

ABDALLA ALNAZER .

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-  test Part 1 (Moodle TT)
 -  Object Oriented Programming Lab - All sections (Moodle TT)
 -  Princess Sumaya University for Technology
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trn:oid:::1:2923726227

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BridgeLocal

Empowering Jordanian Manufacturers

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Project Submitted in partial fulfillment for the degree of Bachelor of Science in
Computer Science

Second Semester -2024

Declaration of Originality

This document has been written entirely by the undersigned team members of the project. The source of every quoted text is clearly cited and there is no ambiguity in where the quoted text begins and ends. The source of any illustration, image or table that is not the work of the team members is also clearly cited. We are aware that using non-original text or material or paraphrasing or modifying it without proper citation is a violation of the university's regulations and is subject to legal actions.

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Acknowledgments

This project holds great personal significance to us, inspiring us to help local producers in Jordan overcome market entry barriers. Witnessing the challenges they face in gaining traction motivated us to take this step.

We would like to express our deepest gratitude to Dr. Raghda Hraiz for her invaluable guidance and support throughout this project. Her expertise has been instrumental in shaping BridgeLocal.

Lastly, we extend our heartfelt appreciation to our peers and faculty members at Princess Sumaya University for their encouragement and assistance. Also we would like to extend our gratitude to our families for the continuous support throughout the duration of this project. Their encouragement has been a constant source of motivation. This project would not have been possible without the collaborative efforts and insightful feedback from all involved.

Summary

Small-scale local producers in Jordan are frequently unable to compete in the market and achieve recognition because larger manufacturers frequently overrun them. This indicates that there is an urgent need for a system that can successfully link these regional producers with retailers, guaranteeing an environment that is fair and competitive and showcases high-quality regional goods.

By enabling local manufacturers in Jordan, the Bridge Local online application aims at bridging this gap. It seeks to give businesses a strong platform on which to present their goods, interact with merchants directly, and thereby increase their market share. By streamlining the sales process of local products to retailers, this platform hopes to support the expansion of local businesses and provide retailers with a wide selection of goods.

Using a user-centered design approach, the project places a strong emphasis on making the process intuitive for retailers as well as manufacturers. Our methodology which comprises carrying out comprehensive market research tailored to the Jordanian context, succeeded by the creation of an application prototype that is safe, scalable, and easy to use. This entails putting in place features like advanced analytics, user-specific dashboards, a rigorous process for validating products, and safe payment methods.

The project is specifically designed to meet the specific needs of the Jordanian market. The project's strategy places a strong emphasis on addressing issues with user adoption, data security, and the advancement of ethical and sustainable business practices. These issues will be dealt with through user training, intuitive UI/UX design, robust encryption, regular audits, compliance with industry standards, and continued user base interaction.

In Conclusion, Bridge Local is a cutting-edge solution designed specifically for the Jordanian market. It has the potential to greatly increase the visibility of local manufacturers, simplify the procurement process for retailers, and cultivate a more supportive and connected business community. In addition to providing its direct users with immediate benefits, Bridge Local also establishes a standard for future projects aimed at supporting local businesses in Jordan and beyond by addressing essential market demands and promoting the creation of sustainable local economies.

List of Abbreviations

List the abbreviations you have used in your project if there are any and what they stand for.

UML: Unified Modeling Language.

JSP: Java Server Pages.

DLL: Dynamic Link Library.

CMS: Content Management System.

ERD: Entity Relationship Diagram.

OO: Object Oriented

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Chapter 1

Introduction

1.1 Overview

Bridge Local is a platform created to support Jordan's economy by increasing local manufacturers' visibility and access to markets. The goal of Bridge Local is to close the crucial gap that exists between small-scale producers and retailers by providing a simple, safe, and effective platform for local product promotion and sales. It is essential for encouraging sustainable business practices in the area as well as fair competition and economic progress. An analytics-driven interface for retailers to track purchase history and product profitability, a comprehensive dashboard for manufacturers to monitor product performance and receive feedback and advanced features like product validation and secure payment processing are the main use cases of Bridge Local. Bridge Local is an example of how technology can drive social and economic progress by empowering local companies and promoting a more sustainable economy.

1.2 Problem Statement

The primary problem that Bridge Local aims to resolve is the considerable barrier that Jordanian local manufacturers experience when trying to enter the market and gain traction. Small scale producers frequently face difficulties competing with larger enterprises because they have restricted access to retail networks and have trouble reaching potential customers. Furthermore the current markets and platforms are unable to fully address the particular requirements of local Jordanian producers, creating a void in the market where premium and locally produced goods are marginalized and underrepresented. This situation not only limits local businesses' potential for growth but also denies customers and retailers access to a wide variety of high quality locally produced goods.

Bridge Local's primary goal is to develop a web application that functions as a marketplace and a tool for business-to-business networking, improving product visibility, guaranteeing product authenticity, and expediting the purchase process. In addition to improving the financial prospects of local producers this approach aims to strengthen and expand the local economy by providing a wide range of superior and local products to the retail sector.

1.3 Related Work

However, some applications offer similar services and features that could potentially be present in our system:

1. Faire (faire.com):

Faire is a web-based marketplace connecting retailers with independent brands, available in various countries such as the United States, Canada, and the United Kingdom. Ideal for retailers looking for a curated selection of products from established independent brands. Faire offers a wide variety of products across categories like home decor, food & beverage, apparel, and more. Benefits for retailers include flexible payment terms, free returns on opening orders, curated product recommendations, and a user-friendly platform. Some distinctive characteristics include:

- Curated Selection: Faire validate brands, ensuring a high-quality selection for retailers.
- Wholesale Buying: Retailers can purchase products in bulk at wholesale prices.
- Flexible Payment Terms: Offers flexible payment options for retailers.
- Free Returns on Opening Orders: Reduces risk for retailers trying new products.

2. Jungleworks Yelo (jungleworks.com/yelo):

Jungleworks Yelo is a web-based platform designed for local businesses to establish an online presence. Located in the USA, Yelo equips local businesses with the tools they need to create an online store, manage inventory, and engage customers. Features include digital storefront creation, inventory management tools, and customer engagement tools (may vary depending on the plan). Yelo offers a free trial along with paid plans. Among Jungleworks Yelo's key characteristics are:

- Local Business Focus: Tailored specifically for the needs of local businesses.
- Easy Online Store Creation: User-friendly platform allows businesses to quickly set up an online store.
- Integrated Tools: Provides tools for managing inventory and engaging customers.
- Free Trial: Allows businesses to try the platform before committing to a paid plan.

3. RangeMe (rangeme.com)

RangeMe is a web-based marketplace located in the USA connecting brands with retailers and distributors across various categories. A valuable tool for both brands and retailers. Brands can showcase their products and connect with potential buyers, while retailers can discover new and innovative products from a wide range of brands. RangeMe offers a freemium model with a free basic plan and paid options for additional features. Among the numerous distinctive elements of this application are:

- **Broad Reach:** Ideal for brands seeking to expand their reach and retailers looking for a diverse selection of products.
- **Freemium Model:** Caters to different needs with a free plan and paid options.
- **Brand-Retailer Connection:** Facilitates communication and product discovery between brands and retailers.
- **Focus on Discovery:** Helps brands get discovered by potential buyers and allows retailers to find unique products.

Table 1.1 Applications Comparison

<i>Features</i>	<i>BridgeLocal</i>	<i>Faire</i>	<i>Jungleworks</i>	<i>RangeMe</i> <i>(Yelo)</i>
<i>Jordan Based</i>	Yes	No	No	No
<i>Target Audience</i>	Local Manufacturers and Retailers	Retailers	Brands & Retailers	Local Business
<i>Focus</i>	Local Business Networking & Support	Wholesale Buying	Product Distribution	Online Store Creation
<i>Similarities</i>	User-friendly interface, connects businesses in e-commerce space	User-friendly interface, e-commerce focus	Connects businesses in e-commerce space	N/A
<i>Key Differences</i>	Promoting local businesses mainly	Focus on pre-vetted brands, wholesale buying	Focus on brand discovery, wider reach	For local businesses, online store creation

In addition to the above: there exist other platforms that provide similar services such as GO Wholesale, MerchantCircle, Mable.

1.4 Document Outline

The document provides a comprehensive and structured approach to the development and implementation of BridgeLocal, a platform aimed at empowering local manufacturers in Jordan by bridging the gap between them and retailers. Each chapter of the document carefully outlines different aspects of the project, ensuring a thorough understanding and effective execution. The following is the detailed outline of the document:

Table 1.2 Documentation Outline

<i>Chapter Title</i>	<i>Description</i>
<i>Chapter 1: Introduction</i>	Includes a brief overview of the project and a summary of the problem the project is trying to solve.
<i>Chapter 2: Project Plan</i>	Includes a detailed explanation of the project plan, the role of each team member, cost estimation, and necessary tools.
<i>Chapter 3: Requirements Specification</i>	Includes a detailed description of the system functional and nonfunctional requirements as well as declaration of the stakeholders.
<i>Chapter 4: System Design</i>	Includes a detailed analysis of the system components, and low- and high-level designs of the system.

Chapter 2

Project Plan

2.1 Project Deliverables

BridgeLocal encompasses a comprehensive set of components crucial for its development, deployment, and effective use. These include the complete source code and detailed documentation covering all system aspects, as well as the database schema with initialization scripts. Additionally, high-fidelity user interface designs and strict security guidelines ensure the platform is scalable, secure, and user-friendly. Together, these deliverables form the backbone of the Bridge Local platform, facilitating a direct connection between local manufacturers and retailers, promoting local products, and fostering a sustainable market environment in Jordan.

2.2 Project Tasks

Table 2.1 shows the tasks that will and have taken place during our project. The project starts with the analysis phase, where the main project idea and requirements were stated. The next tasks are in the design phase, where the logical model design and user interface prototyping are completed. After the design phase, we are expected to complete implementation at a later time, when the system will be fully functional and ready for the user. Every phase has been given an expected completion time.

Table 2.1 Project Tasks

Task ID	Task Name	Description	Dependencies	Start Date	Due Date	Completed
Analysis						
T1	Brainstorming Ideas	Meeting with the project supervisor to discuss project ideas	-	3/3/2024	7/3/2024	100%
T2	The general idea and problem statement	Planning and discussion of the project with group individuals	T1	10/3/2024	12/3/2024	100%
T3	Requirements Gathering	Collecting information from local manufacturers about their needs for the application and the database.	T1	10/3/2024	14/3/2024	100%

T4	Scope Definition	Defining the features and functionality that will be included in the project as well as constraints and Limitations	T3	17/3/2024	21/3/2024	100%
T5	Related Work	Researching similar applications and competitors	T4	24/3/2024	28/3/2024	100%
Design						
T6	Documentation design	Involves designing the documentation for the application and the database, including manuals, specifications, and system diagrams	T1	17/3/2024	11/5/2024	100%
T7	User-Interface design	Designing our website's interface	T5	14/4/2024	11/5/2024	100%
T8	Database design	Designing the database for the website	T5	14/4/2024	11/5/2024	100%
T9	Documentation Finalization	Finalizing and organizing the four chapters	T8	11/5/2024	19/5/2024	100%
T10	Presentation Preparation	Preparing for the project presentation	-	19/5/2024	25/5/2024	100%
Implementation						
T11	Coding and Development	Writing the code for the interface, database development	T7,T8,T9	6/10/2024	28/12/2024	0%
T12	Testing	Conducting rigorous testing of the developed system	T11	29/12/2024	11/1/2025	0%

