Collat – An Android Based College Application

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A B S T R A C T

Typical university teaching and learning management information systems suffer from issues with information retention, accuracy, and query time. Accordingly, this study proposes an Android-based university education management information system. By looking into the needs of college's education system and information management, the principles of system design is determined and the structural design of the college's education system and information management is carried out. By analyzing the complexity of education management system in colleges and universities, investigation of information is determined in an effective manner so that priority and processing of the system is effective.[10]

Ultimately, the RDBMS model aims to complete the design of the education system in our project COLLAT. Comparative surveys are designed to verify the effectiveness of this strategy. The results calculated experimentally shows that this strategy can successfully improve the retrieval and accuracy of information while decreasing the query time. Android uses a communication method. The main objective is to develop an Android-based mobile application to help advance institutional and academic systems. Students, teachers, and parents will all use the app. In the old method, all knowledge was stored on a hard disk or on a website. At the same time, when searching for information, it is difficult to access it, and the actual website visit time is longer.

To overcome this, an Android-based Smartphone app is needed to make the process easier, safer, and less error-prone. The system will provide more efficient information. When sensitive data is kept on the device, our application ensures its safe storage.

Keywords: Android Studio, Cloud Storage, Firebase, JAVA, Mobile Application, User Experience.

Introduction

An Android application called "Collat-A College App" was created to overcome the problems of the current manual teaching model. In order to reduce the problems encountered by the current system, this application is supported in certain cases. The system was also created to meet the specific requirements of the company to carry out its activities.

Programs are made simple in order to reduce errors due to data entry method. Error is also displayed when user enters invalid data entry. Users do not need any formal training to use the system. That alone speaks to its friendliness. Collat can lead to an error-free system which can be reliable as well as safe. Users can conveniently focus on the activities rather than worrying about managing them regularly in a static methodology. Hence, it will utilize the resources in a better way.[4]

Managing student, college, employee, salary, and faculty information is a problem faced by all organizations, regardless of size. We create innovative employee management systems based on your administrative needs, because each College / University has different needs. It is designed to strategically plan and ensure that your business has the right amount of knowledge, management and information to achieve its future goals. Plus, our system can access remotely, allowing you to manage your workforce when needed, perfect for drivers who are constantly mobile. Ultimately, these solutions will lead to better and efficient resource management.

Literature Survey

- **CLOUDSIS**

The requirements specification and a cloud-based architecture for managing numerous school branches, whether online or offline are described in this article. The suggested architecture's goal is to create a generalized solution which is low cost for system that can be used to a chain of colleges or

universities [14]. It assists the employees of administration department to help to summarize decision making and it enables end-user and middle-user to communicate in a manner which is automated and safe. A cloud computing system known s Cloud Based SIS is uses that allow schools to communicate with its branches in rural and urban regions by efficient use of existing communication infrastructure and technology. It connects the cloud and remote branches via the public internet or cellular data networks, and it connects the head office with the college infrastructure and the cloud via VPN. It is difficult to share information between school branches that are managed by the same person. In the future, we will connect schools under different management so that when a student transfers, the new school will have access to his learning habits, attitude, skills, and finances. [15]

- **College Management System**

The project is called "COLLEGE MANAGEMENT SYSTEM FOR COLLEGE." (CMS). CMS is defined as an Intranet-based program that strives to provide information to all levels of management inside an organization. This system may be utilized as an information management system for the college. [16] The Administrator creates login id and password for a certain student/staff (Technical / Non-technical), and using these student/staff (Technical / Non-technical) may access the system to either upload or download some information from the database.

- **Firebase as BAAS**

Android applications use multiple databases for their back-end. SQLite, Realm DB, ORMLite, Berkeley DB, and Couchbase Lite are the most often used commercially. [16] Apart from these, the usual ones heard about or implemented in projects include MySQL and Microsoft SQL Server. This approach necessitates the deployment of the application on a server, as well as the use of PHP files to link them. As a result, extensive coding skills is necessary. Wasp DB, Couchbase Lite, Forest DB, and Firebase Database are examples of NoSQL databases that have gained prominence in recent years. [10] These gained popularity as a result of JSON and Key-Value pairs, which provided programmers with strength in terms of features such as Shared Preferences.

