Polytechnic University of the Philippines
Santa Rosa Campus
Bachelor of Science in Information Technology

Object – Oriented Programming 2024 Final Project

Café Encanto Inventory System: Desktop Based Application

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PREFACE

As a part of the new curriculum and in order to enhance practical knowledge in programming, we are required to make an application to serve as our final exam. This final project is entitled "Café Encanto Inventory System." The basic objective behind doing this project is to make a reliable and efficient system for managing the café's inventory. In this project, we have included various functions for viewing, storing, updating, and deleting products in the inventory. Doing this inventory system helps us improve our skills in programming. We did some research to help us make the application. Through this report, we learn about the importance of teamwork and the role of devotion towards the work.

INTRODUCTION

According to Mwamba and Yangailo (2024), inventory management is essential to the successful operation of every business. Managing inventory efficiently and effectively will allow the organization to avoid too many investments. It enables management to make easier and more precise decisions. It will also help to increase the value of many businesses' current assets (Team, n.d.). Effective inventory management ensures that businesses have the correct products in the right quantities, decreasing the possibility of stockouts and ensuring that customers get what they need when they need it (Inventory, n.d.). Café Encanto Inventory System is the administration of products stored in a database. It includes the activities of adding, viewing, updating, deleting products. The main purpose of this system is to make it easy to control and monitor stock levels accurately, which helps the café lower the possibility of overstocking or stockouts of products. As members of Generation Z, we have noticed that a lot of students these days study and unwind at local coffee shops. Students prefer drinking coffee while studying, so we selected a café as the company for our inventory system.Our group chose this system because it will help Café Encanto to reduce waste, keep an ideal inventory, and increase their overall production. It is not only a tool for inventory control systems. This system may help the owner to complete inventory-related duties quickly and effectively, which keeps the café running smoothly. The inventory system is a crucial part of the café business plan, which aims to increase business performance, cut expenses, and provide customers with an amazing experience.

PLATFORM

Operating System: Windows 11
Technologies Use:
- **Front End:** Java Swing, JDK 22
- **Language:** Java
- **Back End:** MySQL

Software Requirements:

Minimum:

Operating System: Windows 10 or later (including Windows 11).

- Java Development Kit (JDK): JDK 21 (Java SE 21). Ensure proper configuration within Visual Studio for Java development.
- Integrated Development Environment (IDE): Visual Studio with Java extension.
- Database Server: XAMPP (Apache, MySQL, PHP).
- Web Server: Apache HTTP Server (part of XAMPP).
- SQL: SQL for database management and queries.

Recommended:

- Operating System: Windows 11 (latest update recommended).
- Java Development Kit (JDK): JDK 21 (Java SE 21).
- Integrated Development Environment (IDE): Visual Studio with Java extension (latest version).
- Database Server: XAMPP (Apache, MySQL, PHP).
- Web Server: Apache HTTP Server (part of XAMPP).
- SQL: SQL for database management and queries.

Hardware Requirements:

Minimum:

- Processor: 1 GHz or faster processor.
- RAM: 2 GB RAM.
- Storage: At least 500 MB of available disk space.
- Display: Minimum resolution of 1024x768 pixels.

Recommended:

- Processor: Multi-core processor (Intel i5 or equivalent) or better.
- RAM: 4 GB RAM or higher.
- Storage: SSD with at least 1 GB of available disk space for development tools and projects.
- Display: Full HD resolution (1920x1080 pixels) or higher.

Software Requirement Specification:

1. **Introduction**

1.1 Purpose

The purpose of this document is to define the essential requirements for developing a Java GUI Café Inventory Management System that includes CRUD functionalities. This system aims to enhance the existing Café Encanto Inventory System by facilitating efficient management and monitoring of stock levels. By providing a user-friendly interface and robust features, the system aims to increase operational efficiency and customer satisfaction within the café environment. The primary goal is to simplify inventory handling for users, thereby improving overall café management processes and ensuring timely and accurate stock control.