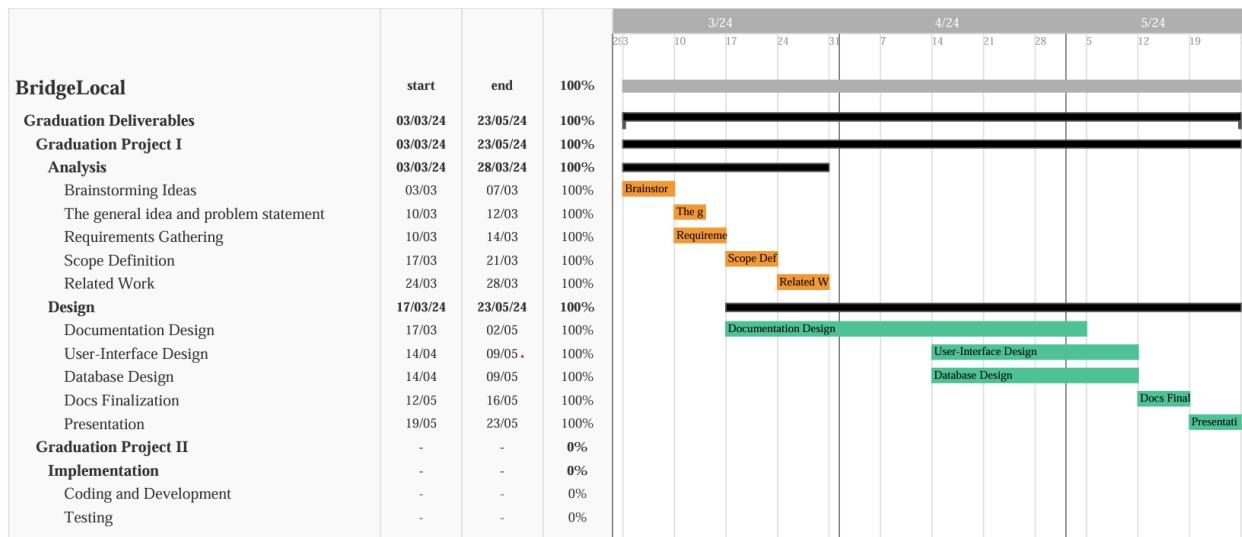


Figure 2.1 Gantt Chart

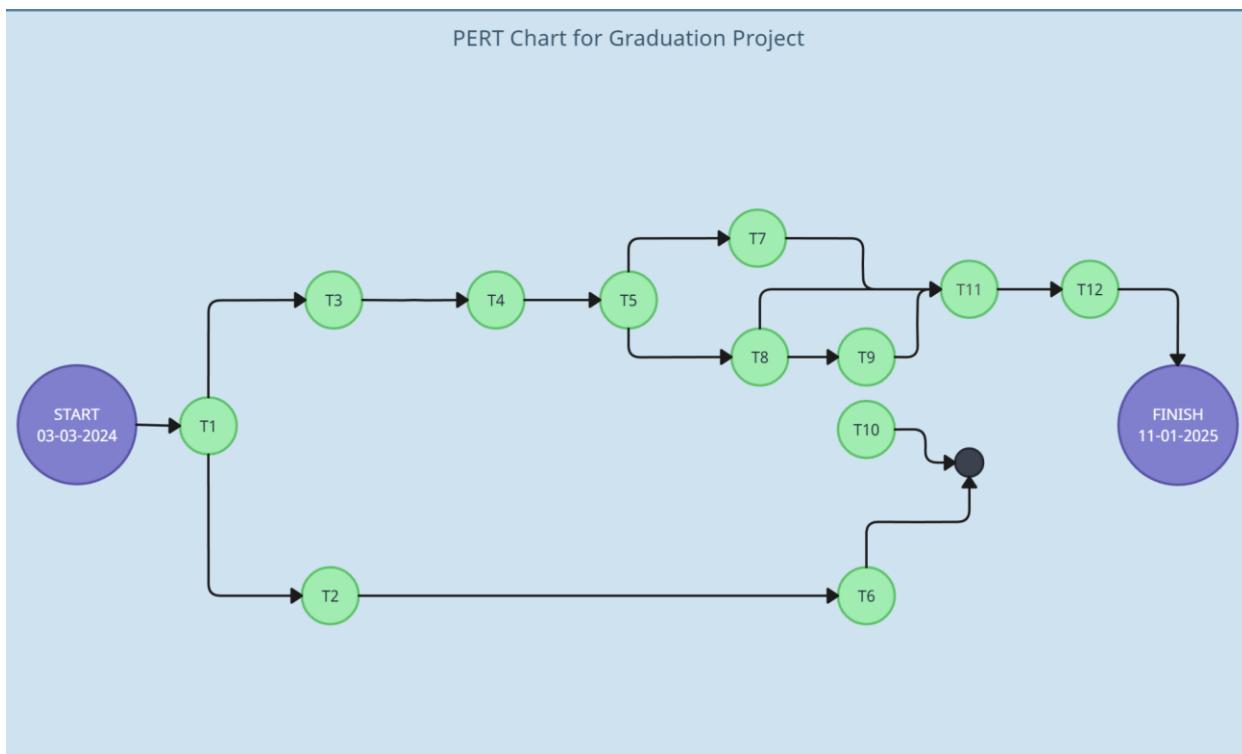


Figure 2.2 Pert Chart

2.3 Roles and Responsibilities

Table 2.2 shows the roles of each team member in the project and what tasks they will be responsible for.

Table 2.2 Roles & Responsibilities

<i>Member Name</i>	<i>Responsibility</i>
<i>Mohammad Abuayyash</i>	Documentation, Database, and Back-end
<i>Hamzeh Nsirat</i>	Documentation, Database, and Back-end
<i>Rafeeq Al-Shareef</i>	Documentation, Database, and Front-end
<i>Hussam Jabban</i>	Documentation, Design, and Front-end

2.4 Risk Assessment

Table 2.3 shows the possible obstacles and issues we might come across, We also provided a risk response, which shows what can be done to avoid these potential risks.

Table 2.3 Risk Assessment

<i>Risk ID</i>	<i>Task ID</i>	<i>Task Name</i>	<i>Risk Description</i>	<i>Probability</i>	<i>Risk Response</i>
<i>R1</i>	T1 & T2	Brainstorming ideas and the idea and problem statement	Conflict about the project specifications and misunderstanding of the project goals	Low	Making sure that everyone has a comprehensive understanding of the project requirements and ensure that everyone is on the same page moving forward
<i>R2</i>	T3	Requirement Gathering	Inadequate understanding of user requirements leading to incomplete or incorrect feature implementation	Medium	Conduct thorough interviews and surveys with local manufacturers to gather requirements. Prioritize based on impact and feasibility.
<i>R3</i>	T4	Scope Definition	Unclear project scope resulting in scope creep or project delays	Medium	Collaborate closely with stakeholders to define clear project scope and objectives. Document scope boundaries and constraints.
<i>R4</i>	T5	Related Work	Not finding applications related to our project	Low	Conducting an extensive search of applications

R5	T6	Documentation design	The documentation may be incomplete or inaccurate	Low	Establishing clear documentation guidelines and ensuring the documentation is organized and accessible
R6	T7	User-Interface design	Not providing the user with an adequate user-interface results in poor user experience	High	Ensuring the user is involved in the UI design process and conducting usability testing
R7	T8	Database design	Inefficient database design may result in poor query performance, slow data retrieval, or inefficient storage structures	High	Prioritizing a thorough analysis of data requirements and implementing an optimized database structure
R8	T9	Documentation Finalization	Not completing the documentation on due date	Low	Making sure every chapter has a designated time period and sticking to the project plan
R9	T10	Presentation Preparation	Unclear communication of project purpose and main goal	Low	Ensuring that everyone in the team is well prepared and understands the project's problem statement in addition to conducting several rehearsing sessions



Figure 2.3 SWOT Grid

The SWOT analysis provides a clear overview of the internal and external factors that impact the BridgeLocal project. The strengths highlight the platform's ability to support the local economy, foster sustainability, and provide advanced analytics and product validation tailored for the Jordanian market. Weaknesses such as dependency on user adoption, initial market competition, and the required skillset for development and maintenance are identified. Opportunities include potential expansion to other markets, integration with local payment gateways, and community-building features. However, the project must also navigate threats such as market dominance by large manufacturers, cybersecurity risks, and rapid technological change.

2.5 Cost Estimation

Table 2.4 describes the services needed for this project in addition to the cost estimation of each service and a brief description on how these services are used.

Table 2.4 Cost Estimation

<i>Service</i>	<i>Cost Estimate</i>	<i>Description</i>	<i>Actual Cost</i>
<i>Servers</i>	\$2500 ONE TIME	Servers play a crucial role in the infrastructure of any web-based application. They host the application, manage requests from clients and store data.	\$0
<i>Development Tools and software Licenses</i>	\$150 per user/year	Software licenses for development tools, integrated development environments (IntelliJ IDEA), and other necessary utilities	\$0
<i>Domain Registration</i>	\$10-\$20 per year	Provides a recognizable and professional web address for users to access BridgeLocal	-
<i>SSL Certificate</i>	\$200 per year	An SSL certificate encrypts data transferred between users and the website, which is crucial for security	Free Access
<i>Cloud Services and Hosting</i>	\$100 per month	Cloud Hosting: is essential for deploying and scaling the application Cloud Storage: For storing user data, product images, and other content.	-

2.6 Project Management Tools

Table 2.5 shows the tools that will be used in the implementation of this project.

Table 2.5 Project Management Tools

<i>Tool</i>	<i>Description</i>
<i>Google Docs</i>	Documentation
<i>Google drive</i>	Sharing folders between team members
<i>Createley</i>	PERT chart
<i>TeamGantt</i>	Gantt Chart
<i>Lucidchart</i>	UML Design
<i>Figma</i>	Interface Design
<i>Visual Studio Code</i>	Front-End Development
<i>IntelliJ IDEA</i>	Back-End Development
<i>PostgreSQL</i>	Database Interfacing and Administration
<i>AWS Services</i>	Cloud Services for Storage and Computing

Chapter 3

Requirements Specification

3.1 Stakeholders

Table 3.1 defines the stakeholders of the system, their importance, and how they benefit from our platform.

Table 3.1 Stakeholders

<i>ID</i>	<i>Stakeholder</i>	<i>Description</i>
S1	Local Suppliers	Local suppliers are individuals or businesses that produce goods locally within Jordan. They are the primary users of the BridgeLocal platform, utilizing it to showcase and sell their products to a wider audience.
S2	Retailers	Retailers are businesses or individuals who sell products to end consumers. They utilize BridgeLocal to discover and purchase locally produced goods to stock in their stores or sell online.
S3	System Administrator	The system administrator is responsible for the overall management of the system, this is an essential role to ensure that the system stays reliable and secure.
S4	Guest User	Guest Users can view platform services.

3.2 Platform Requirements

Table 3.2, Table 3.3 describe the client requirements and server requirements respectively, in addition to their importance.

Table 3.2 Client Requirements

<i>Requirement</i>	<i>Requirement Name</i>	<i>Importance</i>
<i>CR1</i>	PC or Laptop or Mobile	Required
<i>CR2</i>	Connection to Internet	Required
<i>CR3</i>	Connection to Server	Required

Table 3.3 Server Requirements

<i>Requirement</i>	<i>Requirement Name</i>	<i>Importance</i>
<i>SR1</i>	Access to Database	Required
<i>SR2</i>	Connection to Internet	Required

3.3 Functional Requirements

3.3.1 Common Functional Requirements

Table 3.4 describes the common functional requirements of the system and outlines the features that all users can have.

Table 3.4 Common Functional Requirements

<i>ID</i>	<i>Requirement</i>	<i>Description</i>
<i>CFR1</i>	User Login	Allows users to get into their specified dashboard based on the information provided.
<i>CFR2</i>	User Sign up	Allows new users to join by providing their personal information.
<i>CFR3</i>	Dashboard	Each type of user has a specified dashboard that they are redirected to after checking their login information.
<i>CFR4</i>	Forget Password	Allows users to easily change their passwords and confirmation to ensure security measures are upheld.
<i>CFR5</i>	User Logout	The users have the option to logout of their accounts anytime they want.
<i>CFR6</i>	Navigation Menu	The landing page of the website provides a navigation menu that educates the user about our website and what exactly it does, it helps them learn more about the services provided.
<i>CFR7</i>	Access Control	Users should have appropriate access rights based on their roles and permissions.
<i>CFR8</i>	View Platform Services	Users can view detailed information on all available services, search, filter by category, sort, and read reviews to easily find and compare services.

3.3.2 System Administrator Functional Requirements

Table 3.5 describes the functional requirements of the system from the system administrator's perspective. As the main mediator of the system, they can do all the operations

Table 3.5 System Administrator Functional Requirements

<i>ID</i>	<i>Requirement</i>	<i>Description</i>
<i>SAFR1</i>	View Users	System administrators should have the ability to view users such as retailers and local suppliers.
<i>SAFR2</i>	View Applications	System administrators should be able to review applications from suppliers and retailers upon signing up.
<i>SAFR3</i>	Apply Penalties	System administrators should have the authority to apply penalties upon violation of order fulfillment, order payment, and other relevant policies.
<i>SAFR4</i>	Add Users	System administrators should be able to add users to the system.
<i>SAFR5</i>	Edit Users	System administrators should be able to edit users to the system.
<i>SAFR6</i>	Delete Users	System administrators should be able to delete users to the system.
<i>SAFR7</i>	Approve Applications	System administrators should be able to approve applications sent by suppliers and retailers.
<i>SAFR8</i>	Reject Applications	System administrators should be able to reject applications sent by suppliers and retailers.
<i>SAFR9</i>	View Complaints	System administrators should be able to view complaints sent by suppliers to retailers and vice versa.

3.3.3 Retailer Functional Requirements

Table 3.6 describes the functional requirements of the system from the retailer's perspective.

Table 3.6 Retailer Functional Requirements

<i>ID</i>	<i>Requirement</i>	<i>Description</i>
RFR1	View Account Info	Retailers should be able to view their account information easily.
RFR2	Update Account Info	Retailers should be able to update their account information easily.
RFR3	View Requested Quotations	Retailers should be able to view quotations that have been sent to the supplier.
RFR4	View Dashboard Content	Retailers should have access to a customized dashboard featuring data analytics and visualization tools.
RFR5	Export Dashboard Content	Retailers should be able to export dashboard content as a PDF
RFR6	Search Marketplace and Filter by Category.	Retailers should be able to search the marketplace for products and filter results based on categories, and other relevant metrics.
RFR7	View Product	Retailers should be able to view supplier products
RFR8	Save Favorite Listings	Retailers should have the ability to save favorite listings from search results for later reference.
RFR9	View Past Purchases Performance	Retailers should be able to view past purchases' performance based on factors such as profits and quality ratings.
RFR10	Request Quotation	Retailers should be able to request quotations from local suppliers for desired products.
RFR11	View Selected Quotation	Retailer should be able to view a selected quotation from the quotation list.
RFR12	Accept The Supplier's Placed Quotation	Retailer should be able to accept the quotation that is sent by the supplier.

RFR13	Cancel Send Quotation	Retailers should have the option to cancel their quotation requests to suppliers.
RFR14	View Supplier's Related Products	Retailers should be able to view other supplier's products when they request the quotation.
RFR15	Add Supplier's Related Products	Retailers should be able to add other supplier's products to the requested the quotation.
RFR16	Cancel Order	Retailers should be able to cancel orders that been sent to suppliers.
RFR17	Add Feedback	Retailers should be able to give feedback for the supplier based on their products.
RFR18	Escalate Order Fulfillment Failures	Retailers should be able to escalate order fulfillment failures to resolve issues promptly.
RFR19	Monitor Purchase Status	Retailers should be able to monitor the status of their purchases, including quotation responses, bid-order process, payment, delivery, and feedback.

3.3.4 Supplier Functional Requirements

Table 3.7 describes the functional requirements of the system from the supplier's perspective.

