Overall Project Design

Assignment 2: Milestone 1

CS 346: Software Engineering Laboratory

Task:

Telephone (ISP) Management System

Authors:

Aasneh Prasad	210101001
Abhi Agarwal	210101002
Abhinav Kumar	210101003
Abinash Sonowal	210101004
Achintya Gupta	210101005
Achyut Dhiman	210101006

Instructor:

Prof. Pradip K. Das, Dept. of CSE, IITG

February 8, 2024

1 Problem Statement

The Problem Statement given is to develop a $VisualBasic$ Application of Telephone Management System (ISP) for Indian Institute of Technology, Guwahati (IITG). This report presents the development of a Visual Basic Application tailored to address the institution's telecommunications needs.

The Telephone Management System (TMS) must be designed to streamline various tasks associated with telephony services, including new user registration, profile management, plan management, and administrative functionalities.

Leveraging $VisualBasic$ as the primary programming language and utilizing either $MySQL$ for database management, the TMS must offer a robust platform to manage telephone-related operations seamlessly.

The subsequent sections of this report will delve into the design, development, and implementation details of the Telephone Management System, elucidating its features, architecture, and functionalities in depth. Additionally, it will address the methodologies employed, challenges encountered, and future recommendations for further enhancements.

2 Design Requirements

The following are the specifications of the software that have to be developed according to the design requirements:

- **User Registration:**
  - The system should provide a user-friendly interface for new users to register their telephone accounts.
  - Mandatory fields such as *name*, *IITG email id*, *usertype* and *password* should be included in the registration process.
  - Validation mechanisms should ensure the integrity of user-provided information.
- **Profile Management:**
  - Registered users should be able to access and update their profile information.
  - Profile management functionalities should include options to view personal details, update contact information, and modify active plans.
- **Plan Management:**
  - The application must support the management of various telephone plans offered at IITG.
  - Users should have the ability to select and/or modify their telephone plans as per their needs.
  - Plan details such as *subscription fees*, *validity*, *talktime* and *data limits* should be clearly presented to users.

- **Admin Panel:**
  - An administrative dashboard should be provided for authorized personnel to manage system settings and user accounts.
  - Admin functionalities should include user account management (creation, modification, deletion), plan configuration, access control, and monitoring.
  - Comprehensive reporting tools and analytics features should be available to administrators for tracking system usage and performance.
- **Database Management:**
  - The application should integrate with MySQL for database requirements.
  - Database design should support efficient storage and retrieval of user profiles, plan details and administrative data.
- **User Interface Design:**
  - The application's interface should be intuitive, user-friendly, and responsive on user's device.
  - Navigation should be simple and logically organized to facilitate smooth user interactions.
  - Clear and informative content should be provided to users and admin during registration, profile management, and other system operations.
- **Scalability and Performance:**
  - Extensive testing and performance monitoring tools should be utilized to identify and address bottlenecks in system performance.
  - The system architecture should be designed to accommodate large data.

3 Design Components and Visual Interface

3.1 Landing and Login

Figure 1: Login Interface

Components of Landing page:

- **New User Button:** Click to register if you are new user and have not registered yet.
- **Login Button:** Click to login if you are an existing user.
- **Admin Button:** Click to manage various activity if you are an admin

Components of Landing page:

- **IITG Email ID:** Enter your IIT Guwahati official mail ID.
- **Password:** Enter your secure password that you set during registration.
- **Login Button:** Click to Login with your username and password.

Technical details and Functionality:

- **Picture Box**: Picture Box is used to display images, icons, or other graphical content on a form.
  - PictureBox1: Display an image of *IITG* Logo.

Figure 2: Login Interface

- **Button**: Button control is a fundamental graphical user interface (GUI) element used to trigger actions or events when clicked by the user.
  - Button1: Select *Login* option to log in to your profile.
- **Label**: The Label control is used to display static text or descriptive information on a form.
- **TextBox**: TextBox control is used to display and edit formatted text, allowing users to create, view, and manipulate text.
  - TextBox1: Take username of user as input.
  - TextBox2: Take Password of user as input. ***UseSystemPasswordChar*** property of Textbox control is set to True so the dots are shown instead of real password to secure users privacy.

Error Handling and Edge Cases:

- **Email not registered:** In case of mail ID not found on database, an error message will be displayed "Email not registered", prompting the user to re-enter a username and password.
- **Incorrect Password:** An error message will be displayed stating "Incorrect Password" and prompting the user to enter the password.
- **Empty Input:** An error message will be displayed stating "Email and Password required" and prompting the user to re-enter.