- **Management Information System (MIS)**

According to the conclusions of this study, MIS was not being used effectively at universities for long-term planning, short-term planning, and budgetary decisions. As a result, it is advised that the MIS units be sufficiently funded and maintained to enable free flow of information and adequate use of MIS in decision making on long-term and short-term planning, as well as budgeting.[17] Managers at all levels should get thorough orientation, as well as in-service training for secretaries, to guarantee proper and adequate use of MIS resources in creating and sharing information for better choices in universities.

Identification of Need

The original manual method had several drawbacks. As the whole system requires manual maintenance, the process of storing, maintaining, and retrieving information is time-consuming and labour-intensive. These records are never used on an ad hoc basis. In the past, it was very difficult to associate each individual transaction with a specific context. If you want to find information, you have to go through various records and files to find it, and the generation of a report never exists.

Time is always wasted importing records and retrieving records. Another problem is that it is difficult to identify the problem when typing the input. [2] It is extremely difficult to edit records after submission. The reason for this is that there is an enormous amount of information that needs to be tracked

The current system is difficult rather than being largely automated (computerized), because the same information needs to be entered thrice. New system must provide reports and documentation: Some reports may help management to make decisions and control costs, but since these reports have not been identified and given much attention, details of the data are required for each document and report such as:

- Each document requires distribution and frequency.

- Each report must be provided with possible sources of information.

- Digital system is adopted so that the problem of managing and organizing these files can be handled with ease.

- Retrieval of files and documents seems much simpler as a click of mouse can reduce the access time.

As an outcome, our system COLLAT offers a much simpler environment which not only saves time but also facilitates information flow by providing relevant and required information.

Objective

It is an Android-based application that allows us to access all College information including staff, students, and facilities. The program will provide you a tour of campus which will be virtual and easy to understand. We will get the latest information of staffs and students here. COLLAT is a universal app is designed to help students with information about lessons, subjects, classes, assignments, grades, and schedules. It also allows teaching member to view their schedule, upload assignments, and send notifications to students.

This is where Administrators will manage student and faculty accounts, create schedules, and upload the latest campus information. Not only that, but it provides a virtual interface for students and teens living off-campus to learn more about the college and its surroundings. [3]

Existing System

The existing system has following functionalities:

- Data security is lacking.

- Additional manpower.

- Time-consuming.

- Manual computation and a lot of paperwork is required for maintaining data.

- Senior officials are not involved directly.

- Spreadsheets are only reliable for one user.

- Online portals used occasionally crash, making it impossible to search for a specific topic.

- Because of the numerous channels, data management and flow were dispersed.

Proposed System

In the existing system, the changes are done manually with help of paperwork. We need to provide a dynamic updation in the view of our application COLLAT so that the manual work of the system is reduced. More secure platform for objective results.

- Platform for Data Management that is Stable.

- The firebase database is used to store all data.

- JAVA is used to create a user-friendly design.

- Several levels of user authentication.

- Data is a multi-user-addressed tool.

- The Android platform delivers a faster, safer, and offline platform.

- Mail features are provided by using various classes to upload files.
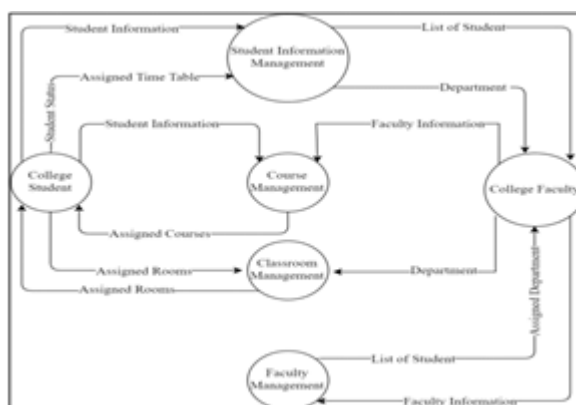

Fig. 1 – Use Case Diagram

Features

Collat- A College App is an android application that is developed to hereby implement dynamic working in the college environment - from the head to toe. It includes. This application is a centralized streamline for various college activities available for both students and faculty.