1.2 Scope

- Café Encanto Inventory System manages inventory items such as supplies and menu items.
- This system will allow the owner to perform CRUD operations on these items while ensuring that inventory data is up-to-date and very accurate.
- This system has different features such as search product, search account, add account and delete account.
- This system will support the monitoring and reporting of inventory levels, which will help prevent overstocking or stockouts. Also, it will help the cafe make good decisions about inventory purchases and usage.
- System has print and export functionalities to provide soft and hard copies of up-to-date inventory reports and is intended to smoothly integrate into the café's everyday operations, delivering extensive inventory management features that will support Café Encanto's overall business goals.

1.3 Definitions, Acronyms, and Abbreviations - Technology Overview (Java, My SQL, Apache, xampp etc).

IMS - Inventory Management System
DBMS - Database Management System
IDE - Integrated Development Environment
SQL - Structured Query Language
HTTP - Hypertext Transfer Protocol
OS - Operating System
GB - Gigabyte
GHz - Gigahertz
SSD - Solid-State Drive
HD - High Definition
RAM - Random Access Memory

PHP (Hypertext Preprocessor) : A general-purpose scripting language often used for web development.

GUI (Graphical User Interface): A user-friendly interface with visual elements like buttons, menus, and text boxes for interacting with the system. In this project, Java Swing is used to create the GUI.

JDK (Java Development Kit): A software package containing tools and libraries required for developing Java applications.

Java: A high-level, object-oriented programming language.

MySQL: An open-source relational database management system used to store and manage inventory data.

XAMPP: Allows developers to test their code locally on their own computers.

Apache: An open-source cross-platform web server.

CRUD: Create, Read, Update, Delete - Fundamental data manipulation operations used in software systems, especially for managing data in a database (relevant for product management in this project).

2. Over-all Project Description

2.1 Project/product Perspective

This is about developing a simple tool for managing stock control in a café, and it's called the "Café Encanto Inventory System." The main purpose is to ensure that the café owner can trace their supplies and ingredients with ease and update them on a day-to-day basis. This system will be part of the everyday activities of the café, resulting in effective inventory management.

2.2 Project/product Functions

Inventory Management/CRUD operations:

- Create/add Product: Allows the owner to Create or add new products to the inventory, including details such as product name, description, price, and category.
- Read/view: Users can view existing inventory items. This may display details like current stock levels.
- Update Product: Enables users to modify existing product details.
- Delete Product: Permits users to remove products from the inventory.

Stock Management:

- Update Stock: Facilitates updating the stock quantities for each product, ensuring accurate inventory levels.

Reporting:

- Inventory Reports: Allow users to generate reports on various aspects of the inventory. This could include overall stock summaries, usage trends for specific items, or reports on low-stock or out-of-stock situations.

User Management:

Log In:

- User Authentication: Allow the owner to securely log in the system.

- Verify Password: System will verify whether or not the inputted username or password is correct or incorrect. It should display an error message if the inputted information is incorrect.
- Access Control: Ensures that only authenticated owner can access the system.

Log Out:

- Session Termination: Provides a secure way for users to log out of the system.

Search Management:

- Search Product: Allows the owner to search for products within the inventory using various criteria (e.g., product id, category).
- Search Account Info: Enables owner to search for account information, including user details and access levels.

Additional Functions:
Account Management:

- Add Account: Allows the owner to create new user accounts, assigning appropriate access levels.
- Delete Account: Permits the owner to remove existing user accounts from the system.

Main Menu Function:

- Navigation: Provides a central interface from which the owner can navigate to various system functionalities such as product management, stock management, search, and account management.

2.3 User Classes and Characteristics

The users of the proposed system will be those who are owning/ administering and have relation or working by the Cafe Encanto Inventory System since it can be applied in their day to day business transactions. The users who have the right to use the system will need some practice on how to manipulate the system in order to implement the system.
Users are required to have a background in using computers to handle product information and inventory.

