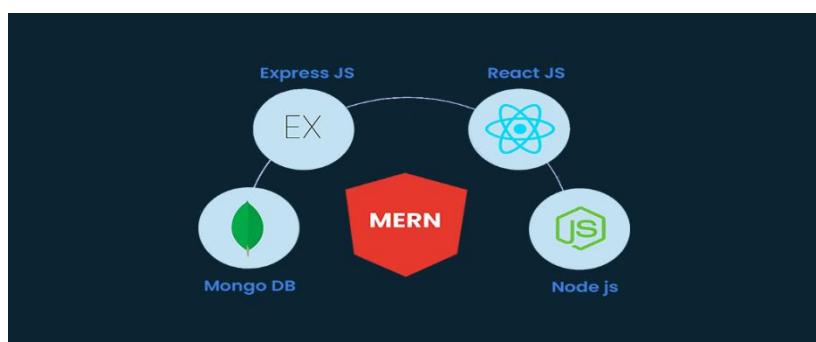


Figure 36:MERN stack

Here's a breakdown of each component in the MERN stack:

1) MongoDB :

MongoDB is a NoSQL document-oriented database that provides flexibility and scalability. It stores data in JSON-like documents, allowing for easy integration with JavaScript-based applications. MongoDB is known for its ability to handle large amounts of data and its flexible schema design.



Figure 37: MongoDB

2) Express Js :

Express.js is a minimalistic web application framework for Node.js. It provides a set of robust features and middleware that simplify the development of web applications. Express.js enables the creation of server-side applications, handling routing, request handling, and providing an interface between the server and the client.



Figure 38: Express Js

3) React js :

React is a JavaScript library for building user interfaces. It allows developers to create reusable UI components that update efficiently and respond to changes in data. React follows a component-based architecture, making it easy to manage complex UI structures. React is commonly used for building dynamic and interactive single-page applications.

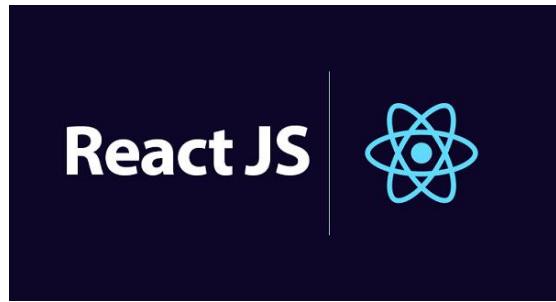


Figure 39: React Js

4) Node Js:

Node.js is a JavaScript runtime environment that allows server-side execution of JavaScript code. It provides an event-driven, non-blocking I/O model, making it well-suited for building scalable and high-performance web applications. Node.js enables developers to use JavaScript both on the server and client-side, providing a seamless development experience.



Figure 40: Node Js

Together, the MERN stack offers a comprehensive set of tools and technologies for building end-to-end web applications. It leverages the power of JavaScript throughout the entire development process, enabling developers to work with a unified language and ecosystem. The MERN stack is known for its efficiency, scalability, and flexibility, making it a popular choice for building modern web applications.

II) Why MERN stack?:

Before diving into the deployment process of our MERN (MongoDB, Express.js, React, Node.js) stack application, it is essential to understand the compelling reasons behind our choice of this technology stack.

The MERN stack offers a comprehensive and modern set of technologies that work seamlessly together, providing a robust foundation for developing dynamic and interactive web applications. Here are key reasons why we have opted for the MERN stack:

1. Full-Stack JavaScript Development:

The MERN stack allows us to leverage the power of JavaScript across the entire application stack. With JavaScript as the core language for both frontend and backend development, we benefit from code reuse, streamlined workflows, and enhanced developer productivity.

2. React for Rich User Interfaces:

React is a highly popular and efficient JavaScript library for building user interfaces. Its component-based architecture, virtual DOM, and extensive ecosystem of libraries and tools make it ideal for creating highly interactive and responsive UIs. React's declarative syntax and efficient rendering enable us to deliver a superior user experience.

3. Node.js for Scalable Backend:

Node.js is a lightweight, event-driven JavaScript runtime built on Chrome's V8 engine. It allows us to build scalable and high-performance backend applications that can handle a large number of concurrent connections. Node.js' non-blocking I/O model and extensive package ecosystem make it well-suited for building efficient and scalable server-side applications.

4. Express.js for Web Application Framework:

Express.js is a fast and minimalist web application framework for Node.js. It provides a robust set of features and middleware for building RESTful APIs and web applications. With Express.js, we can handle routing, request handling, and other server-side operations with ease, simplifying the development process.

5. MongoDB for Flexible and Scalable Database:

MongoDB is a popular NoSQL database that offers flexibility and scalability. Its document-based data model allows us to store and retrieve data in a JSON-like format, making it suitable for handling complex data structures. MongoDB's horizontal scaling capabilities enable us to accommodate growing data volumes and user demands.

By choosing the MERN stack, we harness the power of JavaScript for full-stack development, leverage React for rich user interfaces, utilize Node.js for scalable backend architecture, and benefit from MongoDB's flexibility and scalability. This comprehensive technology stack empowers us to build modern, responsive, and scalable web applications tailored to meet the needs of our users.

III) Setting up MERN environment:

To set up a MERN (MongoDB, Express, React, Node.js) environment, you need to follow these steps:

1) Install Node.js and npm:

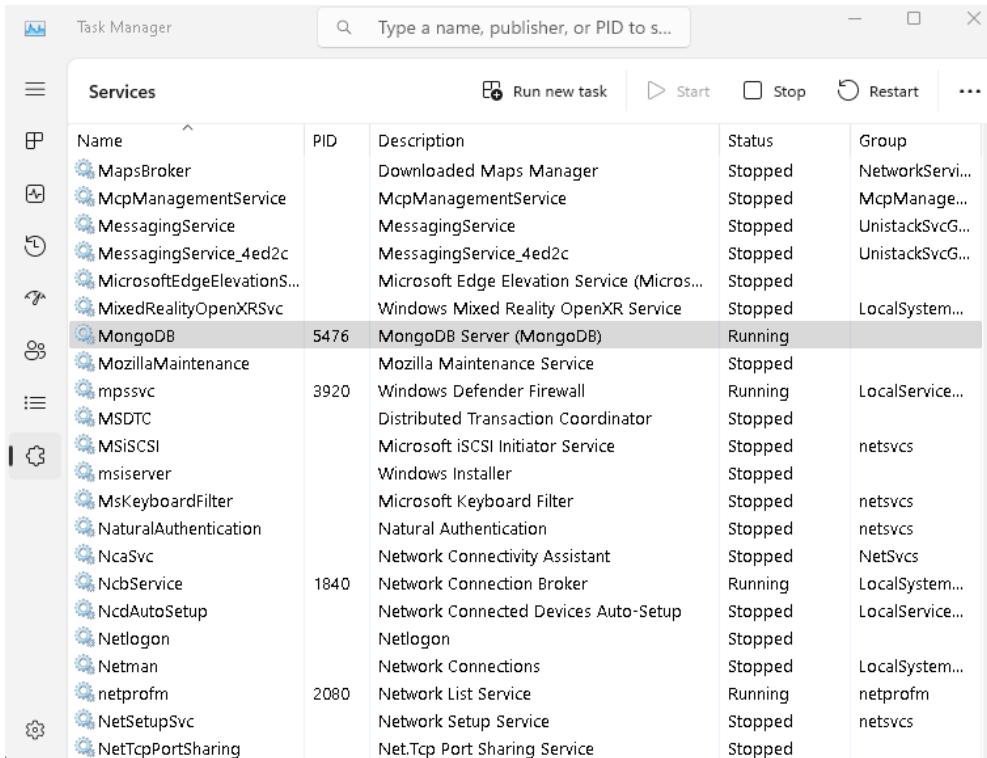
- Visit the official Node.js website (<https://nodejs.org>) and download the latest LTS version for your operating system.
- Run the installer and follow the installation instructions.
- After the installation, open a terminal or command prompt and verify that Node.js and npm are installed by running the following commands:

```
Node -v
```

```
Npm -v
```

