Title of the Project: Security Management System

Abstract:

Security Management System is a system which maintains the information about the visitors visiting a certain place. This is very difficult to organize manually. Maintenance of all this information manually is a very complex task. Owing to the advancement of technology, organization of an Online system becomes much simple. The Security Management has been designed to computerize and automate the operations performed over the information of the visitor. This computerization of the manually supported (register) system helps in many instances of its maintenances. It reduces the workload of management as most of the manual work done is reduced

Security Management System is an application which refers to systems which are generally small or medium in size. In many places (buildings, schools, colleges, etc.) maintaining a manually supported system (registers) for entering data of visiting people has become a problem. The current system is ineffective. This is seen when data of people entered is not accurate or is difficult to get when required. It is perceived inefficiency that rendered this study important. Software is to be developed to automate this system. The system should be standalone in nature. It should be designed with focus on security and should have a break-through user interface to make it easy for people using it. The following functionalities are required:

- Login for access to portal.
- Get data and purpose of visit from visitor.
- Automatically record entry date and time.
- Automatically record exit date and time.

All these modules are able to help security in-charge to manage with more convenience and in a more efficient way as compared to previous manually driven systems which are not computerized.

Introduction:

- Purpose

  The main objective of this document is to illustrate the requirements of the project Security Management system. The document gives the detailed description of the both functional and non-functional requirements proposed by the client. The purpose of this project is to provide a friendly environment to maintain the details of visitors. The main purpose of this project is to maintain easy circulation system using computers. This project describes the hardware and software interface requirements using ER diagrams and UML diagrams.

- Document Conventions
  - ❖ Entire document should be justified.
  - ❖ Convention for Main title
    Font face: Times New Roman
    Font style: Bold
    Font Size: 12
  - ❖ Convention for Sub title
    Font face: Times New Roman
    Font Size: 12
  - ❖ Convention for body
    Font face: Times New Roman
    Font Size: 12

- Scope of Development Project

  Existing System:

  - ❖ In early days the security personnel had to manage the data of visitors manually. It required lot of time to record or to retrieve the details. The personnel who had to record the details must perform their job very carefully. Even a small mistake would create a lot of problems. Security of information is very less. Report generations of all the information is very tough task.
  - ❖ Maintenance of register is very complex task. In addition to its maintenance of visitor details, entry date and time, and exit date and time, etc. manually is a complex task.

- ❖ All the operations must be performed in perfect manner for the maintenance of the data without any degradation which may finally result in the failure of the entire system.

Proposed System:

To solve the inconveniences as mentioned in the existing system, an computerised Security management is proposed. The proposed system contains the following features:

- ❖ Only the client will have his account through which he can access and enter the information he needs.
- ❖ Details like visitor name, age, document, id type, id number, entry date and time, exit date and time, etc. all this information can be made handy.
- ❖ Administrator can add, update the visitor's details.
- ❖ Time consuming is low, gives accurate results, reliability can be improved with the help of security.

- Definitions, Acronyms and Abbreviations

  JAVA -> platform independence

  SQL-> Structured query Language

  ER-> Entity Relationship

  UML -> Unified Modeling Language

  IDE-> Integrated Development Environment

  SRS-> Software Requirement Specification

  ISBN -> International Standard Book Number

  IEEE ->Institute of Electrical and Electronics Engineers

- References
  - https://openjfx.io/
  - https://www.oracle.com/in/database/technologies/xe-downloads.html
  - https://www.oracle.com/in/index.html
  - https://stackoverflow.com/
  - https://gluonhq.com/products/scene-builder/
  - https://www.javatpoint.com/example-to-connect-to-the-oracle-database
  - https://ieeeproject.org/ieee-projects-cse/ieee-java-projects/
  - https://www.tutorialspoint.com/uml/uml_standard_diagrams.htm
  - https://staruml.io/

- PRODUCT DESCRIPTION:

  Security Management System is a computerized system which helps user (security personnel) to manage their daily activity data in electronic format. It reduces the risk of paper work such as file lost, file damaged and time consuming. It can help user to manage the records more effectively and timesaving.

- PROBLEM STATEMENT:

  The problem occurred before having computerized system includes:

  - ❖ File lost

    When computerized system is not implemented file is always lost because of human environment. Sometimes due to some human error there may be a loss of records.
  - ❖ File damaged

    When a computerized system is not there file is always lost due to some accident like spilling of water by some member on file accidentally. Besides some natural disaster like floods or fires may also damage the files.
  - ❖ Difficult to search record

    When there is no computerized system there is always a difficulty in searching of records if the records are large in number .
  - ❖ Space consuming

    After the number of records become large the space for physical storage of file and records also increases if no computerized system is implemented.
  - ❖ Cost consuming

    As there is no computerized system the to add each record paper will be needed which will increase the cost for the management of library

- SYSTEM REQUIREMENTS

  1. NON-FUNCTIONAL REQUIREMENTS

     I. Product Requirements

- EFFICIENCY REQUIREMENT

  When security management system will be implemented security in-charge can easily access the data as searching will be very fast.

- RELIABILITY REQUIREMENT

  The system should accurately get entry and exit time and date, and save information of visitor.

- USABILITY REQUIREMENT

  The system is designed for a user-friendly environment so that Security in-charge can perform the various tasks easily and in an effective way.

II. Organizational Requirements

- IMPLEMENTATION REQUIREMNTS

  In implementing whole system it uses Java in front end with JDBC which will be used for database connectivity and the backend i.e. the database part is developed using oracle.

- DELIVERY REQUIREMENTS

  The whole system is expected to be delivered in three months of time.

III. External Requirements

- LEGISLATIVE REQUIREMNTS

  The information that is used must be acknowledged by the authorized people so that it does not violate the law. This information is copyrighted and protected by law.

- SECURITY REQUIREMNTS

  This system must be highly secure in the login part. It is because the information can only be viewed by the admin level.

2. FUNCTIONAL REQUIREMENTS

❖ LOGIN

Description of feature

This feature used by the client to login into system. They are required to enter id and password before they are allowed to enter the system. The id and password will be verified and if invalid id is there user will not be allowed to enter the system.

Functional requirements

- id is provided when they register

-The system must only allow user with valid id and password to enter the system

-The user must be able to logout after they finished using system.

❖ ADD NEW VISITOR

Description of feature

This feature allows to add new visitor in database and store their information.

Functional requirements

- System must be able to give a serial number to user.

- System must be able to take visitor's information.

- System must be able to automatically record entry time and date of visitor.

❖ UPDATE VISITOR INFORMATION

Description of feature

This feature allows to modify visitor's name or age if it already exists in database and store new data.

Functional requirements

- System must be able to modify the data of visitor.

- ADD EXIT DETAILS

  Description of feature

  This feature allows to add exit details for existing visitors in database and store their information.

  Functional requirements

  - System must be able to verify information

  - System must be able to automatically record exit time and date of visitor.

- DISPLAY

  Description of feature

  This feature allows to display data of all visitors in database.

  Functional requirements

  - System should be able to display information of all visitors.

- EXIT

  Description of feature

  This feature will commit all the changes that are made during the use.

  Functional requirements

  - System should be able to commit changes and reflect them again in new session of system.

- SOFTWARE AND HARDWARE REQUIREMENTS

1. SOFTWARE REQUIREMENTS

   - ❖ Operating system- Windows 10 is used as the operating system as it is stable and support more features and is more user friendly
   - ❖ Database Oracle -Oracle is used as database as it easy to maintain and retrieve records by simple queries which are in English language which are easy to understand and easy to write.
   - ❖ Development tools and Programming language- Java is used to write the whole code, JavaFX is used to create interface and JDBC is used to connect to the database.

2. HARDWARE REQUIREMENTS

   - ❖ RAM 4GB is used as it will provide fast reading and writing capabilities and will in turn support in processing.

- SOFTWARE TOOLS USED

The whole Project is divided in two parts the front end and the back end.

1. Front end

   The front end is designed using JavaFX.

   JavaFX:

   JavaFX is a Java library used to build Rich Internet Applications. The applications written using this library can run consistently across multiple platforms. The applications developed using JavaFX can run on various devices such as Desktop Computers, Mobile Phones, TVs, Tablets, etc. To develop GUI Applications using Java programming language, the programmers rely on libraries such as Advanced Windowing Tool kit and Swing. After the advent of JavaFX, these Java programmers can now develop GUI applications effectively with rich content.

2. Back end

The Back end is designed using Java.

- JAVA:

  Java is a widely used object-oriented programming language and software platform that runs on billions of devices, including notebook computers, mobile devices, gaming consoles, medical devices and many others. The rules and syntax of Java are based on the C and C++ languages.

  One major advantage of developing software with Java is its portability. Once you have written code for a Java program on a notebook computer, it is very easy to move the code to a mobile device. When the language was invented in 1991 by James Gosling of Sun Microsystems (later acquired by Oracle), the primary goal was to be able to "write once, run anywhere."

  It's also important to understand that Java is much different from JavaScript. Javascript does not need to be compiled, while Java code does need to be compiled. Also, Javascript only runs on web browsers while Java can be run anywhere.

  New and improved software development tools are coming to market at a remarkable pace, displacing incumbent products once thought to be indispensable. In light of this continual turnover, Java's longevity is impressive; more than two decades after its creation, Java is still the most popular language for application software development—developers continue to choose it over languages such as Python, Ruby, PHP, Swift, C++, and others. As a result, Java remains an important requirement for competing in the job market.

3. Database

- ORACLE DATABASE (11g enterprise edition):

  Oracle database is a relational database management system. It is also called OracleDB, or simply Oracle. It is produced and marketed by Oracle Corporation. It was created in 1977 by Lawrence Ellison and other engineers. It is one of the most popular relational database engines in the IT market for storing, organizing, and retrieving data. Oracle database was the first DB that designed for enterprise grid computing and data warehousing. Enterprise grid computing provides the most

flexible and cost-effective way to manage information and applications. It uses SQL queries as a language for interacting with the database.