User Classes and Characteristics
Owner/Admin

- Interact with the application
- Able to access/login to their account using their username and password provided
- Able to monitor the available supply
- Able to modifying, editing, adding, and deleting data in the system
- Able to log out from their account

2.4 Operating Environment

The system must be operated within the computer. The Cafe Encanto Inventory System is intended to work on Windows 11 operating systems.
To run the application smoothly, the hardware requirements are not high because the system only needs a 1GHz processor, 2 GB RAM, a minimum of 500 MB free disk space, and screen resolution of at least 1024x768 pixels.
Normally a database management system (DBMS) is used to store data and it is usually stored in a server where it will be used for managing data such as accessing, delete, update, and store new data to the database. In this IMS, database management and queries are done through MySQL. Further this application uses XAMPP as a web server consisting of Apache HTTP Server, MySQL, and PHP. By employing current technologies and assuring that it fits into commonly utilized platforms it provides a reliable and user-friendly interface.

2.5 Constraints

The Cafe Encanto Inventory System will be built utilizing a Java GUI framework, such as Swing or JavaFX, to provide interconnection with Windows, macOS, and Linux operating systems. The system will use XAMPP to run MySQL for database administration, which will require a JAR file (e.g.,'mysql-connector-java') to connect the Java application to the MySQL database. An Integrated Development Environment (IDE) such as IntelliJ IDEA, Eclipse, or NetBeans is required to develop, debug, and build the program, with the project set up to generate an executable JAR file for easy distribution and running.

The system will have a verification panel with user login and authentication, role-based access control to limit access to specific functionalities, and verification processes for essential tasks like adding or deleting inventory items. The user interface must be intuitive and responsive, including inventory management features such as search, filtering, and sorting. Robust error handling is required to manage database connectivity issues, invalid inputs, and other unexpected mistakes. Furthermore, the system must be thoroughly examined, including unit tests, integration tests, and user acceptance tests, to verify reliability and usability.

2.6 Use case diagram/model

2.7 System Architecture

3. Data Design

3.1 Entity Relationship Diagram

In the final Cafe Encanto Inventory System implementation, Users and Stock tables are designed to be separated. This has the added benefit of decoupling user authentication information from inventory data, leading to an overall modular and more secure system. There is no explicit association between the Users and Stock tables in this version, but that's appropriate for basic inventory management constraints. If a relationship were to get established these tables allow for future possibilities of the enhancement. These improvements are out of the scope of this final system, and they serve no purpose in its current operation.

4. Functional Design Description

4.1 Activity Diagram

5. System Walkthrough -Screenshots of GUI Modules

The first step is to open the XAMPP control panel and start MySQL and Apache. Next is to open and run the system application. When it runs, the first panel that will be displayed is the verification panel. In this, the user is asked to enter the correct admin pin that is saved on the admin's account in the database in order to be able to access the system. In entering the PIN, numbers are only allowed to be entered, and the maximum length is 6, like in the database.

When the user tries to click the verify button without a single input in the PIN field or an incorrect pin is entered, it will display the error message "Invalid PIN. Try again." By clicking the OK button, it lets the user try entering the PIN again.

Entering contents in the PIN field is masked by default for an extra layer of security.

The PIN field can only be unmasked if the show/hide pin button beneath it is clicked by the user.

The user can close the verification panel by clicking the close button.

After clicking it, it will prompt a message: “Do you want to continue?” with options Yes or No.

When the No button or close button was clicked, the close process of the verification pane was cancelled, allowing the user to try entering their PIN again.

However, when the Yes button is clicked, it will display the message "Verification failed. Exiting the Application" that when the OK button is clicked, it will continue the close process of the verification panel and exit successfully.

Then, when the verify button is clicked and the PIN is correct, it will now proceed to the login page.

When the user leaves one or all fields empty and inputs the wrong credentials and clicks the Sign-In button, it will display an error message: “INVALID USERNAME OR PASSWORD! ”.

Entering contents in the PIN field in the login pane is also masked by default for an extra layer of security.

The PIN field here can also only be unmasked if the show/hide pin button beneath it is clicked by the user.