Some basic features of this android application are: -

- **Affordable Platform**

Hardware and final products are relatively less expensive sporadic compatibility problems with every new OS release. Android developers have simple access to tools and infrastructure.

- **Quick and Simple to Create**

The simple working model's accessibility is what makes the development of apps so quick. In the previous five years, the flexibility of apps has led to their exponential expansion, with time metrics and the cost of app creation emerging as key elements of this platform.

- **With Lower Costs and a High Return**

The simple accessibility of the Android SDK is one of the main benefits of developing Android apps. The material design from these SDKs can be used by the development teams to create interactive apps. However, a one-time registration fee must be paid by the developers/development teams in order to distribute applications. Then, with minimal investment and higher user engagement, people can use any computer device to design and test the product on their smart phones. An engaging app benefits the end users in turn, and the organization sees a larger return on investment.

- **More Rapid Deployment**

Professional Android applications go through a rapid development cycle of several hours. This provides a competitive advantage to companies looking to bring their innovative ideas to market faster. Therefore, one of the main benefits of developing for Android is reduced time to market (TTM).

- **Improved Security**

Several new built-in and additional security features have been added to Android P. This will help prevent viruses and malware. Therefore, security and reliability are tremendous benefits of Android app development. Read on to learn more about Android security and privacy best practices that help companies set appropriate policies throughout the app lifecycle.

- **Scalability and Flexibility**

The OS's level of flexibility and adaptability has increased with the introduction of Android Studio. It is compatible with any device running the Android operating system, including wearable's, tablets, smart phones, and Android TVs. It allows Android Apps to work with cutting-edge technologies such as the Internet of Things, AR, and VR. As a result, it is another obvious benefit of android apps. Additionally, the Android app platform's adaptability enables development teams to create dynamic mobile applications that perform various functions after they are downloaded and installed on a device.

- **Personalization**

Android is an open-source platform that gives development teams the most customization options. That explains why Android apps are a popular option. Also, the OS makes it possible to create flexible Android apps that are simple to connect with multimedia tools and data management features of your current business operations. As a result, businesses can increase their consumer base by adapting to changing business needs.

Theoretical Background

In today's colleges, student information is manually entered. The student details in different records are a laborious process. All these records must be consulted and updated. There is the possibility of more manual errors. Issues with the existing system are :-

- It could only run on one system.

- It was more difficult to utilize.

- There is a lot of manual labor (manual work does not necessarily mean working with pen and paper; it also includes working with spreadsheets and other simple software).

- It necessitates a greater number of employees working.

- A time-consuming procedure.

- The current system has security issues.

- Generating various types of reports was a big issue.

Solution for Given Issues

Keeping in mind the integration approach of database, we have created a new system that consists operations aimed at automating the whole procedure. Some features inbuilt in our application are :-

- The application provides user friendliness through many controls.

- The system simplifies and adapts entire project management.

- It is accessible via the Internet.

- Messaging and uploading functionalities are provided by the use of various classes.

- Data mismanagement is reduced therefore no risk at any stage of project development.

- High level security is provided by using various database authentication protocol

User Requirements

Some user details and requirements are necessary for the proper flow and working of this application. When we look thoroughly through the system we find two modules – admin and student. Following are some of the requirements of user:-

- Data of a particular student will be uploaded by admin . After successfully completing the upload, the user can read the reports.

- A regular user will be able to view the status of a certain Student id number.

- The student has access to similar amenities as he has at college.

- Students can view attendance, notices, grades, reports, and other amenities in real time.