2) Install MongoDB:

- Visit the official MongoDB website (<https://www.mongodb.com>) and download the community edition for your operating system.
- Run the installer and follow the installation instructions.
- After the installation, create a data directory for MongoDB and start the MongoDB service. You can find detailed instructions for your specific operating system in the MongoDB documentation.



Services					
Name	PID	Description	Status	Group	...
MapsBroker		Downloaded Maps Manager	Stopped	NetworkServi...	
McpManagementService		McpManagementService	Stopped	McpManage...	
MessagingService		MessagingService	Stopped	UnistackSvcG...	
MessagingService_4ed2c		MessagingService_4ed2c	Stopped	UnistackSvcG...	
MicrosoftEdgeElevationS...		Microsoft Edge Elevation Service (Micro...	Stopped		
MixedRealityOpenXRService		Windows Mixed Reality OpenXR Service	Stopped	LocalSystem...	
MongoDB	5476	MongoDB Server (MongoDB)	Running		
MozillaMaintenance		Mozilla Maintenance Service	Stopped		
mpssvc	3920	Windows Defender Firewall	Running	LocalService...	
MSDTC		Distributed Transaction Coordinator	Stopped		
MSiSCSI		Microsoft iSCSI Initiator Service	Stopped	netsvcs	
msiserver		Windows Installer	Stopped		
MsKeyboardFilter		Microsoft Keyboard Filter	Stopped	netsvcs	
NaturalAuthentication		Natural Authentication	Stopped	netsvcs	
NcaSvc		Network Connectivity Assistant	Stopped	NetSvcs	
NcbService	1840	Network Connection Broker	Running	LocalSystem...	
NcdAutoSetup		Network Connected Devices Auto-Setup	Stopped	LocalService...	
Netlogon		Netlogon	Stopped		
Netman		Network Connections	Stopped	LocalSystem...	
netprofm	2080	Network List Service	Running	netprofm	
NetSetupSvc		Network Setup Service	Stopped	netsvcs	
NetTcpPortSharing		Net.Tcp Port Sharing Service	Stopped		

Figure 41: run mongoDB service

3) Set up a new MERN project:

- Create a new directory for your project.
- Open a terminal or command prompt and navigate to the project directory.
- Initialize a new Node.js project by running the following command:

```
npm init -y
```

- This will create a **package.json** file in your project directory.

4) Install dependencies:

- In your project directory, install the necessary dependencies for the MERN stack. Run the following command:

```
npm install express mongoose react react-dom concurrently
```

- This command installs Express.js (web framework), Mongoose (MongoDB object modeling), React (JavaScript library for building user interfaces), and Concurrently (allows running multiple commands concurrently).

5) Set up the backend:

- Create a new directory called “**backend**” inside your project directory.
- Inside the “**backend**” directory, create a new file called “**server.js**” or “**index.js**”.
- Set up your Express.js server and MongoDB connection in this file. You can find example code and tutorials in the Express.js and Mongoose documentation.

6) Set up the frontend:

- In your project directory, create a new directory called frontend.
- Navigate to the frontend directory in the terminal or command prompt.
- Create a new React app by running the following command:

```
npx create-react-app .
```

- This command initializes a new React project in the current directory.
- Update the generated files as needed for your application. You can find more information in the React documentation.

7) Connect the frontend and backend:

- In the “frontend” directory, update the API URLs to point to your backend server.
- You can use relative URLs like “/api/endpoint” if your frontend and backend are hosted on the same server. Otherwise, you need to provide the full URL of your backend server.

8) Start the development server:

- Open two separate terminals or command prompts.
- In one terminal, navigate to the “frontend” directory and run the following command:

```
Npm start
```

- This starts the React development server and opens your app in a web browser.
- In the other terminal, navigate to the **backend** directory and run the following command:

```
node server.js
```

- This starts your Express.js server and connects to the MongoDB database.

We will continue building our platform by adding routes, components, and connecting to the database as needed.

IV) Front End:

Developing a front-end requires more than react components in order to get a user-friendly interface so we will use a **Tailwind CSS** for our design.

1) Tailwind CSS:

Tailwind CSS is a highly customizable, utility-first CSS framework that allows you to rapidly build modern user interfaces. Unlike other CSS frameworks that provide pre-designed components, Tailwind CSS focuses on providing a set of utility classes that you can apply directly to your HTML elements.

Here are some key features and concepts of Tailwind CSS:

- a. **Utility Classes:** Tailwind CSS provides a large number of utility classes that you can use to style your elements. These classes are named based on their functionality, such as **text-center**, **bg-blue-500**, **p-4**, etc. By composing these utility classes together, you can quickly apply complex styling without writing custom CSS.
- b. **Responsive Design:** Tailwind CSS has built-in support for responsive design. You can use responsive utility classes to apply different styles based on the screen size. For example, **sm:text-lg** applies a specific font size on small screens, while **lg:text-xl** applies a different font size on large screens.
- c. **Customization:** Tailwind CSS is designed to be highly customizable. You can configure various aspects of the framework, such as color palettes, font sizes, spacing, and more, using a configuration file. This allows you to adapt Tailwind CSS to match your project's unique design requirements.
- d. **Flexbox and Grid:** Tailwind CSS provides utility classes for flexbox and CSS grid, making it easier to create flexible and responsive layouts.
- e. **Dark Mode:** Tailwind CSS includes built-in support for implementing dark mode in your application. You can define dark mode variants for utilities like colors, background colors, and text colors, enabling your users to switch between light and dark themes.
- f. **Integration:** Tailwind CSS can be integrated into various frontend frameworks and build tools, including React, Vue.js, Angular, Next.js, and more. It can also be used with static site generators like Gatsby and Jekyll.