Oracle Database allows you to quickly and safely store and retrieve data. Here are the integration benefits of the Oracle Database:

- Oracle Database is cross-platform. It can run on various hardware across operating systems including Windows Server, Unix, and various distributions of GNU/Linux.
- Oracle Database has its networking stack that allows application from a different platform to communicate with the Oracle Database smoothly. For example, applications running on Windows can connect to the Oracle Database running on Unix.
- ACID-compliant – Oracle is ACID-compliant Database that helps maintain data integrity and reliability.
- Commitment to open technologies – Oracle is one of the first Database that supported GNU/Linux in the late 1990s before GNU/Linux become a commerce product. It has been supporting this open platform since then.

Oracle Database has several structural features that make it popular:

- Logical data structure – Oracle uses the logical data structure to store data so that you can interact with the database without knowing where the data is stored physically.
- Partitioning – is a high-performance feature that allows you to divide a large table into different pieces and store each piece across storage devices.
- Memory caching – the memory caching architecture allows you to scale up a very large database that still can perform at a high speed.
- Data Dictionary is a set of internal tables and views that support administer Oracle Database more effectively.
- Backup and recovery – ensure the integrity of the data in case of system failure. Oracle includes a powerful tool called Recovery Manager (RMAN) – allows DBA to perform cold, hot, and incremental database backups and point-in-time recoveries.
- Clustering – Oracle Real Application Clusters (RAC) – Oracle enables high availability that enables the system is up and running without interruption of services in case one or more server in a cluster fails.

4. Connectivity

The Front end , Back end and the database are connected together by using ojdbc8.

JDBC:

JDBC or Java Database Connectivity is a Java API to connect and execute the query with the database. It is a specification from Sun microsystems that provides a standard abstraction(API or Protocol) for java applications to communicate with various databases. It provides the language with java database connectivity standards. It is used to write programs required to access databases. JDBC, along with the database driver, can access databases and spreadsheets. The enterprise data stored in a relational database(RDB) can be accessed with the help of JDBC APIs.

Conceptual Design using ER Features:

The first step in conceptual database design is to build one (or more) conceptual data replica of the data requirements of the enterprise. A conceptual data model comprises these following elements:

- entity types
- types of relationship
- attributes and the various attribute domains
- primary keys and alternate keys
- integrity constraints

The conceptual data model is maintained by documentation, including ER diagrams and a data dictionary, which is produced throughout the development of the model.

Benefits of ER diagrams

ER diagrams constitute a very useful framework for creating and manipulating databases.

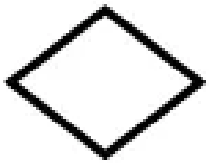
First, ER diagrams are easy to understand and do not require a person to undergo extensive training to be able to work with it efficiently and accurately. This means that designers can use ER diagrams to easily communicate with developers, customers, and end users, regardless of their IT proficiency.

Second, ER diagrams are readily translatable into relational tables which can be used to quickly build databases. In addition, ER diagrams can directly be used by database developers as the blueprint for implementing data in specific software applications.

Lastly, ER diagrams may be applied in other contexts such as describing the different relationships and operations within an organization.

Represents Entity

Represents Attribute



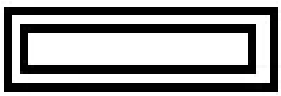
Represents Relationship

Links Attribute(s) to entity set(s) or
Entity set(s) to Relationship set(s)

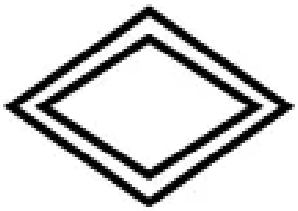
Represents Multivalued Attributes

Represents Derived Attributes

Represents Total Participation of Entity



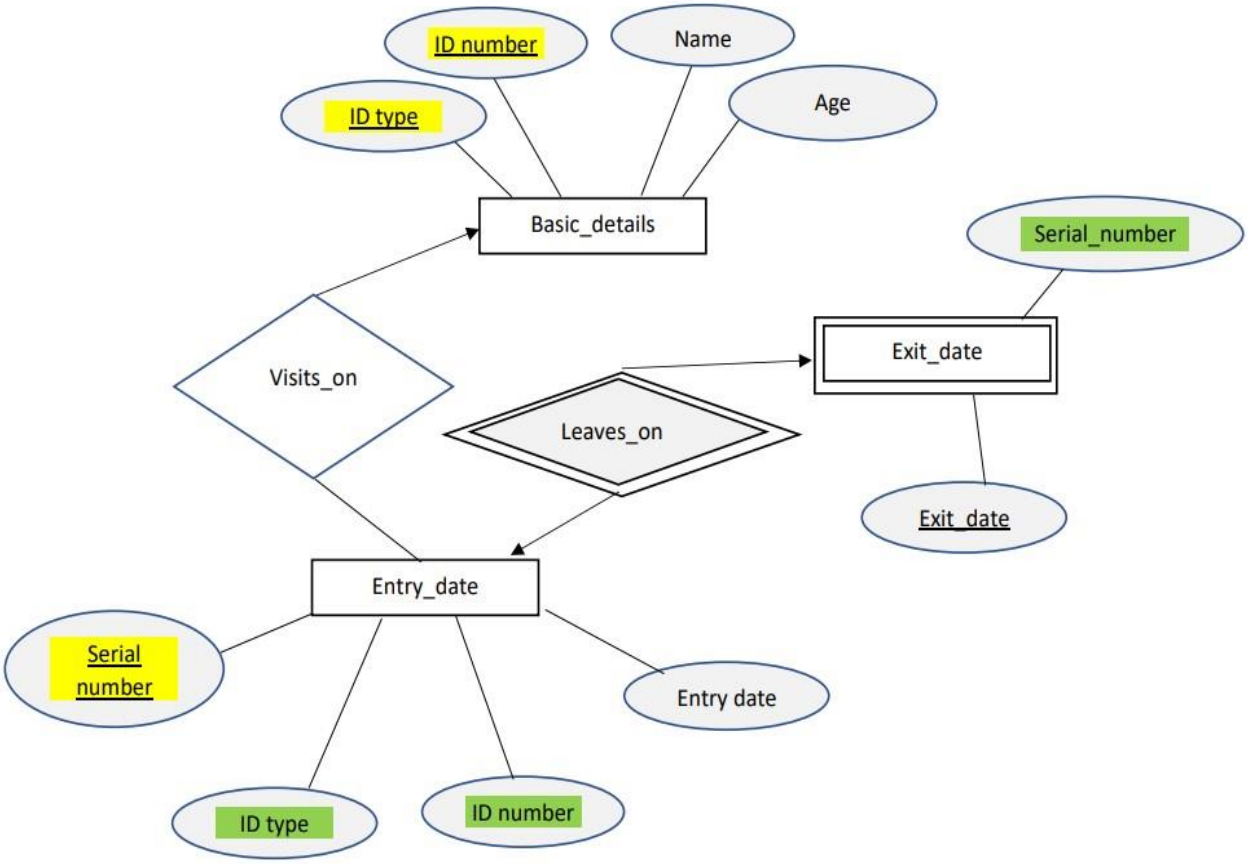
Represents Weak Entity



Represents Weak Relationships

ER Diagram for Security Management System

ER diagram:



This ER (Entity Relationship) Diagram represents the model of Security Management System Entity. The entity-relationship diagram of Security Management System shows all the visual instrument of database tables and the relations between Basic _details, Entry_date and Exit_Date. It used structure data and to define the relationships between structured data groups of Security Management System functionalities.

- Entities:
    1. Basic_Deatils

       Attributes: Id_type(primary key) ,Id_number(primary key) ,Name , Age

    2. Entry_Date:

       Attributes: Serial number (primary key) , Id_type , Id_number,

       Entry date

    3. Exit_Date:

       Attributes: Serial_number(foreign key), Exit_Date

- Weak entity is represented with double rectangle and its weak relation with double diamond shows its dependency on strong entity.
- Cardinality can also be shown with the help of links between two entities.
- Primary key is represented by underlined eclipse.
- Other attributes are simply represented by eclipse.

Relational Model in appropriate Normalize Form

Master table:

Serial_no	Id type	Id number	Name	Age	Entry date & Time	Exit Date & Time

As we can see the given is the master table for our project.
In the given table the prime attribute are Id type and ID number this makes together a primary key so it is a composite primary key.

Database Normalization is a technique of organizing the data in the database.
Decomposing tables to eliminate data redundancy and undesirable characteristics like Insertion, Update and Deletion Anomalies. It is a multi-step process that puts data into tabular form by removing duplicated data from the relation tables.

Normalization:

Normalization is used for mainly two purposes, Eliminating redundant (useless) data.
Ensuring data dependencies make sense i.e data is logically stored.

Conditions for 1NF:
First Normal Form is defined in the definition of relations (tables) itself. This rule defines that all the attributes in a relation must have atomic domains. The values in an atomic domain are indivisible units.
The given table satisfy the First Normal Form condition.

Now to make the table in second Normal Form the following conditions need to be considered,

Condition for 2NF:

Prime attribute − An attribute, which is a part of the prime-key, is known as a prime attribute.
Non-prime attribute − An attribute, which is not a part of the prime-key, is said to be a non-prime attribute.

If we follow second normal form, then every non-prime attribute should be fully functionally dependent on prime key attribute. That is, if X → A holds, then there should not be any proper subset Y of X, for which Y → A also holds true.

As we can see our primary key is the combination of two attributes ID type and ID number, as we know the ID number cannot be same for the same Id type.

Example:
If a person's ID type is Aadhar card and the number is 101, and there is one more person whose ID number is 101 but they are different as the ID type for the second person is passport.
This is how we will separate the anomalous data by using a composite primary key.
As all the other non-Prime attribute like name, age, entry date, entry time, exit date, exit time all are fully dependent on the primary key there is not a single attribute which depends on the proper subset of the primary key.

So, the table is already in second normal form.

Condition for 3NF:

For a relation to be in Third Normal Form, it must be in
Second Normal form and the following must satisfy,
No non-prime attribute is transitively dependent on prime key attribute.

For any non-trivial functional dependency, X → A, then either −X is a super key or, A is prime attribute.

There should not be the case that a non-prime attribute is determined by another non-prime attribute.

As this four columns are dependent on each other no and not on the primary key only we need to separate them and form a new table and to access the data we need to provide a foreign key of the primary key (ID type, ID number).

