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1 PROJECT BACKGROUND

1.1 ABSTRACT

This project is based on the idea to make educational transactions easier between different involving parties i.e. Principal/Dean of any College/School/Institute, faculties/teachers and Parents. It aims to provide flawless management between daily tasks of faculties and it minimizes the time for different procedures, handled offline in an old school way. It is also designed by keeping the current scenarios of our education system in COVID-19 Pandemic in mind.

1.2 OBJECTIVES

The objectives of the system are –

- To reduce/eliminate paperwork.
- To make or execute things in an easy manner.
- To make educational activities transparent.
- Reduced operational time.
- Increased accuracy and reliability.
- Increased operational efficiency.
- Increased Parental monitoring.
- Data security.
- Reliable for faculties to create accounts and add/manage subjects/periods.
- Admin (Principal) and Faculties can view/send daily updates.
- New features can be added as per requirements.

1.3 KEYWORDS OF THE PROJECT

Python, Flask, SQLAlchemy, MySQL, Apache Server, HTML, JavaScript, CSS, Bootstrap, Xampp, Phpmyadmin, Browser, college management, faculty management, Parental monitoring, API, Leaves management, etc.

2 INTRODUCTION

This Educational Tracking and Management System (EduTrack) is designed with the aim to develop an online place that manages the work of all the details of any educational institutes like Colleges, Universities, Schools, Tuitions, Training Centers, etc. This will provide a better and transparent environment for maintaining and delivering different tasks or records a results or remarks respectively. It covers a good number of features from which lets us manage/record any educational tasks like Student attendance details, Student fees details, Event details, Notices, Tests/Exam marks, for students and their parents. Leave management for faculties and other things without any hassle. It covers three roles Admin, Faculties, and Parents where the Admin role is the Superuser of this project and he can be a Principal or Dean of any School, College, and University. All the records are stored in Database. The proposed software will also reduce the cumbersome paperwork, manual labor as well as communication cost**,** and other multiple tasks that might be a challenge to execute in the age of day to day business. It will going to be responsive for mobile and Tablets as well.

2.1 PRESENT STATE

- No software present at all that can fully replace the current educational tasks or activities which are now conducted or recorded on paper.
- Time consumption in accessing the records of the students is more.
- Maintaining a proper transparent environment for Parents and Faculties or Principals is absent.
- Continuous Parental monitoring lacks.
- Tough to handle the things due to COVID-19 Pandemic.
- Time consumption is more in preparing records of students.

2.2 PROBLEM TO BE SOLVED

- Easy to use GUI-based Website for Faculties and Parents.
- Transparency in accessing the records of any Student by their Parents.
- Reduced Paperwork and easy accessibility of information.
- Minimal time consumption.
- No need to meet in person, everything can be done and managed online like PTM, collecting marks, apply for leaves etc.
- Easy to maintain database and secured storage.

2.3 KEY MODULES

STUDENT MODULE: This module used to store student records. It contains the following information such as Students Profile details, Contact information, Educational details, Marks, etc. The Admin (Principal), Faculties, and Parents of students can view all these information from their end.

PARENT MODULE: This module contains viewing their child's progress such as marks for particular test/exams, fee status, remarks/notice, can apply for leaves, students attendance etc.

HOLIDAY/LEAVE MODULE: This module contains the holiday list for the whole year, also records the leave taken by any student after being approved by their respective faculties. There is a separate leave management aspect for faculties, in that, faculties can ask for a leave approval from Admin (Principal) and can take leave after being approved from the Admin.

FACULTY DESK MODULE: This module contains all the information associated with the faculties, they can view their salary, their subject assigned, can apply for leaves, can manage student profiles like progress tracking, send notice/remarks for complains etc.

ADMIN MODULE: This module contains everything covered for a Superuser role, admin can be Principal/Head of Staff/Dean or someone who handles the whole institute. In this module admin have the bird eye view of the things going on in an Institute and have all the privileges.

NOTICE MODULE: This module allows Faculties to send any remark about the student's progress, marks related remarks, complains, notice of absence for a long period of time etc.

FEES MODULE: This module contains the status information about the fees of the student if being paid or not, It's due-date if paid partially, apart from that it will show if the full amount is paid or pending.

UPDATES MODULE: – This module covers the ongoing or future update on any online lectures/classes. Faculties or Admin can share updates here and Parents can view an update directly from the portal.

2.4 TECHNOLOGIES USED

HTML5: HTML is a hypertext markup language which is, in reality, a spinal cord of any website. Any website can't be structured without the knowledge of HTML. If we make our web page only with the help of HTML, then we can't add many of the effective features in a web page, for making a web page more effective we use various platforms such as static and dynamics methods. And here we are using this language to make our web pages more effective as well as interactive for users to understand. And to make our web pages dynamic we are using JavaScript and XML. ***P.S.: We are using HTML for creating website structure.***

CSS3: CSS Stands for (Cascading Style Sheet). Cascading style sheets are used to format the layout of Web pages. They can be used to define way of writing or style, size of various table, and other aspects of Web pages that previously could only be defined in a static page's HTML. The main work of CSS is to separate content of a web document (written in any markup language) that is written using Cascading Style Sheets. There are lots of benefits that one can extract through this like improved content accessibility, better flexibility and moreover, and hence gives a level of control over various presentation characteristics of the document. It also helps in reducing the problems and helps in saving access time. It gives the option of selecting various style schemes and rules according to the necessity. ***P.S.: We are using CSS for styling our web page***.