Tailwind CSS aims to give developers a powerful toolkit to rapidly build user interfaces while maintaining a low-level of specificity. By leveraging the utility classes provided by Tailwind CSS, you can efficiently create consistent designs and focus on building functionality rather than writing custom CSS from scratch.



Tailwind CSS

Figure 42: tailwindcss

2) Theme & Colors:

In order to choose Colors and theme for our platform we used <https://colorpalettes.net> so we can find some colors that match with the idea of serving some bio products that come from nature. And we ended up with some green basic colors that reflect colors of green the nature and help attracting and relaxing eyes.



Figure 43: platform chosen Colors

Primary color : #2e631b

Second color: #6eaf1f

Third color: #b1d823

Fourth color : #e7f653

Side color: #121c04

3) Logo:

A logo needs to reflect main work of a platform, main colors and main key words.

So using **Adobe Photoshop** we combined green(#2e631b) color of leafs with almond and pistachio and we added key words “bio pistachio & almond”



Figure 44: logo creation using Adobe Photoshop

And here's a final result:



Figure 45: bio market Logo

4) Register Farmer stepper:

In order to create an account a farmer need to fill in stepper forms with necessary information.



Bio Market

1 Basic information 2 Contact Information 3 Address Information 4 Payment

First Name

Last Name

password

Confirm Your password

[BACK](#) [NEXT](#)

Sign up as a buyer? [Sign up](#)
already have an account? [Sign in](#)

Figure 46: register farmer stepper 1st form



Bio Market

1 Basic information 2 Contact Information 3 Address Information 4 Payment

E-mail

Phone Number

Alternate Phone

[BACK](#) [SKIP](#) [NEXT](#)

Sign up as a buyer? [Sign up](#)
already have an account? [Sign in](#)

Figure 47: register farmer stepper 2nd form

Bio Market

Step 3 of 4

Basic information Contact Information Address Information Payment

State: GAFSA

Region: EL GUETTAR

Zip Code: 2180

BACK SKIP NEXT

Sign up as a buyer? [Sign up](#)
already have an account? [Sign in](#)

This screenshot shows the third step of a four-step registration process for farmers on the Bio Market platform. The top navigation bar features the Bio Market logo with a green leaf icon and the text "Bio Market". Below the logo is a progress bar with four steps: Step 1 (Basic information) is completed (indicated by a checkmark), Step 2 (Contact Information) is completed, Step 3 (Address Information) is in progress (indicated by a blue circle with the number 3), and Step 4 (Payment) is pending (indicated by a grey circle with the number 4). The main form contains three dropdown menus: "State" (selected: GAFSA), "Region" (selected: EL GUETTAR), and "Zip Code" (selected: 2180). At the bottom of the form are three buttons: "BACK", "SKIP", and "NEXT". To the right of the form, there are links for users who are not registered: "Sign up as a buyer?" followed by a link to "Sign up", and "already have an account?" followed by a link to "Sign in".

Figure 48: register farmer stepper 3rd form

5) Register buyer UI:



Create an account and join Bio market

Full Name

Email or phone

Enter your specific address

Password

repeat your Password

 Sign up

Or Sign up with your e-mail

 [Sign up With Google](#)

 [Sign up With Twitter](#)

already have an account? [Sign in](#)

create a farmer account? [Sign up as a farmer](#)



Figure 49: register buyer UI

6) Login UI:

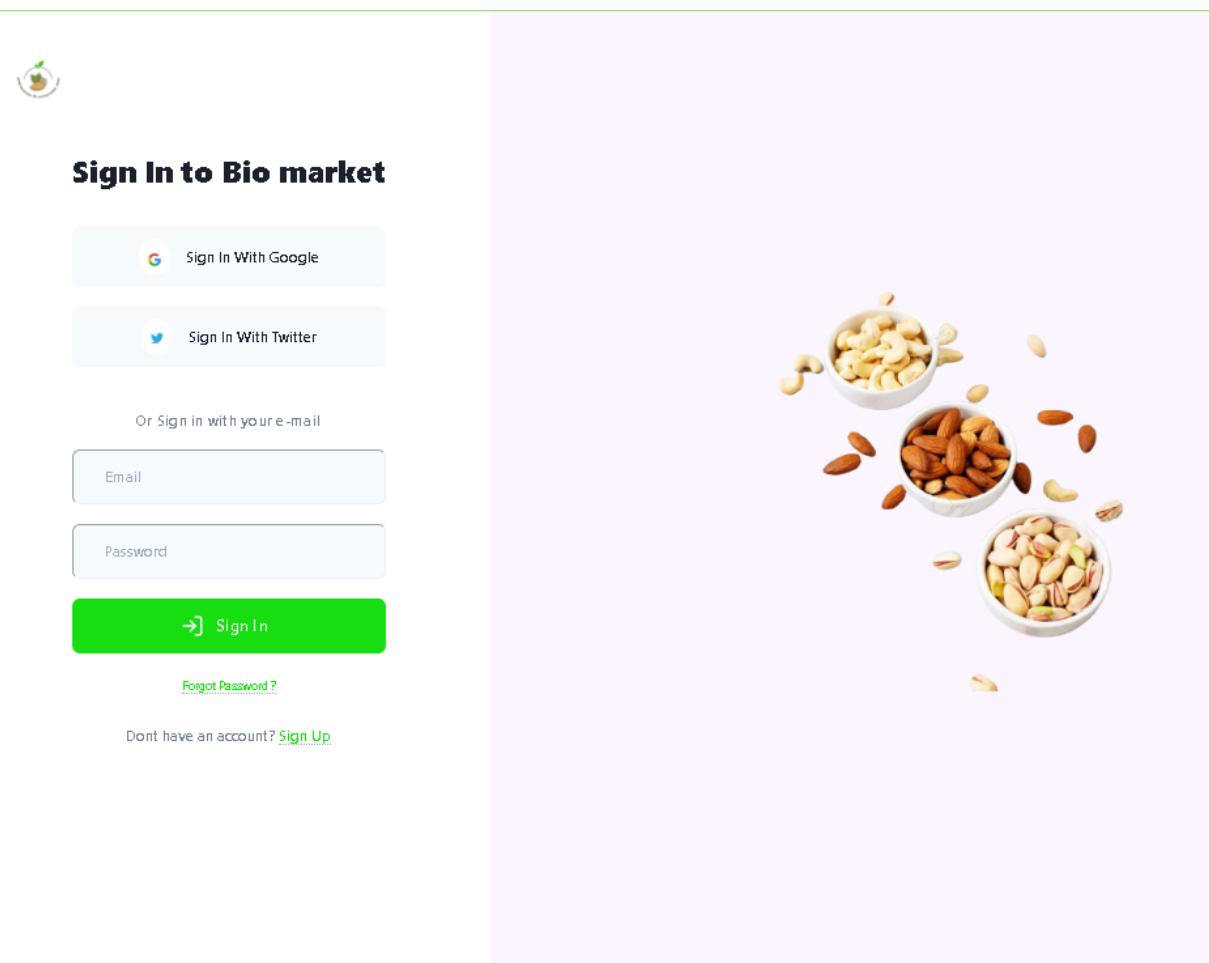


Figure 50: login UI

7) Main page UI:

a. Header:

A header or navigation bar is used to provide a smooth navigation between pages for users.



