T-TUTORIALS ANDROID APPLICATION

A Project Report

Submitted in partial fulfilment of the
requirements for the award of the
Degree
of

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY)

By

MOHAMMAD ADNAN SIDDIQUI

Seat Number: ______________

RAJESH MADANLAL YADAV

Seat Number: ______________

Under the esteemed guidance of

Ms. Harshala Chaudhari

Head of Department, Department of Information Technology

DEPARTMENT OF INFORMATION TECHNOLOGY

BHARATIYA VIDYA BHAVANS

(Affiliated to University of Mumbai)

MUMBAI,400-058

MAHARASHTRA

2019-2020

PROFORMA FOR THE APPROVAL PROJECT PROPOSAL

PNR **No.: ……………………** Rollno**: __________**

1. Name of the Student

   ____

2. Title of the Project

   ____

3. Name of the Guide

   ____

4. Teaching experience of the Guide

   ____

5. Is this your first submission? Yes No

Signature of the Student Signature of the Guide

Date: ………………… Date: …………………….

Signature of the Coordinator

Date: …………………

BHARATIYA VIDYA BHAVANS

(Affiliated to University of Mumbai)

MUMBAI- MAHARASHTRA-400058

DEPARTMENT OF INFORMATION TECHNOLOGY

CERTIFICATE

This is to certify that the project entitled “T-Tutorials Android Application”, is bonafied work of Mohammad Adnan Siddiqui and Rajesh Madanlal Yadav bearing Seat.No:________ submitted in partial fulfilment of the requirements for the award of degree of BACHELOR OF SCIENCE in INFORMATION TECHNOLOGY from University of Mumbai.

Internal Guide **Coordinator**

External Examiner

Date: **College Seal**

ABSTRACT

Mobile learning, also known as m-learning, is a new way to access learning content using mobiles. Mobile learning supports, with the help of mobile devices, continuous access to the learning process. This can be done using devices like your phone, laptop or tablet. You can learn wherever and whenever you want! With the advent of mobile learning, educational systems are changing. More and more schools are starting to use laptops or tablets. They're fun for children and adults. Educational apps are becoming increasingly available to teachers and trainers.

This application is aimed to be a great benefit to all the people associated directly or indirectly with the institution. By this application, all the services and facilities provided by the institution will be one click away. All the information about various educational activities around the globe such as researches, advancement in technology will be easily available to the students. Also the managers, the teaching and non-teaching staff, students and their parents will be saved from tedious and not so important tasks. This, as a result will save time, money and be a relief to the managers of the institution.

ACKNOWLEDGEMENT

The success and the final outcome of this project required a lot of guidance and assistance of many people and I am extremely privileged to have got this all along the completion of my project. All that I have done is only due to such supervision and assistance and I would not forget to thank them.

I owe my deep gratitude to our project guide Ms. Harshala, who took keen interest in my project work and guided me along, till the completion of my project work by providing all the necessary information for developing a good system. I am thankful and fortunate to get constant encouragement, support and guidance from all the teaching staff of the BSc. I.T. department of Bhavan’s College, which helped me in successfully completing my project work.

Lastly, I would like to express my appreciation towards my fellow classmates and friends for providing me the moral support and encouragement.

DECLARATION

I here by declare that the project entitled, “T-Tutorials” done at Bhavan’s College, has not been in any case duplicated to submit to any other university for the award of any degree. To the best of my knowledge other than me, no one has submitted to any other university.

The project is done in partial fulfilment of the requirements for the award of degree of

BACHELOR OF SCIENCE (INFORMATION TECHNOLOGY) to be submitted

as final semester project as part of our curriculum.

Name and Signature of the Student

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Introduction

1.1 Background

The increase in the level and quality of education based on the level of technology is the need of hour. T Tutorial is an Android Application which is initiated in order to make the work of the faculties, the managers, the staff members and all the students studying in this institute easier. This application will provide a number of features for all the students and faculties. Also it will be easier for the owner of the tutorials to manage the institute .This application will ensure easy updates to all persons associated with the institute. The main aim of developing this application is to ensure that all the students as well as their parents get all the services of the institute on a click. In this application we are providing every service of the institute accessible anytime and anywhere which the students and their parents and the faculty members as well can make use of. As we all know the technology nowadays is at the peak of advancement and so does the need to keep up with the technically growing world is also one of the numerous reasons for developing this project. Mostly all of the college going students and nowadays some school kids too own a smartphone which works on android operating system, thus keeping this in mind this application is android based and will be easily available for the students and staff members of the institute. Also the parents of the students can access the services like notifications, viewing results and marks of their children, updates about the lectures, interaction with the teachers, etc. The owner of the institute and lecturers will also be at ease because all of their tedious work such as updating daily schedules, broadcasting notifications will now be easy by the use of this android application. All of these services will be of great benefit to all the people associated with the institute. The institute will also enter into the technically driven world with this application as most of the services of this application will need an internet connection to work. As most of the big educational institutes nowadays have an application to ensure best use of their services, this project of us too will also ensure that the users of this software is fully satisfied with the services provided.

1.2 Objectives

The main aim of this application software is to ensure the following:

- To extricate the institute from “on paper” updates.
- To ensure ease for all persons associated with the institute.
- To save time, money and amount of work needed in the institute.
- To help the institute catch the speed of the fast-paced technologically growing world.
- To provide solutions for interactions between students and faculty members.
- To meet the needs of the students.
- To improve services provided by the institute.
- To provide systematic management of the institute.

This application is targeted mainly to students and staff members of the institute.

1.3 Purpose, Scope and Applicability

1.3.1 Purpose

The purpose of this application is to provide the best educational services to students in the institute by the faculty members and outside the institute by this application. This application will improve the working of the institute as well as it will help the students to learn, understand and research on any specific concepts which they wish. By the variety of features this application will provide, it will be a lot easier than it was back then when this application was not implemented. The practical issue that motivated the development of this project is the lack of direct interaction and engagement between teachers and students in education.

1.3.2 Scope

This application will open new ways of learning anywhere and anytime .Through this android application, students who own an Android Operating System based smart phone will be able to make use of its various features and services. However due to this application being an android application, the students, parents as well as the staff members who do not own a smart phone will not be able to use this application also an Android Operating System is required for this application to work .This application will not work on any other Operating systems like iOS, KaiOS, Symbian, Windows 10 Mobile etc. Also, this application will not work in case of Network failure or connectivity issues due to this app purely being network based.

1.3.3 Applicability

This application is purely developed for educational purposes, the users of this application will be students from the institute, their parents, the staff members i.e. the lecturers and managers of the institute and the owner of the institute. This application will be installed on smart phones of all the persons who are associated with the institute and from their phones they can make use of the services provided by the institute through this application.

1.4 Achievements

This application is targeted to break the various constraints and boundaries that are imposed on institutes such as on paper notices , difficulties faced by students such as asking doubts on a specific concepts face to face , difficulties faced by faculties in communication with students and managers .This application is aimed to overcome the difficulties in managing the institute.

1.5 Organisation of Report

This system is organized such that all the working, non-working people such as the Managers, Lecturers, Students etc are able to utilize the services provided by the institution by the numerous features this application offers.

All of the people associated directly or indirectly with the institution are somehow will be at ease and essential things such as time and money will be saved.

Chapter 2

Survey of Technologies

The rapid technological advancement of mobile technologies is changing the landscape of how m- learning can support education (Park, Nam, & Cha, 2012). M-learning, a relatively new way of learning, occurred from the advancement of mobile, wireless, and ubiquitous technologies (Chao & Chen, 2009) and has enhanced various environments (e.g., education, business, and gaming; Pereira & Rodrigues, 2013). M-learning is constantly evolving and helps the advancement of traditional education, since it can be offered as an alternative or complementary way to support the learning process –says some of the people associated with mobile learning applications.

The objective of the study is to seek better ways to use mobile devices as learning tools in computing education and to provide guidelines to successfully integrate mobile learning into mainstream education. This study is very timely as mobile learning is gaining relevance across several fields of study. However, a gap remains in the development of a mobile learning application that will support the instruction of several topics in computer science education.

Scholars have supported the fact that mobile technologies have unlimited possibilities to advance education.

The expansion of mobile devices usage combined with the continuous increase on connectivity availability are making new, different education scenarios possible. Some of these new scenarios are represented by virtual learning environments, which are increasingly being used in conjunction with mobile devices. The use of these environments enables different pedagogical approaches to be adopted outside the physical classroom.

Mobile learning represents one of the most promising frontiers of current educational technologies. Mobile learning here can be defined as "learning across multiple contexts, through social and content interactions, using personal electronic devices" The widespread distribution of mobile devices, the increasing accessibility of the related infrastructures, and the heterogeneity of apps available on platforms like GooglePlay and AppleStore have nurture a healthy environment for the use of mobile applications in teaching and learning. There have been numerous studies that have attempted to further explore the potential of mobile technology as situated, subjective, dynamic and cooperation facilitator tool used in both formal and informal settings smartphones and mobile devices can provide opportunities to reconsider and reformulate traditional learning, supporting learning with authenticity and context awareness. Finally, their improved usability and online features make them instruments with a relevant impact in terms of diffusion, accessibility and participation. E-learning with mobile and wireless technologies is evolving and transforming education and introduces new learning environment and requires new interactive and dynamic content to be produced.

Tools for making diagrams for the project(StarUML)

StarUML is a UML tool by MKLab. The software was licensed under a modified version of GNU GPL until 2014, when a rewritten version 2.0.0 was released for beta testing under a proprietary license.

After being abandoned for some time, the project had a revival to move from Delphi to Java/Eclipse and then stopped again. In 2014, a rewritten version was released as proprietary software. However, the open source version's community is still active.

The stated goal of the project was to replace larger, commercial applications such as Rational Rose and Borland Together. StarUML supports most of the diagram types specified in UML 2.0. It is currently missing timing and interaction overview diagrams.

StarUML was written in Delphi, which is one of the reasons why it was abandoned for a long time. Since December 2005 StarUML was not updated anymore, although some external modules were updated

Currently the newest version of StarUML by the original authors is available for download under the handle "StarUML 2". The public beta is available, although not under the GPL license. Final price and new license type yet remains unknown. This version has been completely rewritten from scratch and includes among many features: support for extensions, OS X compatibility and a new graphical user interface.

Android Studio

Android studio is based on IntelliJ IDEA, which does all the functionality that Eclipse with

ADT plug-in do, with lot more additional features. The initial version of android studio offers

1. Gradle-based build support
2. and quick fixes
3. Lint tools to catch performance, usability, version compatibility and other problems
4. ProGuard and app-signing capabilities
5. Template-based wizards to create common Android designs and components
6. A rich layout editor: it allows you to drag-and-drop UI components, preview layouts on multiple screen configurations. Preview appears instantly as you change in the layout editor. You can choose a language, and can see the preview of layout with that
7. Rich Color Preview editor: While adding colors as a resource, and we can see the color preview at the left hand side of the editor.

Firebase vs MYSQL

Firebase is a mobile and web app development platform that provides developers with a plethora of tools and services to help them develop high-quality apps, grow their user base, and earn more profit.

Firebase is literally different than traditional databases like MySQL and stores data in the form of documents. These documents can be manipulated in real-time in cross platform mediums. MySQL is a relational database which works with key->value concept and create relations with different set of data.

These relations are then used for data transactions. MySQL lacks the real-time data transition concept and requires so many work to create REST APIs.On the other hand Firebase database provides different platforms like Android, iOS and Web for creating quick APIs. Basically Firebase is a hierarchical data structure i.e it’s just like a JSON tree in the cloud.

Firebase has the concept of keys, which are the names of the nodes that you store data under. You could somehow compare them to the primary keys of a relational database but there is no concept of a managed foreign key in it.

Chapter 3

Requirements and Analysis

3.1 Problem Definition

As we all know nowadays technology is at the topmost level in every aspect of our life. The technology is fast paced and due to this various organizations and institutions compete with each other not only in their respective fields but also in they compete technically. Who is more technologically advanced? Who provides most of the services using technology? –arising of such questions in the market is a daily matter now.

In order to keep up with the advanced world, every institution needs to use technology for its own benefit as well as for the benefit of others. This competition however helps the customers or users of that technology, specifically the people who are associated with the institution.

This project is developed in order to overcome a number of problems faced by the people associated with the institution. The proposed project is targeted to solve various problems by various features and benefits of this application software of which some are listed below:

- Cost Effective:

  Being used on an android smartphone it will save loads of papers which as a result will lower cost and also it is good for our environment. Also mobile phones are now widely used so need to buy additional equipment for making use of the services.

- Time efficiency:

  As the tedious time consuming meetings and arrangements of daily schedules now being done on the application it will save a lot of time.