JAVASCRIPT: JavaScript is the most famous scripting languages of all time. JavaScript is a Scripting Language of World Wide Web. The main usage of JavaScript is to add various Web function, validations, detections, a creation of cookies and so on. JavaScript is the best scripting languages and that is why it is adopted by almost all browsers. JavaScript is considered the most powerful scripting languages in present use. It is used for the client -side web development. JavaScript is used to make pages more interactive. It is a light-weight programming language and it is embedded directly into the markup syntax. JavaScript, as the name defines, was affected by many languages, especially Java. ***P.S.: We are using Javascript for building web logic.***

PYTHON: Python is an interpreted high-level general-purpose programming language. Its design philosophy emphasizes code readability with its use of significant indentation. Its language constructs as well as its object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects. Python is dynamically-typed and garbage-collected. It supports multiple programming paradigms, including structured (particularly, procedural), object-oriented and functional programming. It is often described as a "batteries included" language due to its comprehensive standard library. ***P.S.: We are using Python as a backend technology.***

SQL(MySQL): It is a structured query language used for querying database. Its function is to control the data like storing and retrieving and data as requested by the software applications. ***P.S.: We are using MySQL as database.***

FLASK: Flask is a micro web framework written in Python. It is classified as a microframework because it does not require particular tools or libraries. It has no database abstraction layer, form validation, or any other components where pre-existing third-party libraries provide common functions. ***P.S.: We are using Flask in a backend as a Python module.***

BOOTSTRAP 4: Bootstrap is a free and open-source CSS framework directed at responsive, mobile-first front-end web development. It contains CSS- and JavaScript-based design templates for typography, forms, buttons, navigation, and other interface components. ***P.S.: We are using Bootstrap for styling.***

SQLAlchemy: SQLAlchemy is an open-source SQL toolkit and object-relational mapper for the Python programming language released under the MIT License. ***P.S.: We are using SQLAlchemy for connecting database with flask.***

APACHE SERVER: The Apache HTTP Server is a free and open-source cross-platform web server software, released under the terms of Apache License 2.0. Apache is developed and maintained by an open community of developers under the auspices of the Apache Software Foundation.

API: An application programming interface is a connection between computers or between computer programs. It is a type of software interface, offering a service to other pieces of software. A document or standard that describes how to build or use such a connection or interface is called an API specification. ***P.S.: We in our project are using the "CALENDARIFIC API" for fetching the holiday details.***

TOOLS

VS Code: Visual Studio Code is a source-code editor made by Microsoft for Windows, Linux and macOS. Features include support for debugging, syntax highlighting, intelligent code completion, snippets, code refactoring, and embedded Git. ***P.S.: We are using VS Code as an IDE for frontend languages.***

XAMPP: XAMPP is a free and open-source cross-platform web server solution stack package developed by Apache Friends, consisting mainly of the Apache HTTP Server, MariaDB database, and interpreters for scripts

written in the PHP and Perl programming languages. ***P.S.: We are using XAMPP for MySql and Apache server as of now.***

PyCharm: PyCharm is an integrated development environment used in computer programming, specifically for the Python language. It is developed by the Czech company JetBrains. ***P.S.: We are using PyCharm as an IDE for Python.***

phpMyAdmin: phpMyAdmin is a free and open source administration tool for MySQL and MariaDB. As a portable web application written primarily in PHP, it has become one of the most popular MySQL administration tools, especially for web hosting services. ***P.S.: We are using phpMyAdmin as GUI for handling DBMS.***

2.5 SYSTEM REQUIREMENTS

SOFTWARE REQUIREMENTS

User-End:

- OS (Windows/Linux/Mac OS/iOS/Android etc.)
- Browser (Chrome/Firefox/Safari/Opera/Edge/Brave etc.)

Developer's-End:

- OS (Windows/Linux/Mac OS/iOS/Android etc.)
- Browser (Chrome/Firefox/Safari/Opera/Edge/Brave etc.)
- XAMPP
- VS Code
- PyCharm

HARDWARE REQUIREMENTS

- Pentium 4 - 2.8GHz Processor and above.
- Ram 2 GB and above.
- HDD 20 GB Hard Disk and above.

3 DATA STRUCTURES USED IN THE PROJECT

In computer science, a data structure is a data organization, management, and storage format that enables efficient access and modification. More precisely, a data structure is a collection of data values, the relationships among them, and the functions or operations that can be applied to the data, i.e., it is an algebraic structure about data.

We will be using different data structure for python as follows:

ARRAYS: An array is a collection of items stored at contiguous memory locations. The idea is to store multiple items of the same type together. This makes it easier to calculate the position of each element by simply adding an offset to a base value, i.e., the memory location of the first element of the array (generally denoted by the name of the array).

TUPLES: A tuple is a built-in data structure in Python that is an ordered collection of objects. Unlike lists, tuples come with limited functionality. The primary differing characteristic between lists and tuples is mutability. Lists are mutable, whereas tuples are immutable.

MAPS: A Map is a type of fast key lookup data structure that offers a flexible means of indexing into its individual elements. These keys, along with the data values associated with them, are stored within the Map. Each entry of a Map contains exactly one unique key and its corresponding value.

SETS: A set is a data structure that can store any number of unique values in any order you so wish. Set's are different from arrays in the sense that they only allow non-repeated, unique values within them

LIST: A list is an ordered data structure with elements separated by a comma and enclosed within square brackets. For example, list1 and list2 shown below contains a single type of data.

Here, list1 has integers while list2 has strings. Lists can also store mixed data types as shown in the list3 here.

TREE: A tree is a nonlinear data structure, compared to arrays, linked lists, stacks and queues which are linear data structures. A tree can be empty with no nodes or a tree is a structure consisting of one node called the root and zero or one or more subtrees.