Figure 51: UI :header

b. First section:

First section is actually what users are going to see once they open our platform so we chose to provide him with some information about what does our platform do with a demonstrative video.

The screenshot shows the homepage of a website called "Bio Market". At the top, there is a navigation bar with links for "Home", "Collaborations", "About us", "Contact Us", "notifications", "Login", and a green "Sign Up" button. To the left of the main content area, there is a logo featuring a stylized green leaf and fruit icon. Below the logo, the text "Bio Market" is displayed. The main content area features a large image of a tree branch with several ripe, orange-colored pistachios or almonds hanging from it against a clear blue sky. To the left of this image, the text "Bio Pistachio & Almond" is written in bold black font, followed by "Just Near You." in a larger green box. Below this, a smaller text block states: "We aim to connect farmers who grow organic and bio-certified pistachio and almond crops with potential buyers who are interested in purchasing high-quality, sustainably-grown products." At the bottom left, there is a green button labeled "see more" and a video thumbnail with a play button icon labeled "demo video".

Figure 52: main page: first section

c. Second section:

Second section is about encouraging farmers to join our platform by providing some advantages of being a part of us.

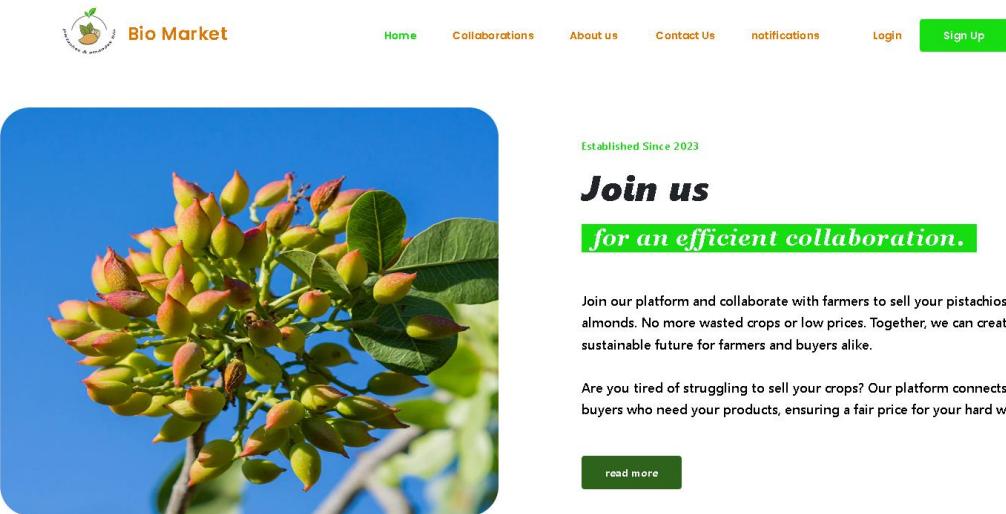


Figure 53: UI main page : second section

d. Third section:

This section will represent some of existing collaborations with a “see more” button that redirects to collabs page

Checkout Collaborations.		
<p>pistachio</p> <p>Owner : kadhem sellami</p> <p>Requested Quantity: 20 Kg</p> <p>Available Quantity: 20Kg</p> <p>100 %</p>	<p>pistachio</p> <p>Owner : kadhem sellami</p> <p>Requested Quantity: 90 Kg</p> <p>Available Quantity: 83Kg</p> <p>92 %</p>	<p>pistachio</p> <p>Owner : kadhem sellami</p> <p>Requested Quantity: 200 Kg</p> <p>Available Quantity: 130Kg</p> <p>65 %</p>
see more		

Figure 54: Ui : Main page : third Section

e. Footer:

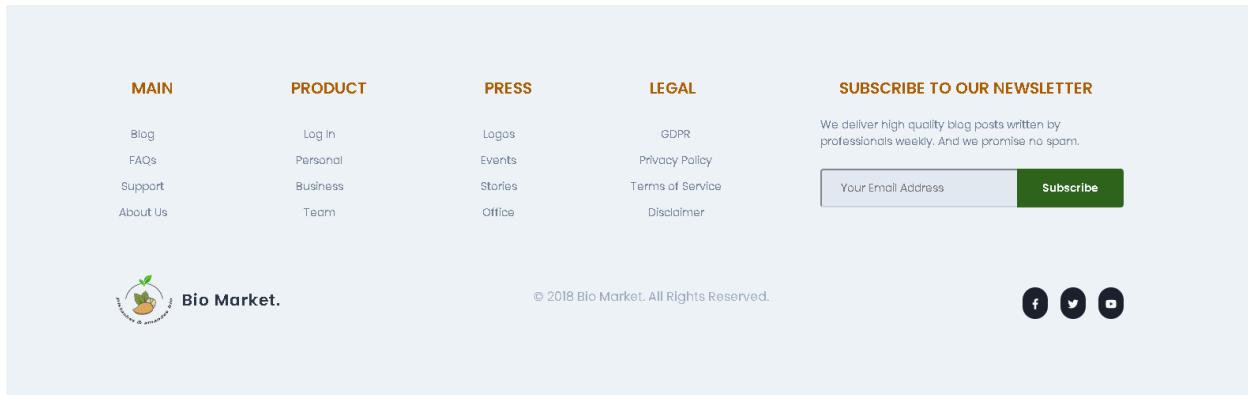


Figure 55: UI: footer

8) Collaborations page:

Collaborations page will appear the same for farmers and non-logged in users but non-logged in users will not be able to join it and it will appear with some extra features for buyers so they can get their own collaborations a side with a button that allows them to create a new collaboration or increase requested quantity of an existed collaboration.