When all credentials entered are correct and the sign-in button is clicked, it will successfully connect to the database and open the main system.

This is the home page pane; it displays the title or name of our system with animation to be appealing to the eyes of the users.

This is the stock page pane; it displays the available products in our café per category.

Let's try to add a new product to the stock table by going to the product page.

Product ID field accepts both letters and numbers inputs but it has maximum length of 20. Clicking the add button even though one or all fields are empty will resulted to an error message: “All fields are required!”.

Next, entering product details has no limitations because its format in the database is text.

Now, click the drop-down button in the categories field and move the cursor to select the category of the product that you will add to the stocks table.

Next, in entering the items available or quantity of the product that you will add, it only accepts numerical inputs.

Clicking the add button after filling up all the fields will check the database for existing product IDs to prevent duplicate product IDs in a product. As shown in the picture below, it will display an error duplicate entry as product 123 is already on the stocks table.

If all fields are not empty and certain conditions are met and clicking the add button will result to a message: "Product added to database" means adding a new product in stocks table is successful.

Going again to the stocks page pane and clicking the refresh button will reveal the newly added product.

Let's try to update the recently added product by going to the update product page pane.

The conditions on this pane are the same as on the add product page pane, so clicking the add button even though one or all fields are empty will also result in an error message: “All fields are required! ”.

The product ID field here also accepts both letter and number inputs, but it has a maximum length of 20. The product ID that you will input here will be the one saved on the stock table.

Next, enter the new product details.

Now, click the drop-down button in the categories field and move the cursor to select the new category of that product, or it depends on you if you want to change it.

Next, enter the new items available or quantity; it also only accepts numericals.

After entering all the fields and clicking the update button, it will first check for product IDs that are saved on the stocks table; if no result is found, it will display an error message: “Product ID not found." If the product ID entered was incorrect, you will see a sign that you need to manually enter the required details, but if you entered the correct product ID, the product details and quantity will automatically populate based on that product ID, except the category.

After entering all the fields, clicking the update button, and certain conditions being met, it will now update the targeted product based on the entered product ID and show a message: "Product updated! ".

Then, if we go to the stocks page pane again and click the refresh button, we will see that the product ID we updated earlier is now displayed.

Now, let's try to delete that product with ID P-12. To do that, let's go to the delete product page pane by clicking the drop-down option in the product button.

If the user tries to click the delete button without an entry to the field, it will show an error message: "The field can't be empty! ".

And if the user entered an incorrect product ID that wasn't on the stocks table, it will display an error message: ProductID not found! ".

So in order to delete a product, the correct product ID of the product that was saved on the stock table must be entered. Like in the picture below, product ID P-12 is on the stock table that we added and updated earlier. So entering the correct product ID will result in the successful deletion of that product, which will display the message "Product deleted.”.

If we go to the stocks page pane again and click the refresh button, we will see that product ID P-12 has been successfully deleted.

Now, on the show stock pane page, by clicking the drop-down button in the categories field, we can view the products on the table per category by selecting each category.

Here, we selected the coffee category, so all products in that category are shown on the table. If ALL category was selected, it will display all product categories on the table.

If ALL category was selected, it will display all product categories on the table.

There's also a print button on this pane, and when clicked, it will display the print preview with another print button.

When the print button in the print preview is clicked, it will display the print panel with the printer type and properties of the document that will be printed.

By clicking the properties, choose the landscape for orientation so that the stock table can be completely seen in the document.

By clicking OK, it will close the properties. Since we chose the printer Microsoft print to pdf, by clicking the OK button again, it will open the directory where you want to save the pdf. Other printers won't open a directory; instead, they will directly print the document.

By going to File Explorer and opening the document, we will see the stock table displayed properly.

The Export File button in this pane also makes a copy of stocks and exports them as an Excel file when clicked, displaying a message: “Export file created! ”.

When we open the file explorer and open the exported file, we can see that it successfully captures the data in the stocks table.

Now, let's try to search for a product by clicking the search account pane in the drop-down option of search.