Table 3.7 Supplier Functional Requirements

<i>ID</i>	<i>Requirement</i>	<i>Description</i>
<i>SFR1</i>	View Account Info	Suppliers should be able to view their account information easily.
<i>SFR2</i>	Update Account Info	Suppliers should be able to update their account information easily.
<i>SFR3</i>	View Product	Suppliers should be able to view their products.
<i>SFR4</i>	Upload Products	Suppliers should be able to upload product listings on the platform.
<i>SFR5</i>	Edit Products	Suppliers should be able to edit product listings on the platform.
<i>SFR6</i>	Search Products	Suppliers should be able to search for their products on their lists.
<i>SFR7</i>	Publish Product	Suppliers should be able to publish their products on the marketplace.
<i>SFR8</i>	Expand Product	Suppliers should be able to expand the selected product from the product list.
<i>SFR9</i>	Export Dashboard Content	Suppliers should be able to export dashboard content with an option for selective report generation.
<i>SFR10</i>	View Profile Insights	Suppliers should be able to view insights into their profiles.
<i>SFR11</i>	View Product Insights	Suppliers should be able to view insights into their product performance.
<i>SFR12</i>	Send Quotation	Suppliers should be able to send quotations to retailers for requested products.
<i>SFR13</i>	Expand Quotation	Suppliers should be able to expand the selected quotation from the quotation list.
<i>SFR14</i>	Escalate Order Payment Failures	Suppliers should be able to escalate order payment failures for timely resolution.

<i>SFR15</i>	Monitor Fulfillment Status	Suppliers should be able to monitor the fulfillment status of orders, including quotation responses, bid-order processes, payment, delivery, and feedback.
<i>SFR16</i>	View Quotation	Suppliers should be able to view quotations that have been sent from retailers.
<i>SFR17</i>	View Orders	Suppliers should be able to view orders coming from retailers.
<i>SRF18</i>	Search Marketplace and Filter by Competitors	Suppliers should be able to search the marketplace for competitors and filter search results based on competitor offerings.
<i>SRF19</i>	Expand Order	Suppliers should be able to expand the selected order from the order list.
<i>SRF20</i>	View Status	Suppliers should be able to view the current status of the selected order.
<i>SRF21</i>	View Feedback	Suppliers should be able to view the retailer's feedback.
<i>SRF22</i>	View Dashboard Content	The supplier should have access to a customized dashboard featuring data analytics and visualization tools.

3.4 Non-Functional Requirements

Table 3.5 defines the non-functional requirements of the system; these are the requirements that show how the system should operate in order for it to meet the desired objective.

Table 3.8 Non-Functional Requirements

<i>ID</i>	<i>Requirement</i>	<i>Description</i>
<i>NFR1</i>	Usability	The system should achieve its specified goals with an efficient, effective, and satisfactory user experience for all users of the system. This includes providing a seamless user experience that ensures all users are satisfied.
<i>NFR2</i>	Performance	The system should run smoothly, handle large amounts of data without interruption, and ensure all functionalities are running smoothly.
<i>NFR3</i>	Security	The platform will ensure that all user data, including personal information and transaction details, is handled securely.
<i>NFR4</i>	Reliability	The platform should provide accurate and reliable information to users, ensuring trustworthiness and credibility. The system should also have a high level of availability, with minimal downtime or disruptions to user access.
<i>NFR5</i>	Scalability	The platform should be designed to handle increasing user traffic and product listings as the user base grows, and the system's performance and capacity should scale with the expanding data volume and user load, ensuring optimal performance under load.
<i>NFR6</i>	Maintainability	The system will be easy to update and fix any issues that may arise.

Chapter 4

System Design

4.1 Logical Model Design

After careful review of the system requirements and based on the complexity factor of the project, we have decided to use an object-oriented approach. This approach focuses on capturing the structure and behavior of the system, ensuring that it remains flexible and maintainable. The object-oriented approach's main benefit is the organization that comes with it, making it beneficial for collaborative development. Encapsulation and abstraction make collaborative work easier since encapsulation focuses on bundling data and methods together into a single class with controlled access (private, public, and protected) for attributes and methods. Abstraction adds to this by ensuring that the system remains simple by focusing on the system's essential features.

Another benefit of the OO approach is code reusability, which can be done using the inheritance principle. Assigning relationships between objects enables developers to create a hierarchy of classes, allowing the reuse of code from existing classes in new ones. The reuse of code promotes efficiency and reduces code redundancy.

Understanding the relationships between classes is very important, since all classes in the system are related to each other and connected in some way. Objects do not exist in isolation they must have relationships with other objects.

In addition to encapsulation, abstraction, and inheritance, polymorphism is a key principle in the object-oriented approach. It allows flexibility in how methods are called since polymorphism describes the concept of accessing different types of objects through the same interface, which is also a very useful principle in reducing the need to duplicate any code.

The Unified Modeling Language (UML) provides a visualization tool for the object-oriented approach to documenting the design of the system. This section is divided into 9 subsections. Each subsection represents a certain UML diagram, starting with use case diagrams that are used to depict the relationships between the actors and the system itself. Then comes the class diagram, which is considered a fundamental part of UML, it depicts the classes of the system in addition to their attributes, methods, and relationships with other classes.

The object diagram represents an instance of the class diagram, which enhances the clarity of the system. Package diagrams are used to organize the structure of the system into 'packages' and to illustrate the relationships between these packages. Followed by component diagrams that are used to offer insight regarding the components of the system, while deployment diagrams, on

the other hand, show the physical aspects of the system and how they communicate with the software.

We used activity diagrams in addition to state transition diagrams to represent the workflow of some features and functionalities of the system, state transition diagram offers a dynamic view of how objects transition between different states. Then, finally, sequence diagrams show the interaction with different objects over an amount of time.

4.1.1 Use Case Diagram

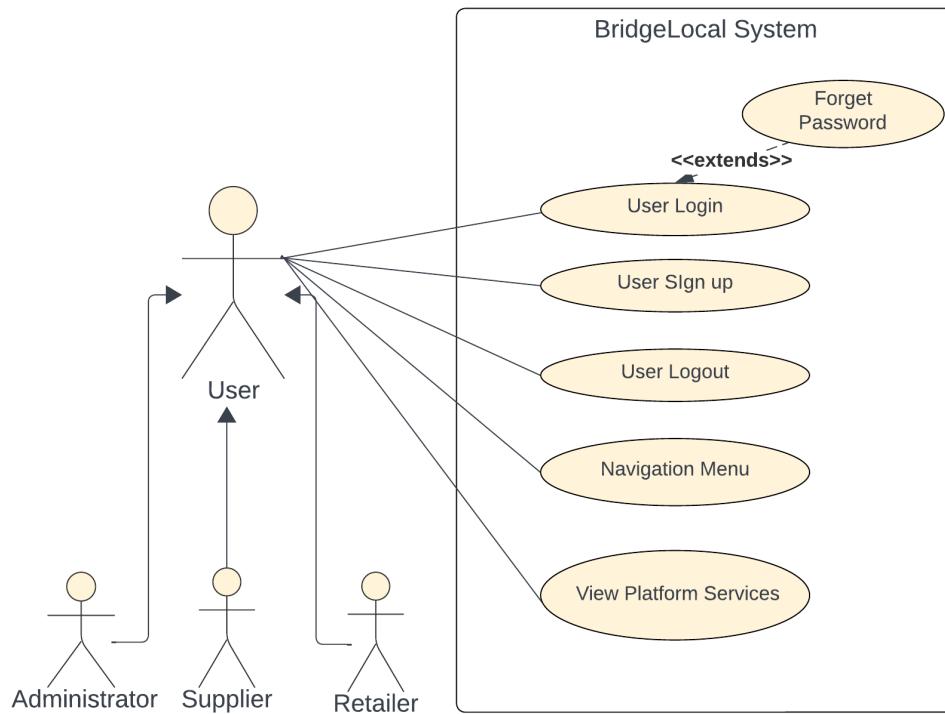


Figure 4.1 Use Case Diagram 1

Use case: Forget Password

Actors: User (initiator)

Purpose: Forget password allows users to change their passwords after authentication

Overview: The user is able to change their password after receiving a confirmation email to add a security measure and ensure that no one is trying to access their account, after the confirmation email the user is able to change their password into a new one.

Type: Essential

Cross-Reference: CFR4

A typical course of action:

Table 4.1 Typical Course of Action - Forget Password

Actor Action	System Response
<i>1. Clicks on forget password</i> <i>2. Enters their email</i>	<i>3. A confirmation email is sent to the user with a link that redirects to the change password page.</i>

4. Enters their new password

5. Saves the new password

6. Sends another confirmation email stating that their password has been changed.

Alternative Solution: the user receives an email regarding a password change and discovers that someone is trying to access their account, the user suspecting a malicious activity decides to ignore the email and does not end up changing their password.

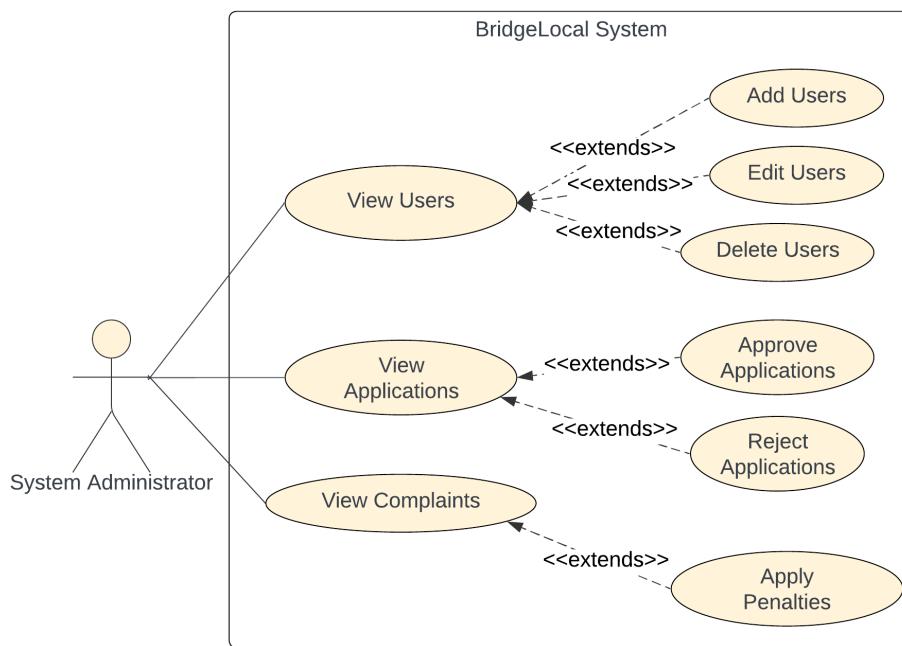


Figure 4.2 Use Case Diagram 2

Use case: View Complaints

Actors: System Administrator (Initiator), Server

Purpose: The purpose of this use case is to enable system administrators to view complaints submitted by customers.

Overview: After logging into the system, a system administrator can access the complaints section where they can view all complaints submitted by retailers/suppliers. They can then take appropriate actions based on the nature of the complaints, such as analyzing trends or taking corrective actions.

Type: Essential

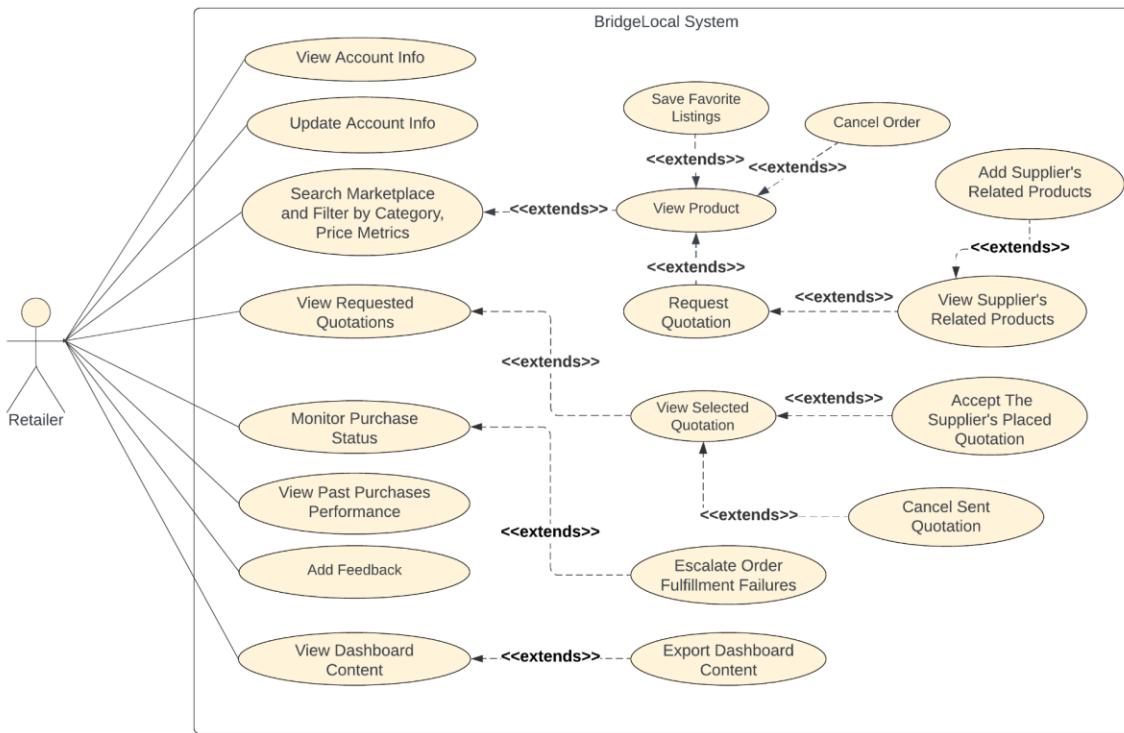
Cross-Reference: SAFR9

A typical course of action:

Table 4.2 Typical Course of Action – View Complaints

Actor Action	System Response
<p>1. Navigates to the complaints section of the dashboard.</p> <p>3. Selects a specific complaint from the list to view details.</p> <p>5. Reviews the complaint details and analyzes the complaint, including the customer's description and then takes the appropriate actions.</p>	<p>2. Server retrieves complaints from the database and displays a list of complaints.</p> <p>4. Server retrieves detailed information about the selected complaint and display its details.</p>

Alternative Solution: If the system encounters issues while retrieving complaints from the database or displaying them to the System Administrator, it notifies the System Administrator about the problem. The system may then present an error message indicating the issue encountered and suggest actions for the System Administrator to resolve the problem. This could include troubleshooting steps such as checking database connectivity, verifying system configurations, or contacting technical support for assistance.