4 TESTING PROCESS TO BE USED

Software testing is a critical element of software quality assurance and represents the ultimate review of specification, design and coding. In fact, testing is the one step in the software engineering process that could be viewed as destructive rather than constructive.

A strategy for software testing integrates software test case design methods into a well-planned series of steps that result in the successful construction of software.

We will be using some of the below testing procedures:

UNIT TESTING: In computer programming, unit testing is a software testing method by which individual units of source code—sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures—are tested to determine whether they are fit for use.

INTEGRATION TESTING: Integration testing is the phase in software testing in which individual software modules are combined and tested as a group. Integration testing is conducted to evaluate the compliance of a system or component with specified functional requirements. It occurs after unit testing and before system testing.

REGRESSION TESTING: Regression testing is re-running functional and non-functional tests to ensure that previously developed and tested software still performs after a change. If not, that would be called a regression.

OBJECT ORIENTED TESTING: Object-Oriented testing is a software testing process that is conducted to test the software using object-oriented paradigms like, encapsulation, inheritance, polymorphism, etc. The software typically undergoes many levels of testing, from unit testing to system or acceptance testing. Typically, in-unit testing, small “units”, or modules of the software, are tested separately with a focus on testing the code of that module. In higher, order testing (e.g, acceptance testing), the entire system (or a subsystem) is tested with the focus on testing the functionality or external behavior of the system. This testing method is a

data-centric technique rather than algorithmic. It is a technique that is based on the hierarchy of classes and well-defined objects. Here, an object is defined as an entity or an instance of a class that is used to store data and send & receive any messages and class can be defined as a group of objects which has common properties.

BETA TESTING: Beta testing also known as user testing takes place at the end users site by the end users to validate the usability, functionality, compatibility, and reliability testing. Beta testing adds value to the software development life cycle as it allows the "real" customer an opportunity to provide inputs into the design, functionality, and usability of a product. These inputs are not only critical to the success of the product but also an investment into future products when the gathered data is managed effectively.

5 SYSTEM DESIGNING

MODULE DESIGN

Software design sits at the technical kernel of the software engineering process and is applied regardless of the development paradigm and area of application. Design is the first step in the development phase for any engineered product or system. The designer's goal is to produce a model or representation of an entity that will later be built. Beginning, once system requirement have been specified and analyzed, system design is the first of the three technical activities-design, code and test that is required to build and verify software.

DATA FLOW DIAGRAMS

A data flow diagram is graphical tool used to describe and analyze movement of data through a system. These are the central tool and the basis from which the other components are developed. The transformation of data from input to output, through processed, may be described logically and independently of physical components associated with the system. These are known as the logical data flow diagrams. The physical data flow diagrams show the actual implements and movement of data between people, departments and workstations. A full description of a system actually consists of a set of data flow diagrams. The development of DFD'S is done in several levels.

Each process in lower level diagrams can be broken down into a more detailed DFD in the next level. The lop-level diagram is often called context diagram. It consists a single process bit, which plays vital role in studying the current system. The process in the context level diagram is exploded into other process at the first level DFD and more at the second level DFD.

DFD SYMBOLS USED:

We have used the following four Symbols,

1. A Rectangle, that defines a source (originator) or destination of system data.

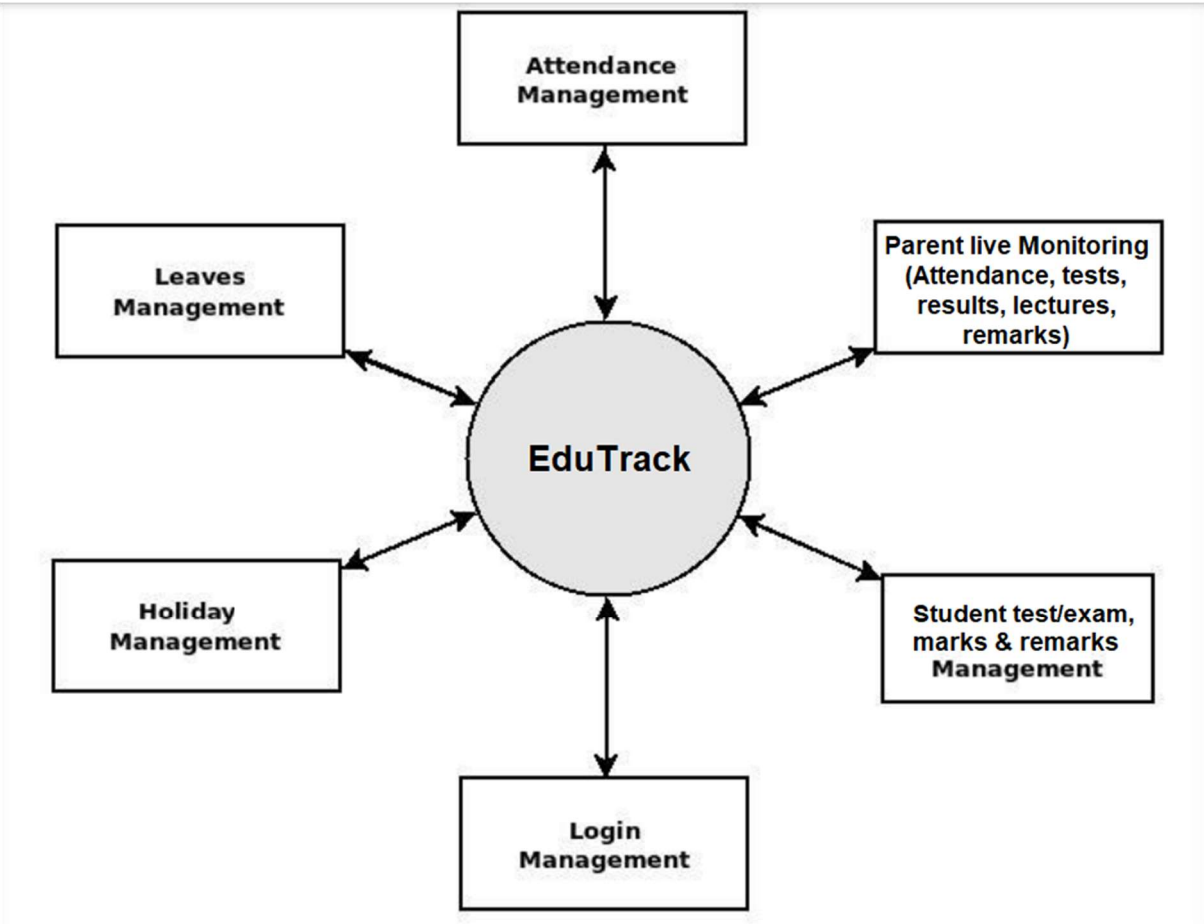
2. An Arrow, that defines data flow. It is the pipeline through which the information flows.