- Reduced Work:

  The people working in the institution of the lecturers will now have a much less amount of work.

- Ease of access:

  The application can easily be used anywhere and anytime wherever needed just an internet connection and login and you are all set to make use of the services of the institution.

- Usability:

  This application is user-friendly and thus does not need professional people to work with the application

- Ease of Learning:

  This application will ensure that the students stay updated about various researches going on around the world in which they are interested in.

3.2 Requirements Specification

The future of e-learning depends to a large extent on how effectively multimedia archives are used to create a better learning environment than what is currently available in the classroom. Many types of courses may become transformed by examples shown as photos, maps, audio, or video segments. This content, currently stored in the databases news organizations, encyclopedias, scientific and other organizations will become more valuable as the bandwidth constraints on users recede. Content that has not been digitized and is not accessible to potential users may require costly efforts to digitize it and make it accessible to the learning public.

The Technology, Education and Copyright Harmonization Act of 2001 expands the "fair use" exemption for copyrighted material allowing them to be used without infringement liability in instructional broadcasting, digital distance learning, or distance education. This puts ELearning on the same level as the traditional classroom approach for the use of these materials. However since some e-learning efforts are meant to make a profit, permission for the use of the content must be granted.

The most critical part of E-Learning is creating or making use of available content, in accordance with training objectives, or a curriculum design, to create an effective online course. Gone are the days of transferring classroom content to the web; the Internet is a new medium, and its strengths are beginning to be understood. In addition to making the course and supporting materials available to the student, the Learning Management System (LMS) should enable interactions between faculty and students, and between students. Administrative tasks, assessment, mentoring and other functions of learning providers comprise a capability that is not available in every E-Learning company. Although the intent is to automate many tasks routinely done by people in a traditional learning environment, an e-learning should have sufficient help available when users phone or email with questions.

3.3 Planning and Scheduling

Any software development life cycle consists of several phases, including requirements gathering and analysis, design, coding, testing, deployment, and maintenance. Depending on how the team wishes to proceed through these phases, several SDLC methodologies can be used.

In fact, agile software development not only eliminates unnecessary action, it also intentionally avoids strict proscription, as it values people, communication, new information, and product quality over blindly following a plan.

One of the Agile methodology pros is that this SDLC model is based on two approaches – Iterative & Incremental. Incremental development means you create something piece by piece. Software is developed in small chunks, adding functionality at each step. This approach allows you to get a minimum viable product (MVP) pretty early in the development process. However, there’s one problem with working this way – your product will not be done until the last piece of working functionality is in place. Iterative product development, on the other hand, means creating something through refinements. Basically, you make a simple draft version of the product that will do the job it’s intended to do, and you go from there – refining functions and different specs. Combined, the approach helps the development team work on the bigger picture, and let them make changes to the product more easily.

Agile model believes that every project needs to be handled differently and the existing methods need to be tailored to best suit the project requirements. In Agile, the tasks are divided to time boxes (small time frames) to deliver specific features for a release.

Iterative approach is taken and working software build is delivered after each iteration. Each build is incremental in terms of features; the final build holds all the features required by the customer.

There are following six phases in every Software development life cycle model:

1) Requirement gathering and analysis: Business requirements are gathered in this phase. This phase is the main focus of the project managers and stake holders. Meetings with managers, stake holders and users are held in order to determine the requirements like; Who is going to use the system? How will they use the system? What data should be input into the system? What data should be output by the system? These are general questions that get answered during a requirements

gathering phase. After requirement gathering these requirements are analysed for their validity and the possibility of incorporating the requirements in the system to be development is also studied.

2) Design: In this phase the system and software design is prepared from the requirement specifications which were studied in the first phase. System Design helps in specifying hardware and system requirements and also helps in defining overall system architecture. The system design specifications serve as input for the next phase of the model.

3) Implementation / Coding: On receiving system design documents, the work is divided in modules/units and actual coding is started. Since, in this phase the code is produced so it is the main focus for the developer. This is the longest phase of the software development life cycle.

4) Testing: After the code is developed it is tested against the requirements to make sure that the product is actually solving the needs addressed and gathered during the requirements phase. During this phase all types of functional testing like unit testing, integration testing, system testing, acceptance testing are done as well as non-functional testing are also done.

5) Deployment: After successful testing the product is delivered / deployed to the customer for their use. As soon as the product is given to the customers they will first do the beta testing. If any changes are required or if any bugs are caught, then they will report it to the engineering team. Once those changes are made or the bugs are fixed then the final deployment will happen.

6) Maintenance: Once when the customers starts using the developed system then the actual problems comes up and needs to be solved from time to time. This process where the care is taken for the developed product is known as maintenance.

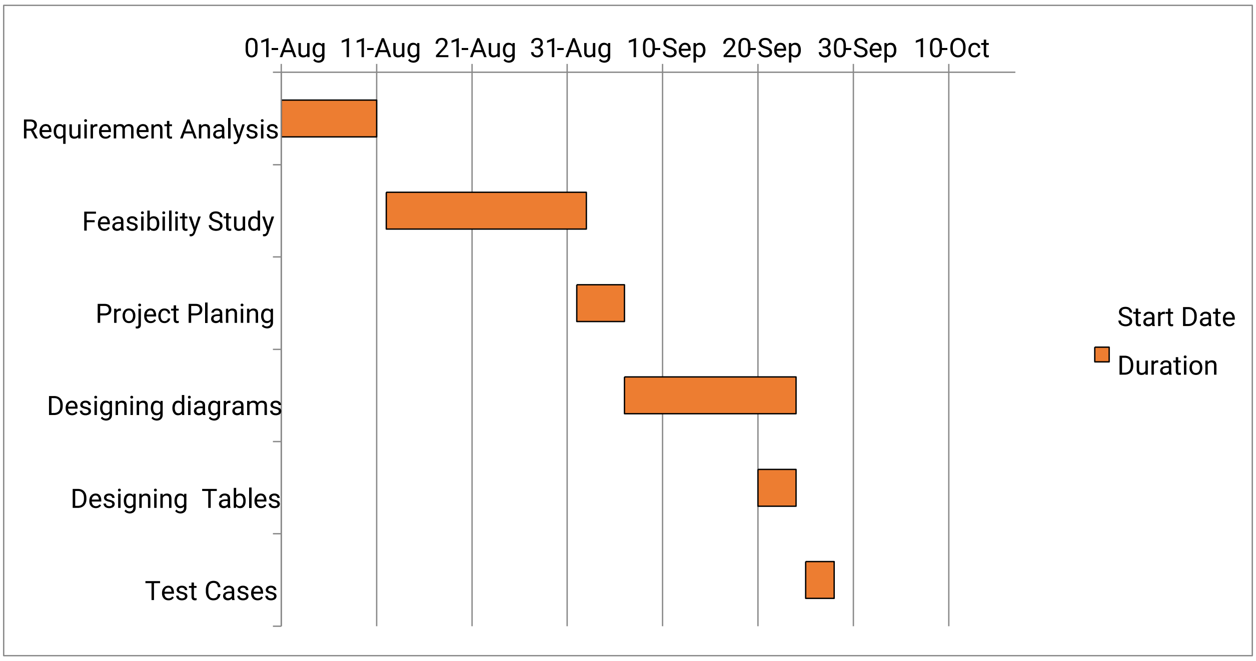
Scheduling

Task	Start Date	End Date	Duration
Requirement Analysis	1-Aug	10-Aug	10
Feasibility Study	12-Aug	31-Aug	21

Project Planning	1-Sept	5-Sept	5
Designing Diagrams	6-Sept	23-Sept	18
Designing Tables	20-Sept	24-Sept	4
Test Cases	25-Sept	28-Sept	3

Gantt Chart

Figure 1. Gantt Chart



A Gantt chart is a type of bar chart that illustrates a project schedule. This chart lists the tasks to be performed on the vertical axis, and time intervals on the horizontal axis. The width of the horizontal bars in the graph show the duration of each activity. Gantt charts illustrate the start and finish dates of the terminal elements and summary elements of a project. Terminal elements and summary elements constitute the work breakdown structure of the project. Modern Gantt charts also show the dependency (i.e., precedence network) relationships between activities. Gantt charts can be used to show current schedule status using percent complete shadings.

Gantt charts are sometimes equated with bar charts. Gantt charts are usually created initially using an early start time approach, where each task is scheduled to start immediately when its prerequisites are complete. This method maximizes the float time available for all tasks.

Gantt charts are widely used in business to describe and monitor all kinds of projects according to the rules of project management. In today's world they are usually created by computer applications, such as Microsoft Project, Primavera Project Planner and Mind View. Here, we refer to such applications as Gantt applications. Different Gantt applications have different features and capabilities: in the discussion below we describe some of the more common ones.

The first thing you will need before setting up a Gantt chart is a detailed project plan.

A project plan is a series of interdependent tasks that need to be performed in a particular order. When moving into a new office for instance, you cannot start redesigning the office space before the lease agreement has been signed.

One way to create a project plan is to use a work breakdown structure, a technique for splitting tasks into sub-tasks and creating a task hierarchy. Gantt applications will generally allow you to reflect the project hierarchy in the Gantt's task list at the left of the chart.

3.4 Software and Hardware Requirements

Hardware Requirements:

- 2 GB RAM minimum, 8 GB RAM recommended
- 2 GB of available disk space minimum, 4 GB recommended (500 MB for Integrated Development Environment (IDE) and 1.5 GB for Android SDK and emulator)
- Intel dual core processor
- 1280x800 minimum screen resolution.
- Android OS version above Marshmallow

Software Requirements:

- Microsoft Windows 7/8/10 (32-bit or (64-bit))
- Android Studio 3.3 or above version (SDK+NDK)
- Firebase platform

- JDK 8
- Internet Connection

3.5 Preliminary Product Description

The proposed project will facilitate the interest of students in learning various concepts and subjects with ease. This project will help the students, their parents, the teaching as well as the non-teaching staff members and the administrator of the institute in various aspects of managing the institution with a much reduced workload. The system will reduce efforts, save time and money and increase the efficiency of students to learn new topics and concepts with great clarity and transparency.

This application is based on android because it is the most widely used open source operating system and thus it is cost effective which results into a number of people preferring android operating system based smartphone over any other operating system. Due to this, a number of students, their parents and faculty members own an android smartphone and hence this application is useful for them in a number of ways. Through this application many activities can be easily carried out such as sending notifications, online payment of fees or salary, daily updates about activities in the institution etc. This, as a result will help every person associated with the institution and will be of great benefit to the institute.

3.6 Conceptual Models

Data Flow Diagram

Also known as DFD, Data flow diagrams are used to graphically represent the flow of data in a business information system. DFD describes the processes that are involved in a system to transfer data from the input to the file storage and reports generation.