**Figure 4.3 Use Case Diagram 3****Use case: Request Quotation****Actors:** Retailer (initiator), Supplier**Purpose:** The purpose of this use case is to facilitate the request for a quotation from a supplier by the retailer.**Overview:** After the retailer initiates a request for a quotation from a supplier, the system processes the request and forwards it to the designated supplier. Upon receiving the quotation, the system notifies the retailer, enabling them to review the provided information.**Type:** Essential**Cross-Reference:** RFR10**A typical course of action:****Table 4.3 Typical Course of Action – Request Quotation**

Actor Action	System Response
1. <i>Retailer initiates a request for a quotation from a supplier.</i>	2. System processes the request and forwards it to the designated supplier.
3. <i>Supplier receives the request and prepares a quotation.</i>	

4. System notifies the retailer about the availability of the quotation.
5. Retailer reviews the provided quotation and takes appropriate action.

Alternative Solution: The system encounters difficulties in processing the request due to incomplete information provided by the retailer. The system then notifies the retailer about the issue and redirects them to a page to rectify the information.

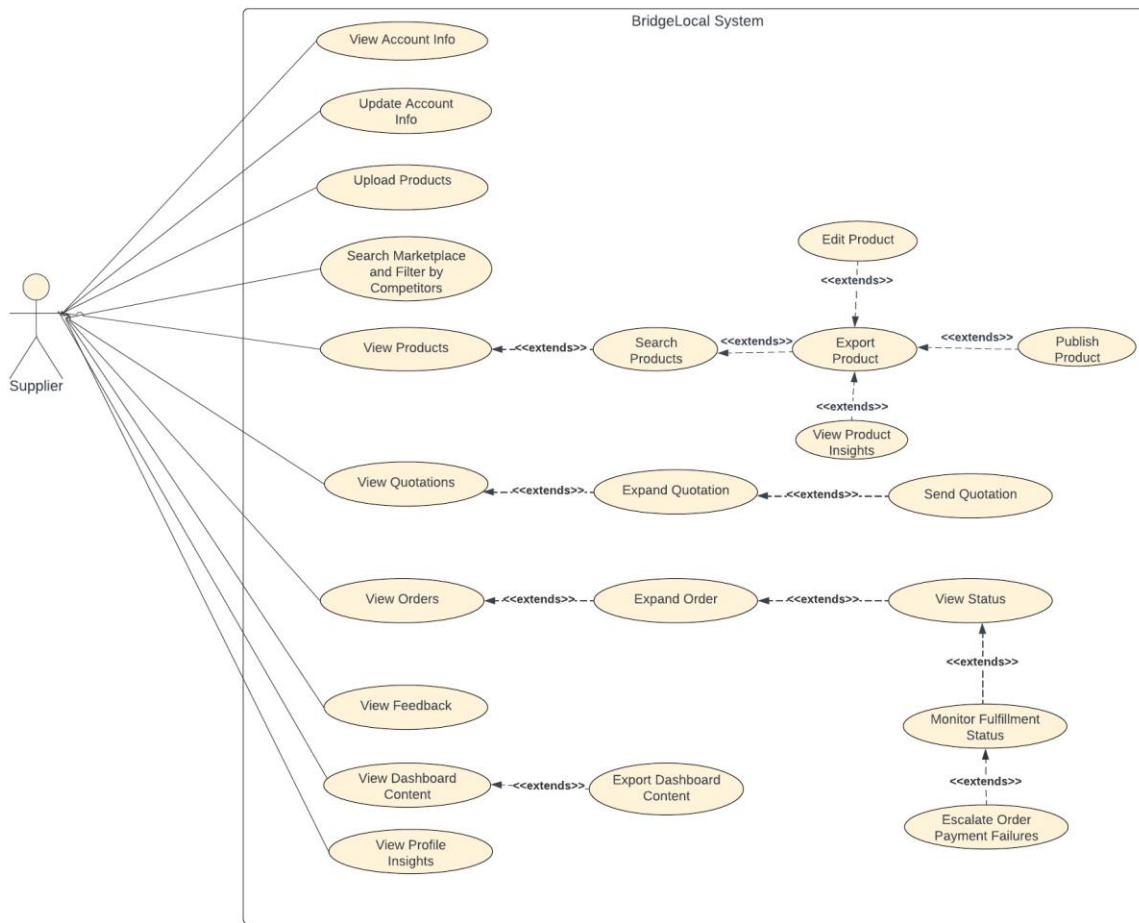


Figure 4.4 Use Case Diagram 4

Use case: Send Quotation

Actors: Supplier (initiator), Retailer

Purpose: The purpose of this use case is to facilitate the sending of quotations from a supplier to retailers.

Overview: After the supplier prepares and sends a quotation to designated retailers, the system ensures proper processing and delivery of the quotation to the intended recipients.

Type: Essential**Cross-Reference:** SFR12**A typical course of action:****Table 4.4 Typical Course of Action – Send Quotation**

Actor Action	System Response
<i>1. Supplier prepares and sends a quotation to the designated retailer(s).</i>	<i>2. System processes the quotation and sends it to the designated retailer(s).</i>
<i>3. Receives the quotation from the supplier.</i>	

Alternative Solution: If the supplier encounters issues while preparing or sending the quotation, the system notifies the supplier about the problem and prompts them to review and rectify the quotation before resending it to the designated retailer(s).

4.1.2 Class Diagram

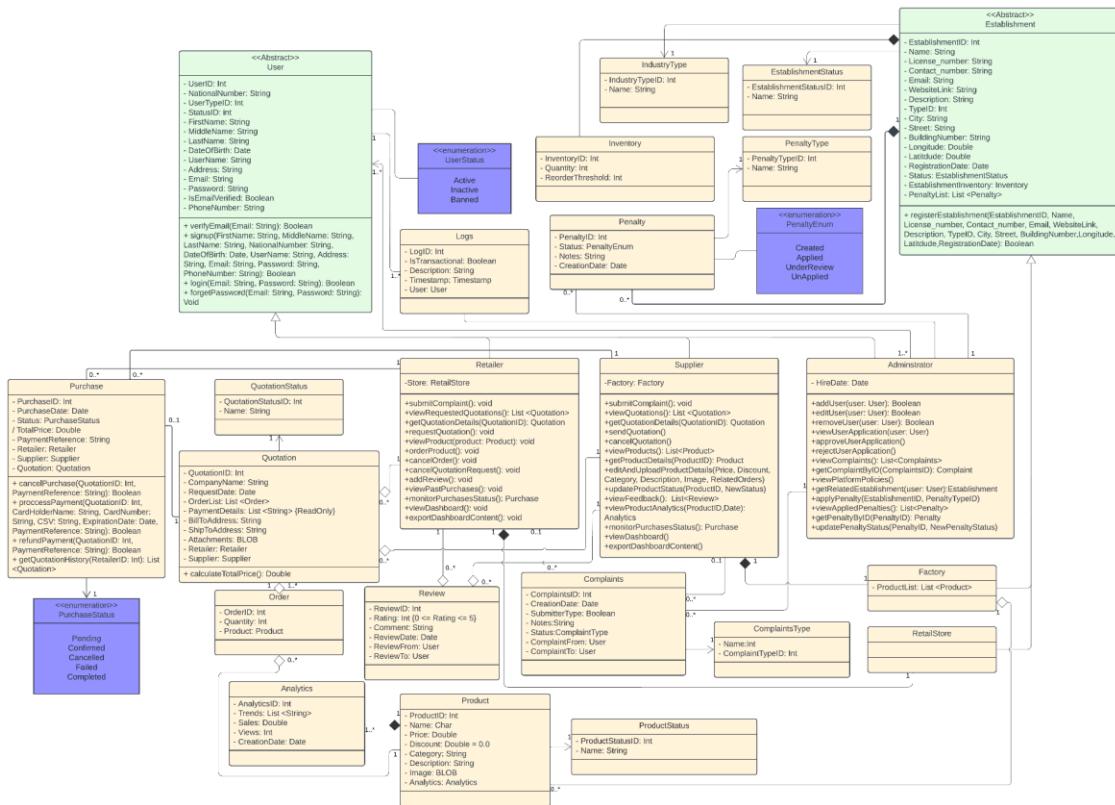


Figure 4.5 Class Diagram

The class diagram for BridgeLocal illustrates the structure and interrelationships of the core entities in the system, providing a comprehensive overview of the platform's object-oriented design. The User class is abstract and serves as a base class for specific user types such as Retailer, Supplier, and Administrator. It includes attributes for identification, contact information, and account management (e.g., UserID, NationalNumber, Email, Password, and PhoneNumber). The class also defines essential methods for user operations, including verifyEmail, signup, login, and forgetPassword.

The Retailer and Supplier classes inherit from the User class and extend it with additional attributes and methods specific to their roles. For example, Retailer has methods for managing orders and quotations (submitComplaint, viewRequestedQuotations, orderProduct), while Supplier includes methods for managing products and quotations (viewProducts, sendQuotation, editAndUploadProductDetails). Both classes facilitate essential functionalities such as submitting complaints, viewing dashboards, and exporting dashboard content.

The Administrator class, also inheriting from User, is equipped with administrative functions like managing users (addUser, editUser, removeUser), handling complaints (viewComplaints, applyPenalty), and overseeing platform policies. This role is crucial for maintaining system integrity and user compliance.

Additional classes such as Product, Order, Quotation, and Complaints are tightly integrated with user classes to facilitate the core operations of the platform. The Product class includes attributes for product details and associations with analytics, while the Order class manages order-specific data. The Quotation class links retailers and suppliers through attributes like QuotationID, CompanyName, and OrderList. The Complaints and ComplaintsType classes manage complaint submissions and categorization, ensuring proper issue tracking and resolution.

Other supporting classes like Analytics, Logs, Inventory, Penalty, and Review enhance the functionality and data management of the platform. Enumerations such as PenaltyEnum, UserStatus, and PurchaseStatus provide predefined values for maintaining consistency in user statuses, purchase processes, and penalties.

Overall, the class diagram for BridgeLocal provides a well-structured representation of the system, detailing the attributes, methods, and relationships necessary to support the platform's functionality and business logic. This comprehensive design ensures a robust and scalable solution for connecting local manufacturers with retailers, promoting local products, and fostering a competitive market environment.