3.2 New User Registration

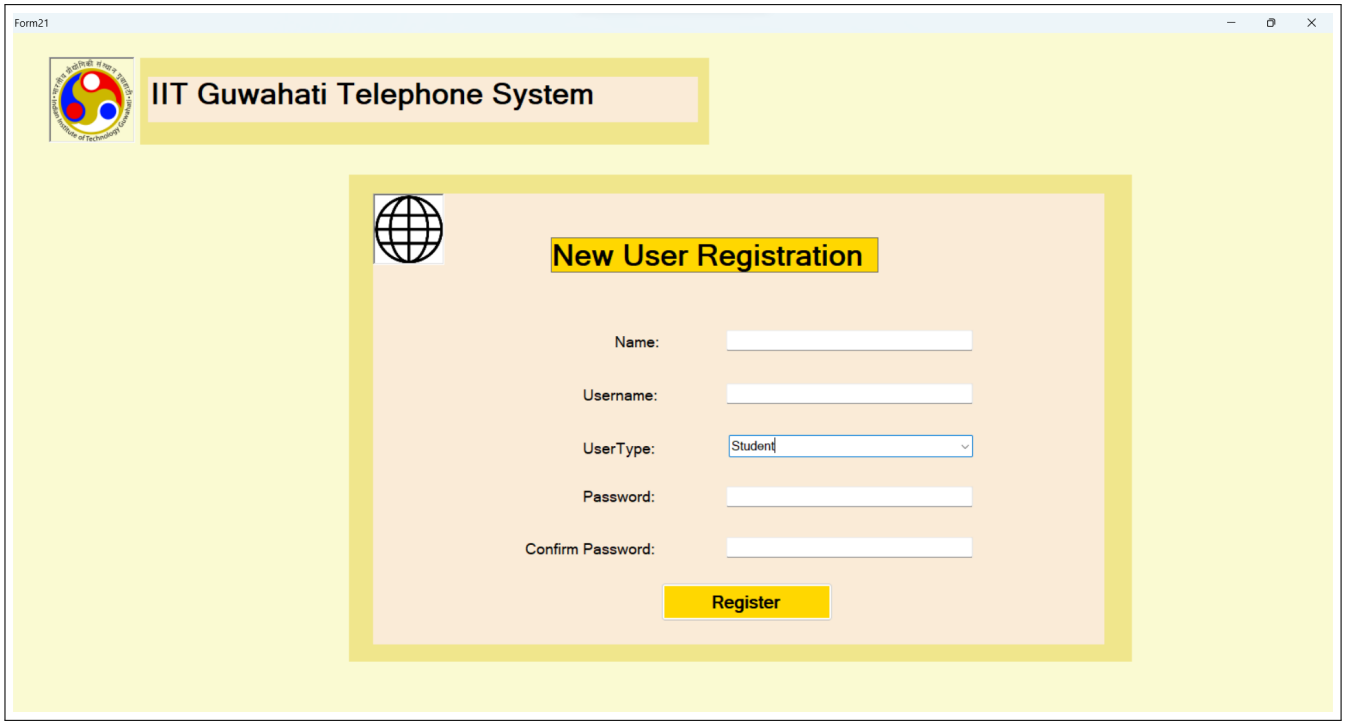

Figure 3: New User Registration Form

Components of Registration Form:

- **Name:** Enter the name of the user, including both First Name and Last Name.
- **Username:** Enter the institute provided e-mail ID for the residents of the college.
- **UserType:** Specify the user type from the specified options.
- **Password:** Enter a secure password for login purposes.
- **Confirm Password:** Re-enter the password to match with the above-mentioned password.
- **Register Button:** Click on the Register Button after filling in the required information to complete the registration.

Communication Messages:

- **Confirmation Message:** On Successful registration, a message will be displayed "Your Account has been successfully created".
- **Phone Number Allocation:** A 10-digit phone number will be provided upon successful completion of registration, and the same should be noted for communication purposes.

Error Handling and Edge Cases:

- **Unique Username:** In case of a non-unique username, an error message will be displayed "Username Already Exists", prompting the user to enter a unique username.
- **Password Mismatch:** An error message will be displayed stating "Password Mismatch" and prompting the user to enter the matching password.

3.3 User Profile Page

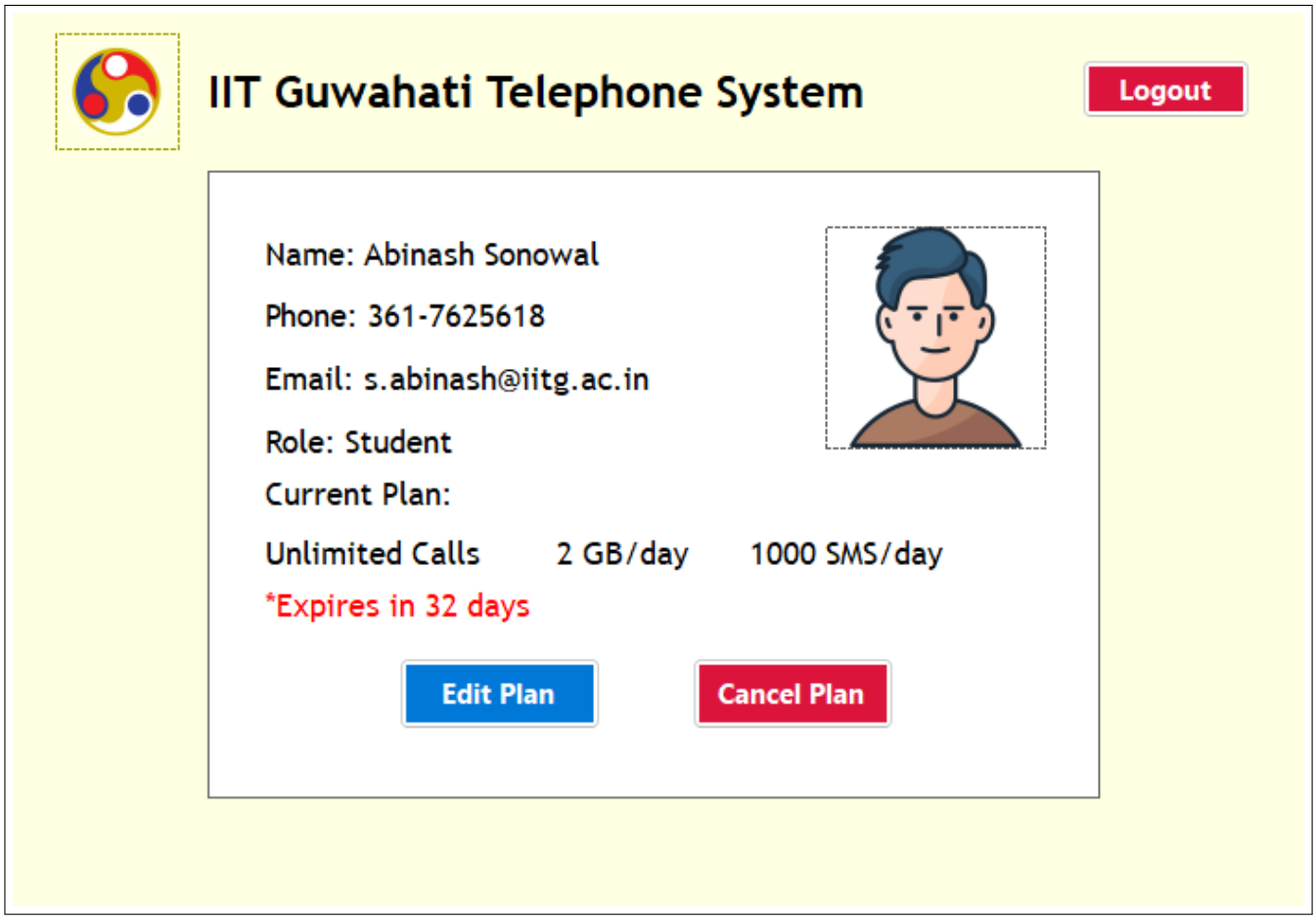

Figure 4: Profile Page graphical layout

Components of Profile page:

- **Details**: This provides the entire information of the user. It consists of the following:
  - **Name**: Displays the name of the user.
  - **Phone**: Displays the currently allotted phone number.
  - **Email**: Displays the IITG Email of the user.
  - **Current Plan**: Displays the plan selected by the user. Also displays the number of days left before expiry.
  - **Image**: Displays the profile image of the user.
- **Buttons**: The buttons allow navigation to other pages.
  - **Edit Plan**: Takes the user to the Plan Management page.