After Decomposing the table by 3NF,

There will be 3 tables:

BASIC_DETAILS:

ID type	ID number	Name	Age

ENTRY_DATE:

Serial number	ID type	ID number	Entry date & Entry Time

Exit_date:

Serial number	Exit date & Exit Time

UML Design:

The **Unified Modelling Language** is a standard visual modelling language is intended to be used for

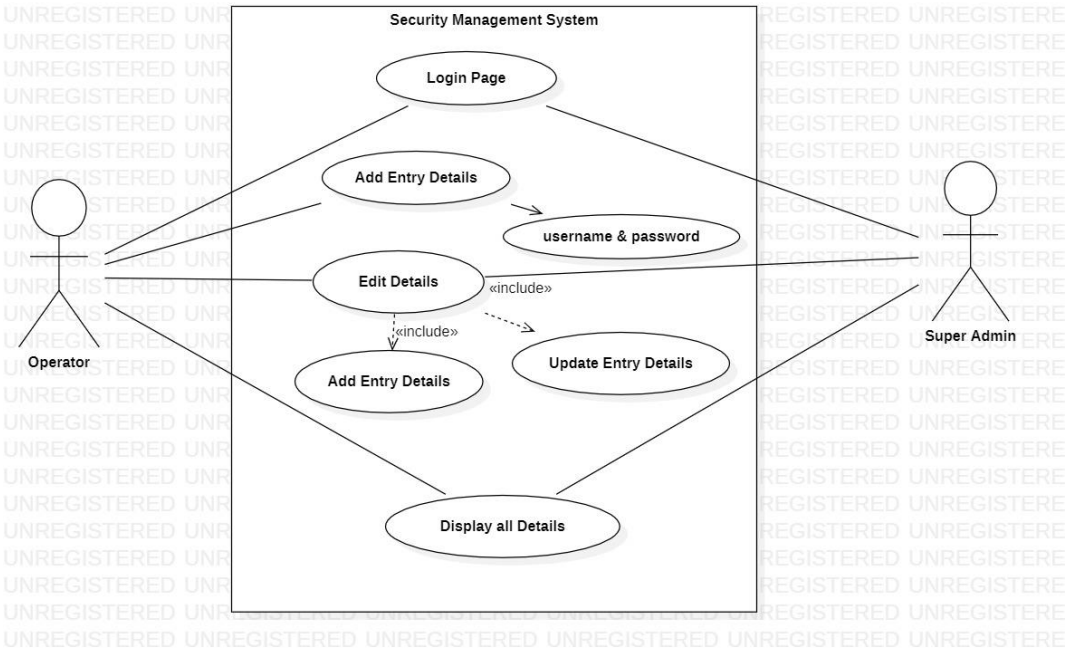
- modelling business and similar processes,
- analysis, design, and implementation of software-based systems

A **UML diagram** is a partial graphical representation (view) of a model of a system under design, implementation, or already in existence. UML diagram contains **graphical elements** (symbols) - UML nodes connected with edges (also known as paths or flows) - that represent elements in the UML model of the designed system. The UML model of the system might also contain other documentation such as use cases written as templated texts.

The kind of the diagram is defined by the primary graphical symbol shown on the diagram. For example,

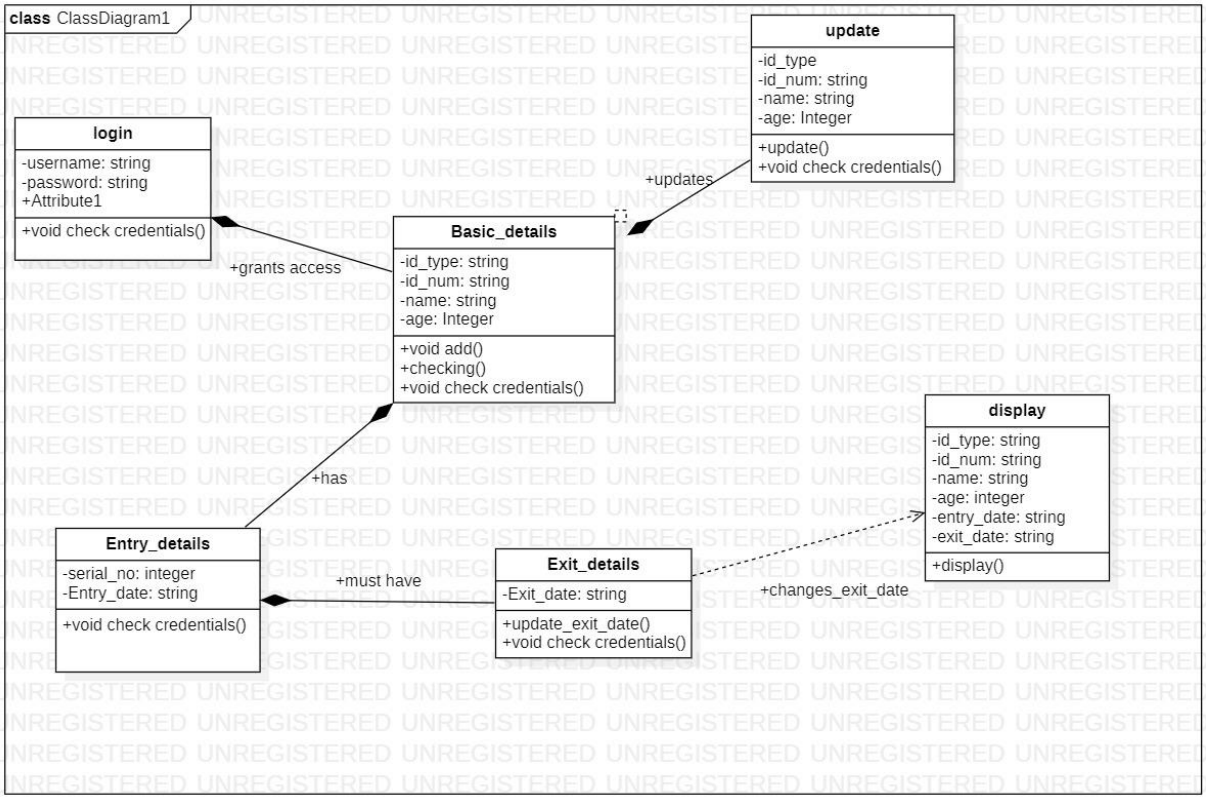
- A diagram where the primary symbols in the contents area are classes is class diagram.
- A diagram which shows use cases and actors is use case diagram.
- A sequence diagram shows sequence of message exchanges between lifelines.

Security Management System Use Case Diagram



This Use Case Diagram is a graphic depiction of the interactions among the elements of Security Management System. It represents the methodology used in system analysis to identify, clarify, and organize system requirements of Security Management System. The main actors of Security Management System in this Use Case Diagram are: Super Admin, System User/Operator who perform the different type of use cases such as Manage Basic Detail, Entry Details, Exit Detail, Display and Full Security Management System Operations.

Security Management System Class Diagram



Security Management System Class Diagram describes the structure of a Security Management System classes, their attributes, operations (or methods), and the relationships among objects.

Classes of Security Management System class diagram are:

- **Login**
- **Basic_Details**
- **Entry_Details**
- **Update**
- **Exit_Details**
- **Display**

Attributes:

- Login attributes: username, password
- Basic_Detail: id_type , id_num, name, age
- Entry_Details: serial_no, Entry_Date
- Update: id_type , id_num, name, age
- Exit_Details: Exit_Date
- Display: id_type , id_num, name, age, Entry_Date, : Exit_Date

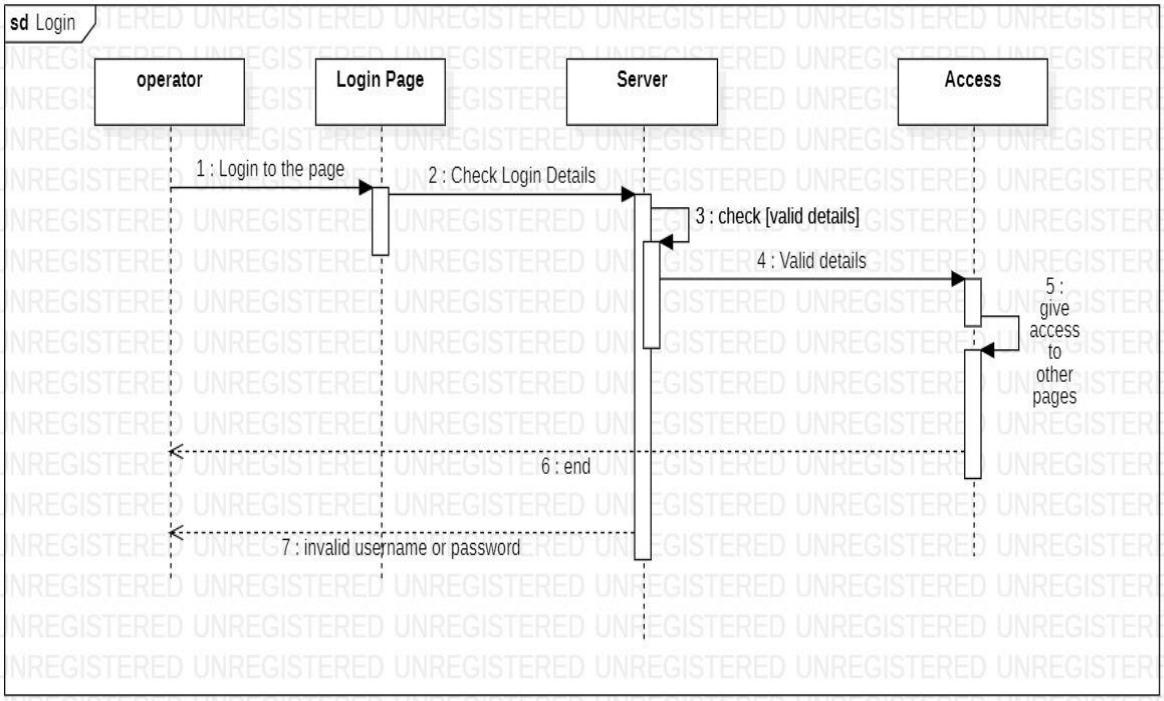
Methods:

- Login: check_Credentials()
- Basic_Details: add(), check(), checkcredential()
- Entry_Details: checkCredential()
- Update: update(), checkcredential()
- Exit_Details: updateExitDate(),checkCredentials()
- Display: display()

