# ERP for College Fee Management System using Blockchain

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## ABSTRACT

*Most academic institutions struggle to keep track of student records, attendance, accounts along with the fees details, admissions, etc. and still use paperwork and manual procedures, which causes problems when parents or officials need specific records or documents. A college management system will reduce manual work and improve communication between management and students/guardians through email, SMS, and push notifications by implementing centralized software with many loosely coupled services that interact to address the above issues. As a server-side enterprise application, it supports most desktop and laptop browsers, mobile browsers, and native mobile apps. The program is responsive, making laptop, smartphone, and business PC users feel at home. Designing and implementing loosely coupled desktop application services is easy. The results show that manual college management is ineffective. This research created a digitalized college management system using ERP-Based College Management System. Over 2000 students and 150 educators are using ERP-Based College Management System for teaching, learning, and evaluations at a reputable NCR educational organization. ERP-Based College Management System is the need and future need of students, parents, staff, and educational organization management. It can be adopted in other colleges, colleges, and educational institutions with adequate infrastructure and funding.*

**Keyword :** *ERP System, Organization, Business, Management, Implementation Development, Analysis, Design, Blockchain*

## 1. INTRODUCTION

There was a time when educational organizations couldn't keep track of their students and employees on paper or on the computer because they used old software like MS Word for long reports and papers, MS Excel for keeping track of grades, and even accountants used it to manage fees and salaries. Software companies made all of their money by selling different desktop-based programs that businesses could use. These programs needed a lot of people to set up and keep up to date. Companies had to keep track of many versions of codes and distribution packages. The rise of web applications led to centralized deployment and upkeep. Web apps that have been set up in a web container are shared by all users. There are some new web technologies that are popular in the area of web application development trends. One way to do this is with single-page web apps. Single-page web applications have the benefit of being built so that they work like PC applications and can be used on any portable device with very few resources. You can use any of the buttons to access a different function without going to a different website. One of the many benefits is that it costs less to create, build, and host a website. When used on the internet, the apps are stored on a remote computer that can be accessed from anywhere at any time with the right credentials.

It doesn't use a lot of resources and works well with HTTP protocol. In web application development, micro-services are groups of smaller services that work well together to make larger, application-wide functions possible. They are best used for bigger, more complicated apps that need to be built and handled as a collection of these services.

It's always hard to run an academic institution and get all the groups that are linked to it to work together to reach the goal. It will be easier to reach the goal if these colleges are changed to use technology-enabled automation solutions to make administrative and academic work easier. Education needs to be brought up to date with cloud, mobile, and digital technologies so that daily operations can be managed more efficiently and the college can be run well. Parents and students no longer have to wait in line for hours on end to get in. Every month, parents and students were informed of their fees by phone calls or by handing over a letter. This made neither the parents nor the class teacher of the educational organization feel good. Online forms make the process easier by letting people register and pay fees, and by letting people send alerts and reminders by email, SMS, and push notifications. It is very important to make a course outline that can be changed to fit the needs of the college as they change. As long as colleges have a course management system, they can get a lot done with less money. making course materials, homework, and exams and keeping track of them in a classroom to help students reach their graduate goals It is important to keep an eye on teachers' progress and see how well their work is doing. It is possible to judge how well teachers are doing by what the students say. Automated evaluation methods help students learn better, be more successful, and do better in college. Because of a communication gap between teachers and students, more and more students are getting in trouble. It is important to have a platform that makes it easy for teachers, staff, and students to talk to each other.

Communication is better with a web-based management system that uses push, email, SMS, and notifications. Teachers have to work hard to keep track of and keep up with student records, which include things like attendance, absences, suspensions, homework, etc. Using an automated student management system that gives real-time updates on student activity status is a good way for institutions to keep track of things and handle students. It's hard for colleges to keep track of the fees they gather and manage their money. All financial action may be seen by a web-based management system for administration. An academic institution's web-based management system makes their job a lot easier and gives them more time to focus on their It's always hard to run an academic institution and get all the groups that are linked to it to work together to reach the goal. It will be easier to reach the goal if these colleges are changed to use technology-enabled automation solutions to make administrative and academic work easier. Education needs to be brought up to date with cloud, mobile, and digital technologies so that daily operations can be managed more efficiently, and the college can be run well. Parents and students no longer have to wait in line for hours on end to get in.

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### 1.1 PROBLEM DEFINITION

To develop an efficient and sober ERP (Enterprise resource planning) Software application for colleges to maintain the academic fees schedule to perform the seamless transaction between the student and the educational institutes.