Collab Type	User	Description
Last Collab	kadhem sellami	Available 20kg (20 kg Required) some pistachio
Last Collab	kadhem sellami	Available 83kg (90 kg Required) I want 90 kg =good quality of pistachio and I want in less than three days please
Recent Collab	kadhem sellami	pistachio
Recent Collab	kadhem sellami	almond
Recent Collab	kadhem sellami	pistachio

Figure 56: farmer collab page part1

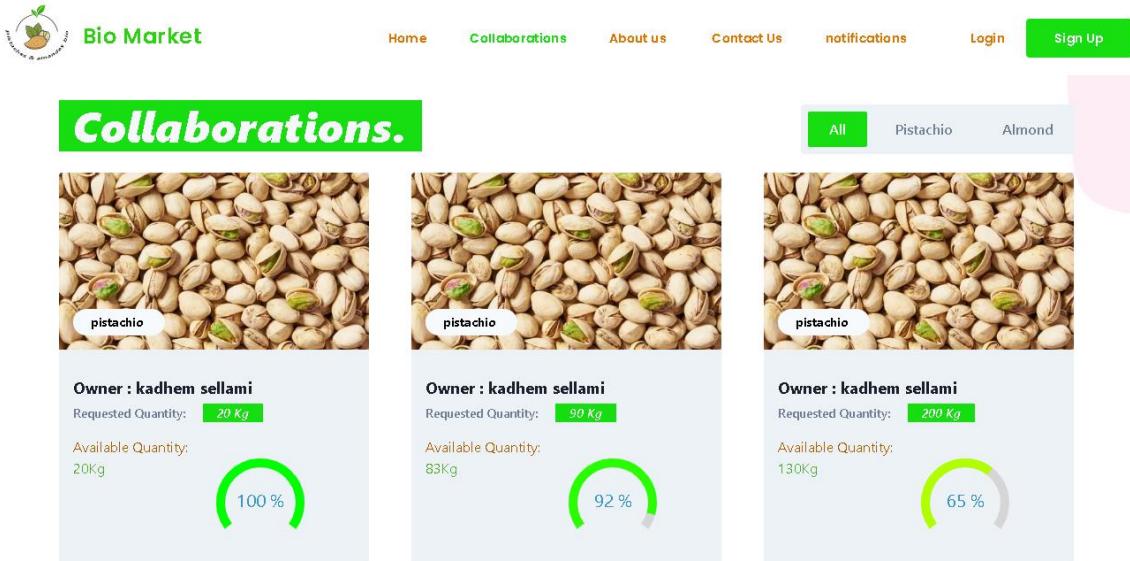


Figure 57: farmer collab page part2

The screenshot shows the 'Create a new collaboration' form on the Bio Market website. At the top, there is a navigation bar with links for Home, Collaborations, About us, Contact Us, notifications, a user icon, and Log Out.

Create a new collaboration

The form fields include:

- Product Type dropdown
- Requested Quantity (en Kg) input field
- Description text area
- accept creating collaboration policy checkbox
- Create button

Figure 58: collab page buyer part1

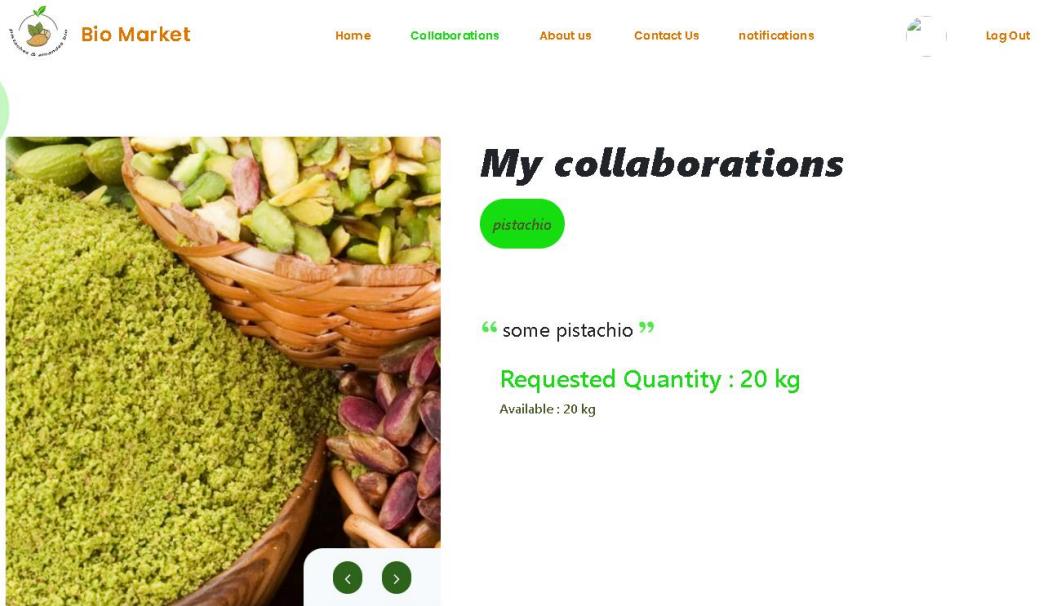


Figure 59:collab page buyer part2

9) Collaboration Details page:

Once a user clicks on details button of a specific collaboration, he will be redirected to collaboration details page where he will find details on participated farmers, owner, quantity and more information with a join button but it will be only available for logged in farmers and once a non-logged in farmer try to join it he will be redirected to the login page.