Security Management System Sequence Diagram

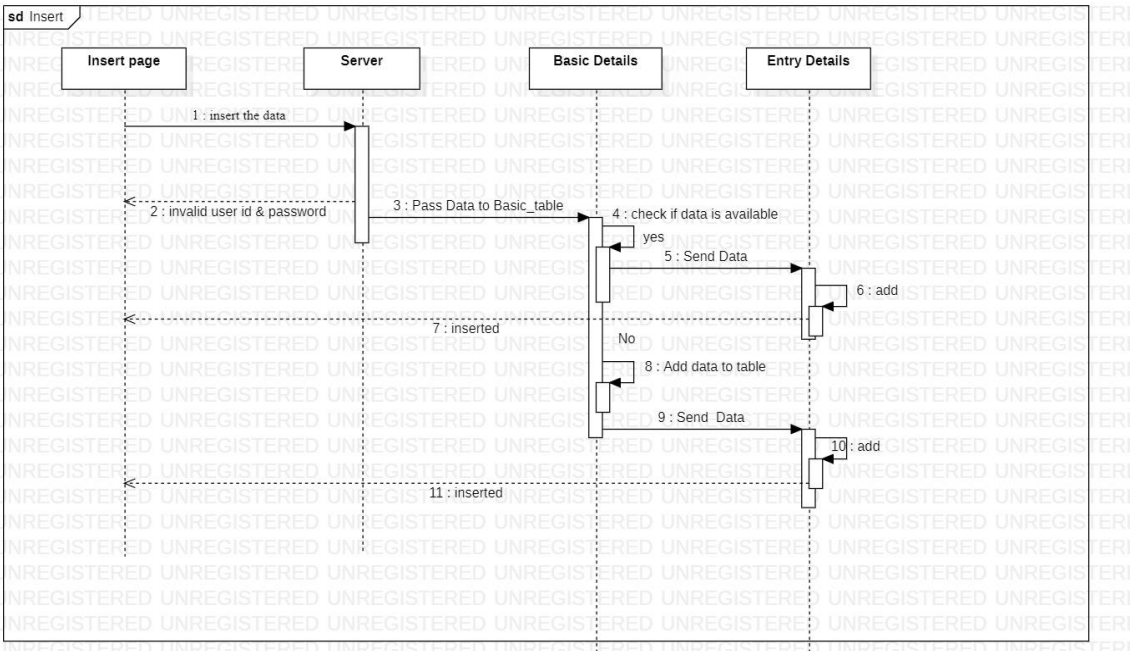
The UML sequence Diagram of Security Management System shows the interaction between all objects.

1. Login Sequence:



This is the Login Sequence Diagram of our project in which operator will able to login on login-page using username and password. If the username or password is wrong then prompt message will appear and show invalid username or password. If operator successfully login then system will give the access to other page on which the operations need to be performed.

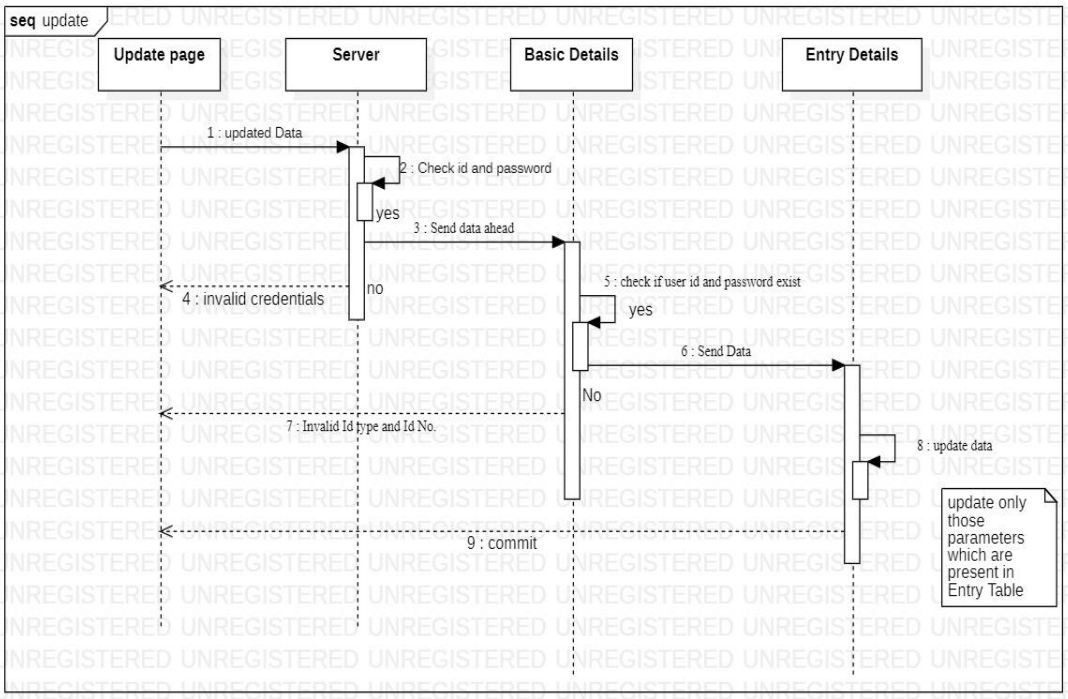
2. Insert Sequence:



This Login sequence is used while adding the entries of visitors.

After filling all the text field on insert page, the data will be pass to server and server will send data to Basic Details. Basic Details will check if data of visitor already exist. If yes, then Basic Details table send it to entry Details and get inserted in the entry table otherwise Basic Details will save it first and then send it to Entry Detail.

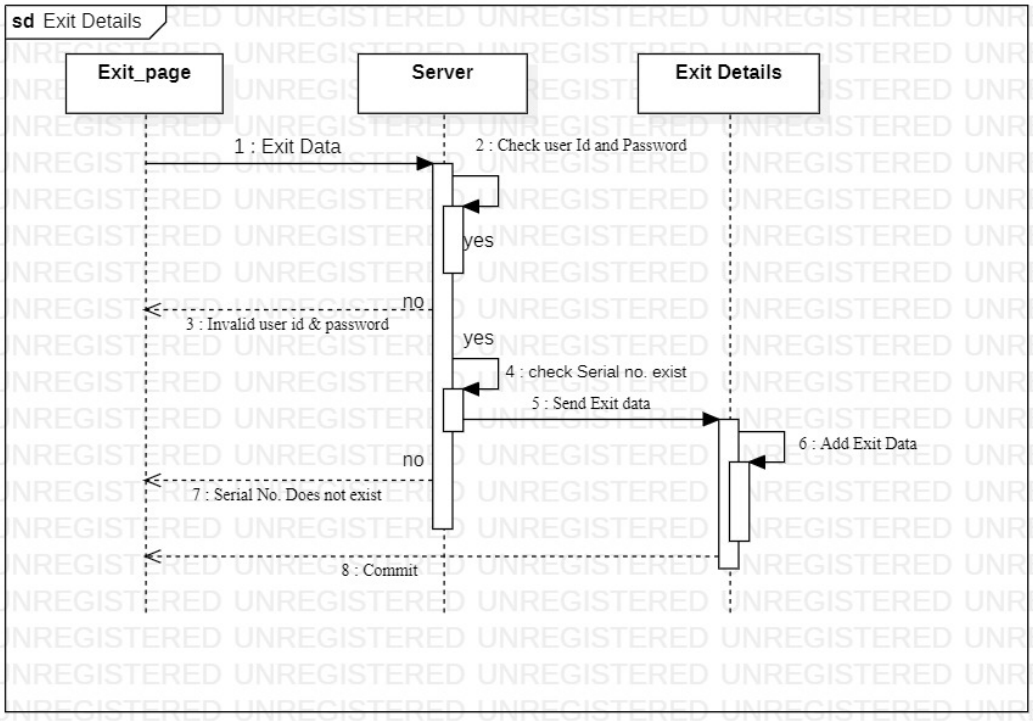
3. Update Sequence:



The Update Sequence will look like above diagram, where update page will send message to server. First, server will check the username and password. If it is correct then send data ahead to Basic details.

The Basic Details get updated and send same data to Entry Details.

4. Exit_Detail Sequence:



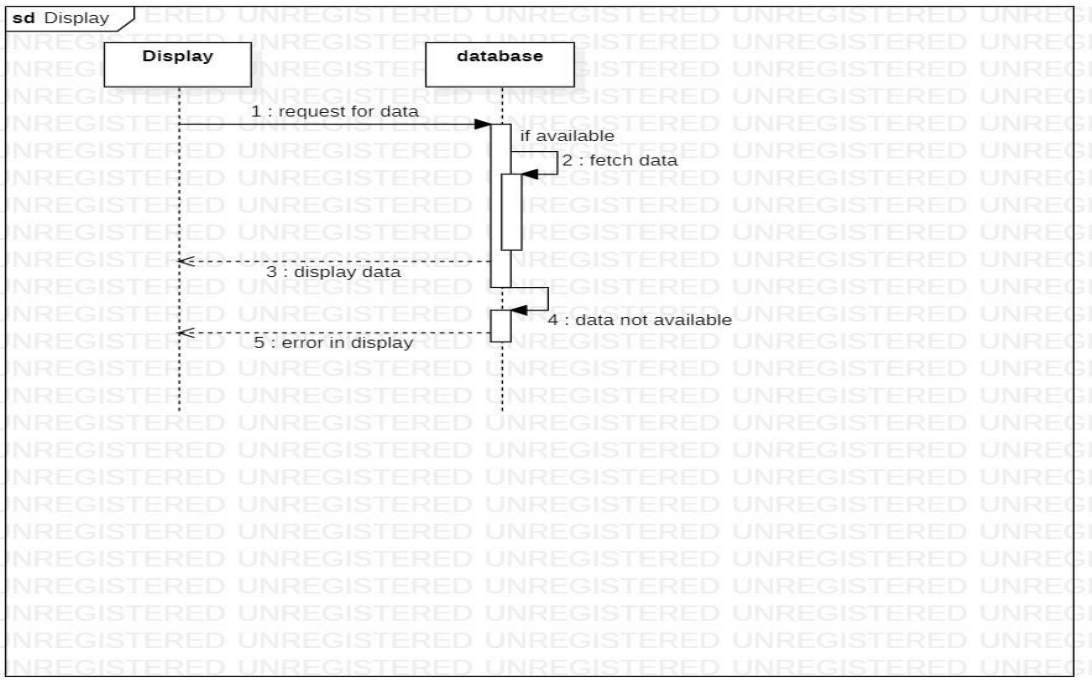
Sequence Diagram for entering the Exit Details