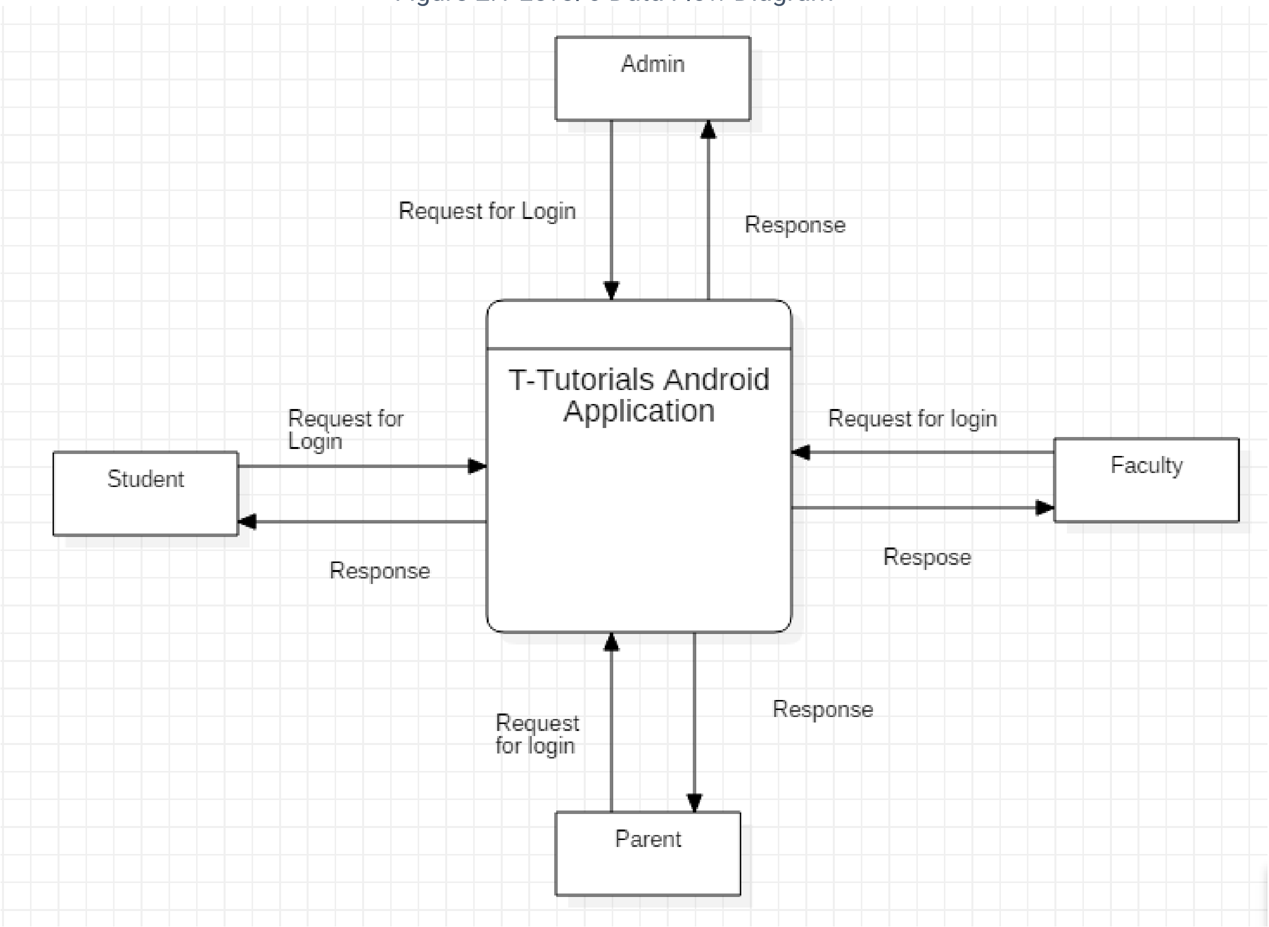
Data flow diagrams can be divided into logical and physical. The logical data flow diagram describes flow of data through a system to perform certain functionality of a business. The physical data flow diagram describes the implementation of the logical data flow.

DFD graphically representing the functions, or processes, which capture, manipulate, store, and distribute data between a system and its environment and between components of a system. The visual representation makes it a good communication tool between User and System designer. Structure of DFD allows starting from a broad overview and expand it to a hierarchy of detailed diagrams. DFD has often been used due to the following reasons:

- Logical information flow of the system
- Determination of physical system construction requirements
- Simplicity of notation
- Establishment of manual and automated systems requirements

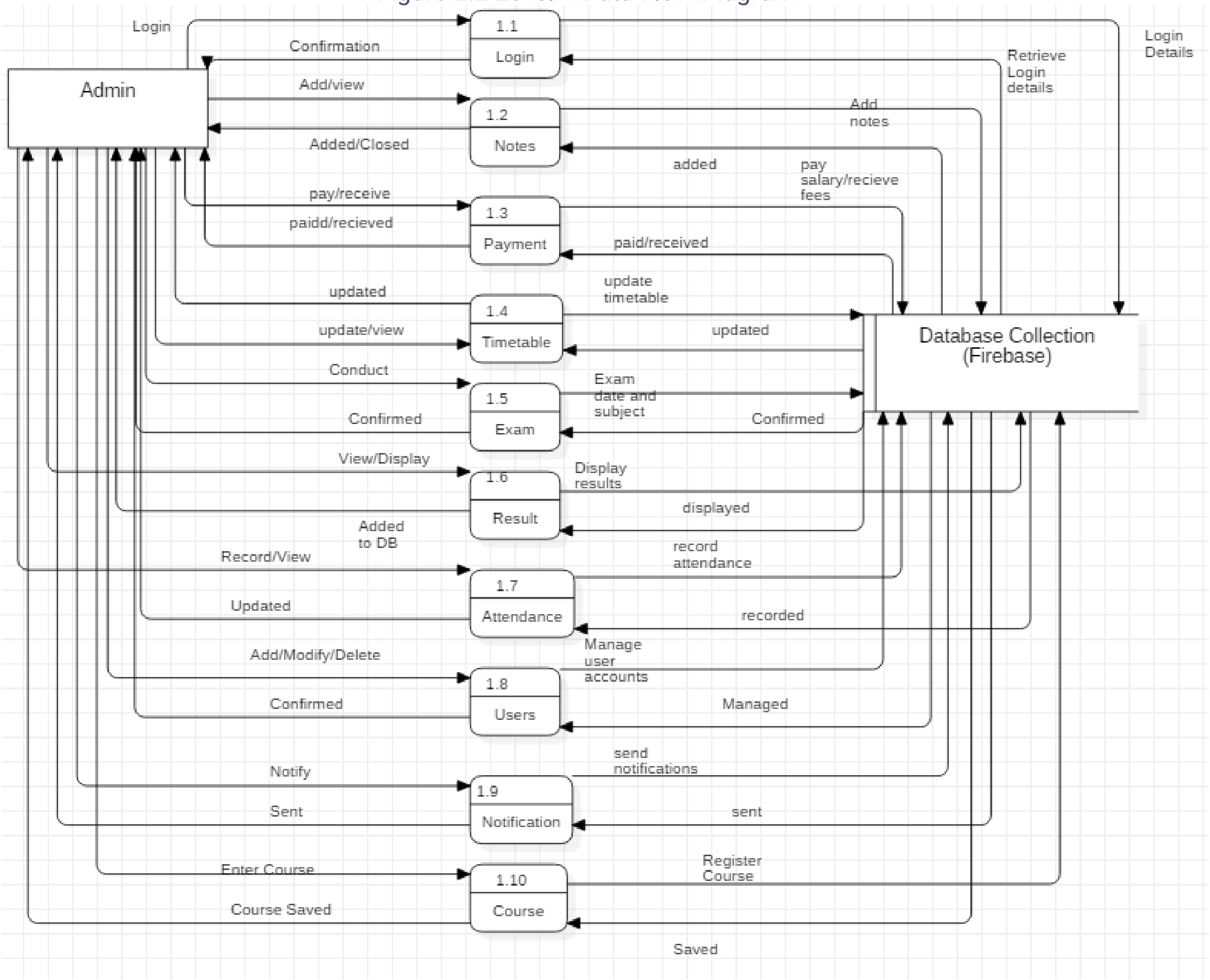
Level 0:

Figure 2.1 Level 0 Data Flow Diagram



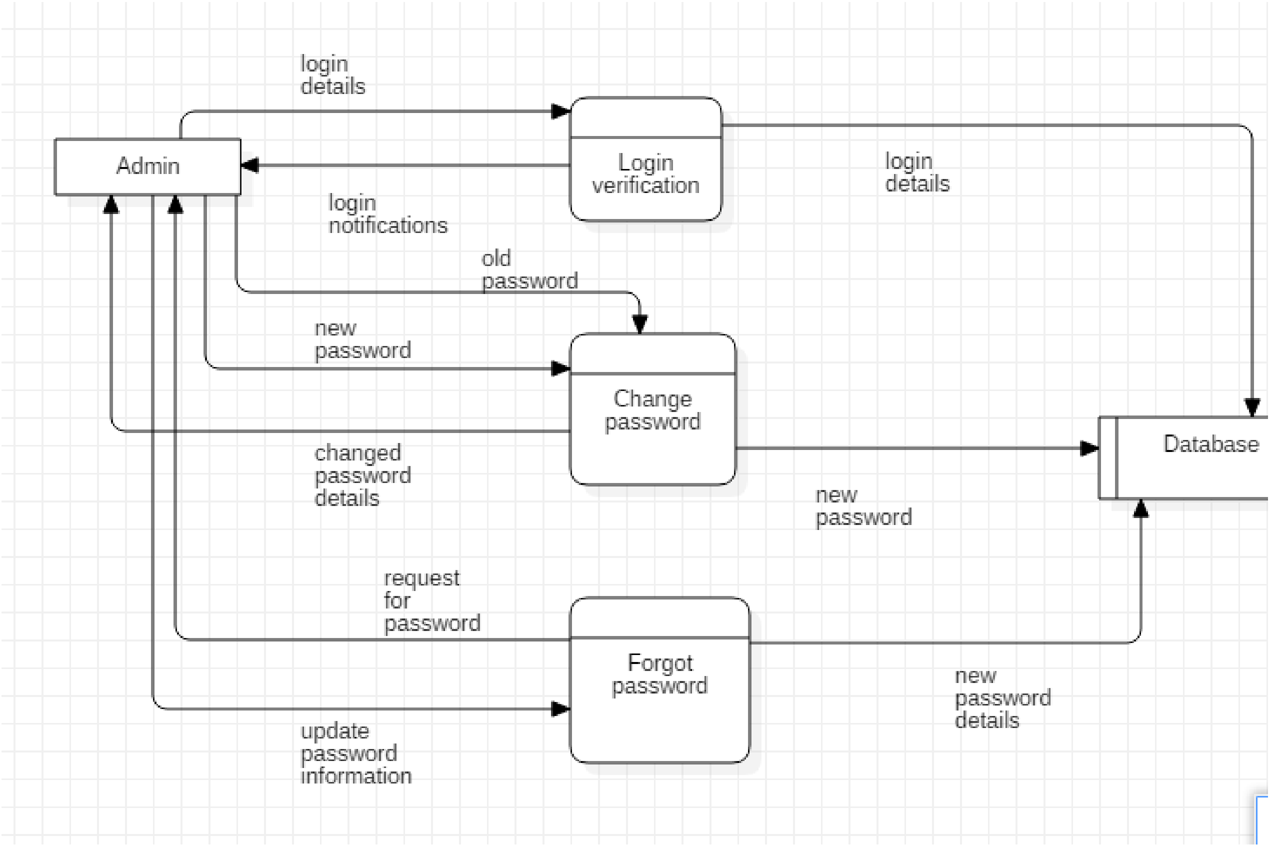
Level 1 (Admin):

Figure 2.2 Level 1 Data Flow Diagram



Level 2 (Login):

Figure 2.3.Level 2 Data Flow Diagram

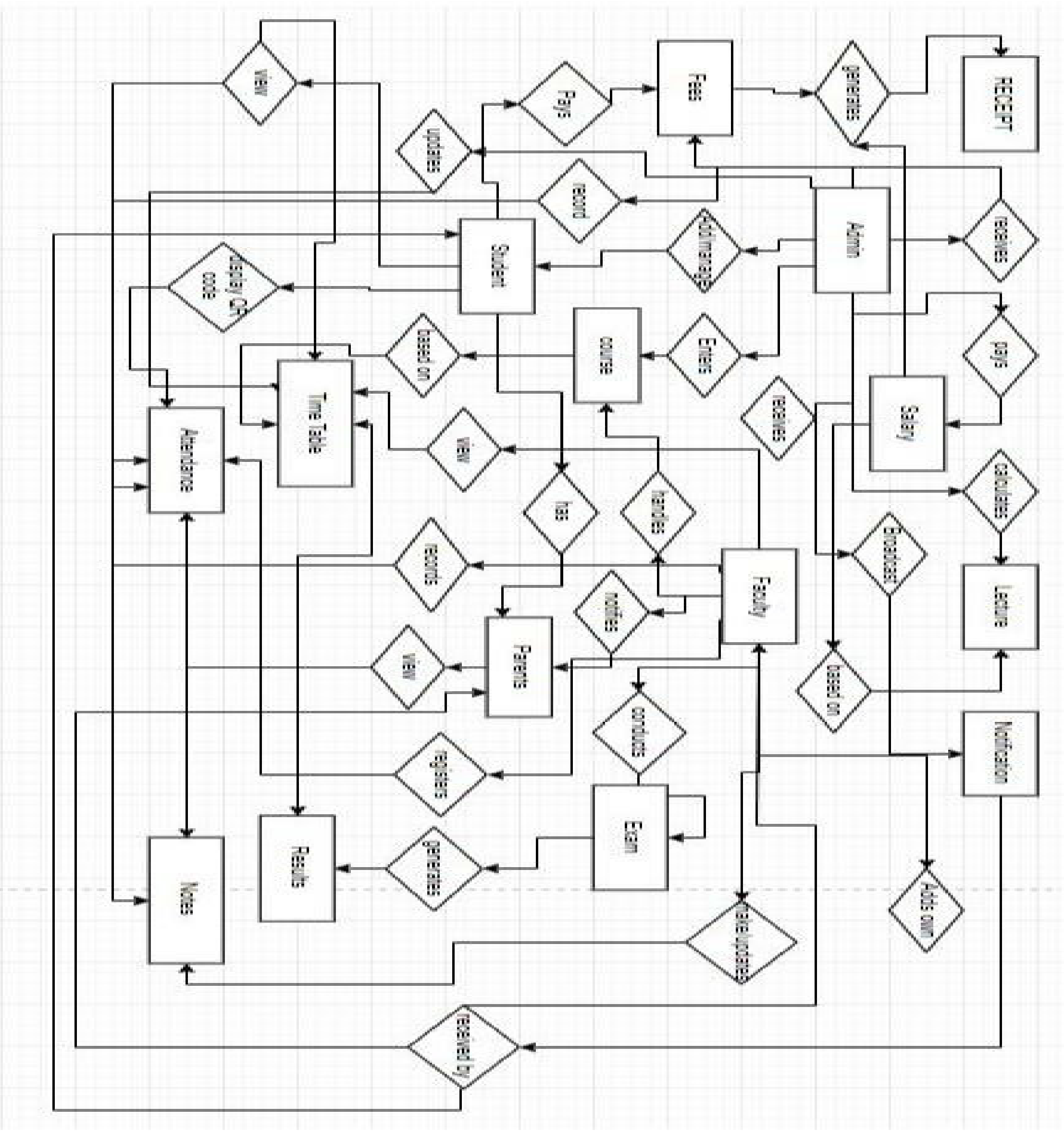


Entity Relationship diagram

An Entity Relationship (ER) Diagram is a diagram that illustrates how “entities” such as people, objects or concepts relate to each other within a system. ER Diagrams are most often used to design or debug relational databases in the fields of software engineering, business information systems, education and research.