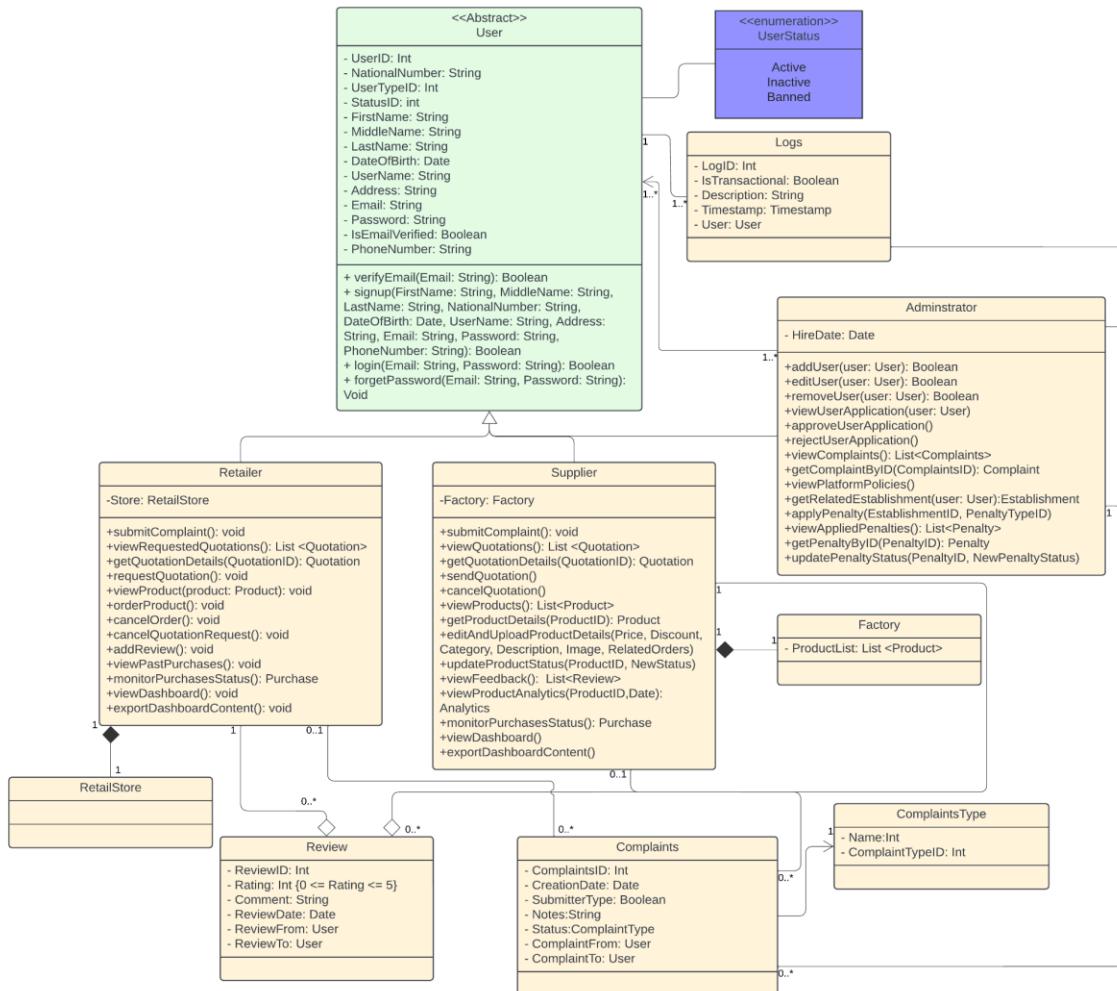


Figure 4.6 Class Diagram - Part1

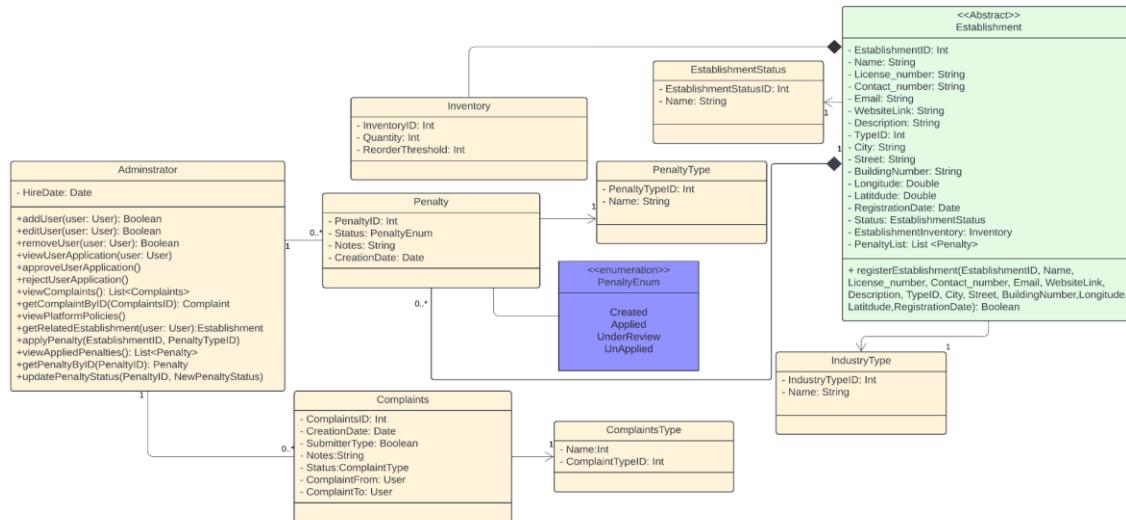


Figure 4.7 Class Diagram - Part2

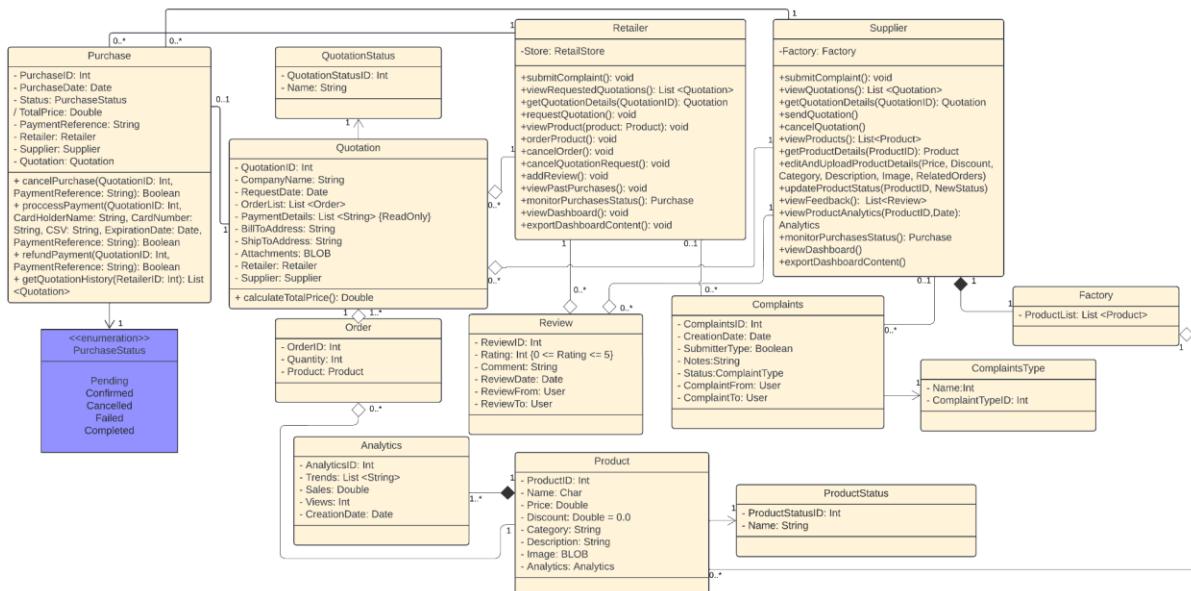


Figure 4.8 Class Diagram - Part3

4.1.3 Object Diagram

The figure below Figure 4.9 illustrates an instance of the class diagram. It provides specific information regarding an administrator by the name of "Ali Ahmad" who applied a type 2 penalty to an establishment by the name of "UTLIndustries" in response to a supplier complaint from the retailer.

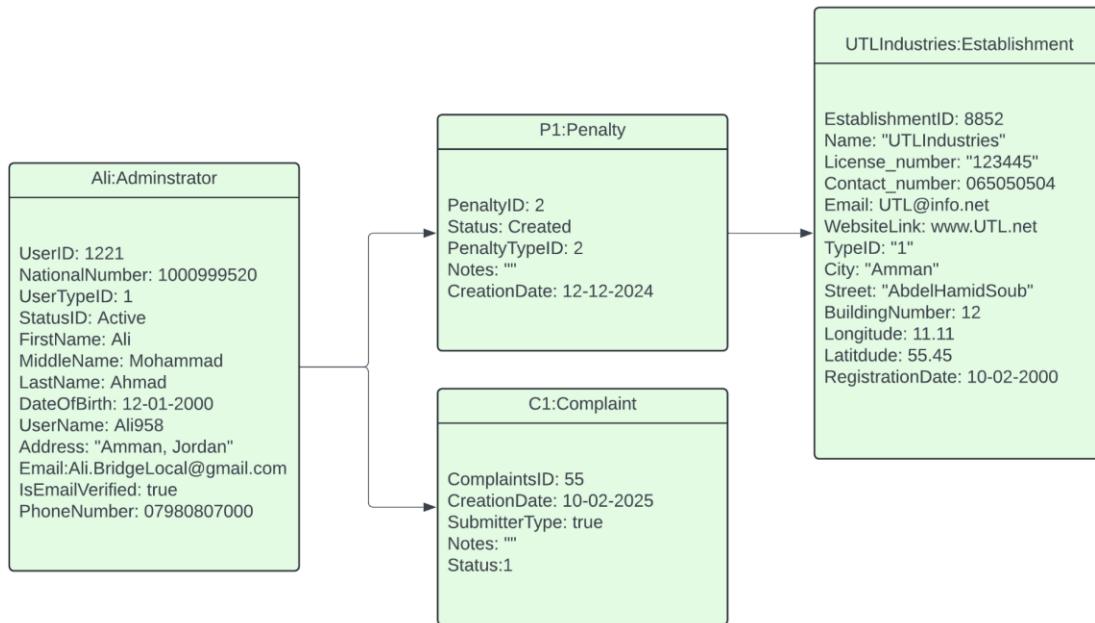


Figure 4.9 Object Diagram 1

The figure below Figure 4.10 illustrates an instance of the class diagram. It provides specific information regarding a retailer by the name of "Jawad Ismael" who gave a review to the supplier by the name of "Ahmad Jarrar" with a rating 2 and the comment "Bad Fulfillment Dates".

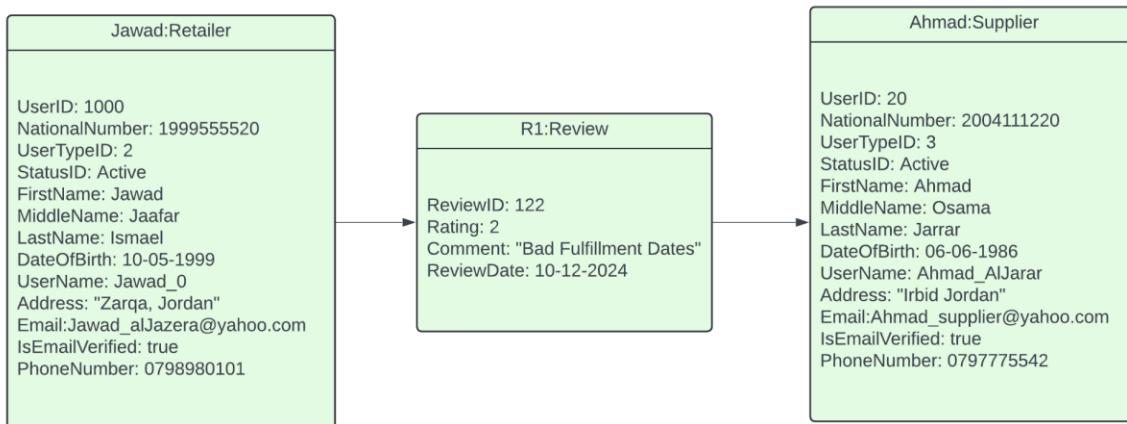


Figure 4.10 Object Diagram 2

4.1.4 Package Diagram

The first package diagram illustrated in Figure 4.11 shows the package “Users” and imported from it three other packages: “Doctor”, “Patient”, and “Potential Patient.”

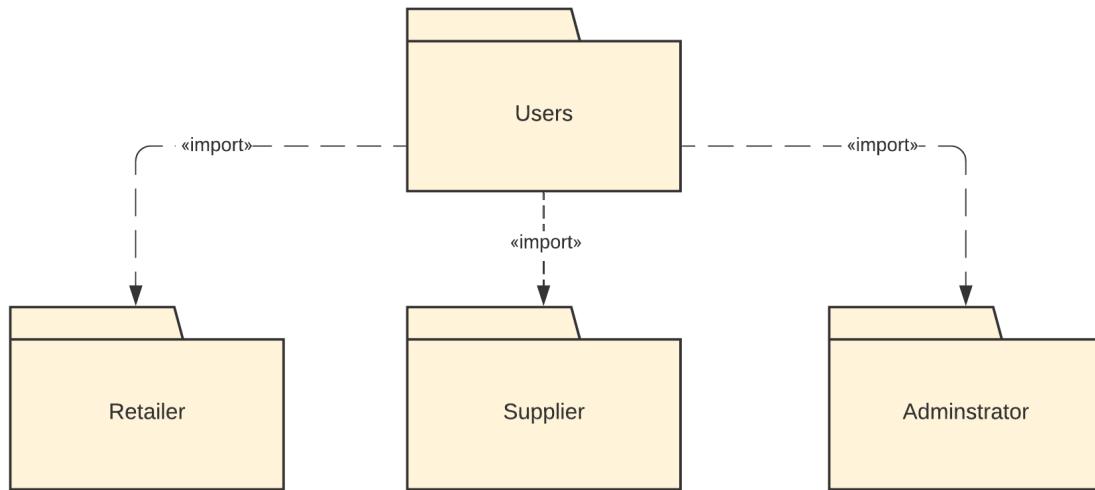


Figure 4.11 Package Diagram 1

The second package diagram illustrated in Figure 4.12 shows "User Management" merging with "Supplier," "Retailer," and "Administrator." It imports from "Platform," which imports from "Product Management." "Order Management" merges with "Order" and "Quotation," and accesses "Data collection/analytic." This detailed view highlights the interactions and dependencies among user management, order management, product management, and data analytics within the BridgeLocal system.

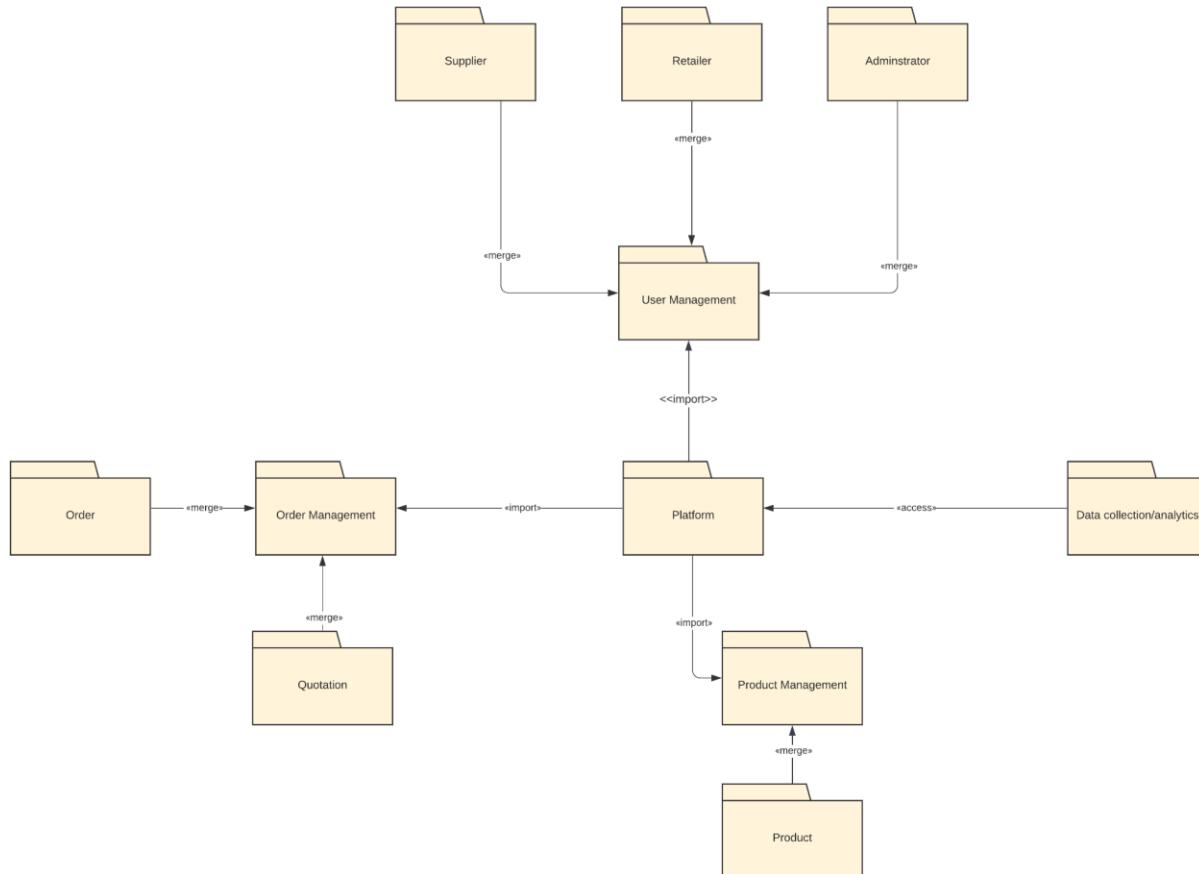


Figure 4.12 Package Diagram 2

4.1.5 Component Diagram

The figure below Figure 4.13 represents the component diagram of the system.