3. An Oval or Ellipse, that represents a process that transforms incoming data flow into outgoing data flows.

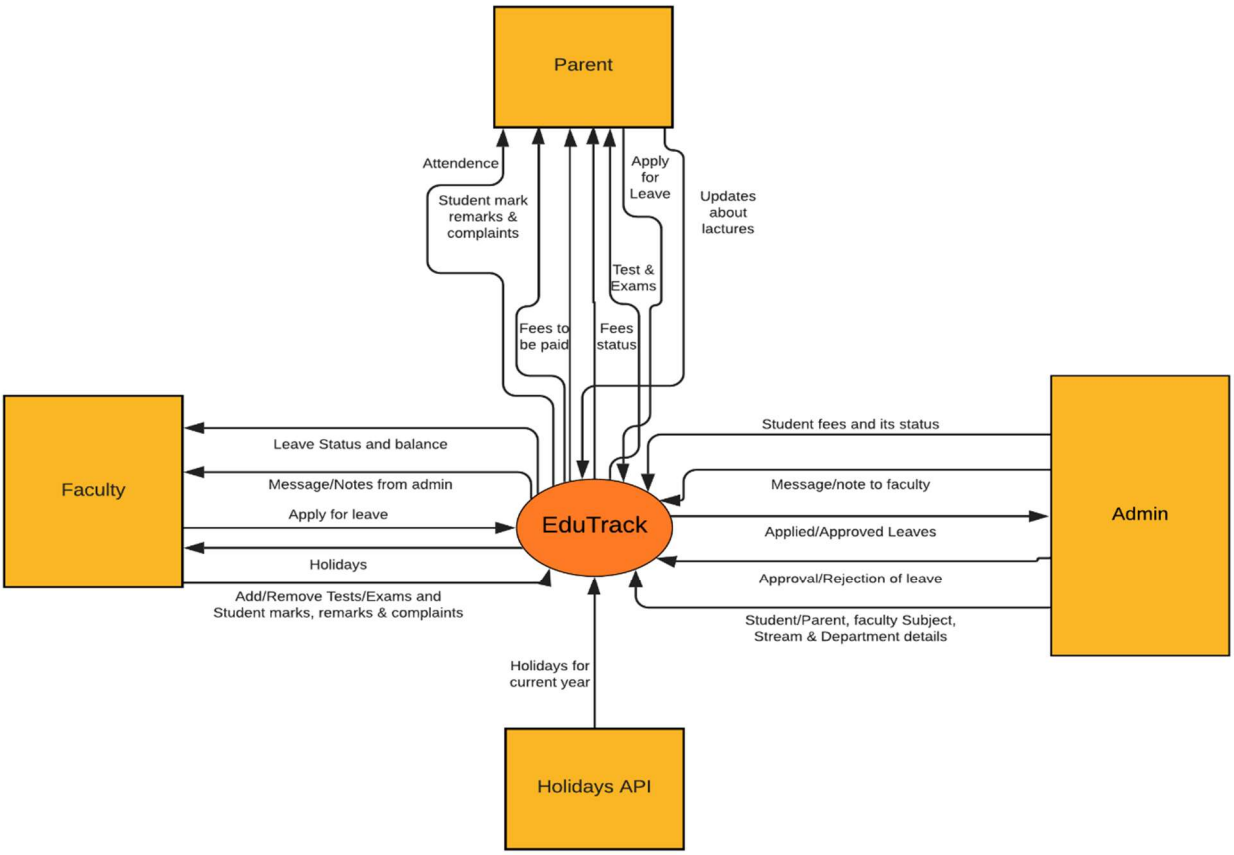
4. A Cylinder rectangle is a data store, data at rest or a temporary repository of data.