- Every student will have his or her own page where he or she may access notices, attendance, grades, assignments, and so on.

- With the login and password provided, parents can only read the student's record.

- Professors can provide attendance and reminders to students.

- All these reports are verified by the administrator and generated for users to read.

- During the examination of user needs, the following criteria are raised:

- A user can access all the information by visiting the first page of the application.

- Creating new users as per the need is the responsibility of the Administrator.

After reviewing the task requirements, we need to assess the problem so as to understand the context of problem. Firstly at this point the existing system needs to be reviewed, further we need to understand the requirements and areas of the new system. Both processes have thier own equal importance, but the first process provides a base for functional specification and the efficient design of the proposed system. [1] To understand the features of a new system is complex process which requires creative thinking it is equally difficult to understand the user requirements a misunderstanding of the current system may lead to deviations from the answer.

Case Studies

Case 1: - Authentication:

Validity of name priority and password.

(H, L)- High Goal of the test: Verifying the user's name and its test description to check if the provided username and password are valid.

Valid user requirements confirmed Tomcat server and database are used in the testing environment.

Test preparation/reconditioning: Actions apologize for the delay. Enter the correct name and password. The user will be registered.

A report fail error is produced when incorrect username and password is entered.

Case 2: - User Login:

- Invalid Username: Wrong username.

- Pass Criteria: An invalid username is detected by generating a suitable notice.

- Proper Input: A valid username and a correct password which is connected with the username that is being used to log in.

Case 3: - E-mail verification:

- Email/priority validation.

- (H, L) -Extremely high-test aim: - to check validity of email.

- Description of the test: - To determine whether or not the e-mail is legitimate.

- Verified requirements: - A valid e-mail address Test Tomcat server and database are required.

Case 4: User Registration

- Invalid Input: The format entered in the input fields for the registration page is incorrect.

- Pass Criteria: Incorrect format in a specific input field should be discovered by generating a suitable notice.

- Proper Input: The format given by the user into the registration page's input fields must be correct.

- College Management System Pass Criteria: The College Management System pass criteria.

Case 5:- User Signup

- Invalid Input: The data field on the registration page is empty.

- Pass Criteria: An error message describing which fields must be completed in order to be registered must be generated.

- Proper Input: The customer must fill out all of the registration form's fields correctly.

- Pass Criteria: The system's pass criteria would be that it takes all new user details, registers the user, and assists him in logging into the system.

Case 6: Event Update:

- Improper Input: The erroneous input is inaccurate search criteria or incorrect data format entered the data entry sections of the event update page.

- Pass criteria: A warning indicating an incorrect entry in the fields must be generated.

- Proper Input: Data is input in the correct format in the data entry fields.