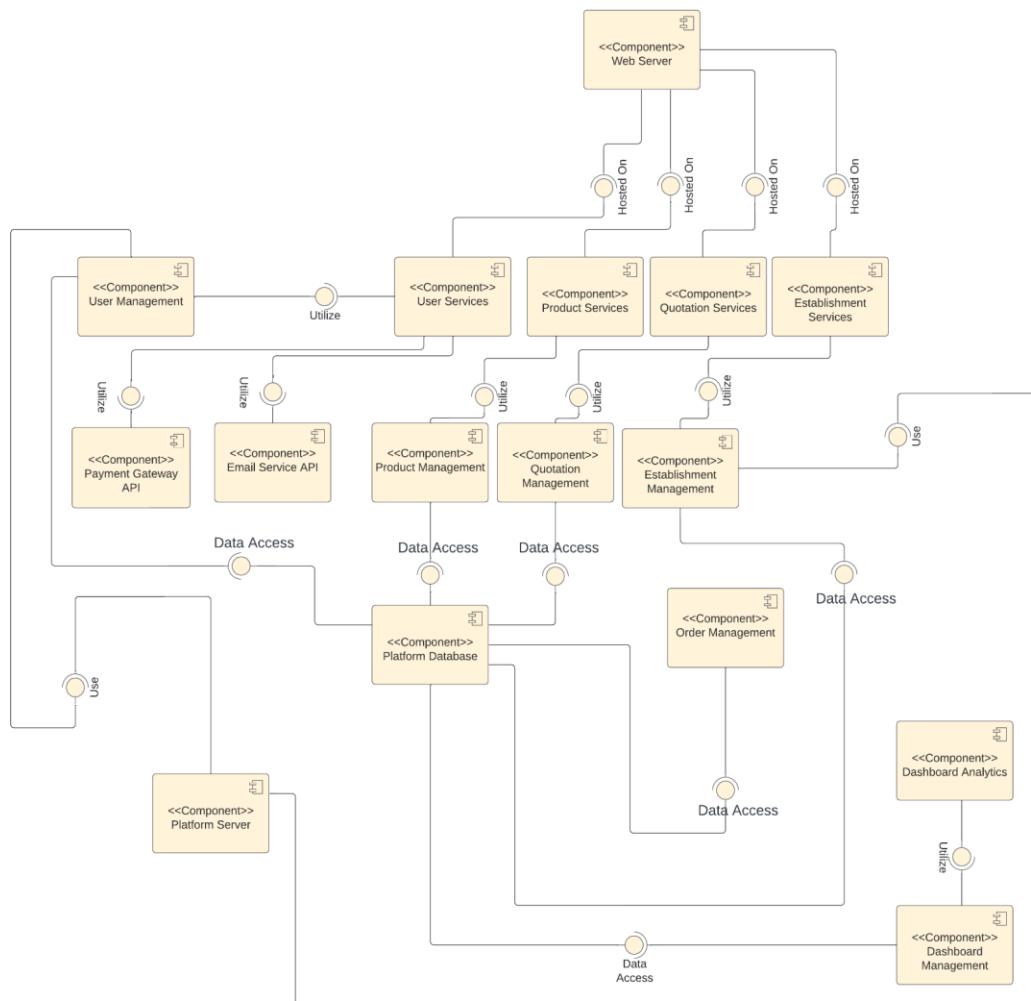


Figure 4.13 Component Diagram

4.1.6 Deployment Diagram

The figure below Figure 4.14 refers to the deployment diagram of the system, and it depicts how the hardware and software components interact with each other.

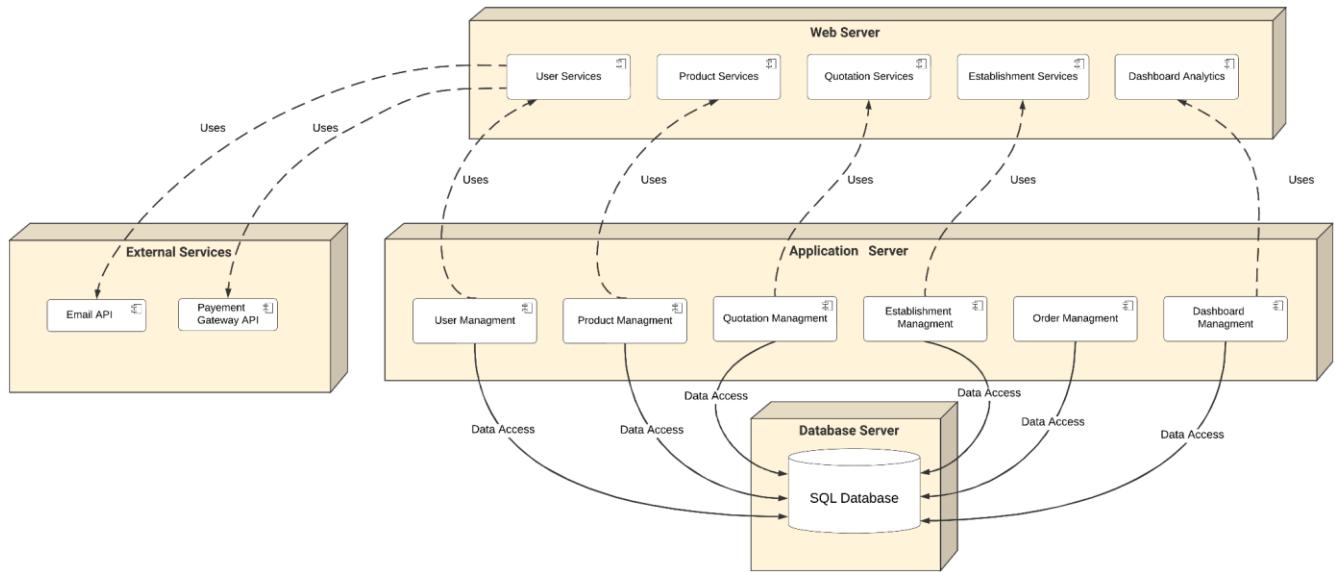


Figure 4.14 Deployment Diagram

4.1.7 Activity Diagram

The figure below Figure 4.15 shows the activity diagram for the “Create User” process, which starts when the user enters their general information. If there’s an error, it displays to the user an error indicating the error. If the information is valid, then the user should choose his type (retailer or supplier) and after that, the user enters their establishment’s details. If the data is valid, the system switches the user to their dashboard; if not, an error message pops up for the user.

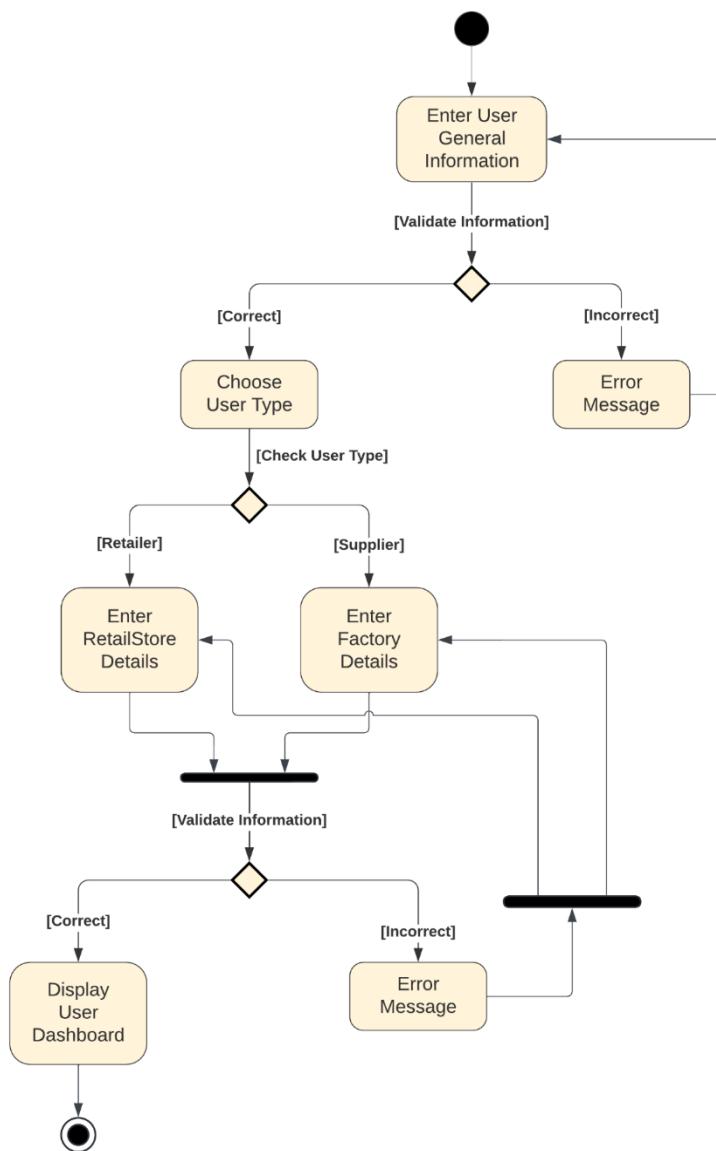


Figure 4.15 Activity Diagram 1

The figure below Figure 4.16 shows the activity diagram for the “Request Quotation” process, which starts when the retailer logs in their account and searches the marketplace for a specific product, after selecting the product, the retailer requests a quotation and sends it to the supplier, and then the supplier responds to the sent quotation and sends it back to the retailer to review it. After reviewing the quotation, they may accept and order it or reject the order.

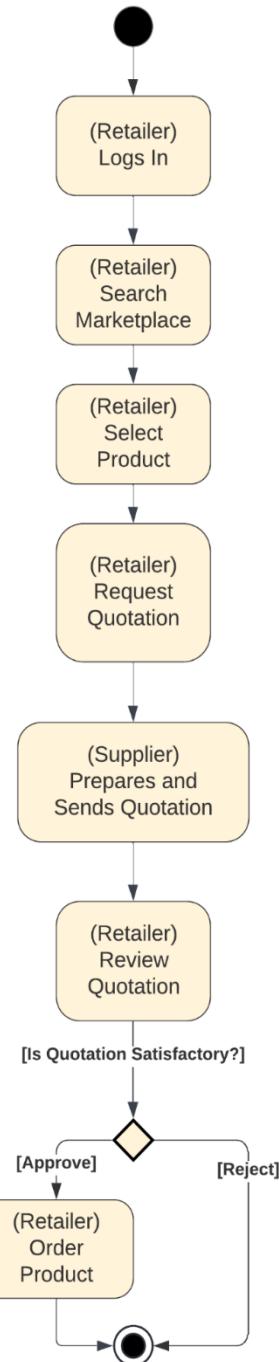


Figure 4.16 Activity Diagram 2

The figure below Figure 4.17 shows the activity diagram for “Applying Penalties” from the admin, which starts when the admin logs in to their account and selects to view the complaints, then views a specific complaint and checks the policies to see if the complaint violates the policies or not, if it violates, then the admin applies a penalty to the establishment complained about, if no policy is violated, the complaint gets canceled

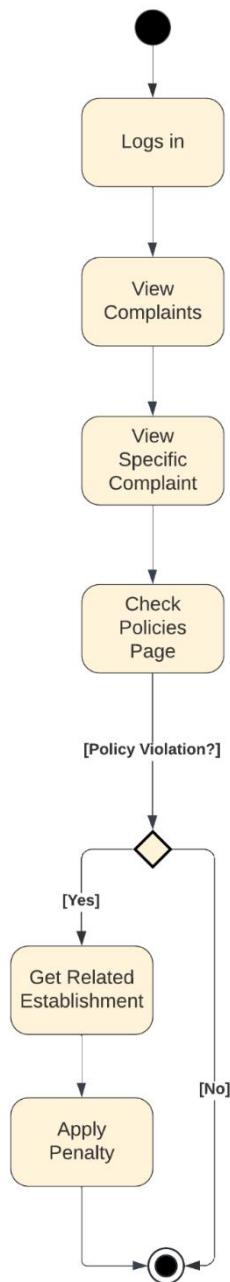


Figure 4.17 Activity Diagram 3

4.1.8 Sequence Diagram

The figure below Figure 4.18 shows the “Application Submission” Process, which starts when the user (retailer or supplier) submits their application to the system, then the admin reviews this specific application, and then the admin may accept the application or reject it and notify the user with the response.