5.1 DFD Diagrams

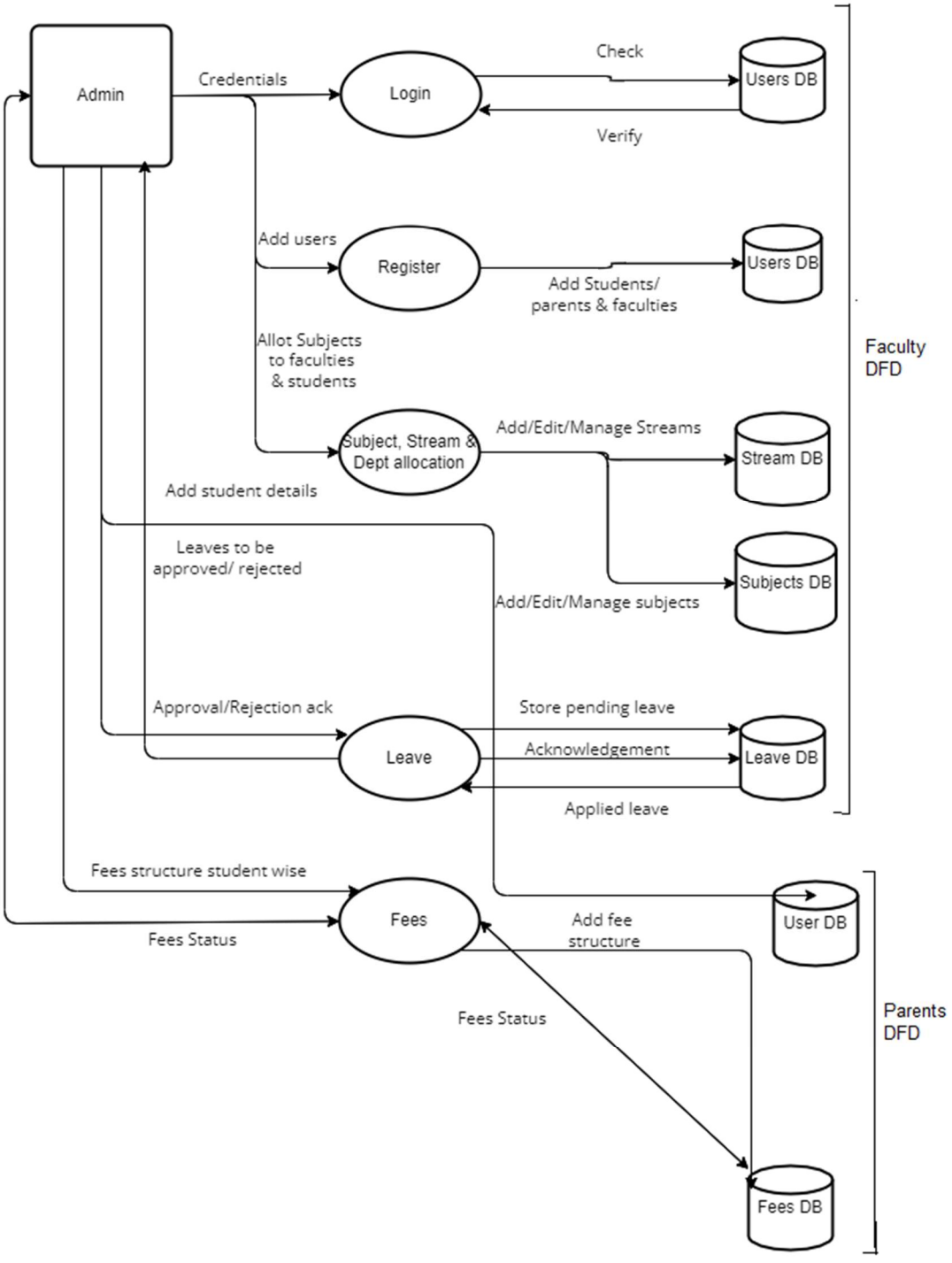
D.F.D. LEVEL - 0



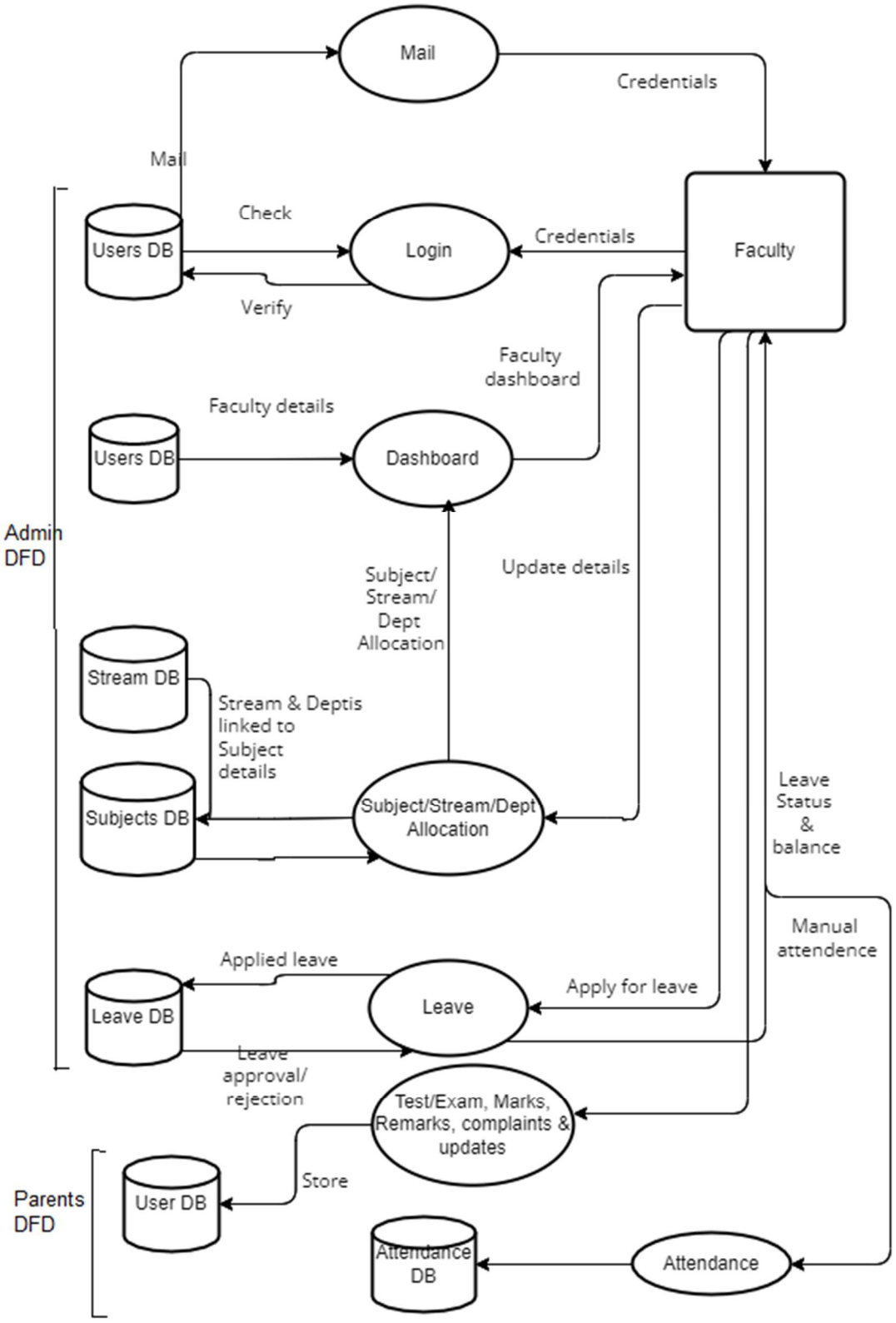
D.F.D. LEVEL - 1


Parent
Attendence
Student mark remarks & complaints
Apply for Leave
Updates about lactures
Test & Exams
Fees to be paid
Fees status
Faculty
Leave Status and balance
Message/Notes from admin
Apply for leave
Holidays