- Pass Criteria: The data will be added to the database and an event will be generated as the pass criteria for this test case.
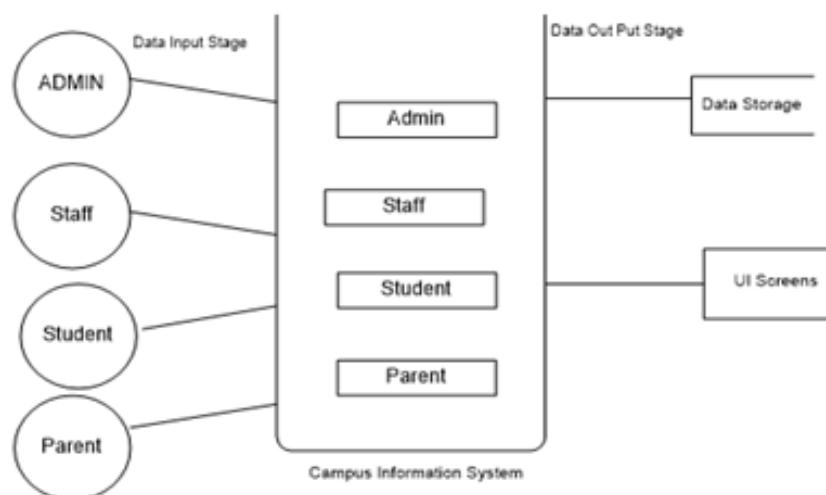
Data Flow Diagram
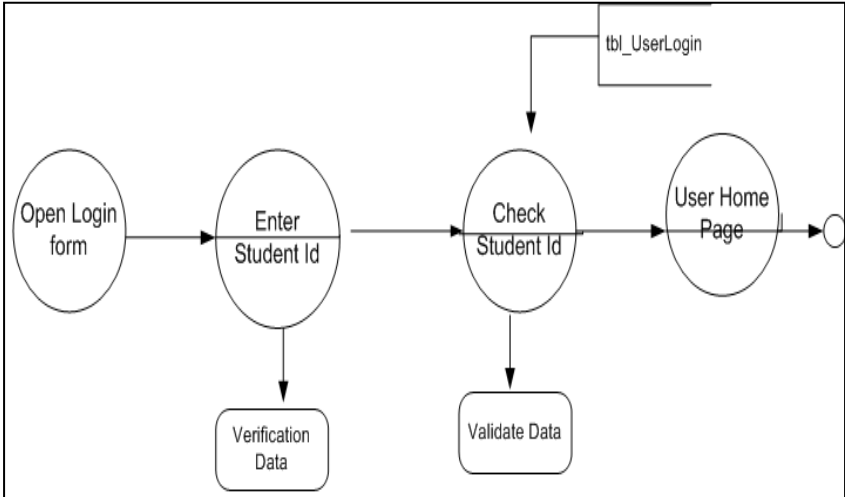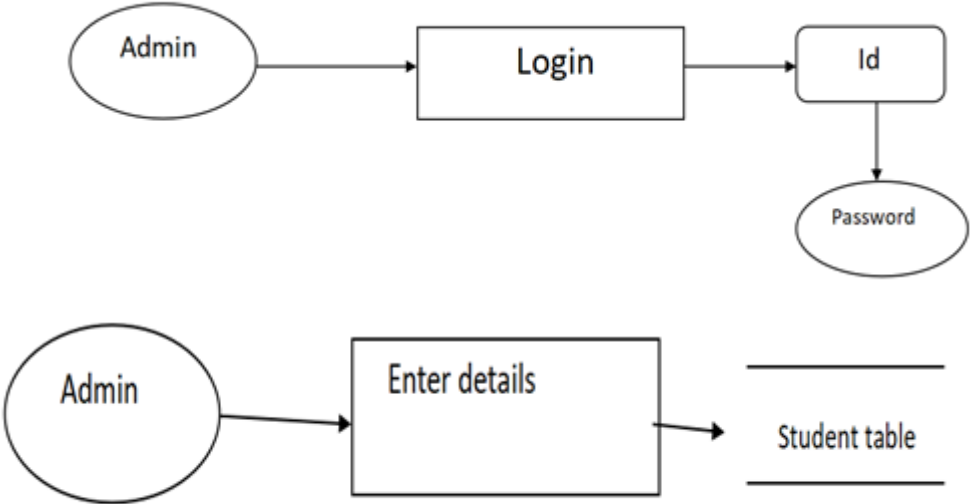