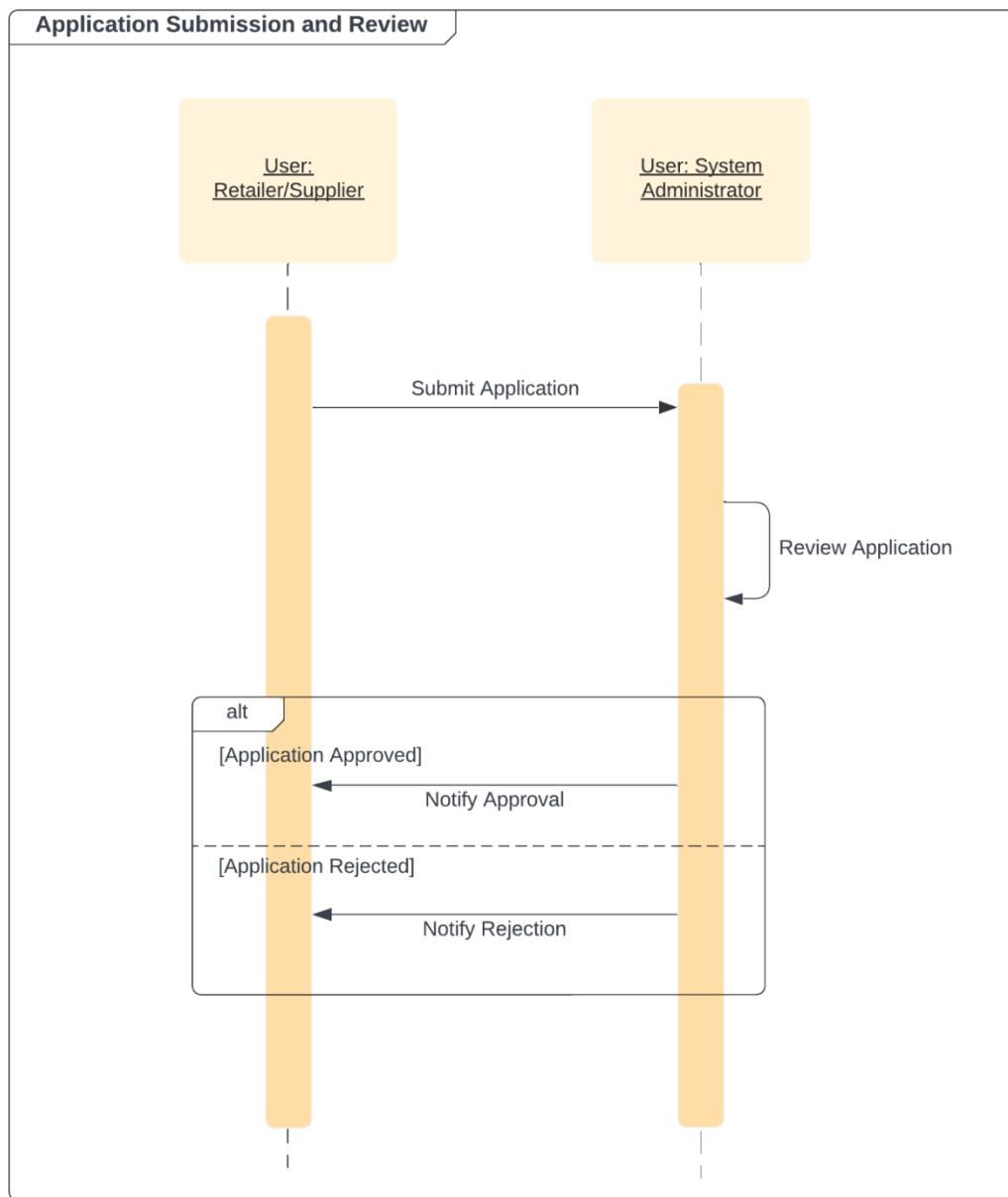


Figure 4.18 Sequence Diagram 1

The figure below Figure 4.19 shows the “Feedback Submission” Process, which starts when the retailer submits a feedback to the database about a specific supplier, the the database notifies the supplier that they received a feedback, the supplier retrieves the feedback from the database then the database shows it to the supplier.

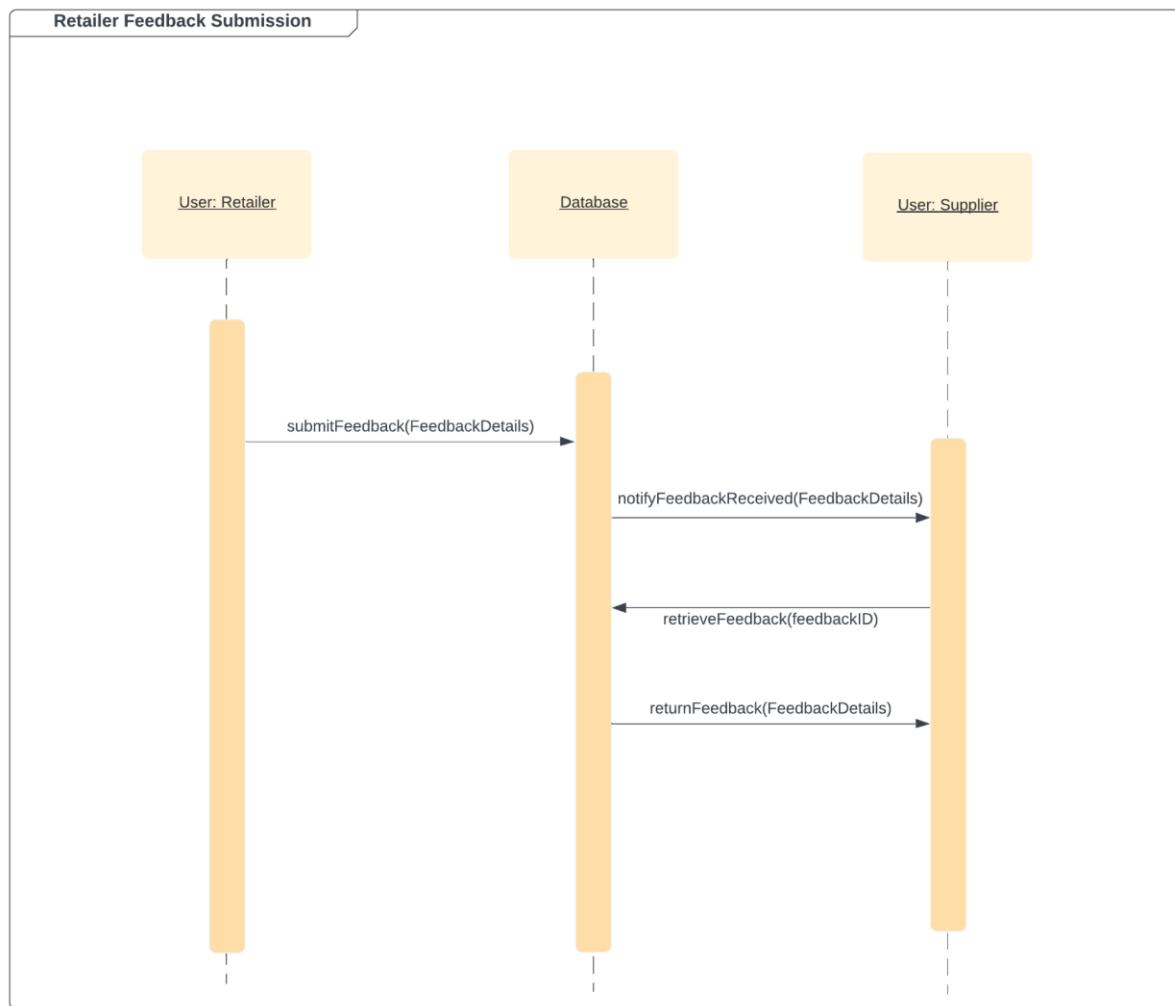


Figure 4.19 Sequence Diagram 2

4.1.9 State Transition Diagram

The figure below Figure 4.20 shows the state diagram for “Complaint status”, A complaint begins in the “Created” state and moves to “Under Review.” If the complaint violates policies, it changes to “Applied.” If it does not violate policies, it moves to “Unapplied.”

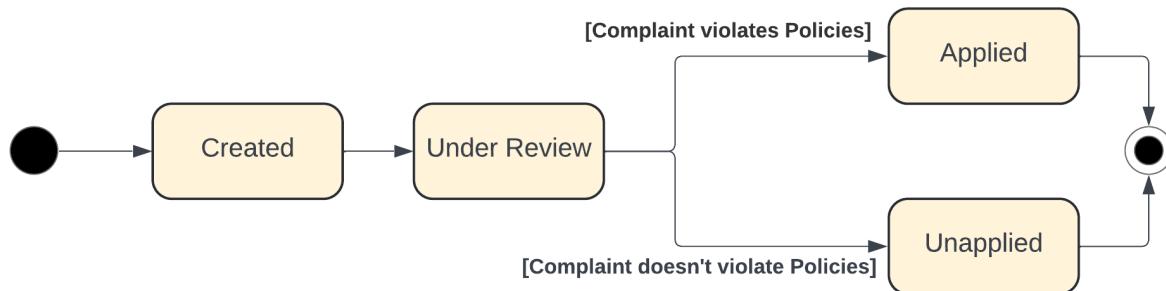


Figure 4.20 State Diagram 1

The figure below Figure 4.21 shows the state diagram for the “User status”, A user can be “Active”, “Inactive” or “Banned”. An account moves to “Inactive” if the user deactivates it, and can return to “Active”, if reactivated. If a banning penalty is applied, the status changes to “Banned.” An admin can lift the ban to return the account to “Active.” If a user remains inactive for a long time after being banned, the account remains “Banned”.

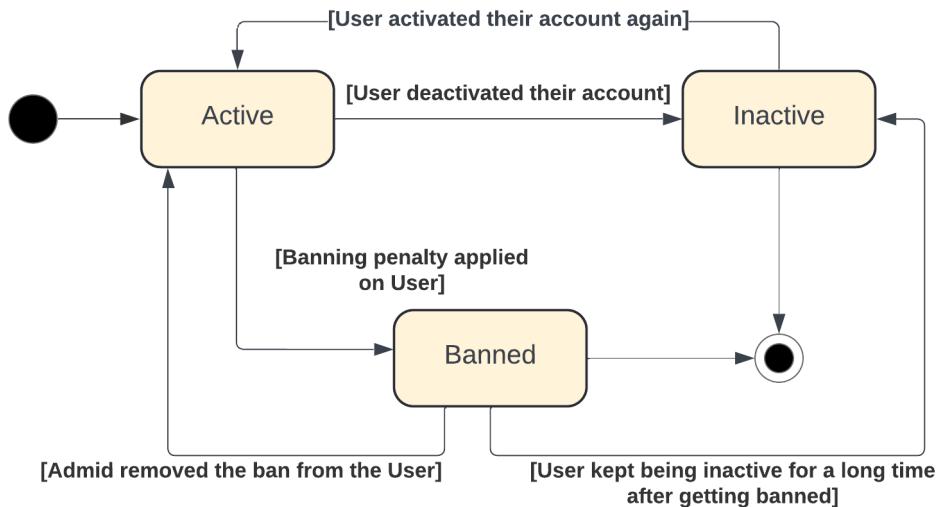


Figure 4.21 State Diagram2

4.2 Physical Model Design

4.2.1 Database Design

4.2.1.1 Database Entity Relationship Diagram

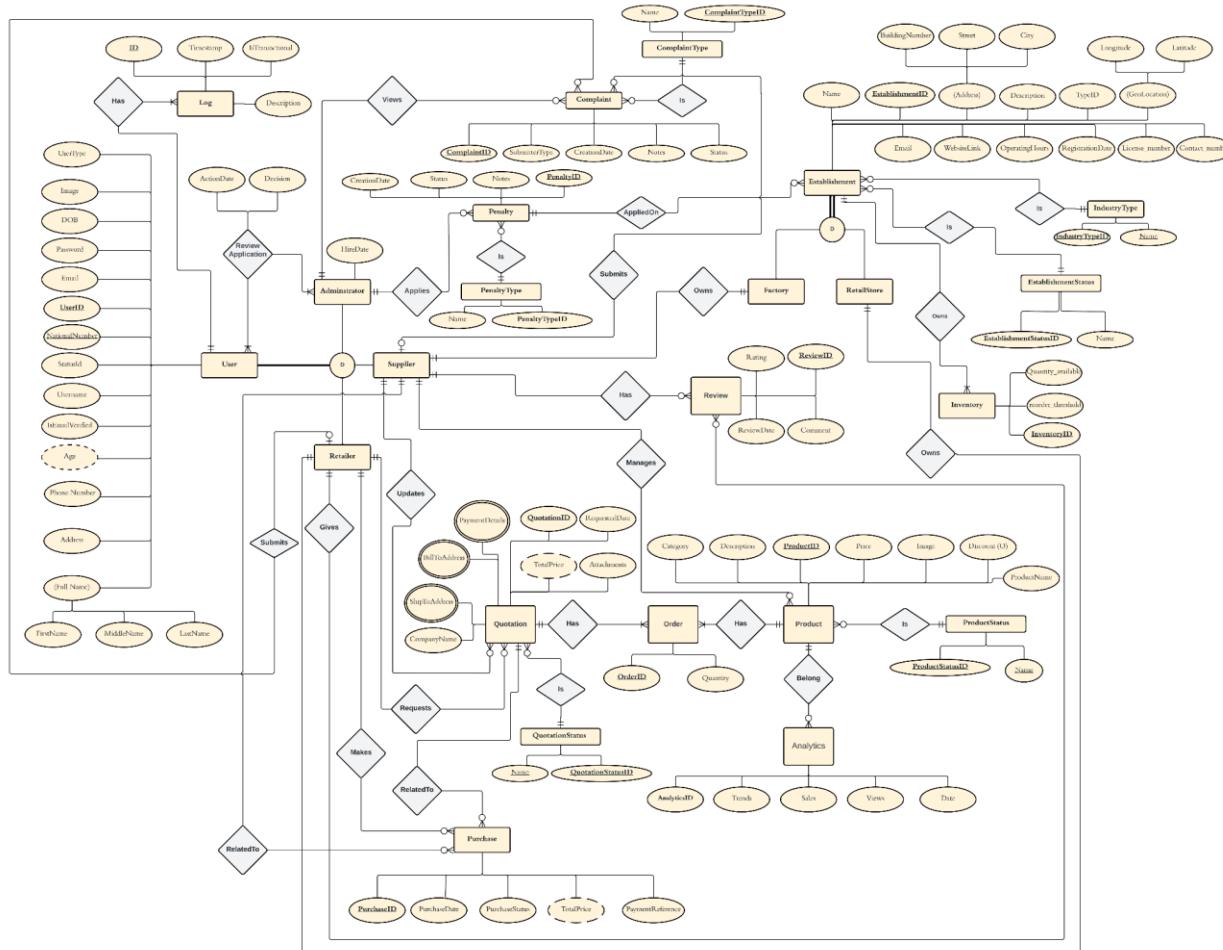


Figure 4.22 Entity Relationship Diagram

The figure above Figure 4.22 shows the ER diagram for BridgeLocal details a comprehensive data structure by defining various entities and their relationships within the system. The "User" entity is central and includes attributes like UserID, Username, Password, Email, Phone Number, DOB, Age, Full Name, StatusId, IsEmailVerified, and NationalNumber. Users can take on specific roles, such as Supplier, Retailer, or Administrator. This setup supports diverse functionalities by linking users to orders, quotations, products, reviews, analytics, establishments, inventory, penalties, and complaints.