Add/Remove Tests/Exams and Student marks, remarks & complaints
EduTrack
Student fees and its status
Message/note to faculty
Applied/Approved Leaves
Approval/Rejection of leave
Student/Parent, faculty Subject, Stream & Department details
Admin
Holidays for current year
Holidays API

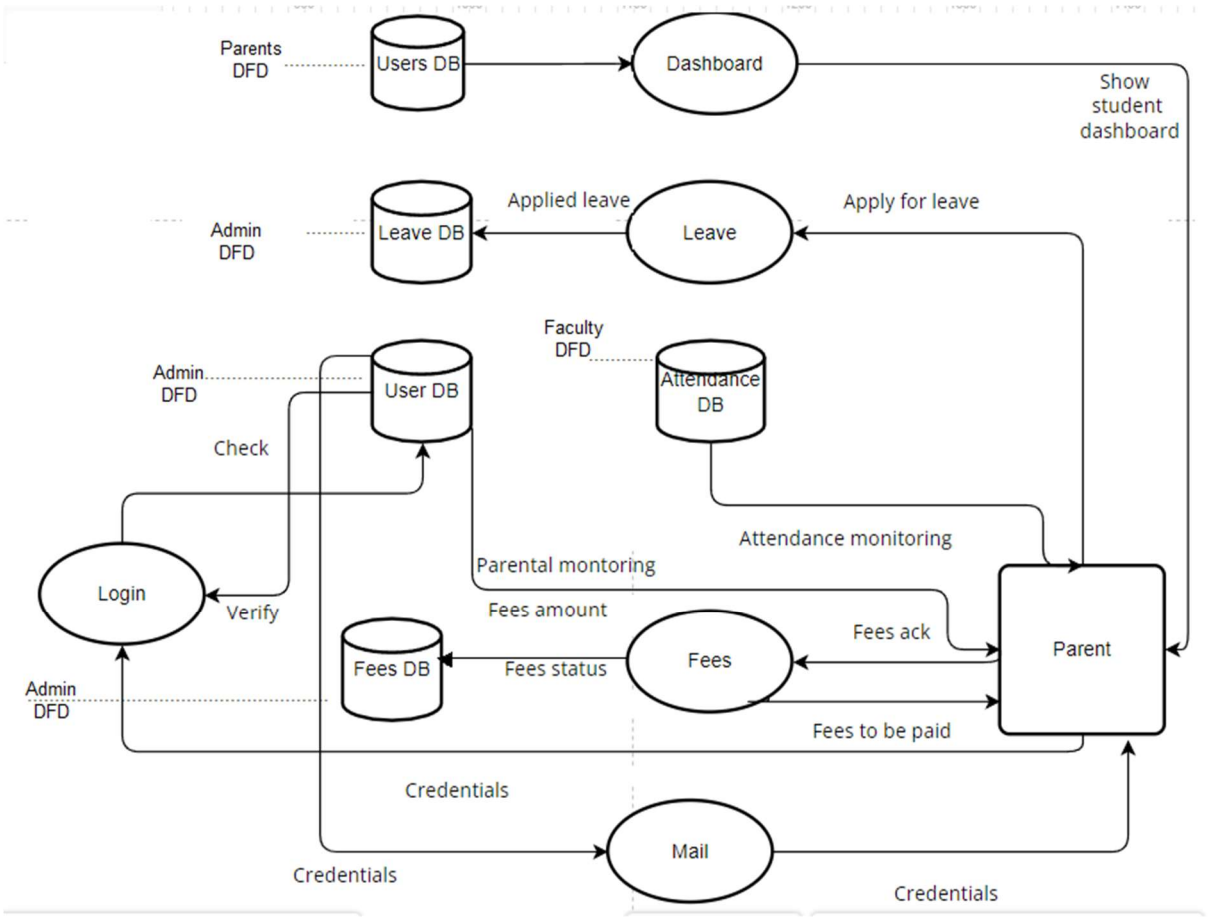
D.F.D. LEVEL - 2 (Admin)