- ER model stands for an Entity-Relationship model. It is a high-level data model. This model is used to define the data elements and relationship for a specified system.
- It develops a conceptual design for the database. It also develops a very simple and easy to design view of data.
- In ER modeling, the database structure is portrayed as a diagram called an entity-relationship diagram.

Figure 3.ER Diagram



Class Diagram

A class diagram models the static structure of a system. It shows relationships between classes, objects, attributes, and operations.

The standard class diagram is composed of three sections:

1. Upper section: Contains the name of the class. This section is always required.

2. Middle section: Contains the attributes of the class, used to describe the qualities of the class.
3. Bottom section: Includes class operations (methods). The operations describe how a class interacts with data.

Representation of a class in class diagram:

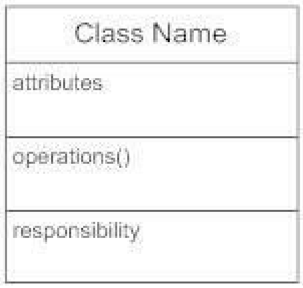
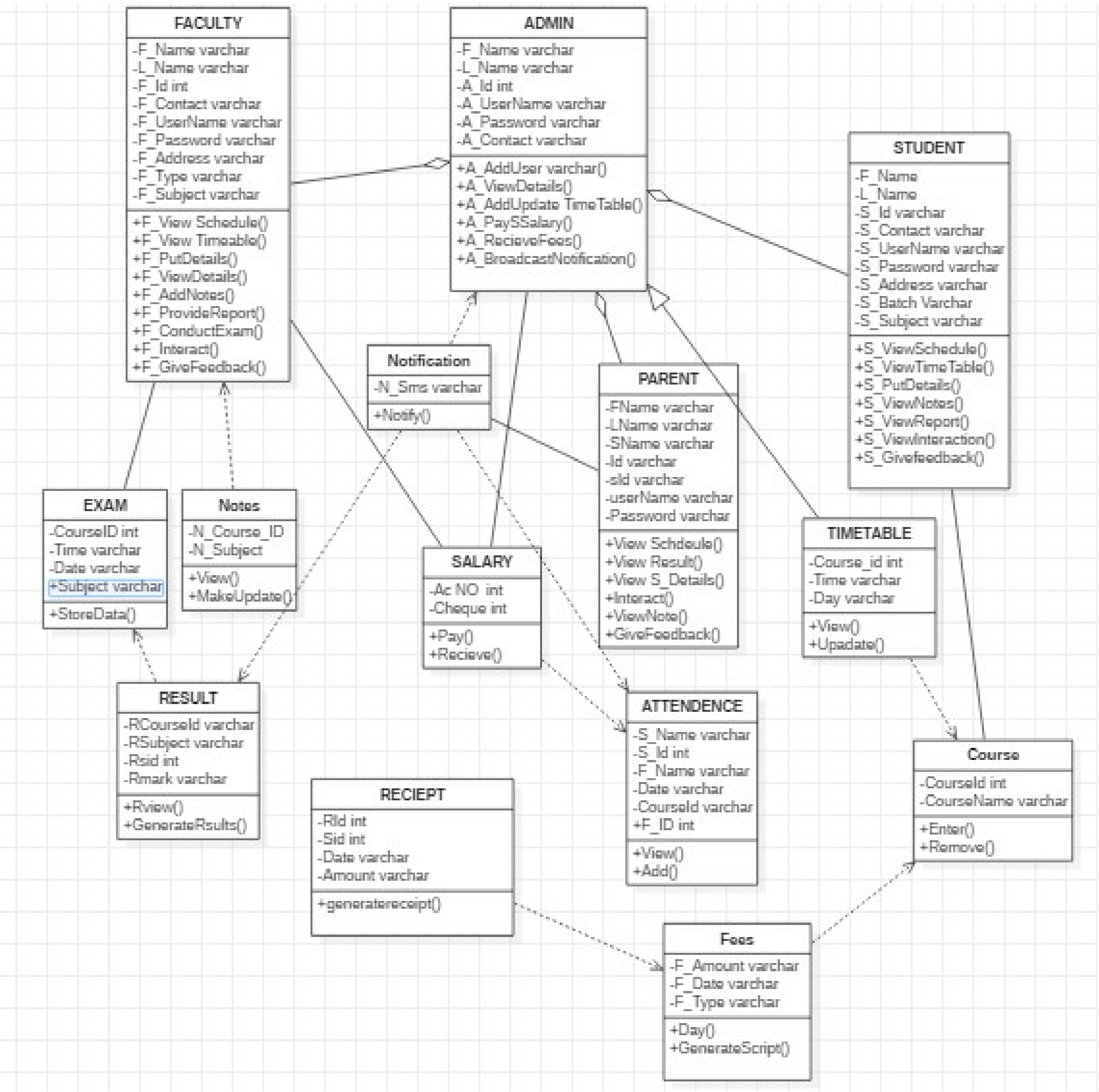


Figure 4.Class diagram



Object diagram

Object diagrams are derived from class diagrams so object diagrams are dependent upon class diagrams.

Object diagrams represent an instance of a class diagram. The basic concepts are similar for class diagrams and object diagrams. Object diagrams also represent the static view of a system but this static view is a snapshot of the system at a particular moment.

Object diagrams are used to render a set of objects and their relationships as an instance

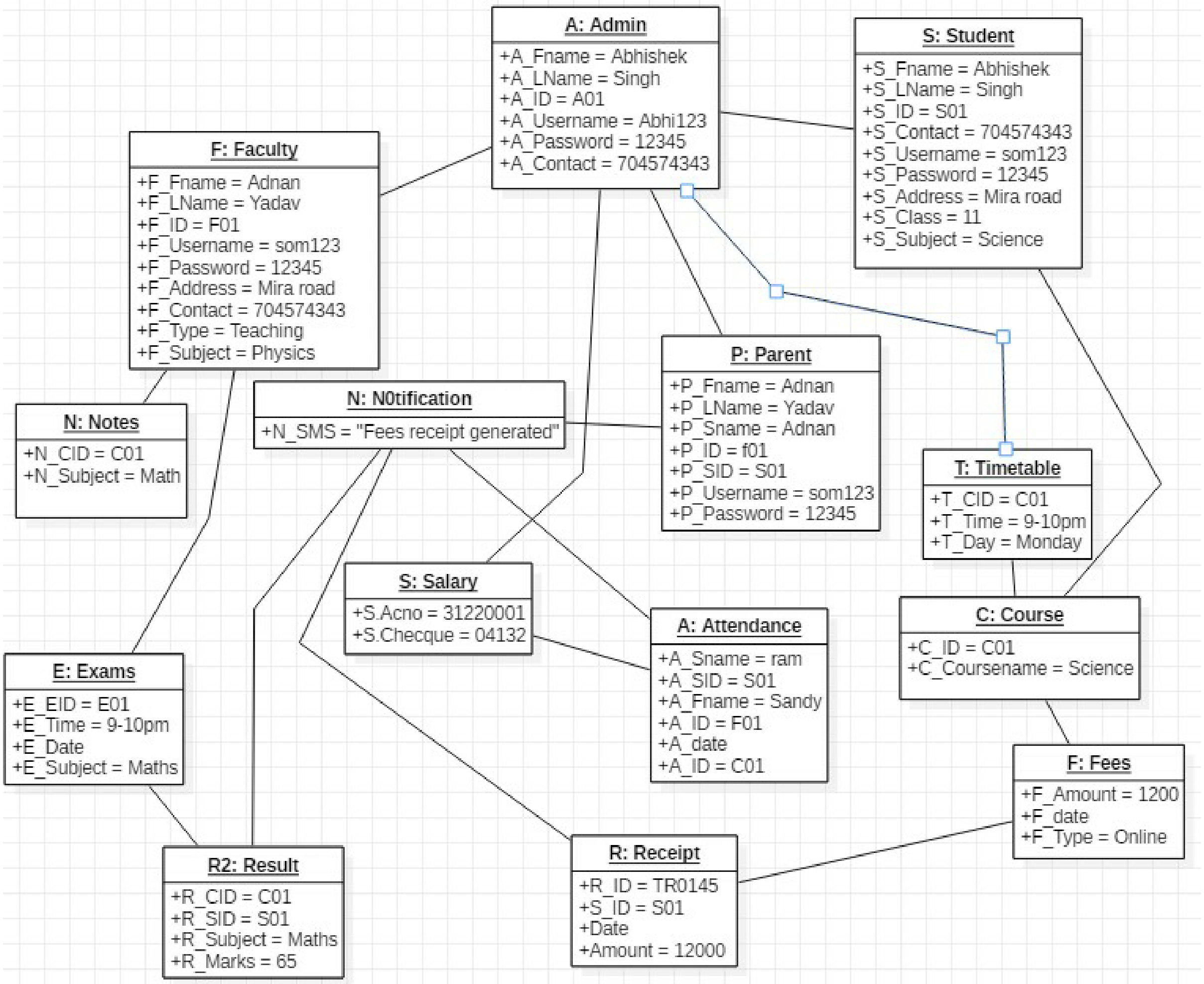
The difference is that a class diagram represents an abstract model consisting of classes and their relationships. However, an object diagram represents an instance at a particular moment, which is concrete in nature.

It means the object diagram is closer to the actual system behavior. The purpose is to capture the static view of a system at a particular moment.

The purpose of the object diagram can be summarized as –

- Forward and reverse engineering.
- Object relationships of a system
- Static view of an interaction.
- Understand object behavior and their relationship from practical perspective

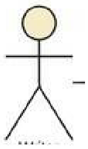
Figure 5.Object Diagram



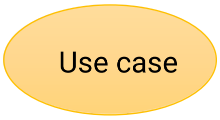
Use Case Diagram

In the Unified Modeling Language (UML), a use case diagram can summarize the details of the system's users, known as actors, and their interactions with the system. A use case diagram helps to represent a scenario in which the system interact with the actor.