As the operator inputs exit details of visitor, the data in server will checked considering two conditions:

1. If the username and password are correct
2. If the serial no. provided to visitor is valid/exist.

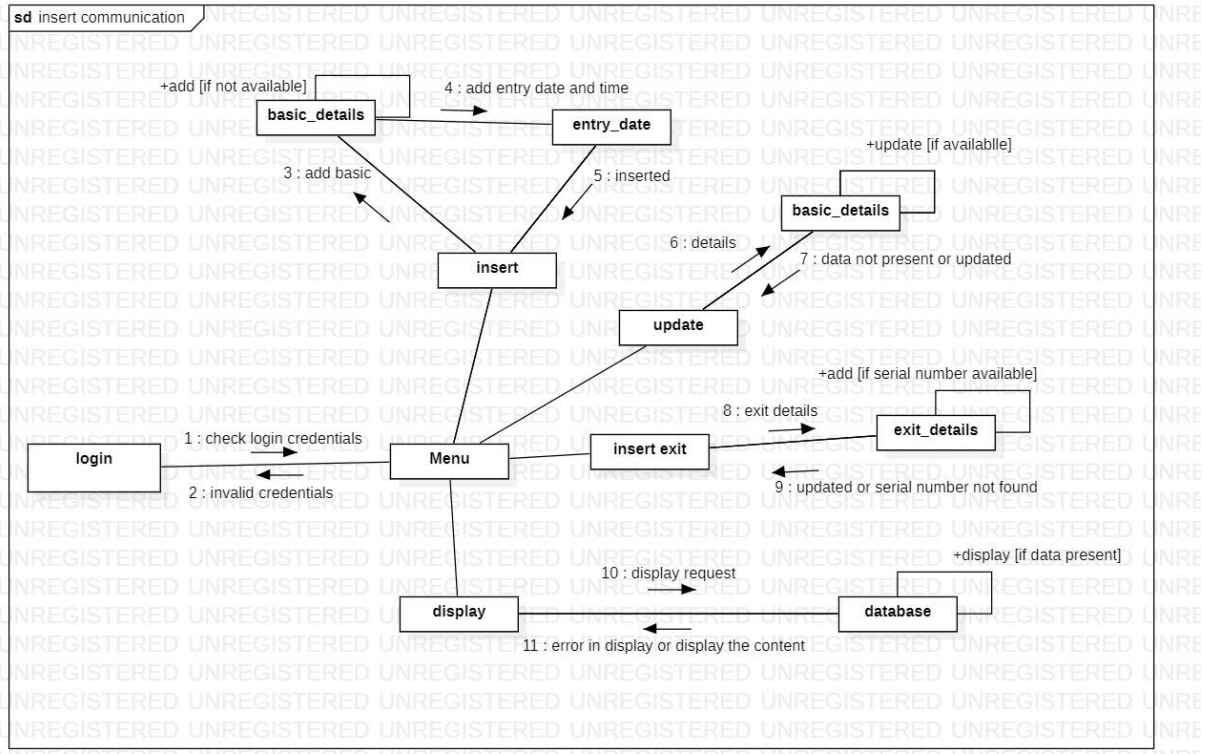
If both above conditions are followed then the data will be stored in Exit Details Otherwise respective error will appear.

5. Display Sequence:



After clicking on display button, the database will check if data is available. yes, it will fetch the data Otherwise prompt window will open showing error in display.

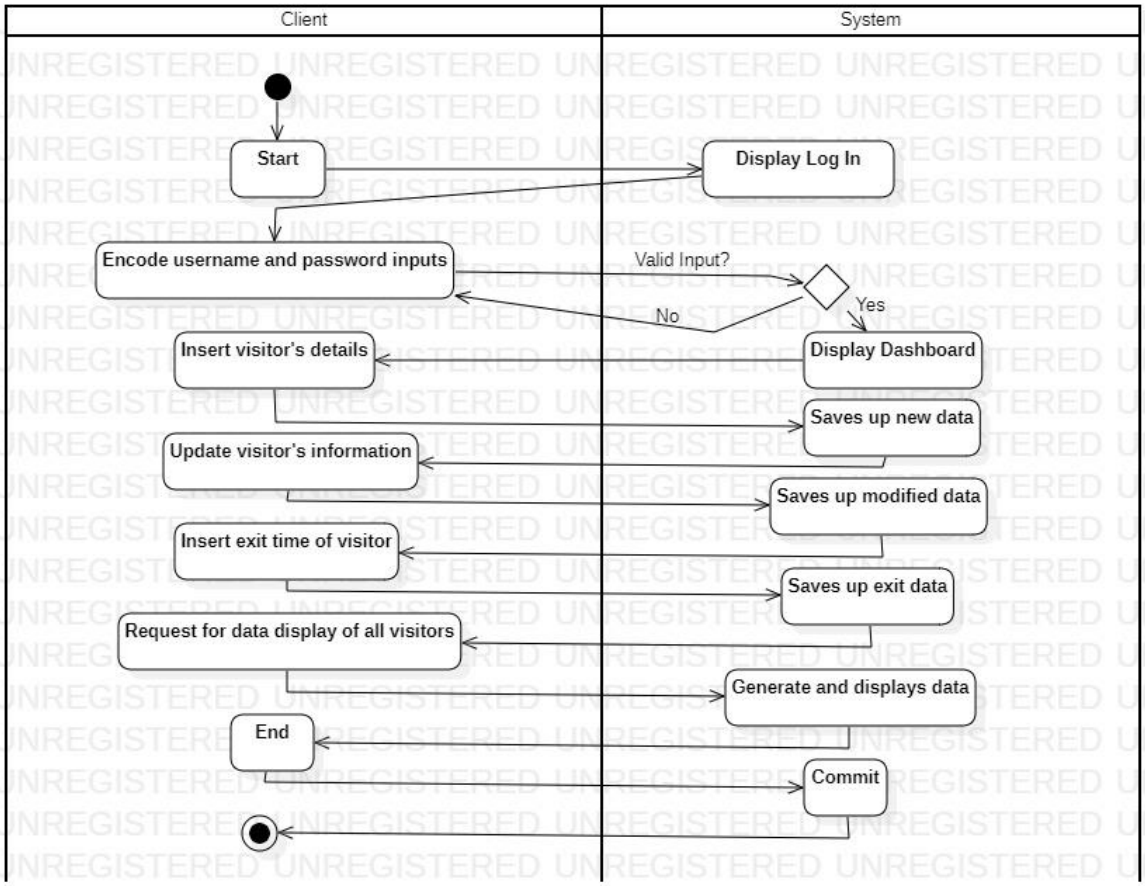
Security Management System Communication Diagram



A Communication diagram models the interactions between objects or parts in terms of sequenced messages. Communication diagrams represent a combination of information taken from Class, Sequence and Use case diagrams describing both the static structure and dynamic behavior of a system.

The communication between the options/ buttons provided by system is shown in above diagram, where one can access Menu option only after a successful communication between the login page.

Security Management System Activity Diagram



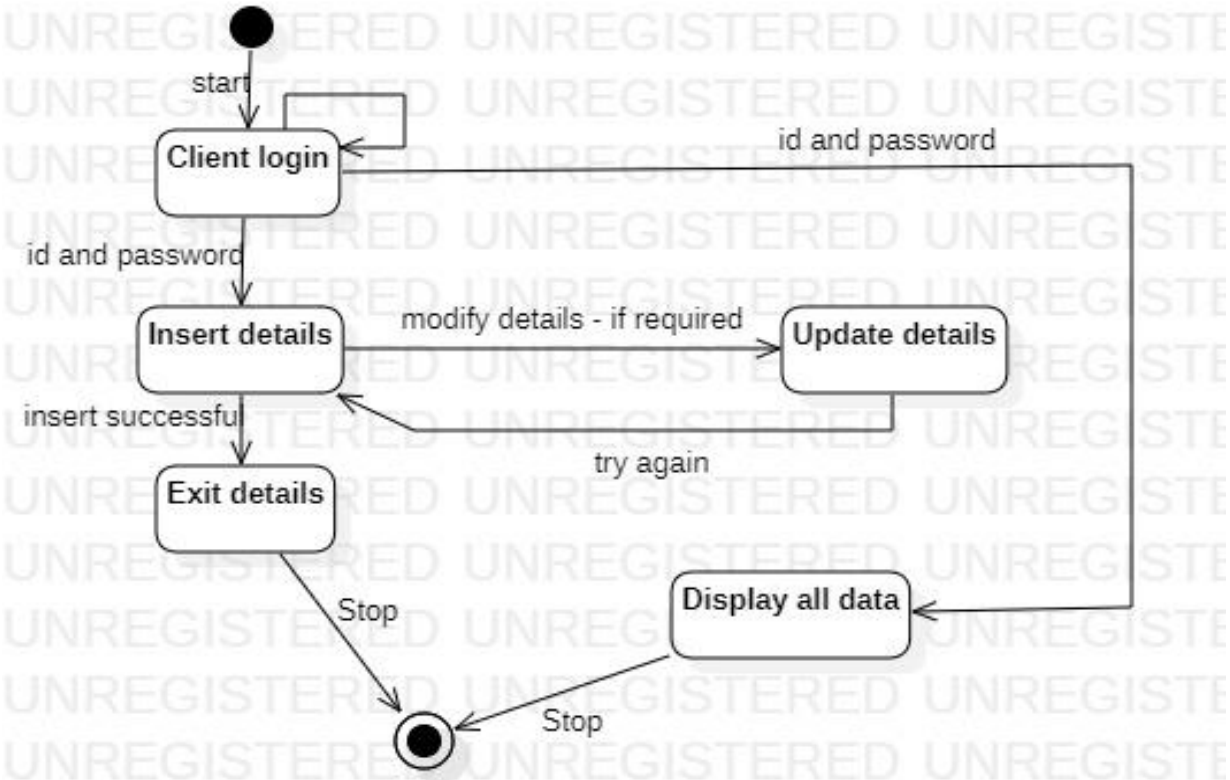
Activity UML Diagram of Security Management System which shows the activity of Client and System.