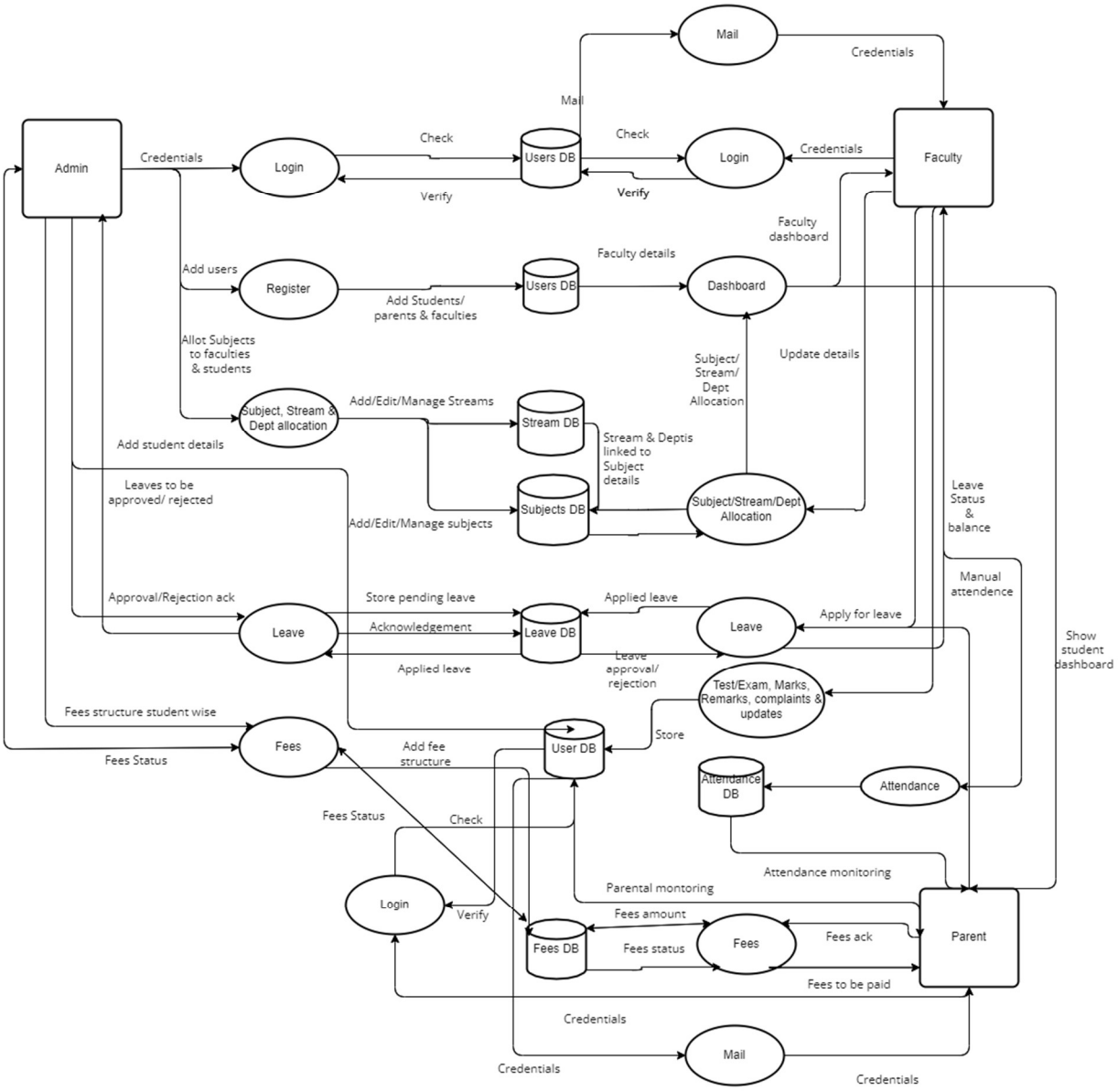
D.F.D. LEVEL - 2 (Faculty)