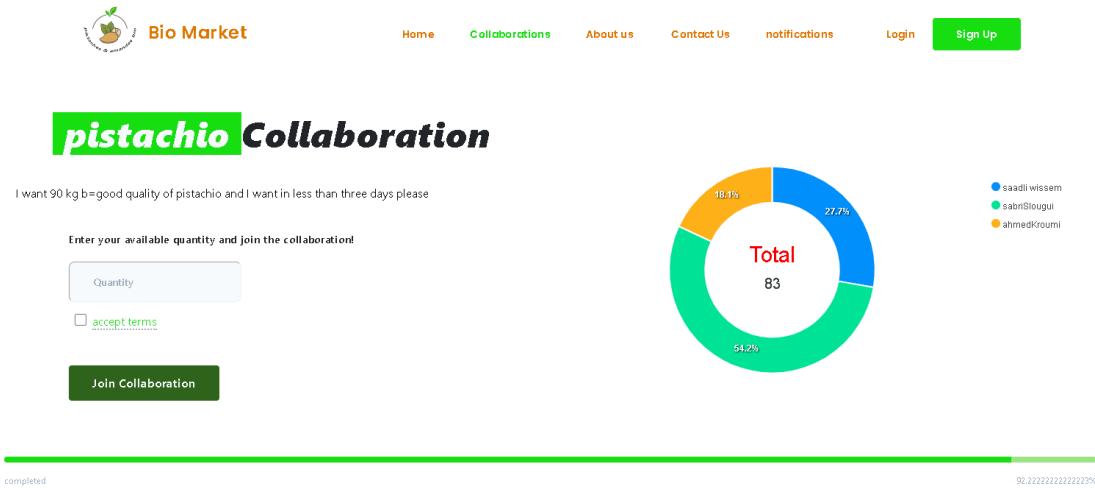


Figure 60: UI : Collab details farmer part1

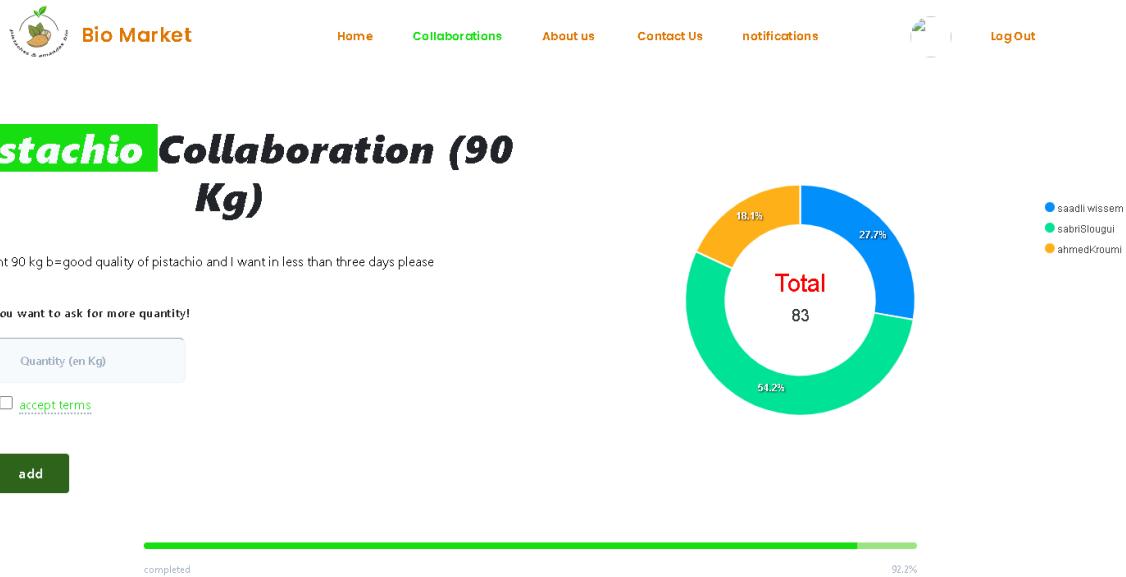


Figure 61: collab details buyer part1

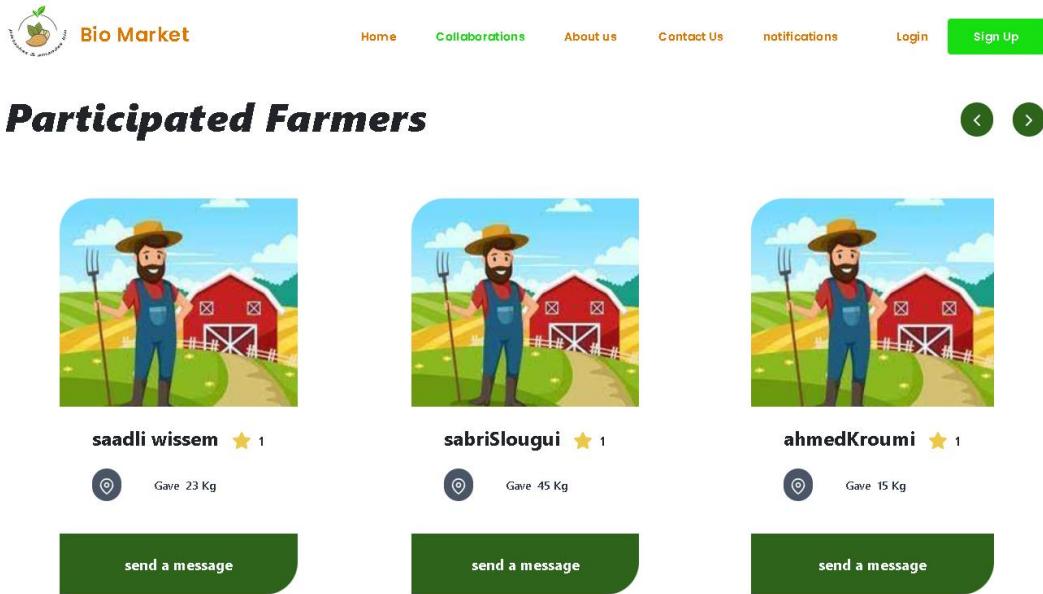


Figure 62: UI : Collab details part2

10) Admin Dashboard:

An admin dashboard is a web-based user interface that provides administrators with a centralized view and control over various aspects of an application, system, or website. It is typically used to manage and monitor the operations, settings, and data of an application or platform.

The specific functionalities and features of an admin dashboard can vary depending on the application or system it is designed for. Here are some common features found in admin dashboards:

- **User Management:** Admin dashboards often provide functionalities to manage user accounts, including creating, editing, and deleting user accounts, as well as managing user roles and permissions.
- **Content Management:** Admin dashboards can include tools for managing content within an application, such as creating, editing, and deleting articles, posts, or other types of content. It may also provide capabilities for organizing and categorizing content.
- **Data Analytics and Reporting:** Admin dashboards often include data visualization and reporting features to provide insights and analytics on various metrics, such as user activity, sales, or system performance. These features help administrators make informed decisions based on the data.
- **Configuration and Settings:** Admin dashboards provide a way to configure various settings and preferences for the application or system, such as site settings, payment gateway integration, email configuration, and more.