Components of a Use case diagram:



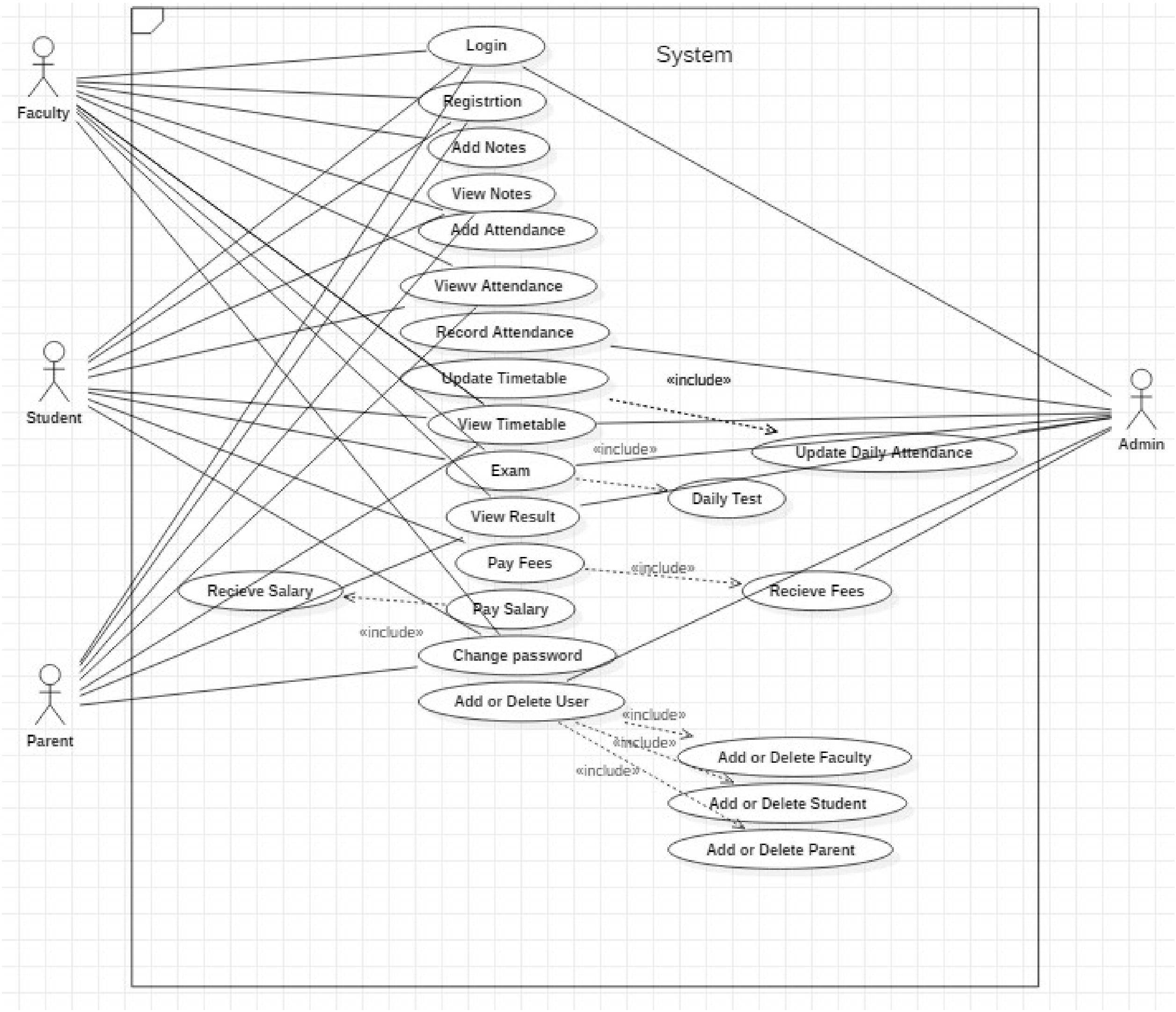
Actors: Stick figures that represent the people actually employing the use cases.



Use case: Defines the different uses that a user might have.

Ordinary relationship: Represents a connection that is a channel for the transfer of information between the use case and or actors.

Figure 6.Use Case Diagram

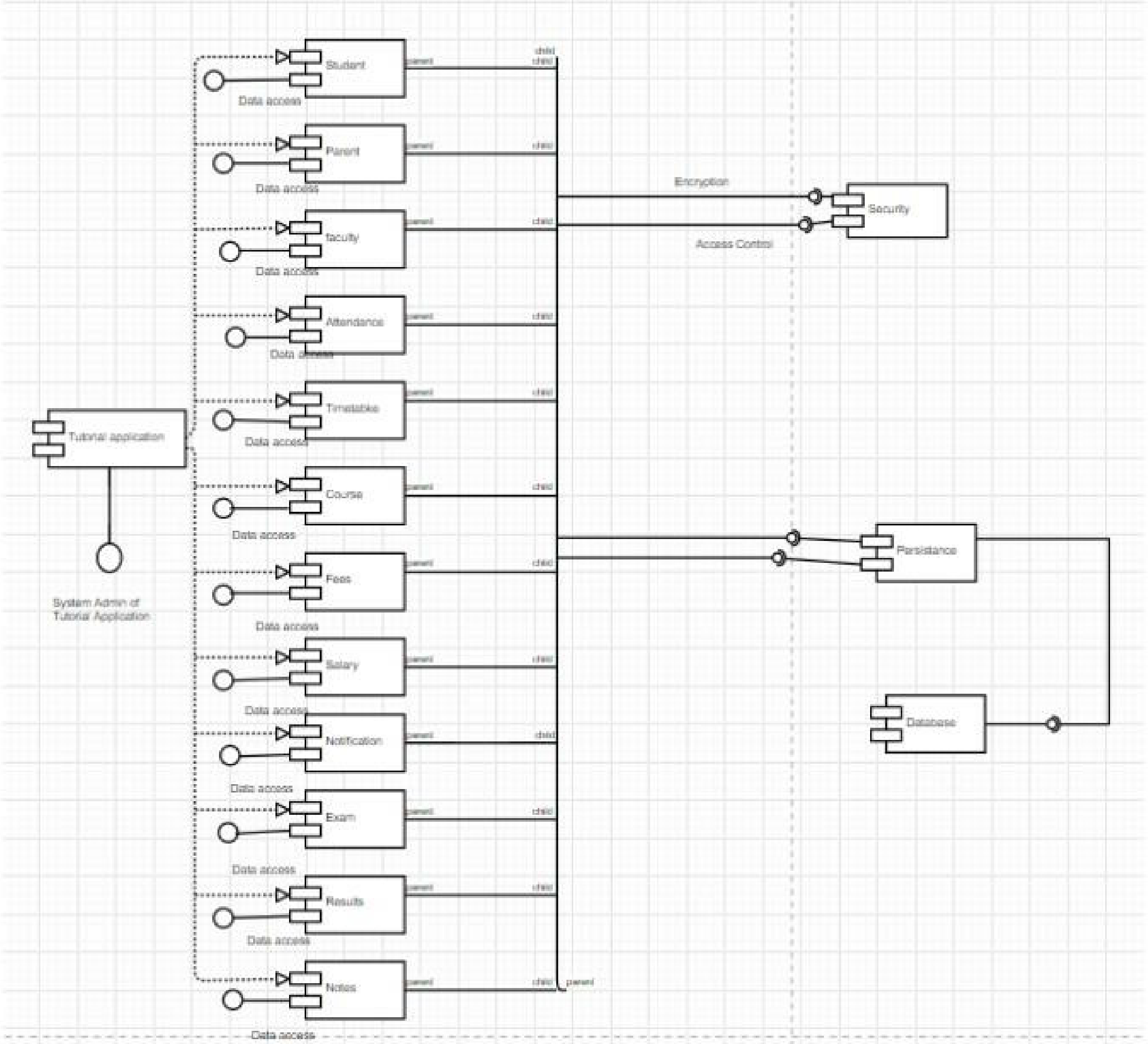


Component Diagram

Component diagrams are different in terms of nature and behavior. Component diagrams are used to model the physical aspects of a system. Now the question is, what are these physical aspects? Physical aspects are the elements such as executables, libraries, files, documents, etc. which reside in a node.

Component diagrams are used to visualize the organization and relationships among components in a system. These diagrams are also used to make executable systems.

Figure 7.Component Diagram



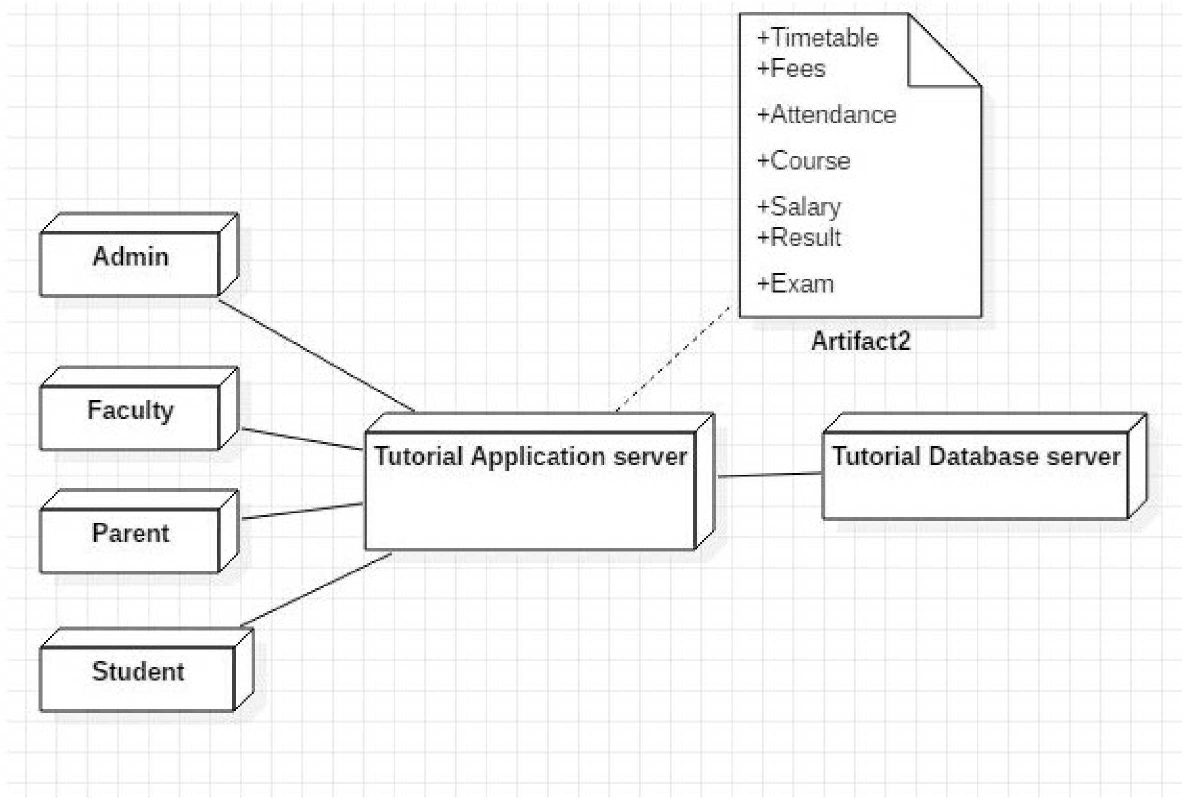
Deployment Diagram

A deployment diagram is a UML diagram type that shows the execution architecture of a system, including nodes such as hardware or software execution environments, and the middleware connecting them.

Deployment diagrams are typically used to visualize the physical hardware and software of a system. Using it you can understand how the system will be physically deployed on the hardware.

Deployment diagrams help model the hardware topology of a system compared to other UML diagram types which mostly outline the logical components of a system

Figure 8.Deployment Diagram



Chapter 4

System Design

4.1 Basic Modules

- **Admin:**

  The Admin module will be only for the managers of the institution and can access all the services and features of the applications. Admins will have access to whole of the system data.

- **Student:**

  The Student module is for the students and trainees of the institution. The students can access various features of the application such as viewing daily schedules, notifications, interaction with lecturers etc.

- **Faculty:**

  This module is for the teaching and non-teaching staff of the institutions such as lecturers, assistants etc. They will be eased by the features of this application

- **Parent:**

  The Parent module is specially designed for parents of all the students studying in the institution. This module will help the parents in many ways and they will be relaxed as their children will be right under their supervision.

4.2 Data Design

4.2.1 Schema Design

A database schema design represents the logical configuration of all or part of a relational database. It can exist both as a visual representation and as a set of formulas known as integrity constraints that govern a database

Given, below, is the list of tables used in the proposed system

1. Admin_Details
2. Student_Details
3. Parent_Details
4. Faculty_Details
5. Notes
6. Fees
7. Salary
8. Lecture
9. Timetable
10. Exam
11. Result
12. Notification
13. Attendance
14. Receipt
15. Course

4.2.2 Data Integrity and Constraints

Data integrity is the maintenance of and the assurance of the accuracy and consistency of, data over its entire life-cycle, and is a critical aspect to the design, implementation and usage of any system which stores, processes, or retrieves data. The term is broad in scope and may have widely different meanings depending on the specific context – even under the same general umbrella of computing. It is at times used as a proxy term for data quality, while data validation is a pre-requisite for data integrity. Data integrity is the opposite of data corruption. The overall intent of any data integrity technique is the same: ensure data is recorded exactly as intended and upon later retrieval, ensure the data is the same as it was when it was originally recorded.