The main activity involved in UML Activity Diagram are

4. Insert Activity
5. Update Activity
6. Exit Details Activity
7. Display Activity

It shows the activity flow of code, adding and updating of visitor's entry details.

Security Management System StateChart Diagram

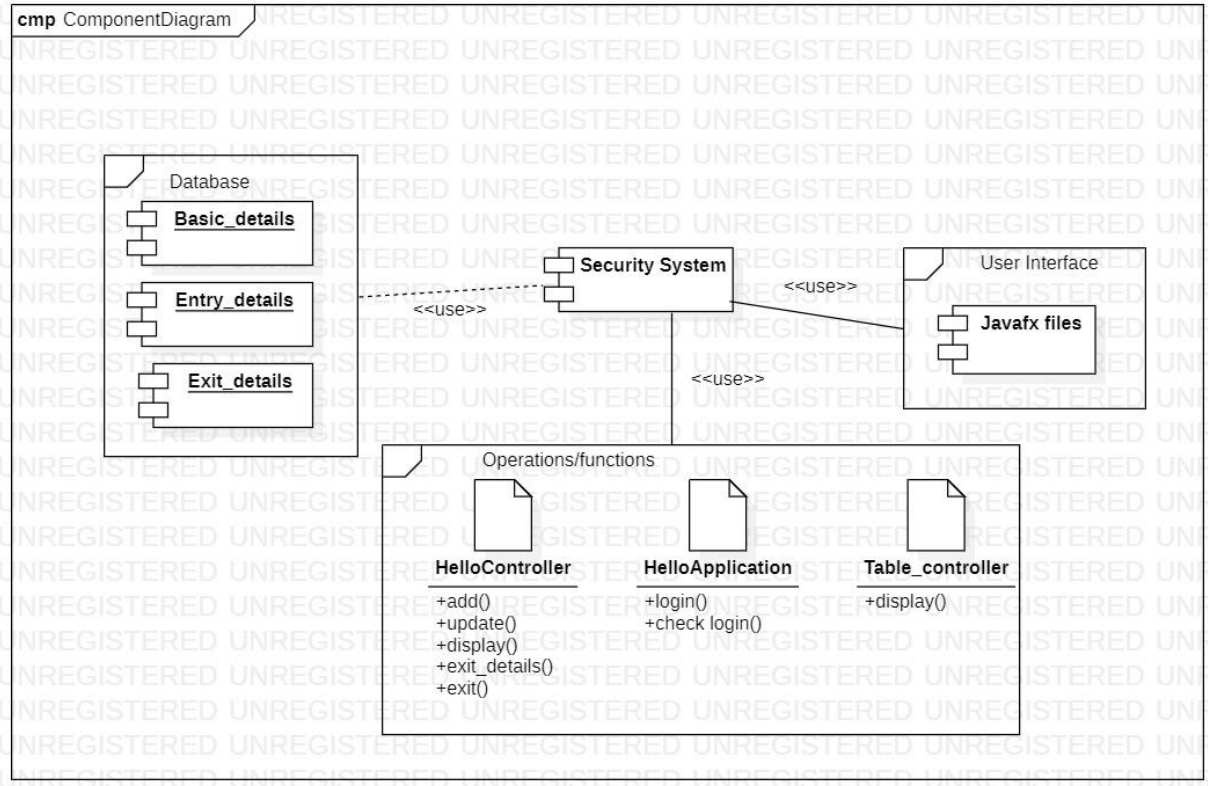


Statechart diagram is one of the five UML diagrams used to model the dynamic nature of a system. They define different states of an object during its lifetime and these states are changed by events. Statechart diagrams are useful to model the reactive systems.

We have shown here the main staes that are going to be there in the system

- Login state
- Insert state
- Update state
- Exit details state
- Display state
- Exit

Security Management System Component Diagram



Component diagrams are used to describe the physical artifacts of a system. This artifact includes files, executables, libraries, etc.

The purpose of this diagram is different. Component diagrams are used during the implementation phase of an application. However, it is prepared well in advance to visualize the implementation details.

The dotted lines in the above diagram defines that the connected module/component is not mandatory but the User Interface, Operation/function module is compulsory for each process.

System GUI Describing Each Menu

Login Form:

When the system will start the first page appear will be login page given in the above image.

User needs to enter the username and password provided by the system developer.

User may ask for changing the username and password to the system developer at the time of installation.

This password and username will be then used for every operation on the system by the operator.

On the login window, we had provided two buttons named as login and clear on the given window, as their name these buttons have functionality like login to the system and clearing the username and password field.

If operator fails to give the correct username and password a prompt message window will appear displaying the message username or password is wrong, As given in the above image.

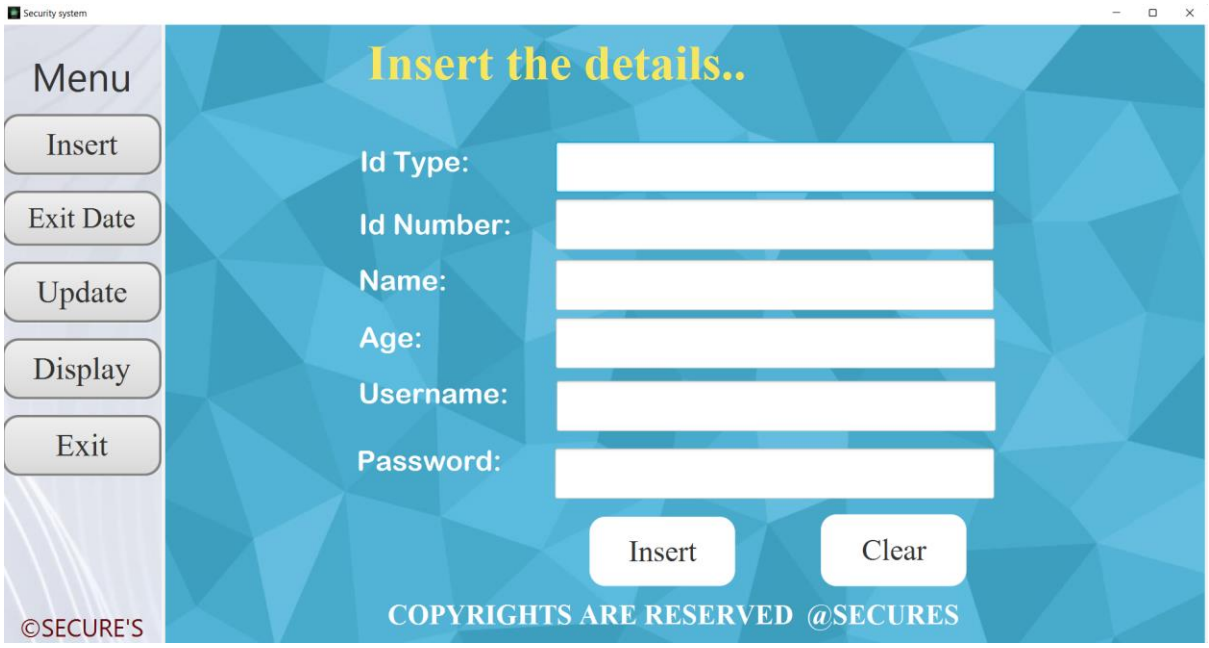
Menu:

If the provided username and password by the operator is correct then the operator will be transferred to the menu window.

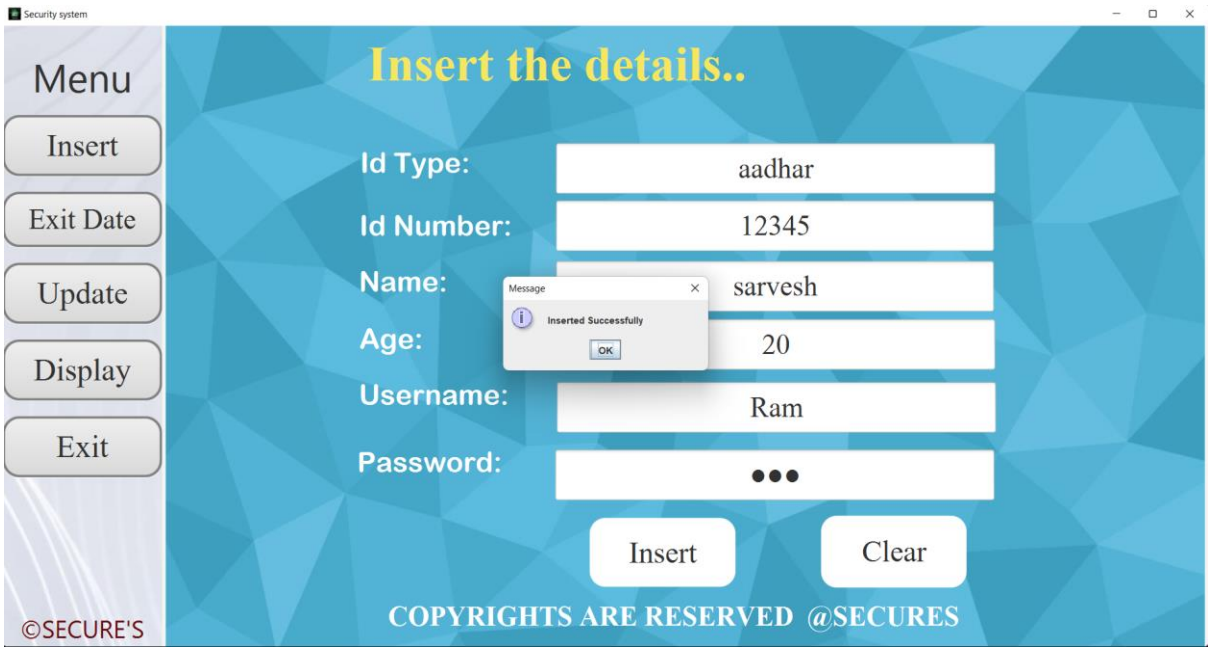
We have provided 5 buttons here those are insert, exit date, update, display, exit.

These buttons perform the operations according to their name.