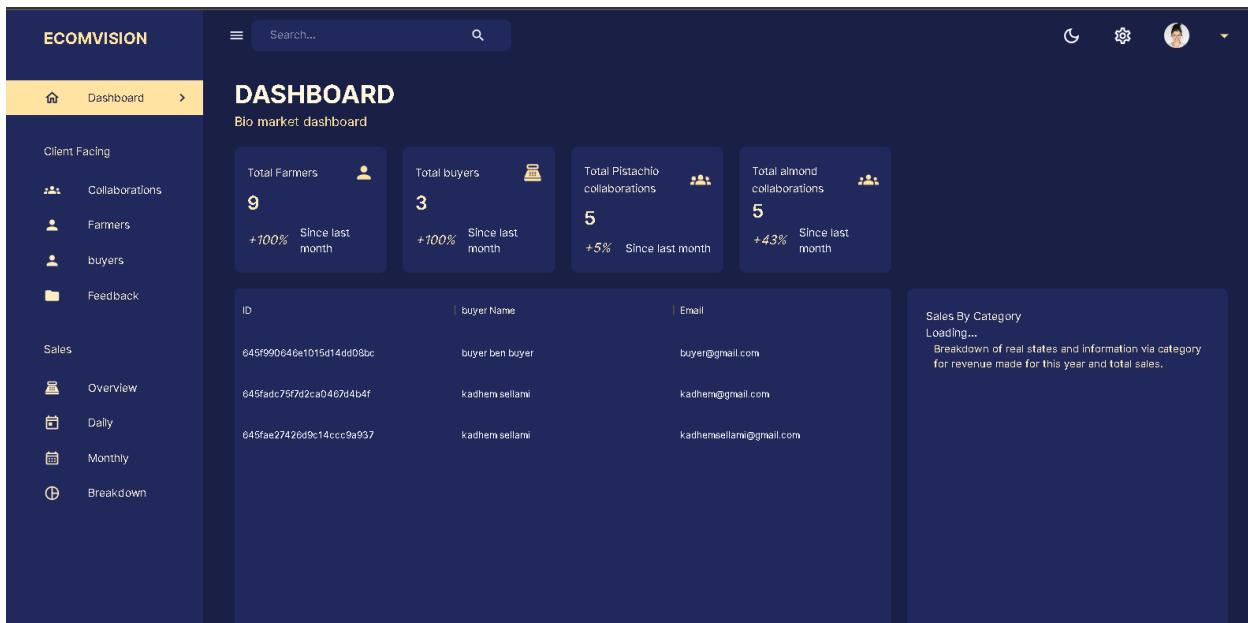


Figure 63 : dashboard main page part1

The screenshot shows the ECOMVISION dashboard with a dark blue header and sidebar. The sidebar on the left includes sections for Client Facing, Collaborations, Farmers, buyers, Feedback, Sales, Overview, Daily, Monthly, and Breakdown. The 'Farmers' section is currently selected and highlighted in yellow. The main content area displays a table titled 'Farmers' with columns: Farmer Name, Last name, Email, and phone. The table contains 9 rows of data. At the bottom of the table, there are pagination controls: 'Rows per page: 100', '1-9 of 9', and navigation arrows.

Farmer Name	Last name	Email	phone
saadli	wissem	saadliwissem68@gmail.com	21886537
sabri	Slougui	sabri@gmail.com	50241568
ahmed	Kroumi	Kroumi@gmail.com	91542368
gaith	Nasri	Nasri@gmail.com	23548625
Haider	Mhadjbi	Haider@gmail.com	24578159
fadhel	bouallegui	fadhel@gmail.com	21546798
hazem	yahyaoui	hazem@gmail.com	23478785
cratos	ben cratos	cratos@gmail.com	21212121

Figure 64: dashboard main page part2

The screenshot shows the ECOMVISION dashboard with a dark blue header and sidebar. The sidebar on the left includes sections for Client Facing, Collaborations, Farmers, buyers, Feedback, Sales, Overview, Daily, Monthly, and Breakdown. The 'Farmers' section is currently selected and highlighted in yellow. The main content area displays a table titled 'CUSTOMERS' with a subtitle 'List of Customers'. The table has columns: Farmer Name, Last Name, Email, Phone Number, Address, Rating, and Block. The 'Block' column contains red circular buttons with the word 'BLOCK' in white. The table contains 9 rows of data. At the bottom of the table, there are pagination controls: 'Rows per page: 100', '1-9 of 9', and navigation arrows.

Farmer Name	Last Name	Email	Phone Number	Address	Rating	Block
saadli	wissem	saadliwissem68@gmail.com	21886537		1	BLOCK
sabri	Slougui	sabri@gmail.com	50241568	hay Ezzehour	1	BLOCK
ahmed	Kroumi	Kroumi@gmail.com	91542368	hay Ezzehour	1	BLOCK
gaith	Nasri	Nasri@gmail.com	23548625	hay Ezzehour	1	BLOCK
Haider	Mhadjbi	Haider@gmail.com	24578159	hay Echabeb	1	BLOCK
fadhel	bouallegui	fadhel@gmail.com	21546798	HEZOUA	1	BLOCK
hazem	yahyaoui	hazem@gmail.com	23478785	JENDOUBA N...	1	BLOCK
cratos	ben cratos	cratos@gmail.com	21212121	BIZERTE NORD	1	BLOCK
cratos	ben cratos	cratossaadli@gmail.com	21212121	JENDOUBA N...	1	BLOCK

Figure 65: dashboard manage farmers

V) Back-end:

Node.js and Express.js provide a smooth backend development experience, allowing developers to build robust and scalable web applications. Node.js is a JavaScript runtime that enables server-side development, while Express.js is a lightweight and flexible web application framework for Node.js. Together, they offer a powerful foundation for creating efficient and high-performance backend systems.

1) API :

API stands for Application Programming Interface. It is a set of rules and protocols that allows different software applications to communicate and interact with each other. APIs define how different components of software systems should interact, making it easier for developers to integrate various functionalities and services into their applications.

The primary purpose of using APIs is to enable seamless communication and data exchange between different software systems, regardless of their underlying technologies or programming languages. Here are some advantages of using APIs:

- **Modularity and Reusability:** APIs promote modularity by breaking down complex systems into smaller, manageable components. These components can be reused in different applications, saving development time and effort.
- **System Integration:** APIs facilitate the integration of different software systems and services. They allow developers to leverage the functionality of existing applications or services without reinventing the wheel.
- **Flexibility and Customization:** APIs provide a standardized way to access and manipulate data. They allow developers to customize and extend the functionality of their applications by integrating third-party APIs or creating their own APIs for others to use.
- **Collaboration and Ecosystem:** APIs foster collaboration between developers and organizations. They encourage the creation of ecosystems where developers can build upon each other's work, promote innovation, and create new business opportunities.

using APIs generally outweigh the disadvantages. They empower developers to create powerful and interconnected applications, leverage existing services, and foster innovation within the software development community.

2) Mongoose:

ORM stands for Object-Relational Mapping. It is a technique used to map data between an object-oriented programming language and a relational database. In the context of MongoDB and Mongoose, the ORM used is specifically designed for NoSQL databases and is referred to as ODM (Object-Document Mapping).

ORMs like Mongoose provide a layer of abstraction that allows developers to interact with databases using familiar object-oriented paradigms rather than writing raw SQL queries. Here are some advantages of using an ORM like Mongoose:

- **Simplified Data Access:** ORM abstracts the complexity of database interactions by providing a high-level API that allows developers to perform common database operations (such as querying, inserting, updating, and deleting) using simple and intuitive code constructs.
- **Object-Oriented Modeling:** With an ORM, developers can define data models as classes or objects and work with them directly in their programming language, making it easier to represent and manipulate data in a way that aligns with the object-oriented paradigm.