Fig. 2 - Context 0th Level Diagram
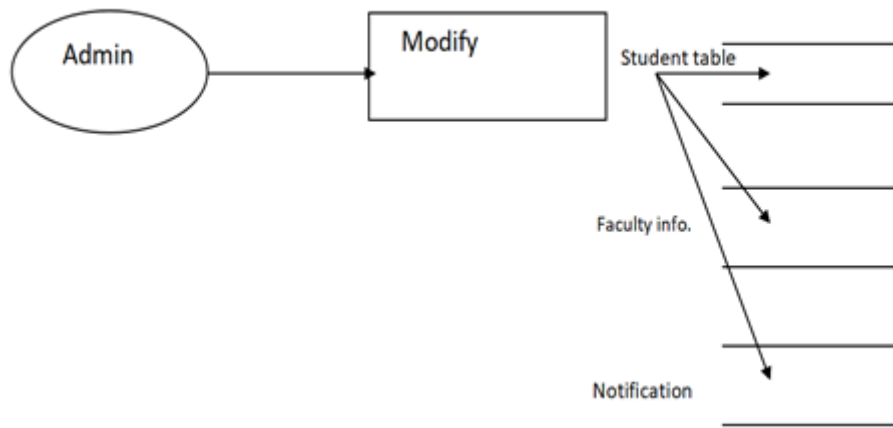
Fig. 3 – DFD Diagram for Login

Fig. 4 – Level 1 Admin DFD
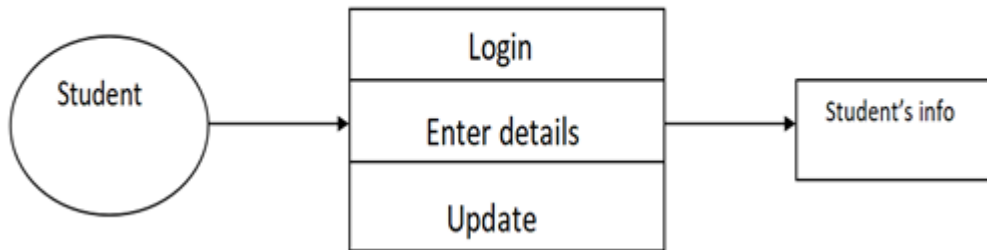
Fig. 5 – Level 2 Admin DFD

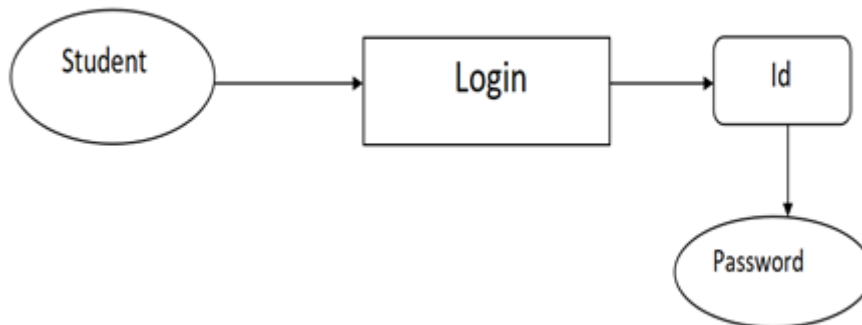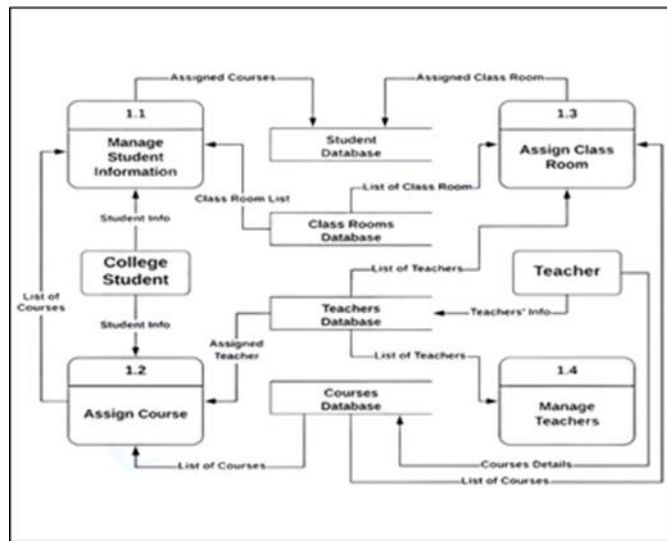**Fig. 6 – Level 1 Student DFD**

Fig. 7 – Level 2 Student DFD

Project Modules The application includes several menu options, such as:

- College Info
- College Events
- My Profile
- Fee Payment
- Notice
- Faculty details
- Gallery
- Notes
- Feedback

Working

The architecture diagram is mostly made up of three modules.