- **Cancel Plan**: Allows user to cancel their plan after a prompt of confirmation.
- **Logout**: Allows the user to logout of the system.

- **Prompts**: There should be multiple prompts to confirm user actions including but not limited to-
  - **Confirm Cancellation**: Cancellation will not lead to a refund and can lead to issues if mis-clicked. Hence a confirmation is required.
  - **Edit Confirmation**: By agreeing to edit plan, the page will be changed. To prevent unintended navigation, a prompt needs to be added.

Error Handling and Edge Cases:

- **No Plan Selected**: In case where no plan is selected, the user will be showed 'Get a Plan' button instead of Edit and Cancel Plan Buttons.
- **No Profile Image**: A basic avatar will be shown when the profile image is not set.

3.4 Plan Management

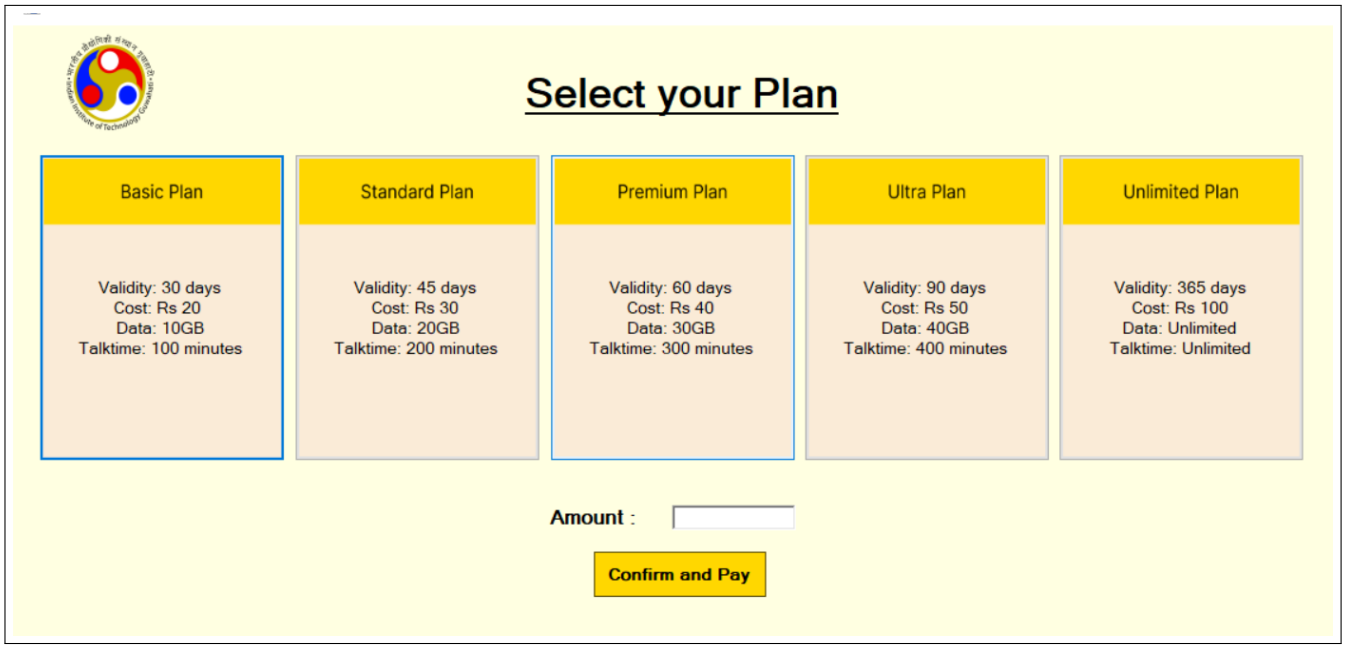

Figure 5: Plan Management Interface

Components of Plan Management page:

- **Data Plans**: Different buttons correspond to different plans. They are used to display the various offers given by each plan. By clicking on any one you can select it and then proceed to payment. There are 5 data plans as follows
  - **Basic Plan**
  - **Standard Plan**
  - **Premium Plan**

- **Ultra Plan**
- **Ultimate Plan**

- **Confirm and Pay Button** : Clicking on which redirects to payment page.
- **Amount**: RichTextBox is used to displays the amount to be paid for the current selected plan.
- **Static Text**: Labels are used to display static texts like header on the screen.
- **IITG Logo**: Picture Box is used to display the IITG Logo.

Error Handling and Edge Cases:

- **Multiple Plans Selected**: It has been ensured that multiple plans cannot be selected at the same time.
- **No Plan Selected**: In case where no plan is selected the User will be prompted to select a plan before redirecting to the Payment Page.
- **Default Plan**: By default the Basic Plan will be selected at the start.