- **Data Validation and Schema Enforcement:** ORMs like Mongoose allow developers to define schemas that enforce data validation rules, ensuring that the data stored in the database meets the defined structure and constraints. This helps maintain data integrity and consistency.
- **Relationship Management:** ORMs provide mechanisms to define and manage relationships between data entities, such as one-to-one, one-to-many, and many-to-many relationships. This simplifies the handling of complex data associations and eliminates the need for manual joins or complex SQL queries.
- **Middleware and Hooks:** ORMs often offer middleware and hooks functionality, allowing developers to define pre and post-processing logic for database operations. This enables tasks like data transformation, validation, or triggering additional actions based on certain events.
- **Database Agnostic:** ORM libraries like Mongoose abstract the underlying database details, allowing developers to switch between different databases without making significant changes to their codebase. This provides flexibility and scalability options in case the database needs to be changed in the future.
- **Community and Ecosystem:** Popular ORMs like Mongoose have a large and active community of developers, which means there is extensive documentation, tutorials, and community support available. This can greatly aid in learning and problem-solving during the development process.

Using an ORM like Mongoose simplifies database operations, improves developer productivity, and promotes cleaner and more maintainable code. It abstracts the complexities of data storage and retrieval, allowing developers to focus more on the application's business logic rather than database implementation details.

3) Routes:

Express routes are a key component of the Express.js web application framework. Routes define the endpoints or URLs that a web application exposes, along with the corresponding HTTP methods (GET, POST, PUT, DELETE, etc.) that the application should respond to. Routes handle incoming requests and define the logic for processing those requests and sending back appropriate responses.

Here are some advantages of using Express routes:

- **Modular and Organized Code:** Express routes allow developers to organize the application's endpoints and logic into separate modules or files, making the codebase more manageable and maintainable. Each route can be defined in its own file, encapsulating related functionality.
- **RESTful API Design:** Express routes provide a convenient way to implement RESTful API endpoints by associating different HTTP methods with specific routes. This enables developers to adhere to REST principles, making the API more standardized and predictable.

- **Middleware Support:** Express routes support the use of middleware functions, which are functions that can be executed before or after the main route handler. Middleware functions can be used for tasks like authentication, request validation, logging, error handling, and more. This promotes code reusability and allows for easy implementation of cross-cutting concerns.
- **Parameterized Routing:** Express routes support parameterized URLs, where certain parts of the URL can be treated as variables. This enables dynamic routing and allows developers to extract and use values from the URL in the route logic. Parameterized routing is particularly useful when working with dynamic data or when defining routes with similar patterns.
- **Route Modularity and Reusability:** Express routes can be modularized and reused across different parts of the application. This makes it easier to maintain and update routes without impacting other parts of the codebase. It also allows for better code organization and promotes code reuse.

Express routes simplify the process of defining and handling HTTP requests in a web application. They provide a structured approach to routing, promote code organization and reusability, and offer flexibility to handle various types of requests and responses.

Here is a table of our platform routes:

Table 12: Platform Routes

Method	Base URL	URL	Function
Authentication Routes			
post	"/api/auth"	"/farmer"	registerFarmer()
post	"/api/auth"	"/loginFarmer"	loginFarmer()
post	"/api/auth"	"/buyer"	registerBuyer()
post	"/api/auth"	"/loginBuyer"	loginBuyer()
Buyer Routes			
get	'/api/buyers'	"/buyer"	getBuyer()
get	'/api/buyers'	"/buyers"	getAllBuyers()
get	'/api/buyers'	("/:id/verify/:token/")	verifyEmail()
Farmer Routes			
get	"/api/farmers"	/:farmerId"	getFarmer()
Collaboration Routes			
post	"/api/collab"	"/"	createCollab()

Post	"/api/collab"	"/participate"	participateInCollab()
Put	"/api/collab"	"/updateCollab/:collabId"	updateCollab()
Put	"/api/collab"	"/updateRequestCollab/:collabId"	updateRequestedCollab()
get	"/api/collab"	getCollabsByBuyerId ()	
get	"/api/collab"	"/farmer/:farmerId"	getCollabsByFarmerId ()
get	"/api/collab"	"/getcollab/:collabId"	getCollabById ()
get	"/api/collab"	"/"	getAllCollabs()

In conclusion, this chapter delved into the MERN stack and provided valuable insights on its utilization, environment setup, and user interfaces. We explored the power of the MERN stack, which comprises MongoDB, Express.js, React, and Node.js, in developing robust and scalable web applications. By leveraging this technology stack, we were able to create a dynamic and interactive platform for the Bio Market. The chapter discussed the step-by-step process of setting up the MERN environment, ensuring that all necessary components are properly installed and configured. Furthermore, we showcased various user interfaces through screenshots, offering a glimpse into the visually appealing and user-friendly nature of the Bio Market platform. These screenshots demonstrated the seamless integration of the MERN stack components, resulting in a cohesive and intuitive user experience. Overall, the utilization of the MERN stack has empowered us to build a cutting-edge platform that caters to the needs of both farmers and buyers, facilitating efficient collaboration and fostering the growth of the local bio market.

general conclusion

In conclusion, this report has delved into the challenges faced by local producers of pistachio and almond in Gafsa and the potential solutions offered by the Bio Market platform. By embracing the concept of collaboration, the platform enables small farmers to participate in larger orders, thereby supporting local producers and fostering growth in the agricultural sector.

Throughout this report, we have highlighted the benefits of the Bio Market platform, such as providing a user-friendly interface for both farmers and buyers, ensuring the traceability and quality of bio products, and facilitating efficient delivery through innovative packaging and QR code tracking.

Furthermore, the deployment chapter outlined the strategic approach to deploying the platform, considering factors like the MERN stack, deployment environment, deployment automation, and rollback and recovery mechanisms. These considerations ensure a smooth and efficient deployment process to deliver a reliable and scalable solution.

The Analysis and Software Design chapter introduced key concepts like use case diagrams, class diagrams, and sequence diagrams, providing a comprehensive understanding of the software architecture and requirements capture.

Moving forward, the project aims to empower local farmers, bridge the gap between buyers and producers, and promote sustainable agriculture. By leveraging technology and collaboration, the Bio Market platform has the potential to revolutionize the agricultural industry in Gafsa and beyond.

We express our gratitude to all the individuals, including farmers, buyers, teachers, and family members, who have supported us throughout this journey. Their contributions and dedication have been instrumental in the successful completion of this project.

As we conclude this report, we remain committed to the vision of creating a vibrant and thriving marketplace for bio products, where farmers can flourish, buyers can access high-quality goods, and the community can benefit from sustainable practices.

Together, let us embrace the Bio Market platform and pave the way for a brighter future in the agricultural landscape.

Thank you.