The "Order" and "Quotation" entities are interconnected, with OrderID, RequestedDate, Quantity, TotalPrice, ShipToAddress, BillToAddress, and PaymentDetails attributes for orders, and QuotationID, RequestedDate, TotalPrice, and Status for quotations. The "Product" entity includes ProductID, Name, Description, Price, Image, Discount, and Status and is linked to inventory and categories. Additionally,

the "Review" entity captures user feedback on products through attributes like ReviewID, Rating, Comment, and ReviewDate, demonstrating the system's capability to handle product reviews and analytics.

The "Establishment" entity encompasses EstablishmentID, Name, Description,TypeID, ContactNumber, WebsiteLink, Email, Address, OperatingHours, RegistrationDate, and LicenseNumber, and it owns the "Inventory" entity. Inventory management is detailed with attributes such as InventoryID, QuantityAvailable, and ReorderThreshold, which connect to the products. The system also addresses regulatory and operational compliance through entities like "Penalty" and "Complaint," which include PenaltyID, Notes, CreationDate, and Status for penalties, and ComplaintID, Notes, CreationDate, and Status for complaints.

Supporting entities like "EstablishmentStatus," "QuotationStatus," "ProductStatus," "PenaltyType," "ComplaintType," and "IndustryType" provide additional granularity in status tracking and categorization. Address attributes for establishments further include BuildingNumber, Street, City, Latitude, and Longitude. This ER diagram effectively maps out the intricate relationships and data flows within the BridgeLocal platform, illustrating how user management, order processing, product handling, review tracking, analytics, and establishment management are integrated to provide a robust system for local producers and retailers.

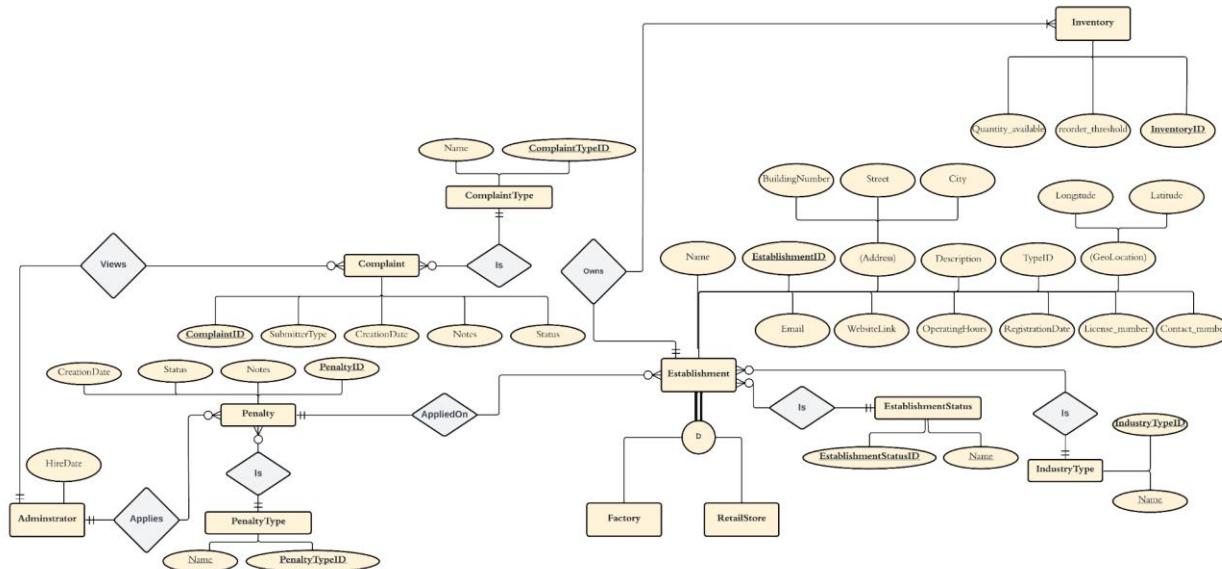


Figure 4.23 Entity Relationship Diagram - Part1

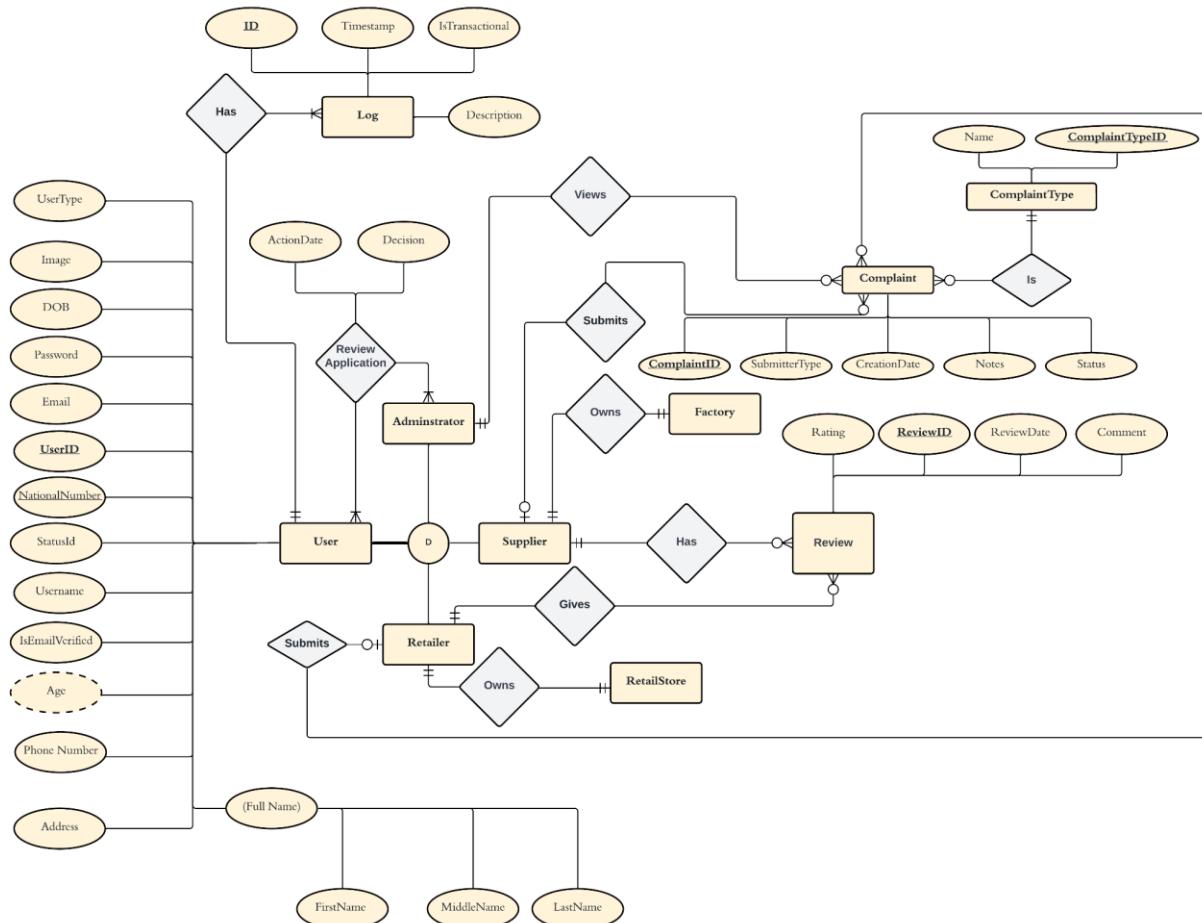


Figure 4.24 Entity Relationship Diagram - Part2

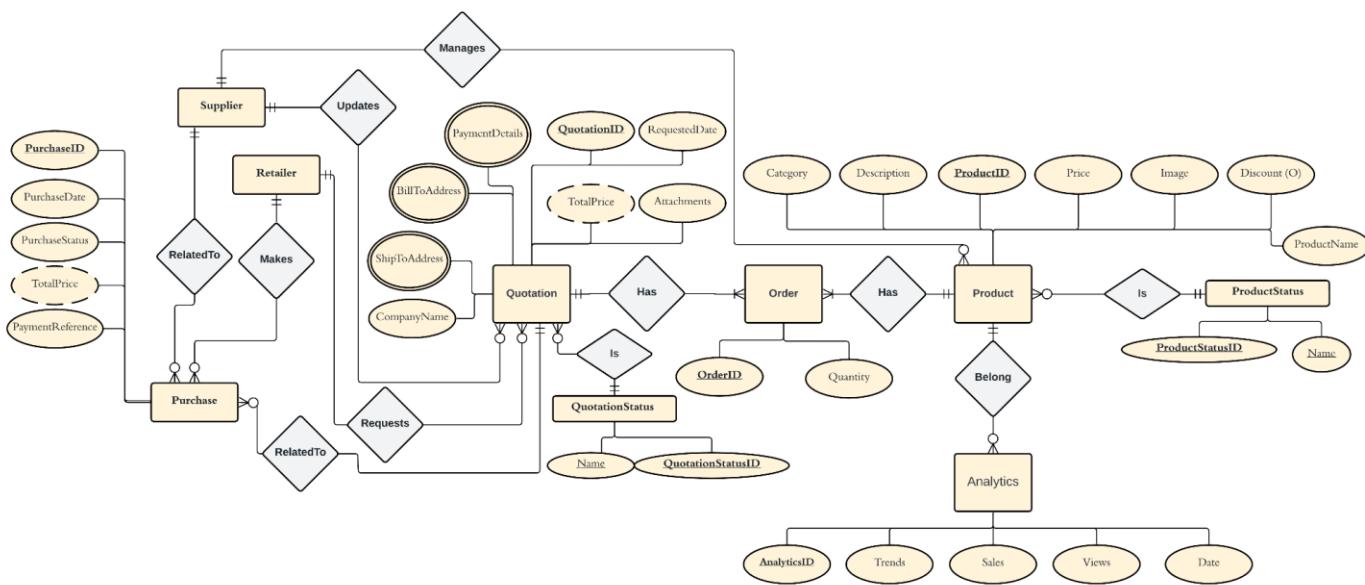


Figure 4.25 Entity Relationship Diagram - Part3

4.2.1.2 Database Schema

The figure below Figure 4.26 represents the database schema, there are 24 tables overall, and the diagram below illustrates the relationships between each table and also shows the attribute types to be employed.

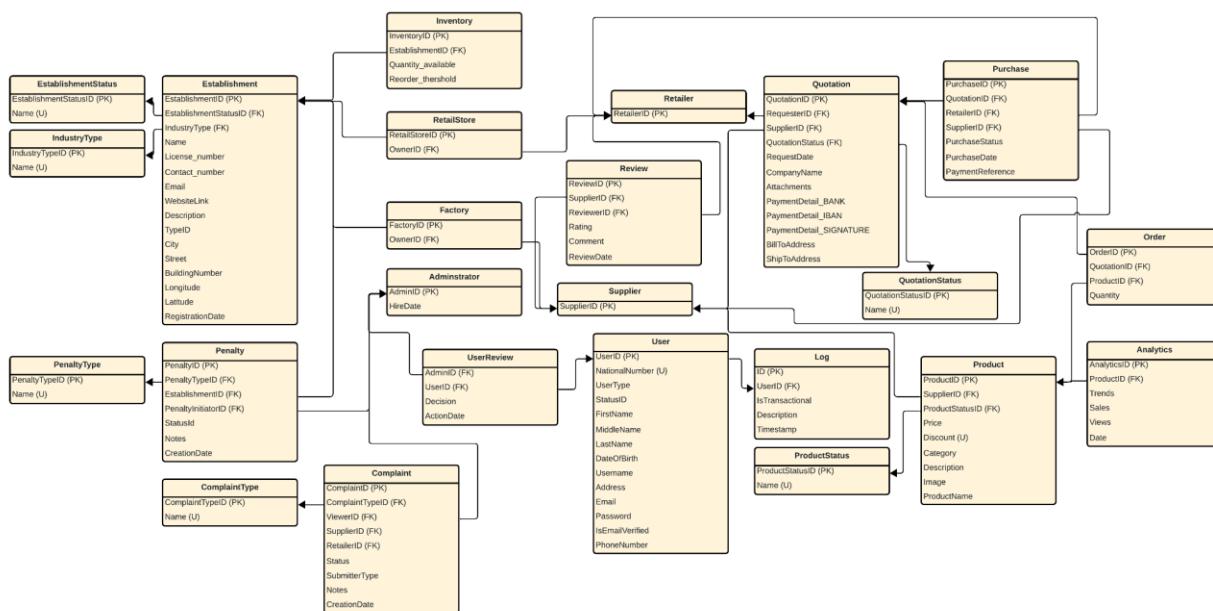


Figure 4.26 Relational Schema

4.2.2 User Interface Design

References

Use any referencing style/standard and be consistent.