3.5 Payment Gateway

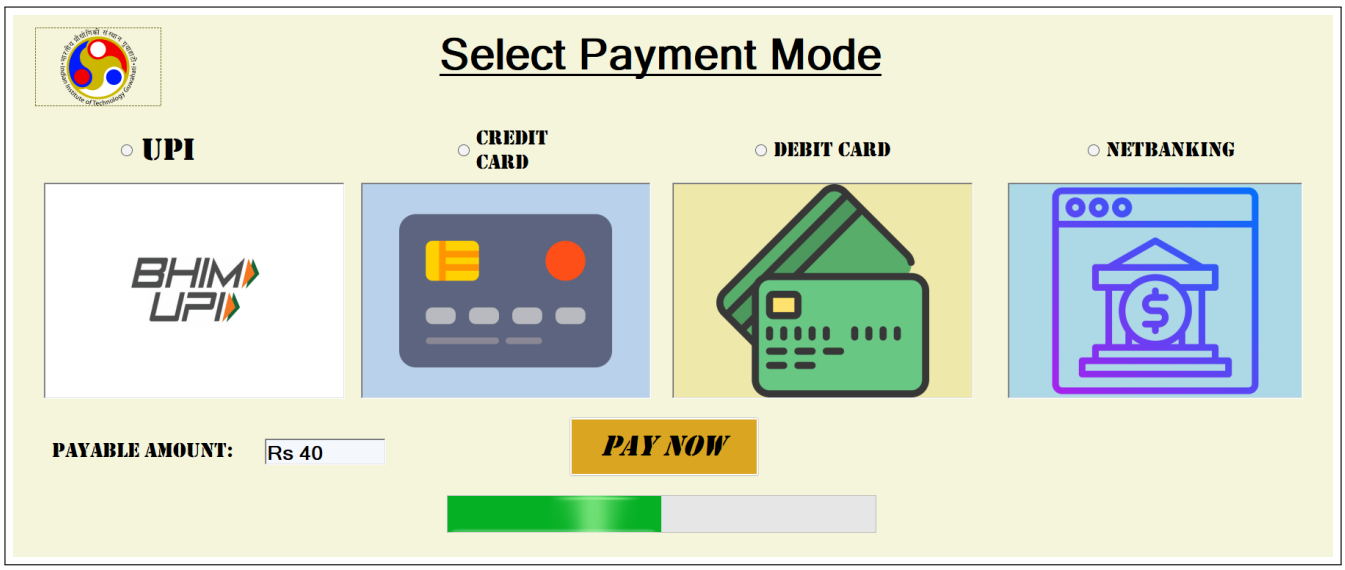

Figure 6: Payment Gateway interface

Technical details and Functionality:

- **Picture Box**: Picture Box is used to display images, icons, or other graphical content on a form. It is used to display various modes of payments' symbols including *UPI*, *Credit Card*, *Debit Card* and *Netbanking*.
- **Radio Button**: The RadioButton control is used to present a set of options to the user, where only one option can be selected at a time. It is used to select a single kind of payment method including *UPI*, *Credit Card*, *Debit Card* and *Netbanking*.

- **Button**: Button control is a fundamental graphical user interface (GUI) element used to trigger actions or events when clicked by the user. Select *Pay Now* option to make successful payment in required payment method.
- **Label**: The Label control is used to display static text or descriptive information on a form.
- **Progress bar**: ProgressBar control is used to visually represent the progress of transaction that takes a certain amount of time/delay to complete..
- **RichTextBox**: RichTextBox control is used to display and edit formatted text, allowing users to create, view, and manipulate text. The payable amount is displayed using this.

Error handling and edge cases:

- We must make sure that the user can select a single form of payment correctly.
- The *Payable Amount* must be appropriate according to the plan selected and displayed correctly.
- The *Transaction* must be initiated when the user clicks *Pay Now* button and must be executed appropriately.

3.6 Administrator

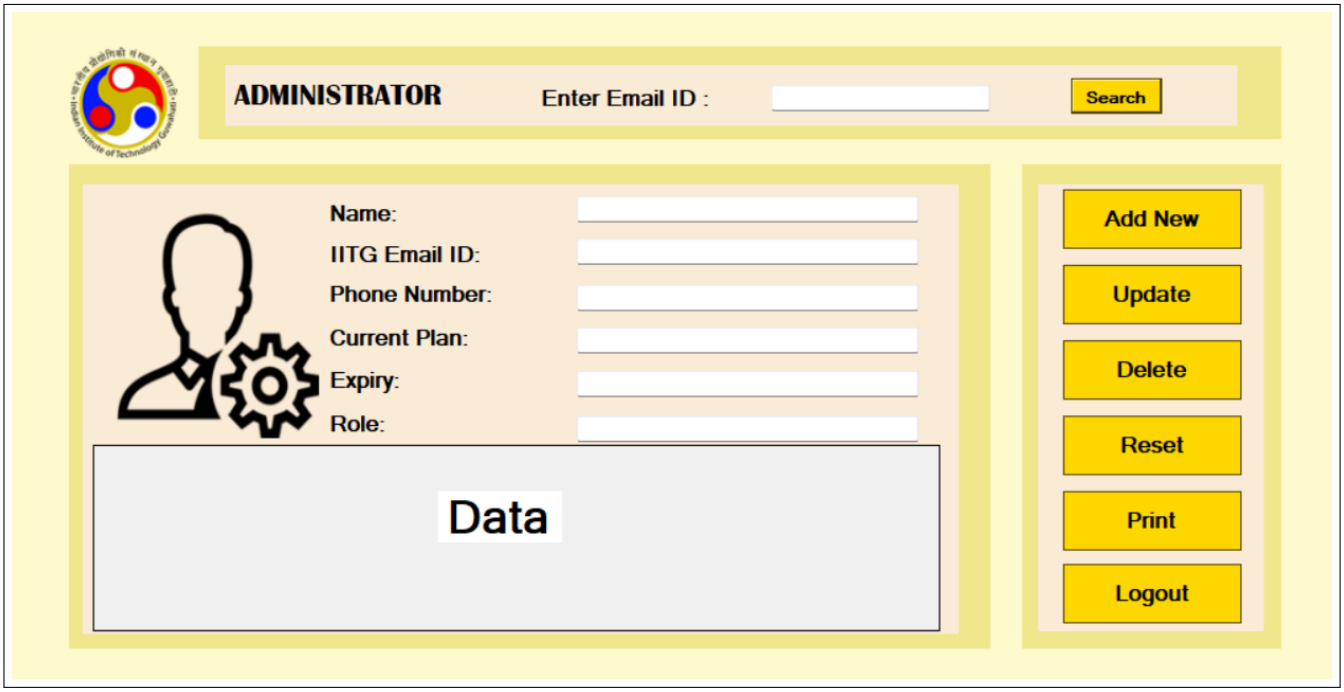

Figure 7: Administrator Interface

Components of Administrator page:

- **Buttons:** There are several buttons for different actions such as adding new data, updating existing data, deleting data, resetting the form, printing data, and exiting the application.

- **Text Boxes:** Textboxes are used for inputting and displaying various information such as name, email ID, phone number, and current plan.
- **DataGridView:** A DataGridView control is used to display tabular data, the telephone system data in this case.