If the search button is clicked even though the field is empty, it will display an error message: "Enter a product ID! ”.

If the entered product ID was incorrect, meaning there was no product ID found that was saved in the database, it will display an error message: “No product found with this id: (product id)”.

But when the entered product ID is correct, meaning it was found in the database, it will successfully display a message that contains the details of that product ID, such as name, quantity, and product ID, which makes the search for a product successful.

Now, let's go search for an account that was in the database. We can do that by clicking the search account in the drop-down menu of options.

In this case, if the user tries to search for an account, leaving the field empty, it will result in an error message: ”Enter an account PIN! ”.

Entering characters in the PIN field isn't allowed, so it must be numbers only, and the maximum length is 6, like in the database.

Entering an incorrect PIN that wasn't saved on any account that was in the database will display an error message: "No account found with this PIN! ".

However, if the entered PIN is correct, it will successfully display a message that contains the account username and password for that PIN.

Now, let's add an account by clicking the add account option in the drop-down menu. Clicking the add button even though one or all fields are empty will display an error message: “All fields are required! ”.

When the user tries to add an account with a username that is already existing in the database, it will display an error message: “Username is already taken.”

Passwords also must not exceed over 8 characters, or else they will display an error message: "Passwords cannot exceed 8 characters." Entering contents in a password is masked by default for an extra layer of security.

The PIN field here also has a length of 6, and letters aren't allowed to be entered.

If certain conditions are met and the add button is clicked, it will now successfully add the account with a message: "Account added to database.".

We can see the new account added by viewing the database or by searching for it in the system by entering the PIN.

Let's try to delete the account we added earlier by going to the delete account page pane in the dropdown options in the option button.

Clicking the delete button doesn't work if the field(s) are empty; it will show an error message: “All fields are required! ”.

If the field(s) contain the wrong credentials and the delete button is clicked, it will show an error message: “Account not found or account credentials are incorrect.”

Also, when the user tries to delete the admin account, it will display an error message: “Cannot delete admin account.” This will make the admin account default in the system.

Passwords also must not exceed over 8 characters, or else they will display an error message: "Passwords cannot exceed 8 characters." Entering contents in a password is masked by default for an extra layer of security. The PIN field here also has a length of 6, and letters aren't allowed to be entered.

If certain conditions are met and the add button is clicked, it will now successfully delete or remove the account with a message: "Account deleted successfully.".

We can now view that deleting the account: wew2 earlier was successfully done through viewing the database or via a search account in the system by entering the PIN that shows a message: “No account found with this PIN! ”.

Last, by clicking the Logout in the drop-down options of the account button, it will exit the main system and rerun the verification pane, which will repeat the same process. The user can also choose to close the main program by clicking the close button if they don't want to re-login again.

6. Source Code

https://github.com/PJM012/CAFE-ENCANTO-SOURCE-CODE.git

7. Conclusion

Café Encanto Inventory System assertion indicates an absolute breakthrough on the terrain of inventory management in the café environment. As emphasized by Mwamba and Yangailo (2024), efficient inventory management is a key factor for the optimal performance of any business. The instrument guarantees that no miscalculation is made in the supplying or warehousing of any product thus reducing errors. It does this through the receipt, display, update, and delete of the item and hence forth decreases the probability of too much or no stock, that supports better business conditions through more efficient and satisfied customers.

The front end was designed with Java Swing while MySQL was used for the back end. The tool's functionality to generate accurate inventory reports enables strategic decision-making which in turn permits the café to be more efficient in its supply chain, have zero waste, and increase the overall productivity. Also, the system runs perfectly on Windows 11 and employs other software like XAMPP and Apache which ensure it is fully functional in the desired environment.

Café Encanto would implement this inventory management system to bring to its system a higher level of accuracy in inventory tracking and control leading to more efficacy and decreasing operational costs. The system, apart from managing stocks, also acts as a tool to support the café's efforts involved in rendering customer satisfaction. This study establishes the crucial inventory management performance of a business and as a solution offers the operational resources to Café Encanto.

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