Insert Window:



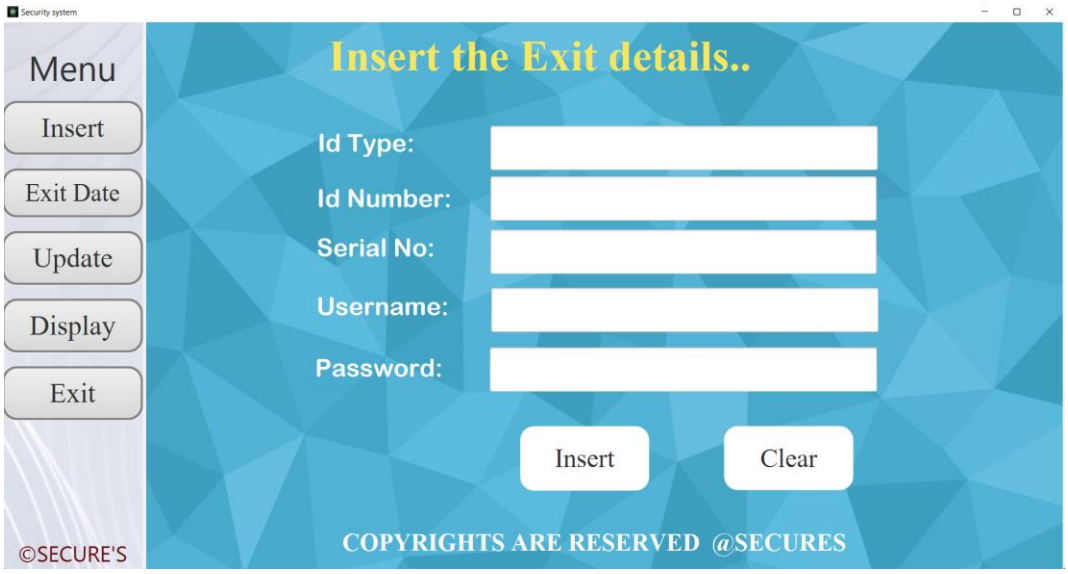
As the insert window will open here operator needs to provide the ID type, ID number, name and age of the visitor after taking all these details operator needs to enter the username and password given to the system.



After providing all the mentioned details the user will click on insert button to insert the data into respected database and tables if the username and the password entered by the operator is wrong then a prompt message will appear telling username and password is wrong.

But if the password and the username entered is correct a prompt message is displayed messaging inserted successfully.

Exit Window:



After clicking on exit date button one Window will appear that will ask ID type, id number, serial number, username, password.

There are two cases in which the data will not be entered into the database the first one is when the serial number given by the operator to the system is not associated with the specified user and, Second when the username and password provided by the operator are not correct.

In this both cases, there will be different prompt messages describing the error.

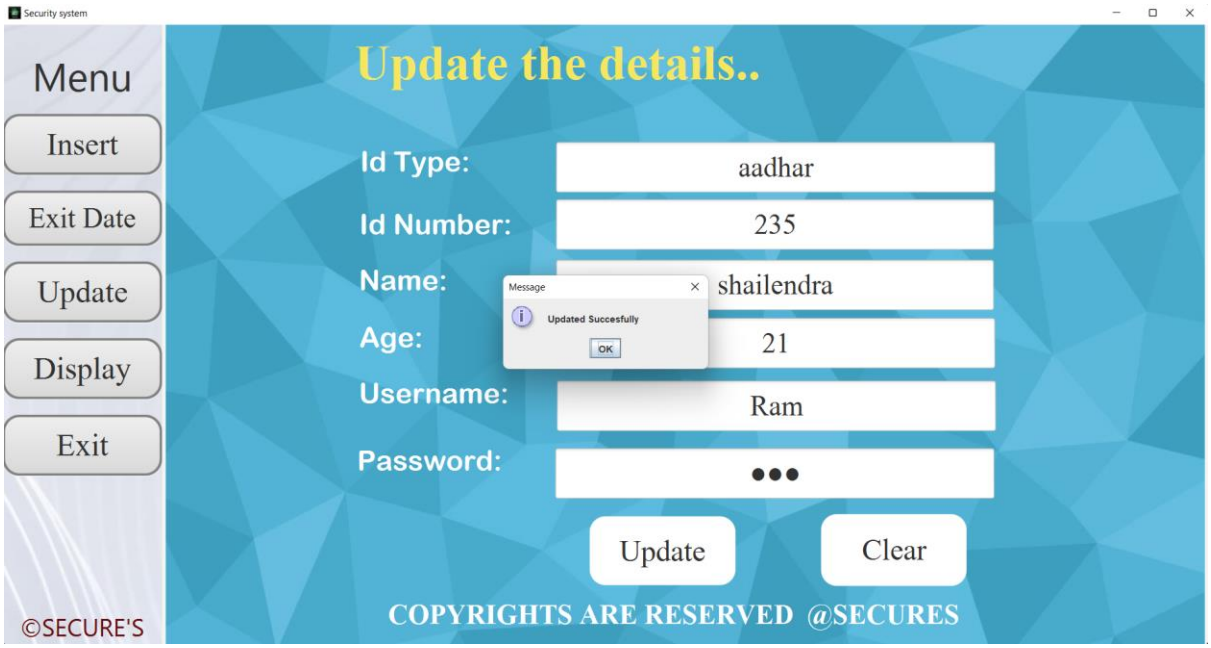
If the serial number is wrong then there will be a prompt message displaying error in serial number.

And the second case there will be username or password is incorrect.

If the details inserted by the operators are correct then the values will be entered and stored into the database.

Update Details:

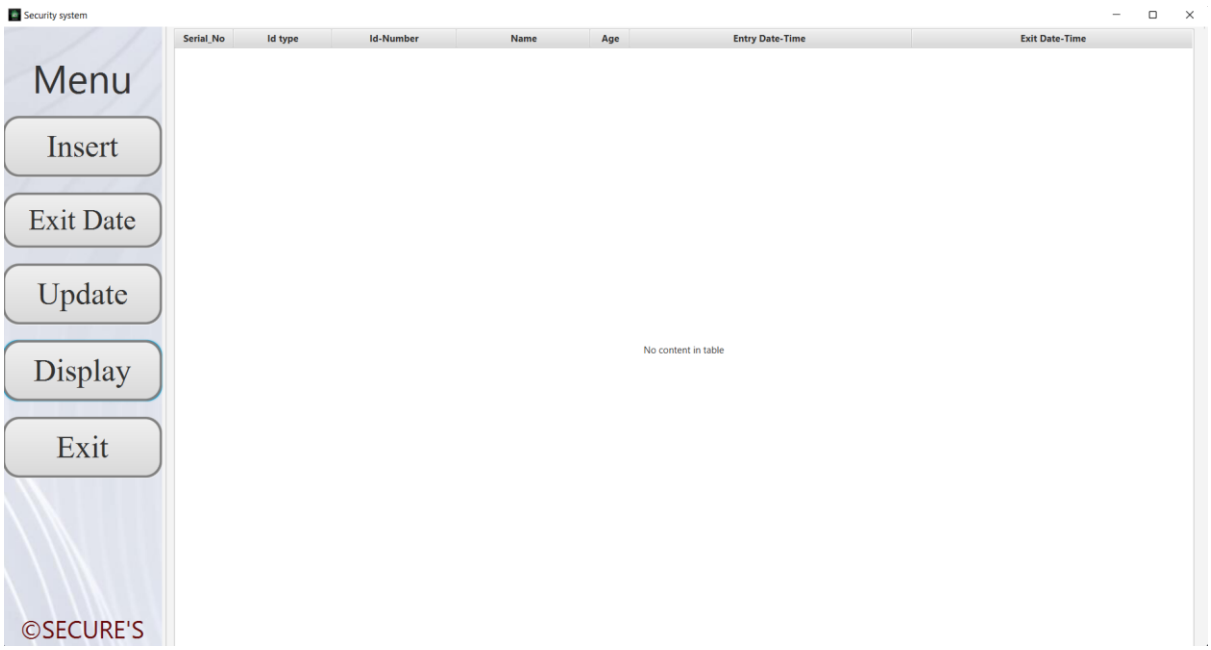
Operator will click on update button, the options will be shown are Id type, ID number, name, age, username and password.



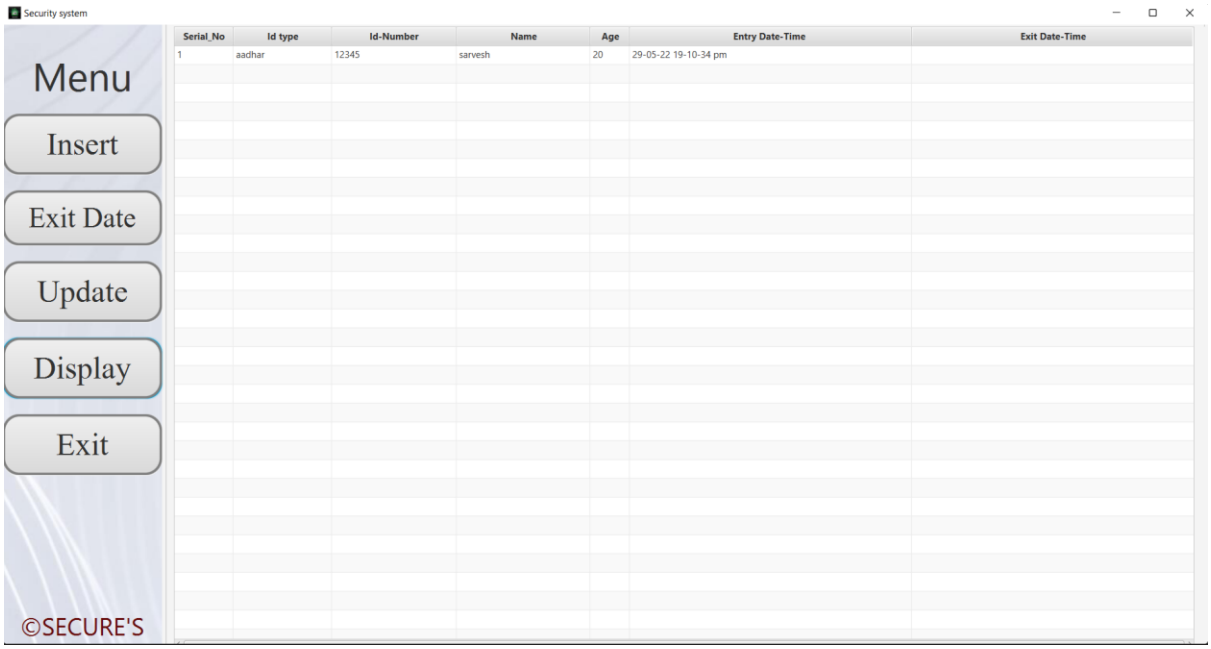
When the visitor again visits, the operator can change both name and age, the name will be change in whole database while the age will only change from today's date or from a particular instance.