Validity checks and constraints provided to maintain data integrity:

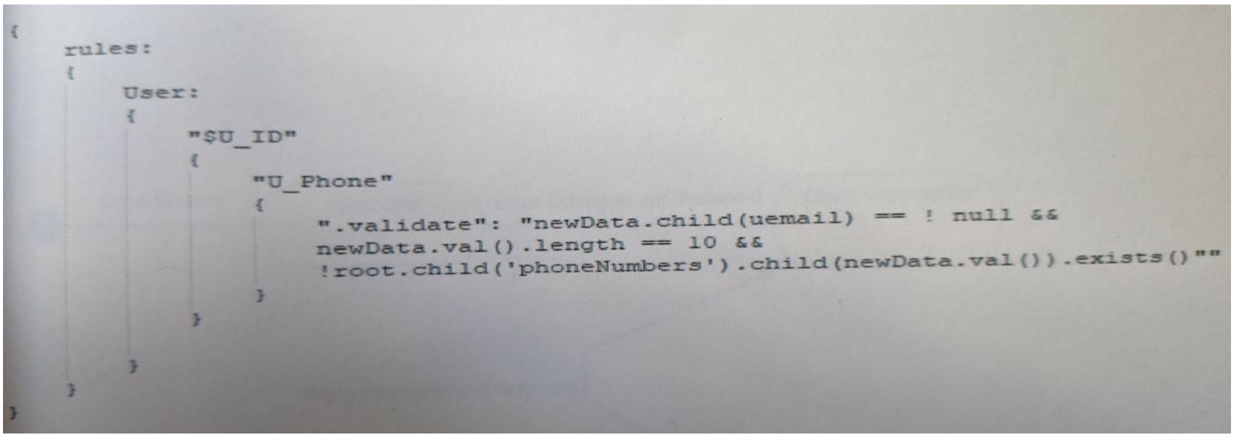
- Account Validation: The email id entered by the user should match an entry in the database. Otherwise the user is requested to create a new account.
- User Validation: The user credentials like email id and password should be correct while logging in. An error is displayed if the credentials are invalid.
- Type Validation: Every field on every page of the application checks the type of the input given by the user. For eg. The field of email id must have the '@' symbol.
- Length Constraint: The field of contact number has a length constraint which allows the user to enter a 10 digit number only. An error is displayed if the length is not equal to 10.

Firebase for database

The Firebase database has a rules language called security rules. Security rules allow you to specify shape and size of data before they get saved to the database.

Security rules in Firebase can be considered as constraints in SQL. Let us consider user structure that I had described earlier and describe some security rules for it.

In the below example we have taken the problem related to the email which user has to enter and the user phone number which should be of 10 digits only.



```
{
    rules:
    {
        User:
        {
            "$U_ID"
            {
                "U_Phone"
                {
                    ".validate": "newData.child(uemail) == ! null &&
                    newData.val().length == 10 &&
                    !root.child('phoneNumbers').child(newData.val()).exists()""
                }
            }

        }
    }
}
```

In the above example we have given a solution related to the problem of email of user and the phone number which will be 10 digits only. Here, we're making sure the phone number is unique by checking if it is already a child of the phone Numbers/ node with the given phone number as key. In other words, we're checking that the phone number has not been registered by a user already. If it has not, then validation is successful and the write operation will be accepted-otherwise it will be rejected.

Even while registering the user, the device uploads the data into the database. There is no direct input from the teacher or the student that can bring upon the need to define rules for each and every object in JSON tree. The only rule that will be implemented are read and write rules. In this case, the user who are using the application to login will only be able to read data and the device will be able to read and write data as well.

Admin_Details:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
A_id	Int	4	Primary Key
A_username	Varchar	50	
A_password	varchar	50	
A_fname	Varchar	50	
A_lname	Varchar	50	
A_designation	Varchar	50	
A_contact	Varchar	20	

A_email	Varchar	50	

Faculty_Details:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
F_id	Int	4	Primary Key
F_username	Varchar	50	
F_password	Varchar	50	
F_fname	Varchar	50	
F_lname	Varchar	50	
F_designation	Varchar	50	
F_contact	Varchar	50	
F_email	Varchar	50	
F_address	Varchar	200	
F_subject	Varchar	50	

Student_Details:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
S_id	Int	4	Primary Key
S_username	Varchar	50	
S_password	Varchar	50	
S_fname	Varchar	50	
S_lname	Varchar	50	
S_email	Varchar	50	
S_contact	Varchar	50	
S_course	Varchar	50	
S_batch	Varchar	50	
S_address	Varchar	200	

Parents_Details:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
P_id	Int	4	**Primary Key**
P_fname	Varchar	50	
P_lname	Varchar	50	
P_username	Varchar	50	
P_password	Varchar	50	
P_email	Varchar	50	
P_contact	Varchar	50	

Lecture:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
L_number	Varchar	10	
L_date	Date		
L_week	Varchar	10	
L_subject	Varchar	50	
L_course	Varchar	50	
L_time	Varchar	50	
F_id	Int	4	Foreign Key

Result:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
R_id	Int	4	
R_course	Varchar	50	
R_date	Date		
R_subject	Varchar	50	
Exam_id	Varchar	Int	Foreign Key

Notification:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
Notification_id	Int		
F_email	Varchar		Foreign Key
S_email	Varchar		Foreign Key

P_email	Varchar		Foreign Key
F_contact	Varchar		Foreign Key
P_contact	Varchar		Foreign Key
S_contact	Varchar		Foreign Key

Salary:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
Sal_id	Int	4	Primary Key
Sal_date	Date		
Sal_amount	Varchar		Primary Key
Sal_month	Varchar		
F_id	Int	4	Foreign Key

Notes:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
N_id	Int	4	Primary Key
N_course	Varchar	50	
N_date	Date		
N_subject	Varchar	50	
N_concept	Varchar	50	

Timetable:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
T_date	Date		
T_subject	Varchar	50	
T_course	Varchar	50	
T_time	Varchar	50	
C_id	Int	4	Foreign Key
T_day	Varchar	50	

Attendance:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
S_id	Int	4	Foreign Key
A_attended	Int	4	
A_Not_attended	Int	4	
A_day	Varchar	50	
A_month	Varchar	50	
A_year	Varchar	50	
A_date	Date		

Fees:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
Fee_id	Int	4	Primary Key
Fee_amount	Varchar	50	Primary Key
Fee_course	Varchar	50	
Fee_subject	Varchar	50	
Fee_date	Date	50	
C_id	Int	4	
S_id	Int	4	Foreign Key

Exam:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
Exam_id	Int	4	Primary Key
Exam_time	Varchar	50	
Exam_course	Varchar	50	
Exam_subject	Varchar	50	

Exam_date	Date		
Exam_batch	Varchar	50	

Course:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
C_id	Int	4	Primary Key
C_name	Varchar	50	
C_subject	Varchar	50	
C_batch	Varchar	50	
C_timing	Varchar	50	

Receipt:

FIELD NAME	DATA TYPE	SIZE	CONSTRAINT
Receipt_id	Int	4	Primary Key
Fee_id	Int	4	
Sal_id	Int	4	
Fee_amount	Varchar	50	Foreign Key
Sal_amount	Varchar	50	Foreign Key
Fee_date	Date		
Sal_date	Date		

4.3 Procedural Diagrams

4.3.1 Logic Diagrams

Sequence Diagram

Sequence Diagrams are interaction diagrams that detail how operations are carried out. They capture the interaction between objects in the context of a collaboration. Sequence Diagrams are time focus and they show the order of the interaction visually by using the vertical axis of the diagram to represent time what messages are sent and when.

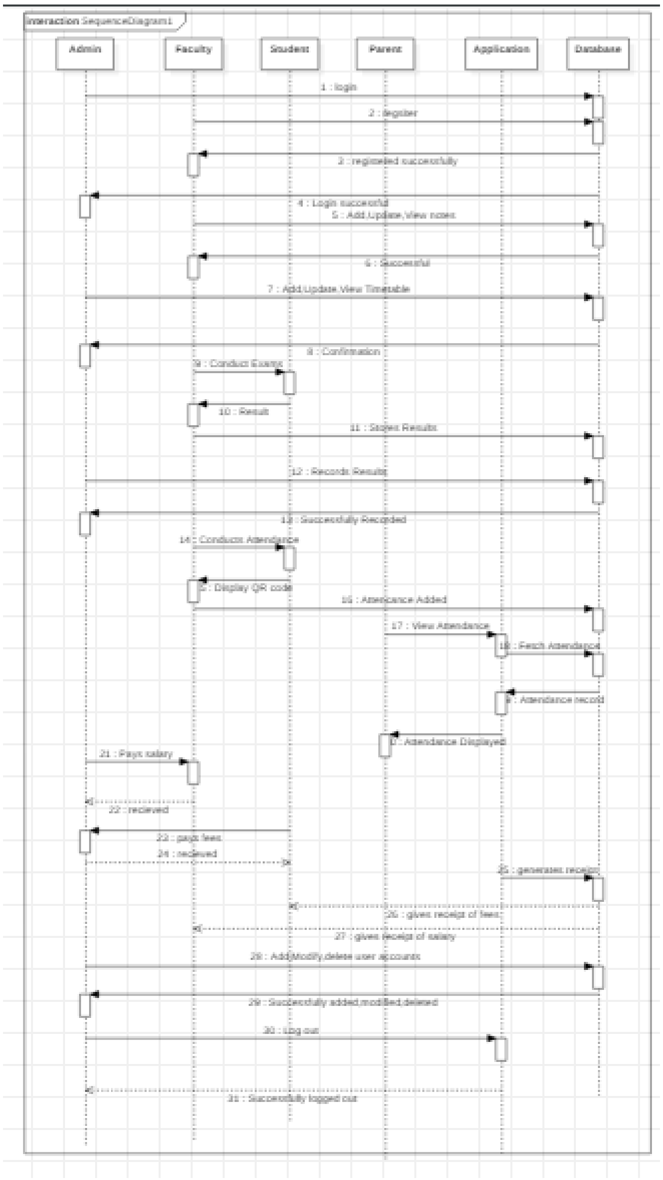
Sequence Diagrams captures:

- the interaction that takes place in a collaboration that either realizes a use case or an operation (instance diagrams or generic diagrams)
- high-level interactions between user of the system and the system, between the system and other systems, or between subsystems (sometimes known as system sequence diagrams)

Purpose of Sequence Diagram

- Model high-level interaction between active objects in a system
- Model the interaction between object instances within a collaboration that realizes a use case
- Model the interaction between objects within a collaboration that realizes an operation
- Either model generic interactions (showing all possible paths through the interaction) or specific instances of a interaction (showing just one path through the interaction)

Figure.9 Sequence Diagram



Activity Diagram

Activity diagram is another important diagram in UML to describe the dynamic aspects of the system.

Activity diagram is basically a flowchart to represent the flow from one activity to another activity. The activity can be described as an operation of the system.

The control flow is drawn from one operation to another. This flow can be sequential, branched, or concurrent. Activity diagrams deal with all type of flow control by using different elements such as fork, join, etc

The basic purposes of activity diagrams is similar to other four diagrams. It captures the dynamic behavior of the system. Other four diagrams are used to show the message flow from one object to another but activity diagram is used to show message flow from one activity to another.

Activity is a particular operation of the system. Activity diagrams are not only used for visualizing the dynamic nature of a system, but they are also used to construct the executable system by using forward and reverse engineering techniques. The only missing thing in the activity diagram is the message part.