Technical Details and Functionality:

- **Add New:** Add a new user to the system with the specs given in the text boxes
- **Update:** Update the changed fields for the user, entered in the relevant textboxes.
- **Delete:** Delete data of the selected user.
- **Reset:** Reset all the textboxes.

Error Handling and Edge Cases:

- **Empty Fields:** There should be validation to ensure that required fields are not left empty when adding or updating data.
- **Duplicate Enteries:** Prevent adding duplicate entries to maintain data integrity.
- **Boundary Cases:** Test edge cases like adding maximum allowed data entries, entering special characters, etc., to ensure robustness.

4 Data Flow Diagrams

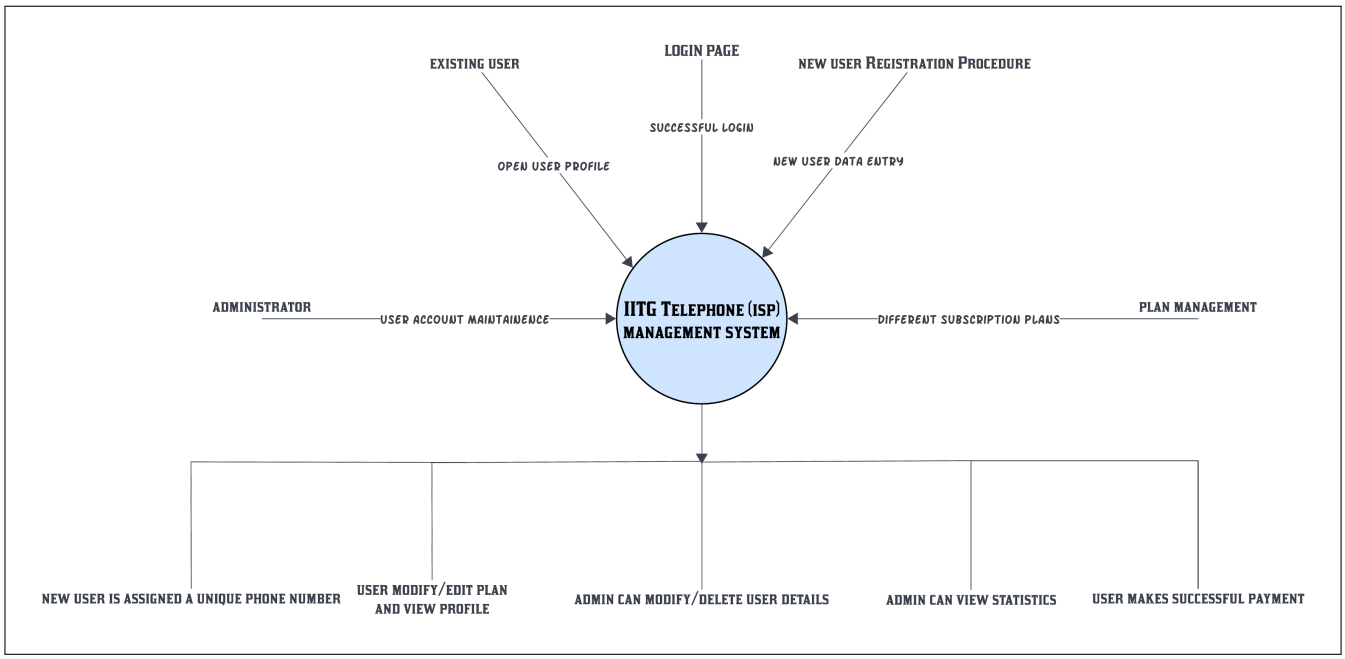

Figure 8: Level 0 Data Flow Diagram

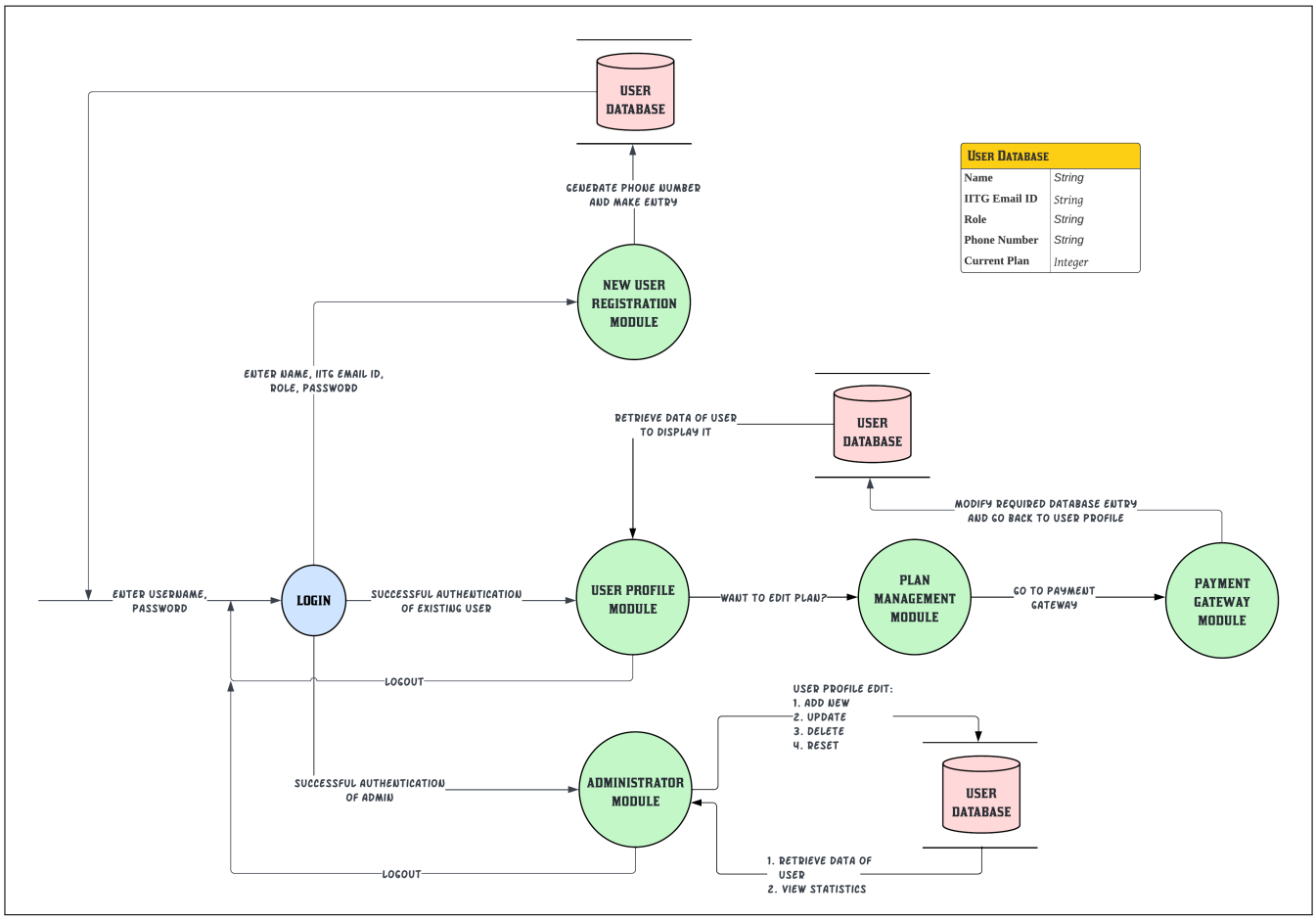

Figure 9: Level 1 Data Flow Diagram

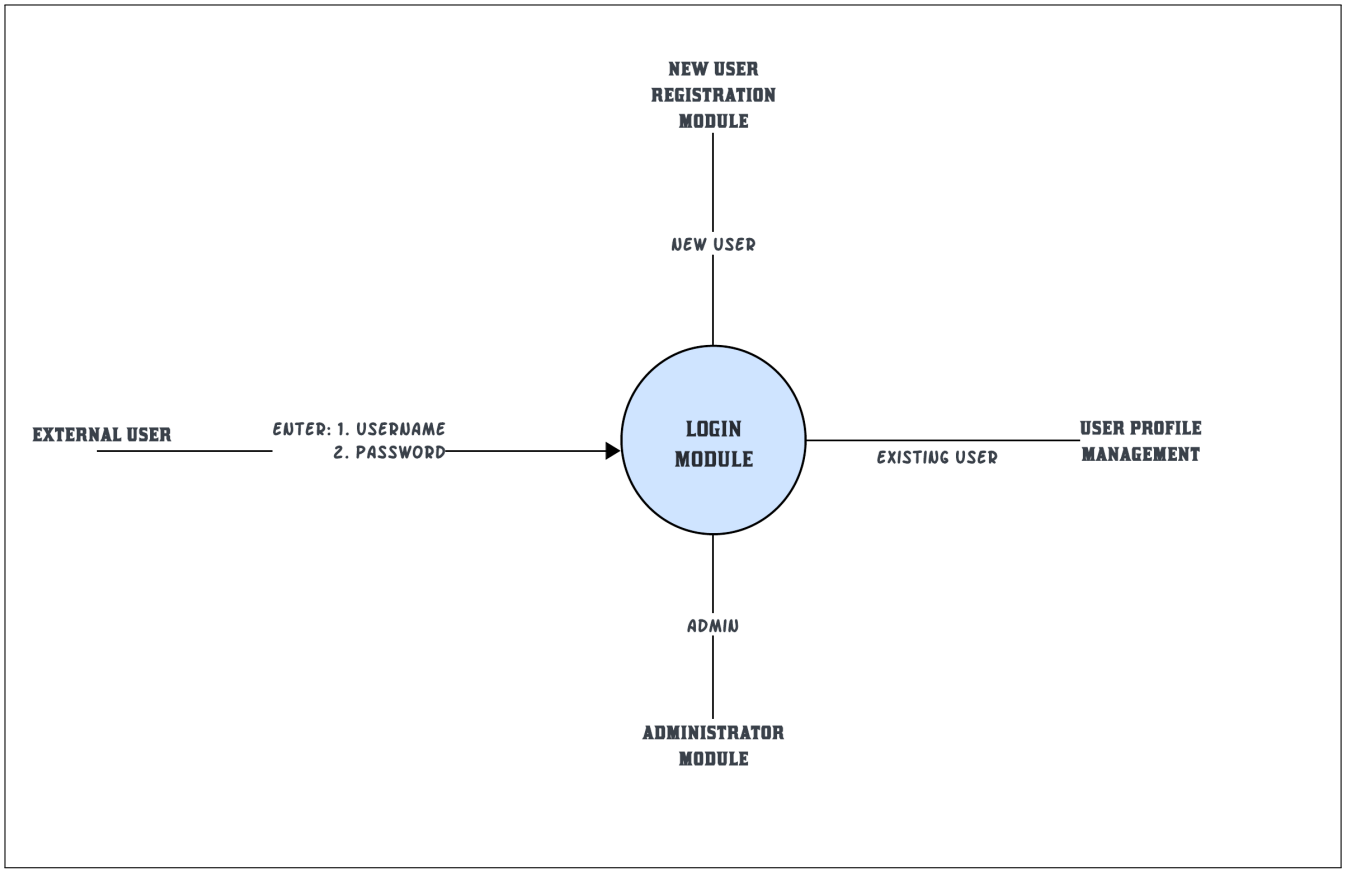

Figure 10: Level 2 Data Flow Diagram : Login Module