- Client
- Server
- College Administrator

Client: First and foremost, the client must be registered with the server; if he is already registered, he must log in. After successfully logging in, he will be authenticated and will be able to search for his query.

- **Step 1:** If the user wants to find a certain college, he must input the college name; otherwise, all information about current activities (such as events, seminars, workshops, and so on) will be presented in front of him. Filtering can be accomplished in this manner. [7]

- **Step 2:** The user must input the services for which he wants to get notifications. After selecting the services, he will receive notifications anytime there is an event or similar at a specific college.

Server: The server is entirely responsible for retrieving and registering inquiries from both end-users and college administrators. After retrieving the query from the end user server, it will be sent to the database for data retrieval. The server has right to change the data entered by the college admin on the cloud.

College Administration: Its duty is to register on a server and update both curricular and co-curricular activities. He is also in charge of updating college information, such as personnel changes.
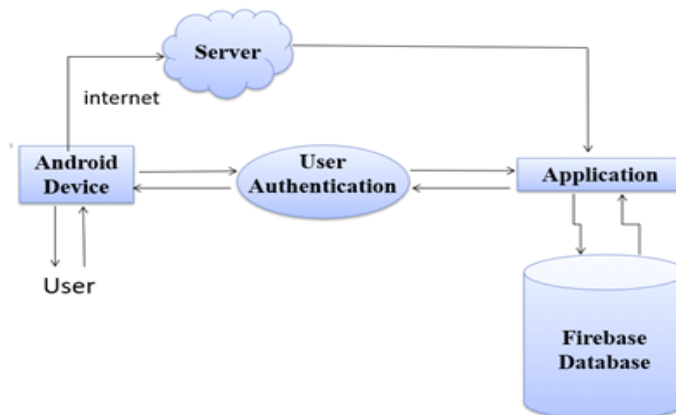
Scope

This advanced management system can be used in a variety of educational institutions, including schools, colleges, and universities. The renowned private institution will be ideal for this type of technology, but schools and colleges can also be suitable. The quantity of students is not an issue. This readily maintains its processing speed with no effort. This can undoubtedly be implemented in a country's capital or elsewhere if internet access is available. 4G internet access is now available practically everywhere. As a result, the percentage of its implementation is sufficiently raised. Many educational institutions have recently opened their doors. Most of them are lacking the necessary schooling environment for the students. [12] They have students, teachers, and workers to handle the institutions, but they lack an organized management framework. As a result, there are several opportunities to apply this advanced management system.

- Online fee payment. Online attendance reminder. iOS implementation is possible.

- A discussion forum can be set up.

- E-learning.

- To conduct online exams, an online examination module would be introduced.

- Payroll can be introduced for faculty members.

Conclusion

This paper is part of a series on the design and implementation of better management systems for small postsecondary institutions. Hence, it discusses the methodology that applies to the series. The management subjects' field is concerned with institutional administration. It is unrelated to departmental administration or specific operations. This document explains how to conduct a management system structure evaluation. It specifies the specific data that must be collected as well as the methods that must be followed. [13] The data will be used to Identify areas of the college management structure which need improvement and evaluate modifications after they have been implemented. The specific data collection approach consists of three steps: a description of the process's outputs, procedures, and inputs, an evaluation of the process's efficacy, needs, and priorities for improvement, and flow charts of process operations and relationships across processes. Each of these processes has an own objective, scope, and data-gathering mechanism. These processes are thoroughly detailed, and data collection forms are provided. Although this study focuses on small college management, the technique is applicable to a wide range of institutions. The technique for management systems reviews available in the literature is primarily ad hoc and has not been developed. As a result, most firms conduct management system reviews informally. This paper proposes one way for organizing and formalizing the review of management systems.

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