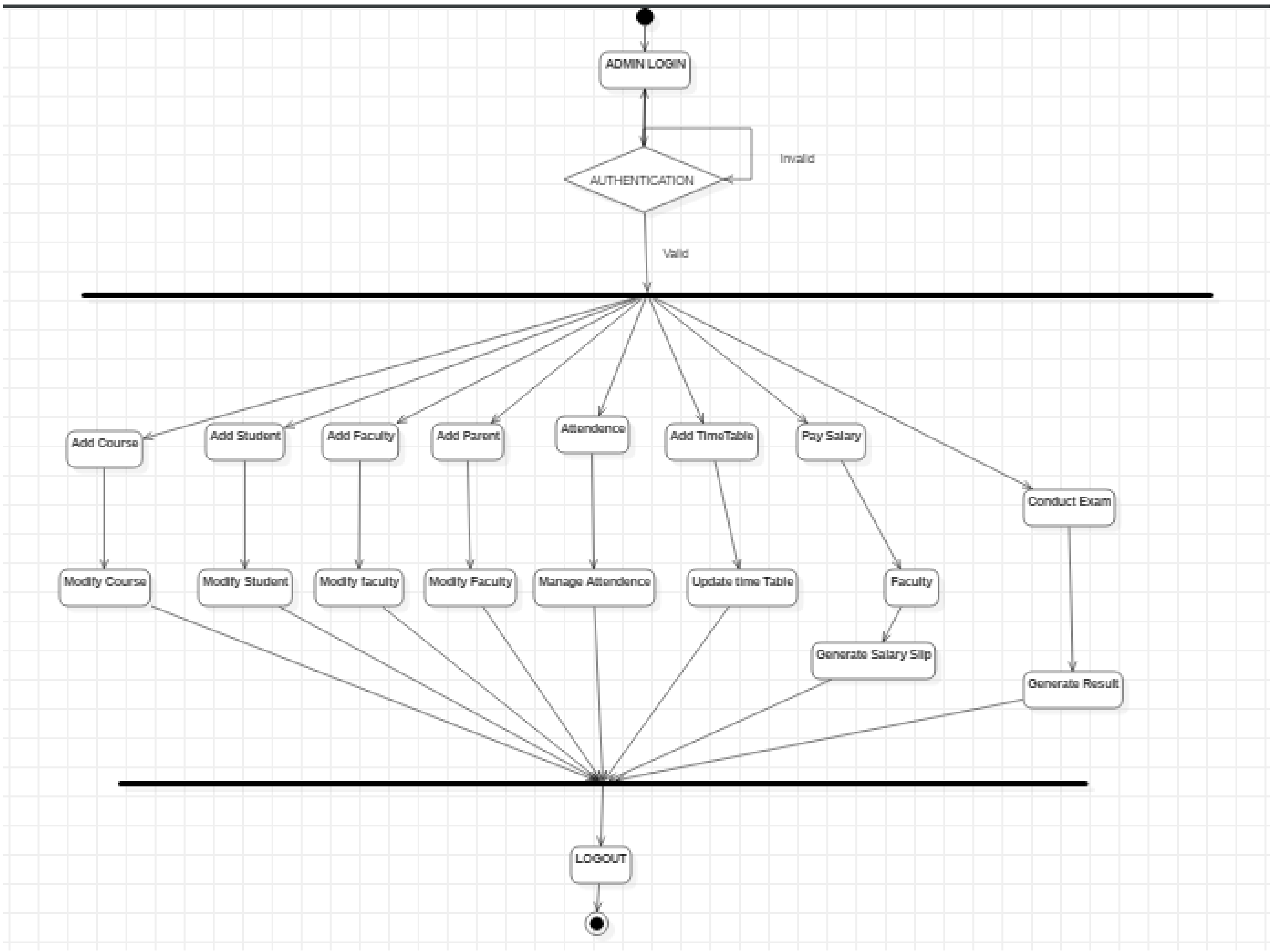
It does not show any message flow from one activity to another. Activity diagram is sometimes considered as the flowchart. Although the diagrams look like a flowchart, they are not. It shows different flows such as parallel, branched, concurrent, and single.

The purpose of an activity diagram can be described as –

- Draw the activity flow of a system.
- Describe the sequence from one activity to another.
- Describe the parallel, branched and concurrent flow of the system.

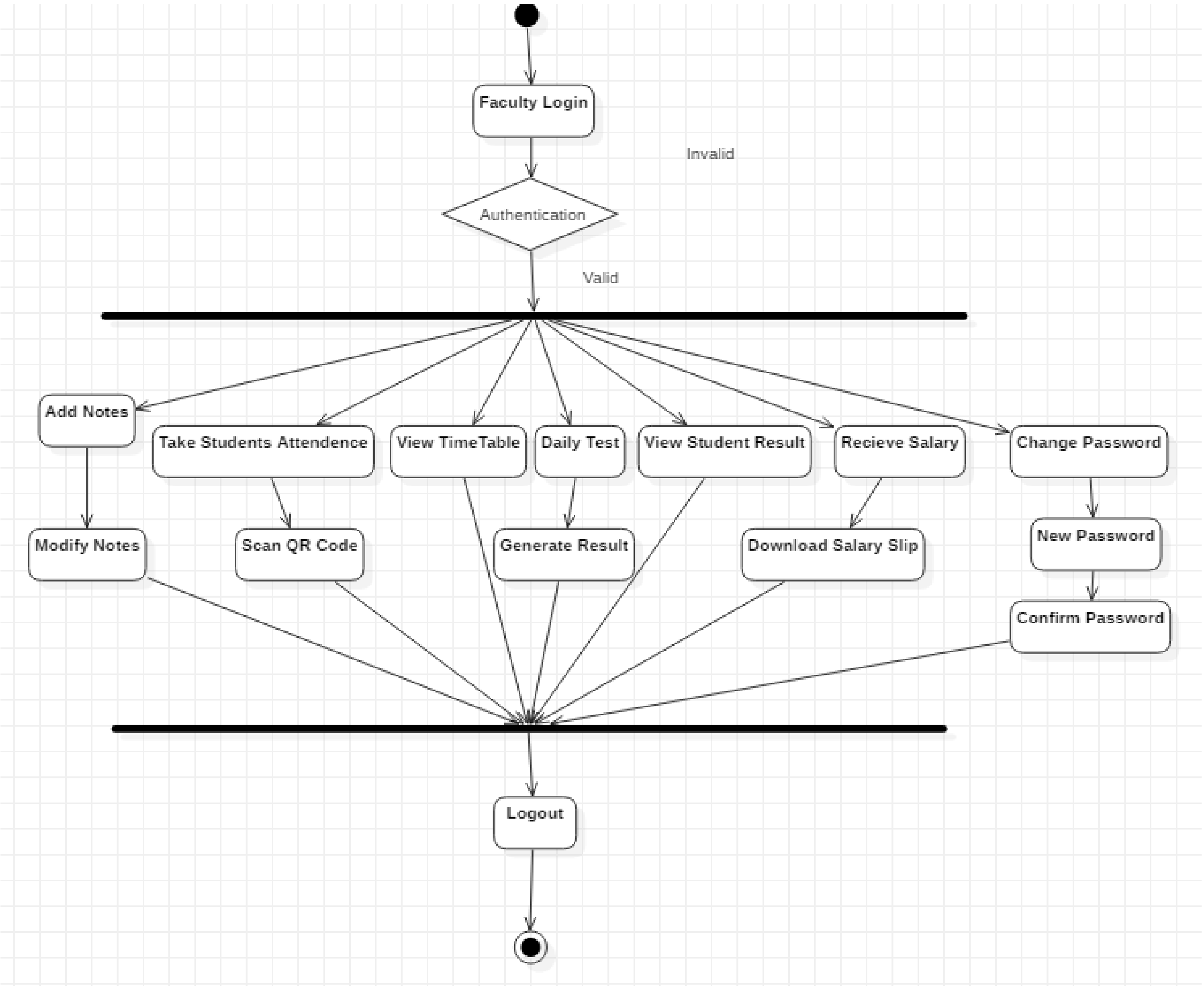
Admin

Figure 10.1.Admin Activity Diagram



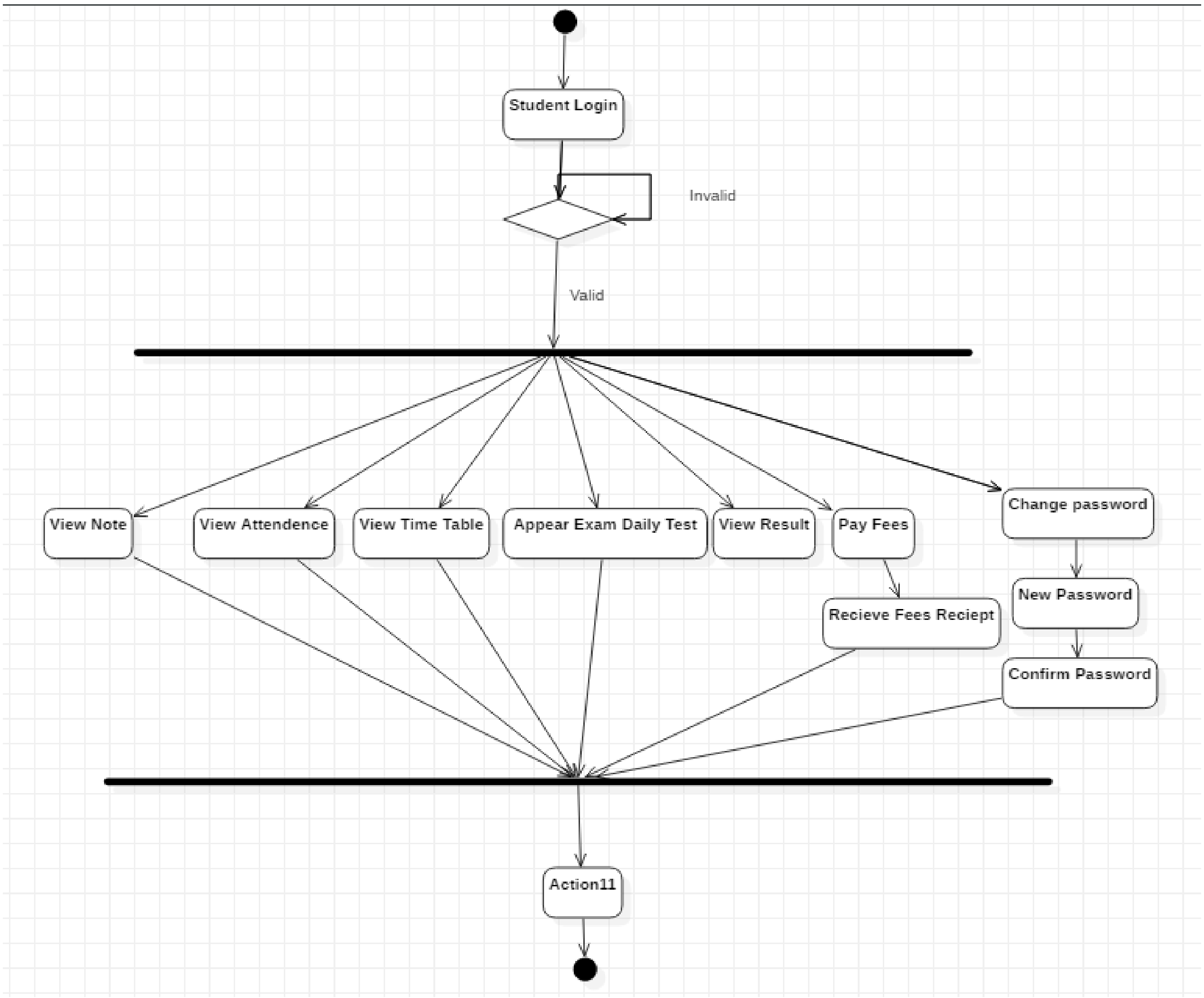
Faculty

Figure 10.2.Faculty Activity Diagram



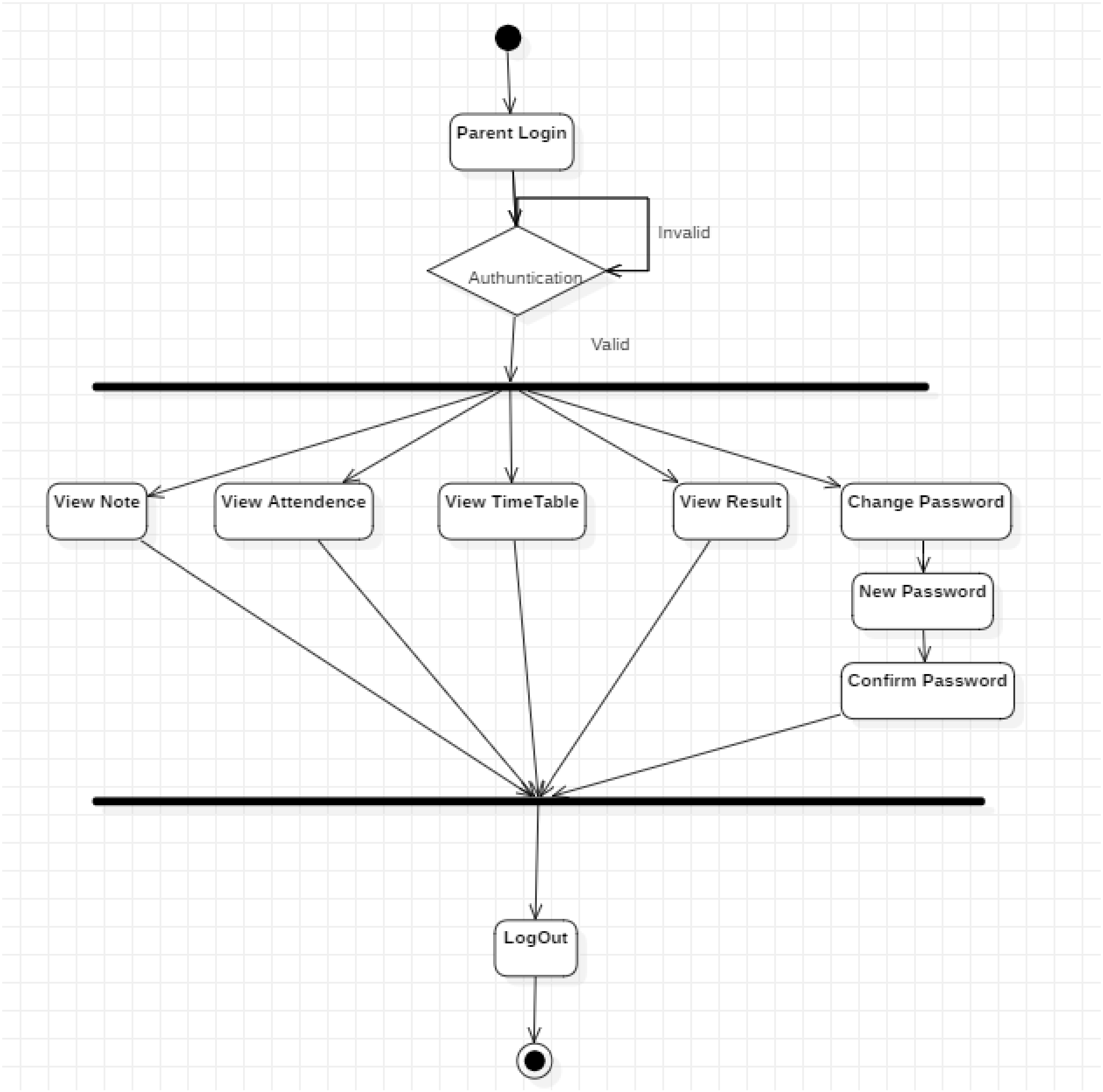
Student

Figure 10.3.Student Activity Diagram



Parent

Figure 10.4.Parent Activity Diagram



State Chart 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. Reactive systems can be defined as a system that responds to external or internal events.