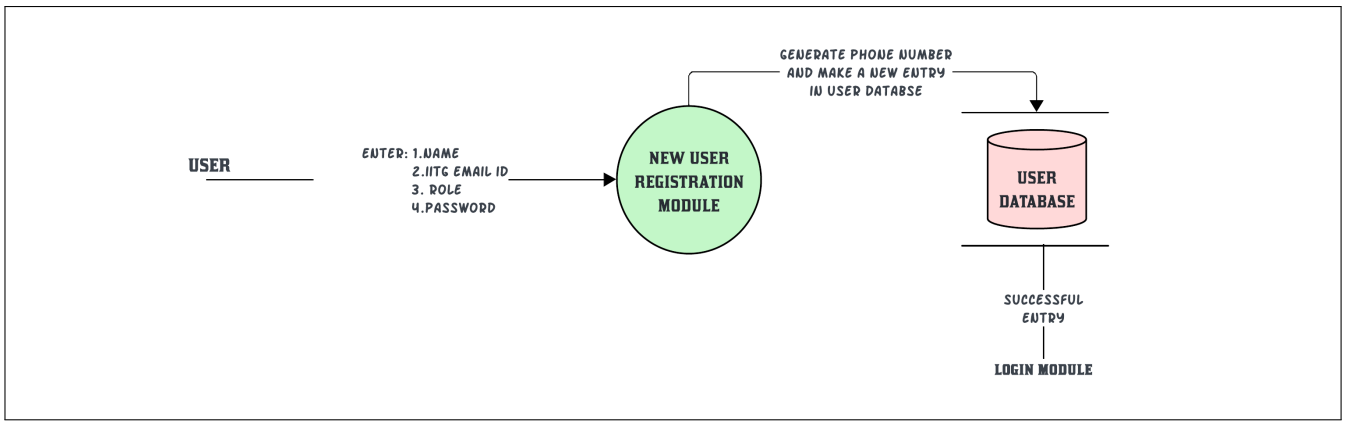

Figure 11: Level 2 Data Flow Diagram : New Registration Module

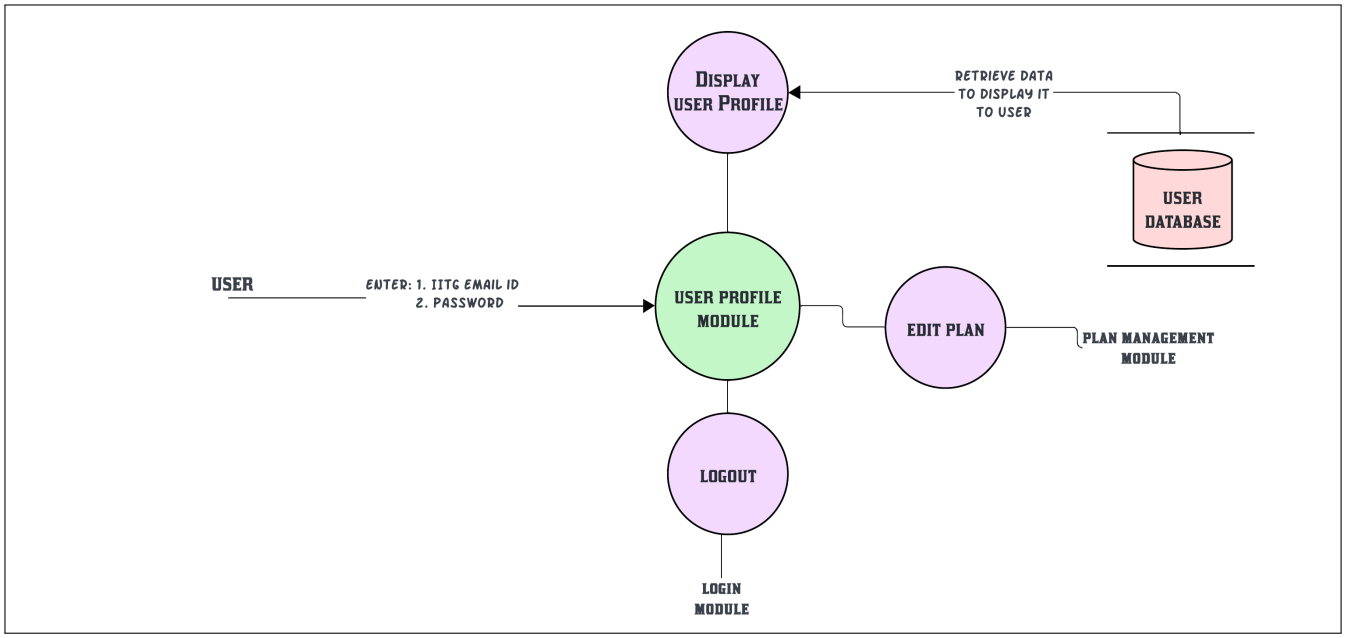

Figure 12: Level 2 Data Flow Diagram : User Profile Module

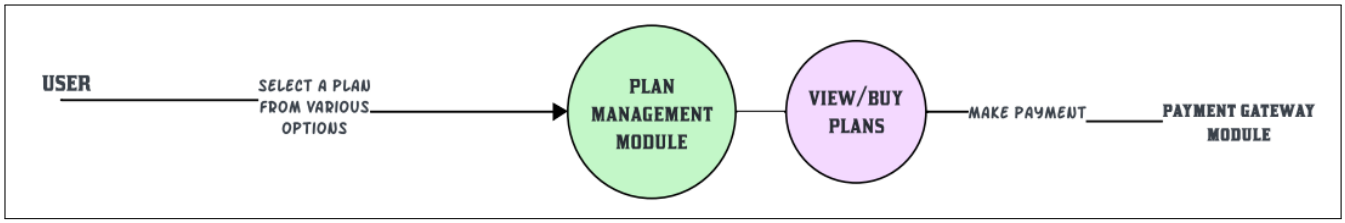

Figure 13: Level 2 Data Flow Diagram : Plan Management Module

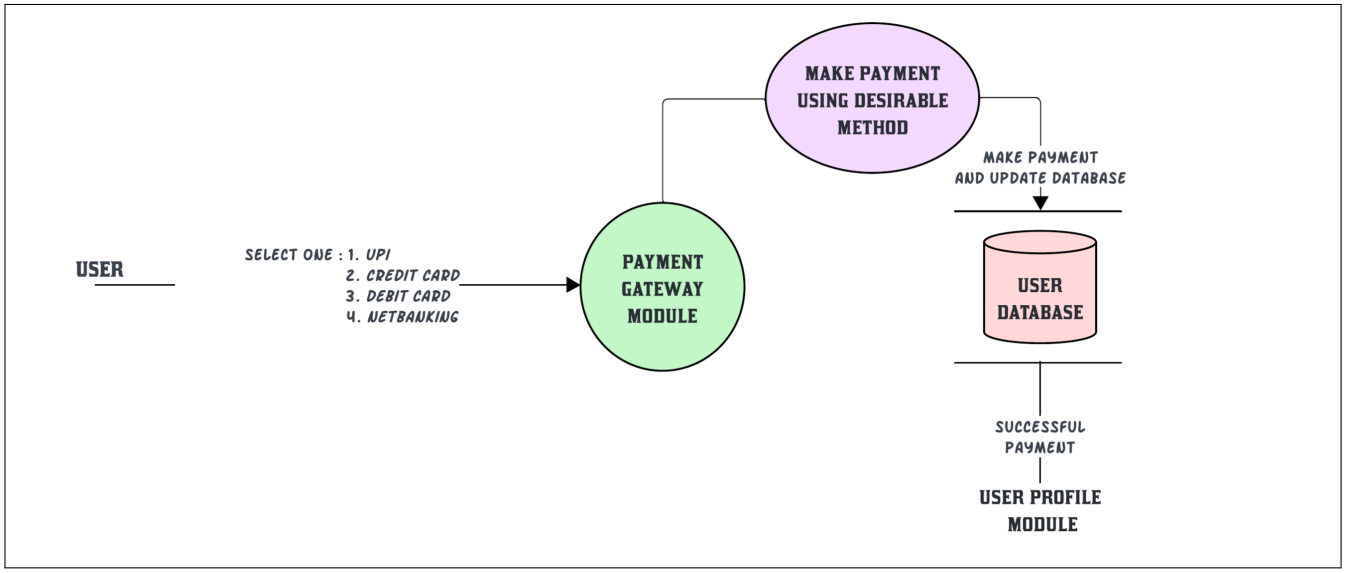

Figure 14: Level 2 Data Flow Diagram : Payment Gateway Module

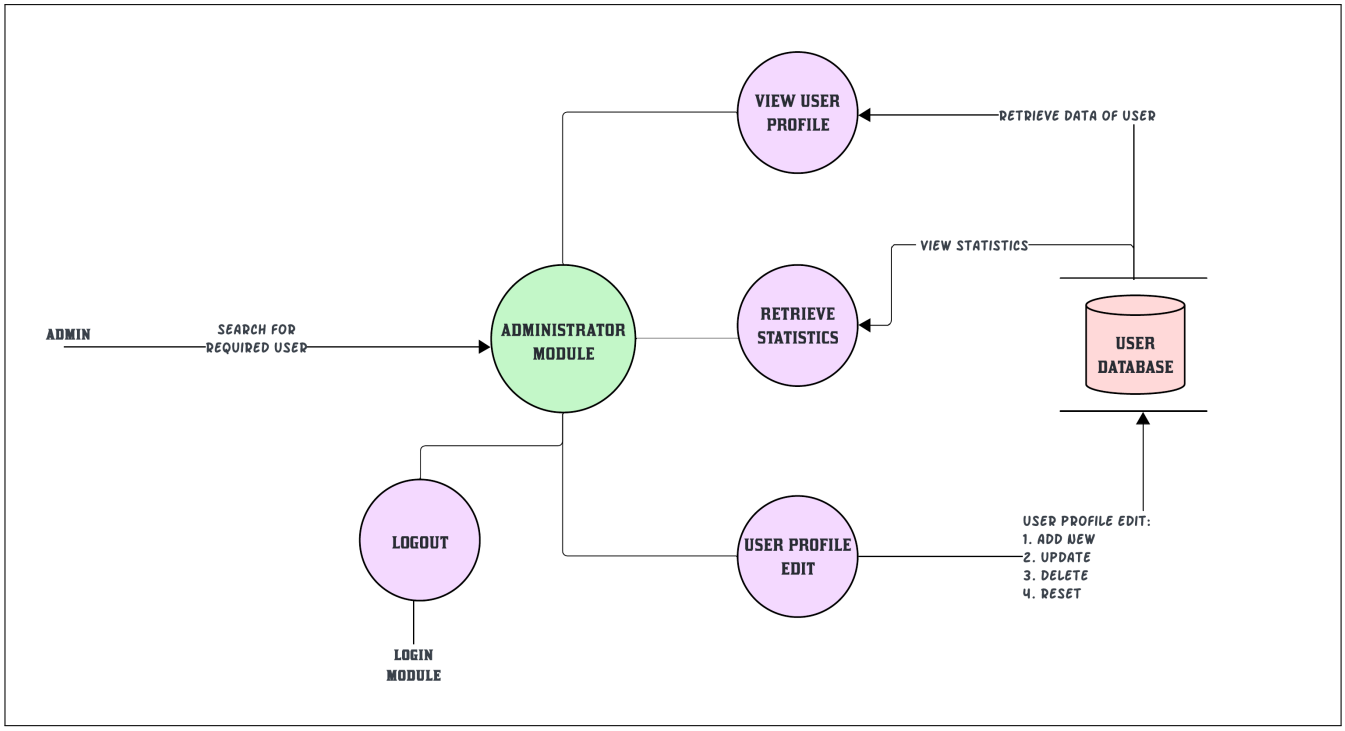

Figure 15: Level 2 Data Flow Diagram: Administrator Module

5 Model for Development:

Incremental Model:

The Incremental Model, a flexible and adaptive approach to software development, breaks down the project into manageable increments, allowing for iterative enhancements and early user engagement.

Features:

- Divides project into manageable increments.
- Each increment is developed independently.
- System evolves progressively with each iteration.

Phases:

1. **Planning:** Identify requirements and define increments.
2. **Architecture:** Design system architecture, considering future increments.
3. **Implementation:** Develop and deliver each increment.
4. **Testing:** Test each increment thoroughly.
5. **Integration:** Integrate increments into the complete system.
6. **Feedback;** Collect user feedback and make improvements.
7. **Validation:** Validate the complete system after integrating all increments.

Advantages:

- Flexibility to accommodate changes.
- Early user access to partial functionality.
- Continuous risk reduction through iterative development.

Disadvantages:

- Complexity increases with each added increment.
- May require more effort in system integration.
- Not suitable for projects with well-defined and stable requirements.

Why and How Incremental??

We chose an incremental model for its adaptability to changing requirements. Our project follows incremental development by dividing tasks into manageable phases like planning, architecture, and implementation. This approach ensures early user involvement and allows for continuous enhancements based on feedback. Incremental development mitigates risks by addressing concerns in smaller iterations.

6 Conclusion

In conclusion, the development of the Visual Basic Application for Telephone Management System (TMS) tailored specifically for the Indian Institute of Technology Guwahati (IITG) is an attempt in addressing the institution's telecommunication needs.

Throughout the development process, the focus remained on delivering a comprehensive solution that meets the diverse requirements of user registration, profile management, plan management, and administrative functionalities. By leveraging the capabilities of Visual Basic, along with utilizing MySQL for database requirements, we have attempted to craft a robust and user-friendly application.