

**DBMS**

Semester Project Report

**Implementation of a Mess System using Database**

## Introduction

## This project report details the development of a Python application named "Giki Mess System." This system is designed to streamline student check-ins and check-outs at Giki Institute's mess facility. It also empowers students to manage their remaining credits and access their credit history for improved transparency.

## System Requirements

## Software:

## Operating System: Windows, macOS, or Linux (as Python runs on all these

platforms)

## Python 3 (latest version recommended for best performance and security)

## Required Libraries: tkinter, sqlite3 (these are typically included in standard Python installations)

## Hardware:

## A computer with sufficient processing power and memory to run the application smoothly. An internet connection is not required for basic functionalities, but may be necessary for future integrations with external systems.

## System Design and Architecture

## The Giki Mess System utilizes a simple client-server architecture. The client application, developed using the tkinter library, provides a user-friendly interface for students to interact with the system. The server-side, implemented with the sqlite3 library, manages a database that stores all relevant information.

## Client Application (tkinter):

## Handles user interactions through graphical elements like buttons, labels, and entry fields.

## Validates user input (e.g., student ID, password, credit amount) for data integrity.

## Communicates with the database server to perform operations like login, signup, credit management, check-in/out, and menu display.

## Database Server (sqlite3):

## Stores student information (ID, password, credits) in a secure manner.

## Maintains check-in/out logs with timestamps and status ("In" or "Out").

## Tracks student credit history, recording timestamps, credit changes (positive or negative), and reasons for the change (purchase, check-in deduction).

## System Functionality

## The Giki Mess System offers a range of functionalities to enhance the mess management process for both students and the administration.

## User Login and Signup:

## Students can log in using their unique ID and password assigned during registration.

## New students can create an account by providing a student ID and a password. The system ensures no duplicate IDs exist to prevent unauthorized access.

## Main Menu:

## Upon successful login, students access a user-friendly menu with clear options for:

## Credits: View remaining credits, load additional credits, and access credit history.

## Check In/Out: Check in or out of the mess facility.

## Menu: View a sample weekly menu (this can be replaced with a real-time menu feed in the future).

## Logout: Safely exit the application.

## Credits Management:

## Students can view their current credit balance, providing transparency into their remaining meals at the mess.

## The system allows students to load additional credits by entering the desired amount. This facilitates easy top-up of credits as needed.

## A detailed credit history is accessible, displaying timestamps, changes in credit amounts (positive for purchases, negative for check-in deductions), and reasons for the changes. This fosters transparency and allows students to track their credit usage.

## Check-In/Out:

## Students can conveniently check in or out of the mess facility using dedicated buttons.

## The system automatically deducts a pre-defined credit amount upon check-in. This credit amount can be configured by authorized personnel to reflect the mess fee.

## To ensure responsible credit usage, the system validates if a student has sufficient credits before allowing check-in. A message alerts students with insufficient credit to top up before attempting another check-in.

## Weekly Menu:

## The system currently displays a sample weekly menu for informational purposes. This provides students with a general idea of the meal options available.

## In the future, the system can be integrated with the mess's actual menu system to display real-time menu information, offering students greater flexibility in meal planning.

## Implementation Details

## The Giki Mess System is implemented using Python, a versatile and widely used programming language. Here's a breakdown of the key components:

## Database Creation: The create\_database function utilizes the sqlite3 library to create the required tables in the database:

## students: Stores student information (ID, password, credits).

## check\_in\_out: Tracks check-in/out logs (student ID, timestamp, status).

## credit\_history: Maintains credit history details (student ID, timestamp, change in credit, reason for change).

## User Interface (tkinter):

The MessSystemApp class defines the application's core functionalities and manages the user interface elements using the tkinter library. Here's an overview of its **Key methods:**

* \_\_init\_\_(): Initializes the application window with a title, geometry (size), color scheme, and student ID variable (initially set to None).
* clear\_frame(): Clears all widgets from the main frame before displaying a new page, ensuring a clean and organized interface.
* show\_login\_page(): Displays the login page with entry fields for student ID and password, along with login and signup buttons.
* authenticate(): Validates user credentials by fetching the entered ID and password from the database and comparing them with stored values. If a match is found, the student ID is stored, and the main menu is displayed. Otherwise, an error message is shown.
* show\_main\_menu(): Presents the main menu after successful login, offering buttons for credits, check-in/out, menu, and logout functionalities.
* show\_credits\_page(): Displays the credits page, showcasing the student's remaining credits, buttons for loading additional credits and viewing credit history, and a back button to return to the main menu.
* load\_credits(): Enables students to load additional credits by entering a desired amount. The system updates the student's credit balance in the database, records the transaction in the credit history, and displays a success message.
* view\_credit\_history(): Retrieves the student's credit history from the database, displaying timestamps, credit changes, and reasons for each transaction. This provides a detailed record of credit usage.
* show\_check\_in\_out\_page(): Presents the check-in/out page with buttons for each action. The system determines the new status (In or Out) based on the last recorded status and deducts a pre-defined credit amount upon check-in (only if sufficient credits are available).
* show\_menu\_page(): Currently displays a sample weekly menu for informational purposes. Future enhancements can integrate with the mess's actual menu system for real-time updates.

**Testing and Deployment**

* **Unit Testing:** Individual functions and modules can be tested with unit testing frameworks like unittest to ensure they operate as expected and handle various input scenarios (valid, invalid, edge cases).
* **Integration Testing:** Once individual components are functional, integration testing verifies how they interact with each other and the database to achieve the desired system behavior.
* **Deployment:** The application can be deployed as a standalone executable using tools like pyinstaller for easy distribution and use on different systems. Alternatively, the source code can be hosted on a server and accessed through a web interface for a more centralized approach.

**Results and Evaluation**

The Giki Mess System has been successfully developed and tested to demonstrate its functionalities. It streamlines the mess management process for both students and the administration by:

* **Enhancing Student Convenience:** Students can easily manage their accounts, check credits, and perform check-in/out operations through a user-friendly interface.
* **Improving Transparency:** Students have access to their credit history, providing insights into their credit usage and fostering responsible management.
* **Simplifying Administration:** The system automates check-in/out processes and credit deductions, reducing manual recordkeeping and potential errors.

**Future Enhancements**

The Giki Mess System offers a solid foundation and can be further improved by incorporating the following features:

* **Integration with Mess Menu System:** Real-time menu integration can display actual meal options, allowing students to make informed choices based on their preferences and dietary needs.
* **Credit Package System:** Implementing different credit packages (e.g., monthly, semesterly) can cater to diverse student needs and spending habits.
* **Low Credit Balance Notifications:** Alerting students with low credit balances can prompt timely top-ups to avoid disruptions in meal access.
* **Admin Panel:** An admin panel can be developed to manage student accounts, credits, menus, and generate reports for better oversight and analysis.

**Conclusion**

The Giki Mess System is a valuable application for Giki Institute, offering a convenient and transparent solution for student mess management. The core functionalities address current challenges and provide a platform for further enhancements. By implementing the proposed future features, the system can become even more comprehensive and beneficial for both students and the administration.