Or if the username or password is wrong, it will show the username and password are incorrect.

Display Window:

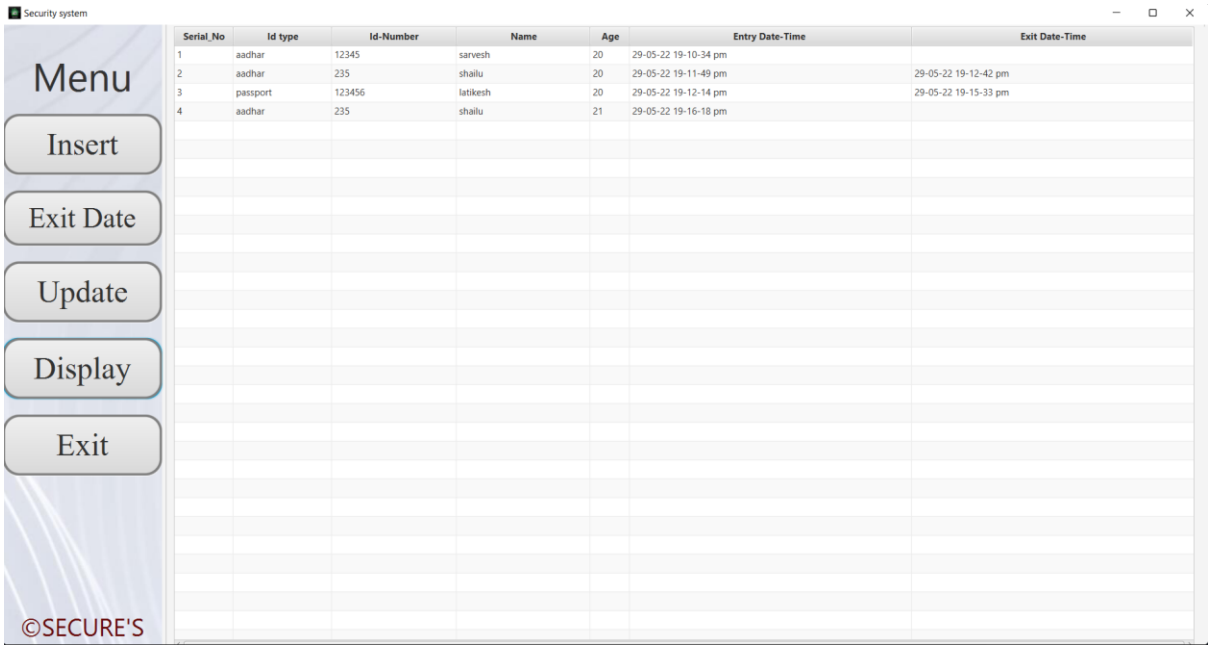


On display button with various fields data serial number, ID type, ID number, name, entry date-time and exit date-time.



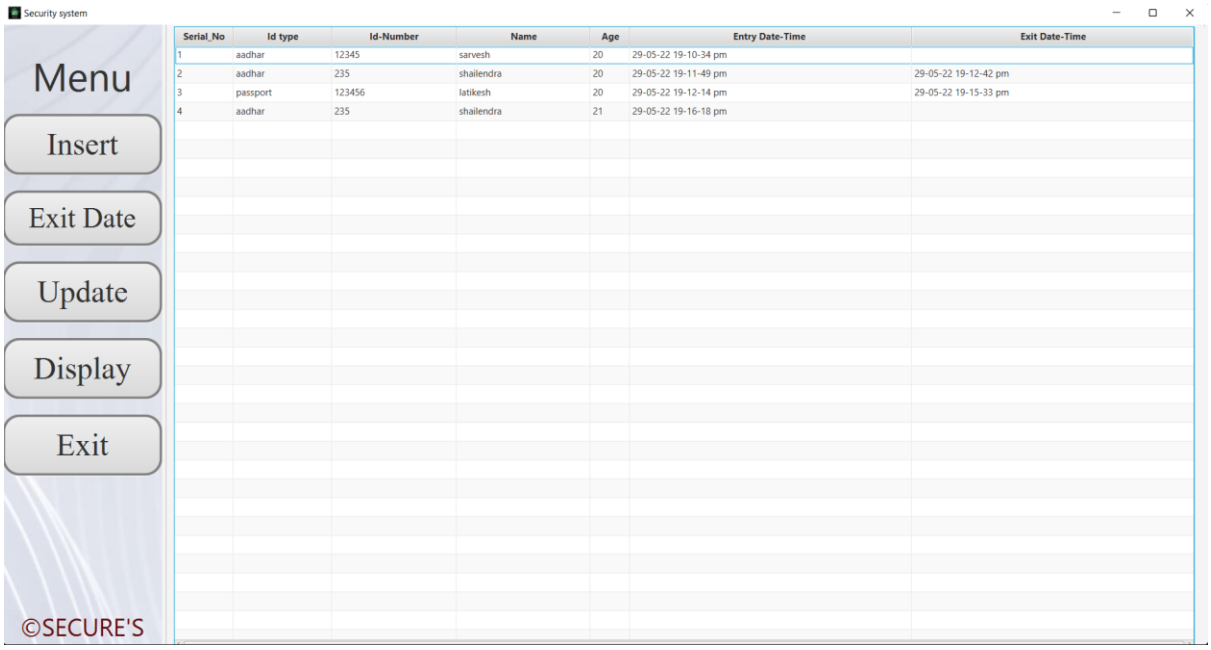
After inserting the detail from insert section and clicking on insert button the data will be just stored in database and display will helps to see the visitor's data.

In above image, operator only entered entry details i.e., entry of visitor so only entry date and time will be visible.



In the image as we can see there are many entries, Some of them have only entry date but some of them have both entry date and exit date.

This is because when the visitor exits from the apartment the operator will ask him his serial number and accordingly he will put the exit date and time these all process will be automatic the operator only needs to enter the serial number of the visitor along with ID type and ID number as mentioned in exit date window.



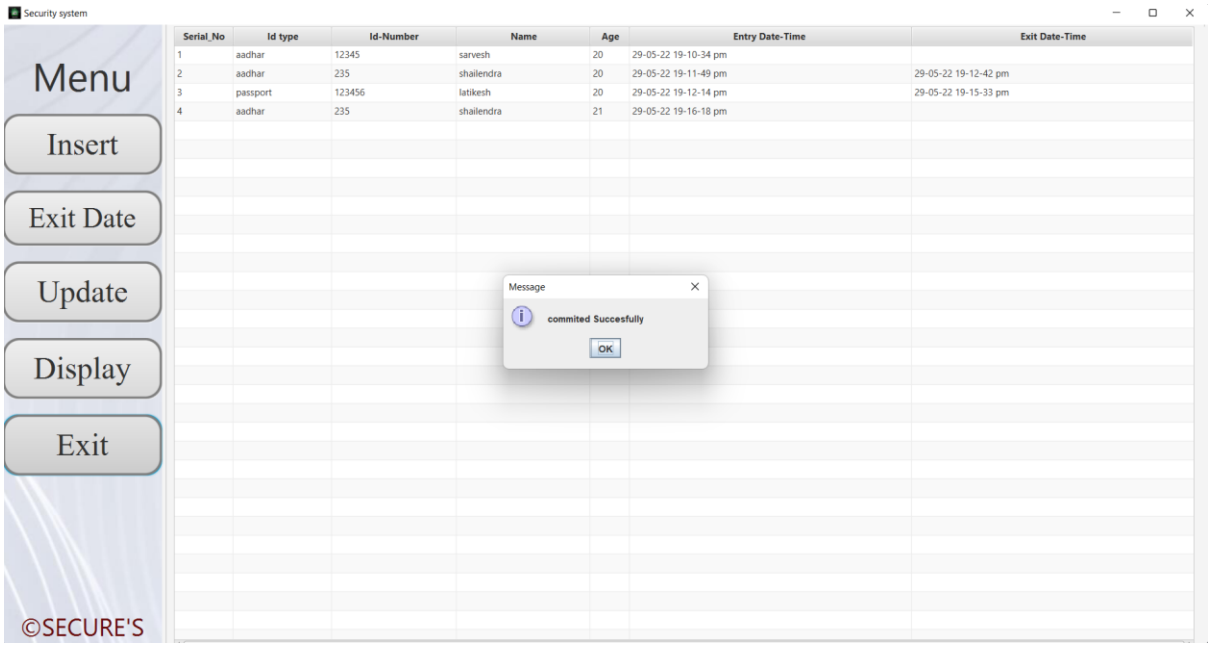
As we have studied about the update window it will update the name throughout the database and the age will be updated after the particular instance like after updating the age.

As we can see in the above image there are two entries with same Id type and ID number.

In the previous image the name for the ID type =(aadhar) and ID number =(235) was Shailu but now it is changed to Shailendra .

And as we discussed the age will only be changed when the new entry is taken, as we can see at the serial number 2 the age of the visitor Shailendra is 20 years but at serial number 4 it is 21 years this is because we have updated the name and age.

Exit:



Last on clicking exit button the data will be just get commit for save in database and we will exit from the systems.

After a successful commit the data will now be available for us whenever required whenever the user starts the system again the data which is ended before will now be displayed in the display section again and the allocation of the serial number is now done from the last allotted serial number.

Source Code:

https://drive.google.com/file/d/1IkK9xAkn0JthrZ3fIXzFDry5Bw9Jwk-R/view?usp=sharing

Conclusion:

1. We have learnt to solve real life problem statement using front-end and Backend application.
2. We have used oracle 11g database to write SQL queries for our Project.
3. We used Star UML to build the UML diagrams which helped us to visualize, how the project will work.
4. We also used JavaFX to create user interface along with this we have Implemented the concepts of Object-Oriented Programming using java.
5. We developed a conceptual design of database and converted it in tabular form, then applied normalization to eliminate redundancy and store data logically.