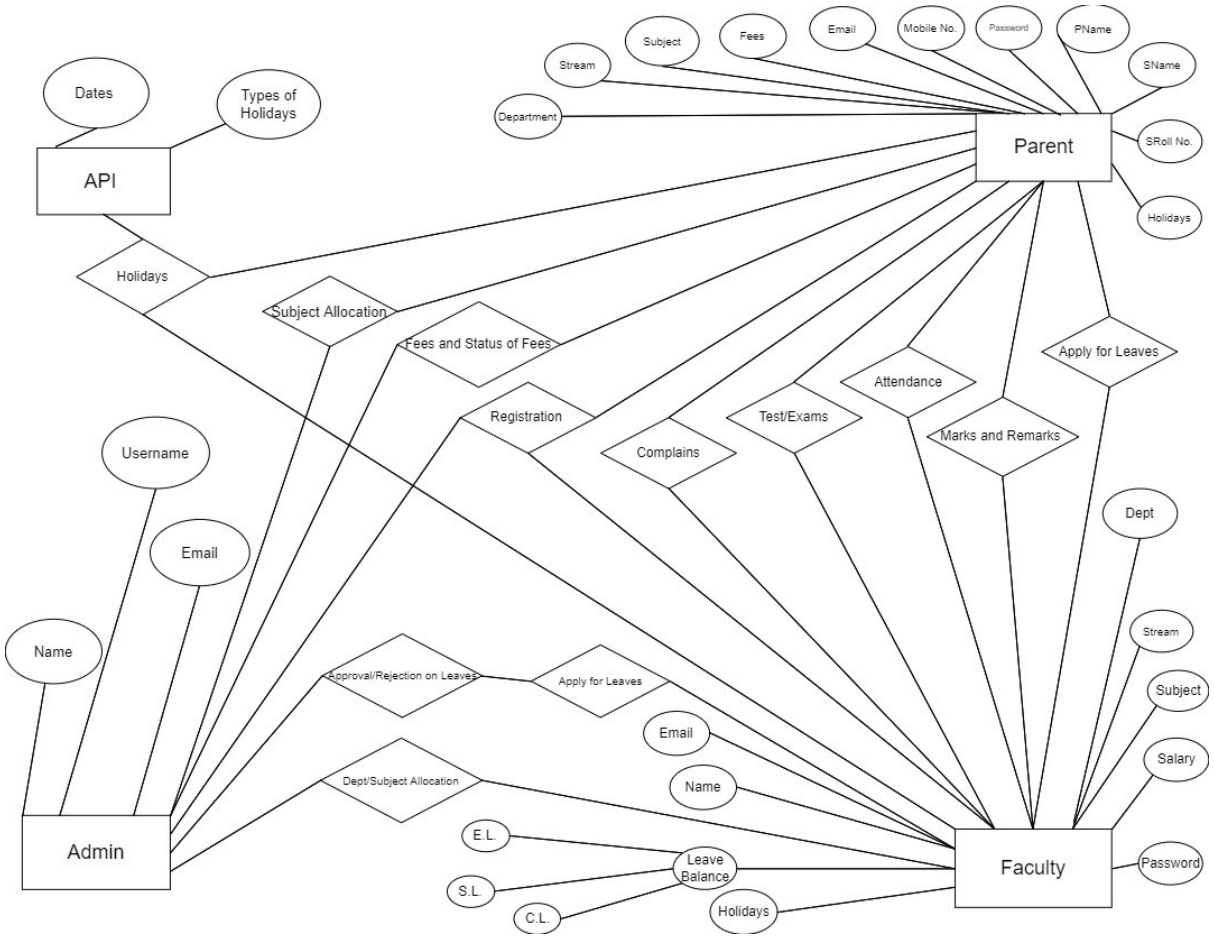
DFD LEVEL - 2 (Parent)



DFD LEVEL - 2 (Combine)



5.2 E.R. – Diagram



P.S: In the above E.R. diagram the terms E.L. , S.L. , and C.L. are Earned Leaves, Sick Leaves, and Casual Leaves respectively.

6 FUTURE SCOPE AND FURTHER ENHANCEMENT OF THE PROJECT

This project can be help to maintain and manage activities in a age of digitalization and will definitely reduce hassle of different resources. This assists in revamping the existing system to site based system. It can be monitored and controlled remotely anytime. This will provide exact information and malpractice will be eliminated. It will provide a better daily transparency for Parental monitoring and progress tracking, without attending or reaching out to school for their child's progress. Apart from that it will help Head of the Institute to get a bird eye view of the ongoing activities as well as provide faculties an ease to manage certain things out which can definitely help them and eradicate carrying registers/heavy notebooks for recording things out.

Further Enhancements can be done in order to improve and add more features in the project, so that nearly everything can be done online.

Few things that can be achieved with further enhancement and by adding new features are as follows:

- Parents can be able to send queries directly from the Portal, for eg: if they need to complain for some other student or something that they don't feel right, also they can ask queries on syllabus to teachers.
- Parents can fill necessary forms that needs to be filled for eg: A form for a permission to go out for a picnic which was sent by their teacher.
- Teachers/Faculties can store much more information of students for better tracking and evaluating them will be easier.
- We can include a section for study materials dump, where different faculties can share multiples study resources that they find useful, for eg: if Science Teacher feels to send some Youtube Tutorial explaining our galaxy or other such resources, he/she can share their.
- We can include Open discussion forum for open interaction of Students/Parents, Teachers and Principal. (Note: Students can operate from Parent account in their Parent's presence)
- Can conduct educational quiz games for students based on "multiple choice questions" before their real test/exam so that it will like a revision for them. ***P.S: We can include many things which can solve the current system between the three mentioned roles for betterment.***

7 REPORT GENERATION

The project report will contain the following information in it, apart from the following listed points we will be adding more according to the Project's requirements.

- Introduction
- Objectives
- Tools Used
- System Requirement
- System Analysis and Implementation
- System Designs
- Code of the Project
- System Testing
- Input and Output Screens
- Security Implementations
- Limitations of this Project
- Future Application of this Project
- Bibliography

8 BIBLIOGRAPHY

The following things are used as a reference that helped me while making this Project Proposal Report.

TECHNOLOGIES USED AND TOOLS:

- Google (www.google.com) to describe different technologies in detail that will be used in this Project.

DATA STRUCTURE USED IN THIS PROJECT:

- Google (www.google.com) and Tutorial's Point (www.tutorialspoint.com) to describe the definitions of data structures that will be used in this Project.

TESTING PROCESS TO BE USED:

- Google (www.google.com) and Youtube (www.youtube.com) are being used to learn about the different Software Testing Processes that will be used in the Project.

SYSTEM DESIGN:

- Youtube (www.youtube.com) is used to learn about the ways to design and develop a software design and different diagrams.

- After designing the DFD and E.R. Diagrams into the Pen and Paper format, different online websites like (www.visual-paradigm.com) and one other are used to create the diagrams, as it allows us to create diagrams and let us download them in .PNG format so that we can easily attach them in our Proposal Report. ***P.S.: The above task can also done using Microsoft Paint.***

COMMON LEARNING AND REFERENCES:

- For learning and implementation/preparing the project and coding we will be using different Youtube Tutorials in case of any queries while coding for the project.

THANK YOU!