Statechart diagram describes the flow of control from one state to another state. States are defined as a condition in which an object exists and it changes when some event is triggered. The most important purpose of Statechart diagram is to model lifetime of an object from creation to termination.

Statechart diagrams are also used for forward and reverse engineering of a system. However, the main purpose is to model the reactive system.

Following are the main purposes of using Statechart diagrams –

- To model the dynamic aspect of a system.
- To model the life time of a reactive system.
- To describe different states of an object during its life time.
- Define a state machine to model the states of an object.

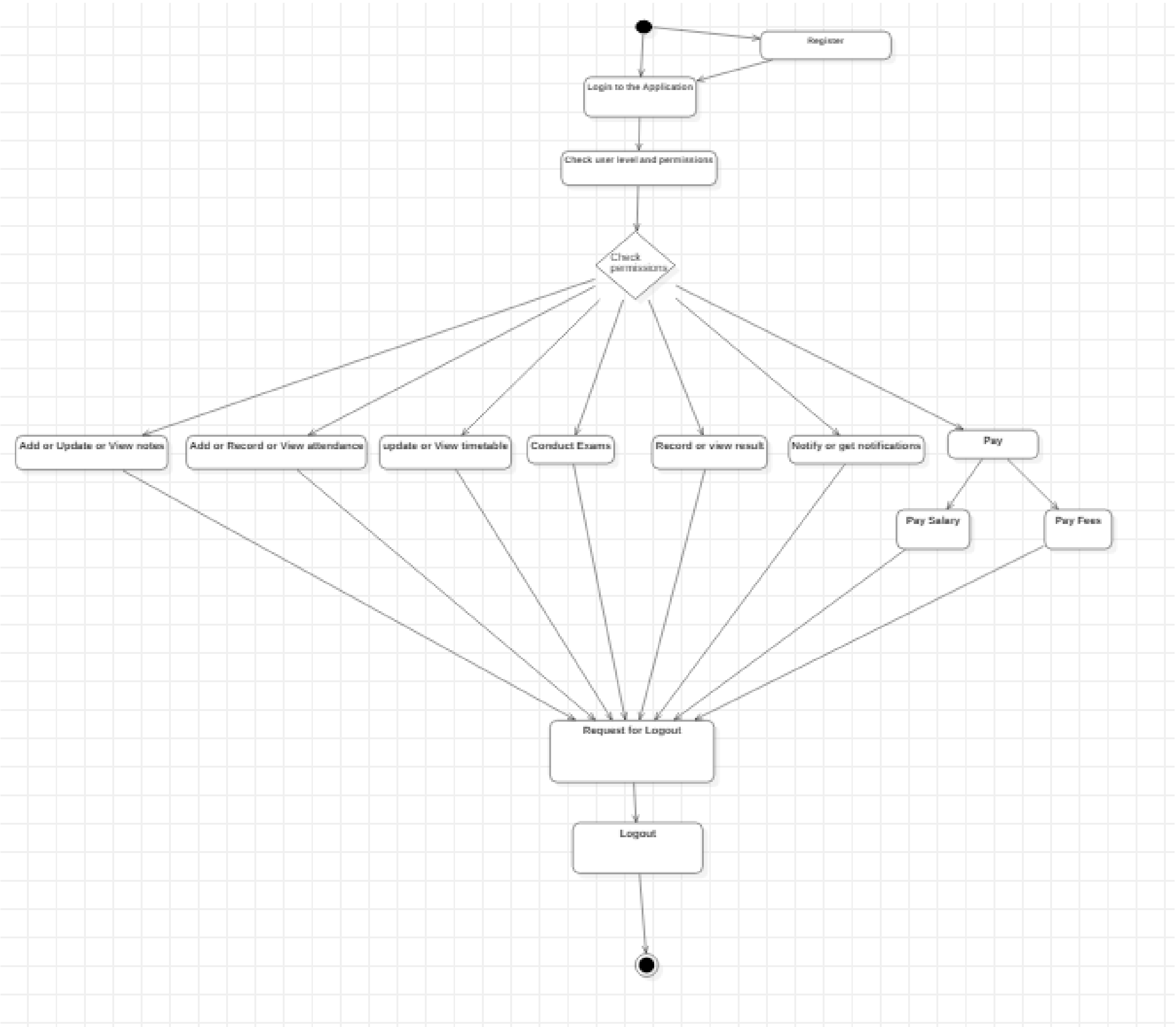
Statechart diagram is used to describe the states of different objects in its life cycle. Emphasis is placed on the state changes upon some internal or external events. These states of objects are important to analyze and implement them accurately.

Statechart diagrams are very important for describing the states. States can be identified as the condition of objects when a particular event occurs.

Before drawing a Statechart diagram we should clarify the following points –

- Identify the important objects to be analyzed.
- Identify the states.
- Identify the events.

Figure 11. State Chart Diagram



4.3.2 Data Structures

Data structures such as matrices, chains, and relational structures are used for the direct representation of image information. Image information in the matrix is accessible through the coordinates of a pixel that correspond with row and column indices. Relational structures is appropriate for higher levels of image understanding. The searching is done using keys, similar to database searching.

A data structure is a specialized format for organizing and storing data. Data is stored using firebase real time database and cloud storage database.

Data is stored in firebase as a large JSON document. The data is stored as large objects which can hold key value pairs where value can be a string, number or another object.

4.3.3 Algorithms Design

An Algorithm is a sequence of steps to solve a problem. Design and Analysis of Algorithm is very important for designing algorithm to solve different types of problems in the branch of computer science and information technology.

Algorithmic ideas are pervasive, and their reach is apparent in examples both within computer science and beyond. Some of the major shifts in Internet routing standards can be viewed as debates over the deficiencies of one shortest-path algorithm and the relative advantages of another. The basic notions used by biologists to express similarities among genes and genomes have algorithmic definitions. The concerns voiced by economists over the feasibility of combinatorial auctions in practice are rooted partly in the fact that these auctions contain computationally intractable search problems as special cases. And algorithmic notions aren't just restricted to well-known and longstanding problems; one sees the reflections of these ideas on a regular basis, in novel issues arising across a wide range of areas.

4.4 User Interface Design

User interface (UI) design is the process of making interfaces in software or computerized devices with a focus on looks or style. Designers aim to create designs users will find easy to use and pleasurable. UI design typically refers to graphical user interfaces but also includes others, such as voice-controlled ones.

Figure 12.1

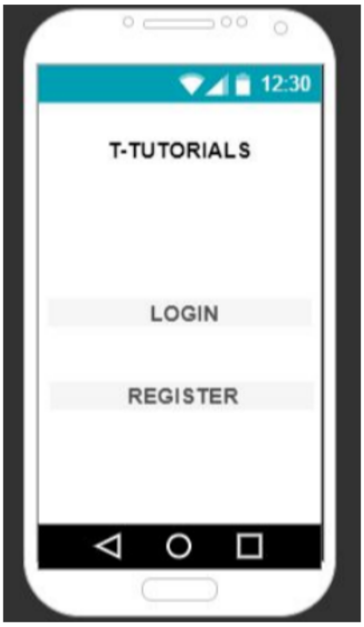


Figure 12.2

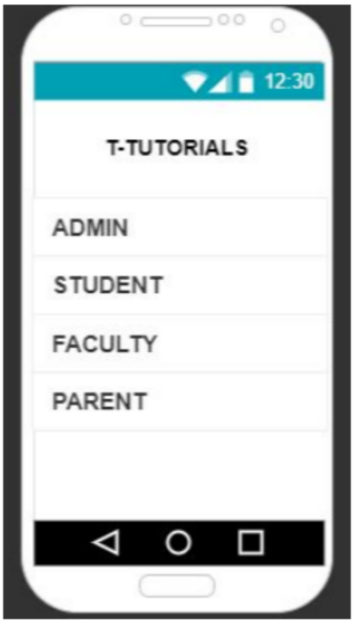
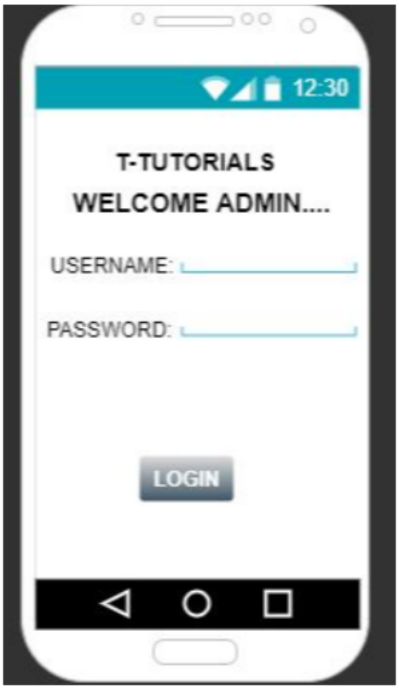


Figure 12.3



4.5 Security Issues

-Unwanted Access Request:

Issue: Some hacker trying to access critical data

Solution: High level security measures

-Unauthorized users:

Issue: The user trying to access application facilities may be unauthorized.

Solution: The credentials used for login must match with the database.

-Invalid account holders:

Issue: The user may try to create an account with the details of some other individual. The intentions of such an act may not be feasible.

Solution: The account is created only after verifying through email ID which is sent to the mentioned email id and that email id will be used for login.

4.6 Test Cases Design

Test cases:

- Functional Testing
- Usability Testing
- Security Testing
- Performance Testing
- Database Testing
- Beta testing.

1. Functional testing:

The services of the application should function efficiently whenever users wish. For eg. The system should send and verify OTP efficiently whenever a request for new user is found.

2. Usability testing:

The functionalities provided by this application should be usable and available. For eg. The user should be able to use the functionality of accesing e-guidance by interacting with teachers.

3. Security testing:

The system should be safe from unauthorized users. The users can access the services only after logging in with valid credentials.

4. Performance testing:

The system should not hang or crack frequently. The application should be highly responsive and pages should load fast.

5. Database testing:

The activities of the user should be recorded in the database. For eg. The details of a user should be added to the database as soon as the account is created.

6. Beta testing:

The application would be installed to multiple android devices of friends and family and errors would be solved if faced.

Name	Description	Inputs	Excepted Outputs
Required Field	Compulsory fields such as the address,contact number,email id etc must be entered by user while registering	User inputs based on the fields	If the user leaves a compulsory field null while registratoin,an error mssg will be displayed when he/she will click on next tab
Account Validation	The user id entered by the user should match an entry in the database. Otherwise the user is requested to create a new account.	User Id.	If the email id entered by the user matches in the database, the user is asked the password. Else, it will ask the user to create a new account.
User Validation	The user credentials like user id and password should be correct while logging in. An error is displayed if the credentials are invalid	User id and Password.	If the user credentials are correct, the user is logged in. Else the login is failed.

Type Validation	Every field on every page of the application checks the type of the input given by the user. For example : The field of email id must have the ‘@’symbol.	Various inputs according to the respective fields.	If the input contradicts any syntax, an error message will be displayed.