## 2. LITERATURE SURVEY

Mr. Prabhuji Gupta et al [1], describes works with most desktop, laptop, mobile, and native mobile apps as a server-side enterprise application. The responsive program makes laptop, smartphone, and business PC users comfortable. Designing and implementing loosely connected web services is simple. Analysis, Design, Development, Implementation, and Evaluation (ADDIE) was used in this research and development. The results demonstrate manual school management fails. This research digitalized school management using ERPBSMS. ERPBSMS has been extensively tested with a reputable NCR educational organization, where over 2000 students and 150+ educators use it for teaching, learning, and evaluation. Students, parents, teachers, and educational organization administration demand ERPBSMS, according to the results. With sufficient infrastructure and financing, other schools, colleges, and educational institutions can adopt it.

Md. Tareq Hasan et al [2], introduces an organization's ERP system that manages marketing, operations, administration, finance, human resources, R&D, and more. Cooperation among internal divisions boosts production and advantages. A systematic ERP system implementation takes years to meet an organization's business needs. Initial ERP implementation is crucial for enterprises. Most companies use ERP to gain a competitive edge. To fully adopt an ERP system, a corporation must invest heavily. Small businesses are investing in ERP with medium and big firms worldwide to improve business management. This study examines ERP's impact on business management.

Mr.Avinash Gutte et al [3], explained ERP systems from manufacturing are increasingly gaining popularity in universities and colleges. ERP is being transformed into a highly integrated, intelligent, collaborative, web-enabled system. Reasons for choosing ERP for education include difficulty accessing paper files, lack of access to old records, and staff wasting hundreds of hours per month manually entering information or performing tasks that could be automated, such as evaluation and result generation. E-college will fill these gaps and save schools time. This article lists a few modules and their implementation that educational institutions need to run smoothly.

Jad Farhat et al [4], narrates ERP is a suite of interconnected systems that allows firms complete visibility over their products, workers, and customers. AI applications require artificial neural networks. Combine these two approaches to create a system that stores and shows data dashboards and computes enterprise future expectations. Many have researched neural network uses for this system. This article analyzes and models a system that estimates an enterprise's inventory needs based on its sales history over time. C#-based system uses real trade cooperation examples for learning. It worked effectively in imaginary simulations.

Samwel Matende et al [5], introduces Enterprise Resource Planning (ERP) systems transform how employees operate. ERP systems span an organization's functional units, hence poor implementation can lead to user resistance. ERP adoption, success assessment, and important success criteria have dominated ERP research. User participation in ERP system implementation is understudied. This study evaluates ERP implementation literature to argue for user involvement.

Dr. Adnan Mustafa et al [6], describes ERP is a popular corporate solution for process integration, automation, performance enhancement, and cost savings. ERP designers had to adapt to new tech. To service businesses and consumers, new ERP system designs spawned new ERP business models. ERP problems in a manufacturing industry that is transitioning from product-centric to customer-centric. To adapt to this change, most ERP companies added capabilities and modules to their core systems despite their product-centric architecture. We analyze promising ERP evolutionary design and models that could revolutionize ERP systems and open new markets for next-generation clients in this article.

Hui Zhang [7], discuss the necessity of ERP financial management systems and develop an ERP-based enterprise financial management system. ERP financial data processing utilizing a deep learning financial risk prediction model is suggested. This work creates an ERP enterprise financial risk hybrid prediction model using multi-objective optimization algorithm and deep learning technology to handle financial risk prediction complexity and compare it to six benchmark models. The model in this study predicts better. Prediction accuracy outperforms other methods. Second, this approach controls prediction accuracy variations and improves prediction stability.

Farhan Aslam [8], Modern firms rely on ERP systems for efficient management of operations. Machine learning (ML) in cloud-based ERP systems is becoming more popular as data grows. This paper critically examines ML applications in cloud ERP systems, highlighting benefits, drawbacks, and implications. Automation, better decision-making, and real-time insights are ML benefits. However, data integration, security, and scalability must be handled. The study sheds light on how ML can improve ERP performance, efficiency, and intelligence.

Udani Weerasekara [9], examines Sugar & Salt, a Sri Lankan manufacturing firm, and its ERP system implementation, benefits, and obstacles, as well as how it became involved in the firm's management accounting processes. Data was acquired through in-depth interviews with ERP system and management accounting participants, informal chats, and document inspection. Themes were used to analyze data. Tools: This study uses qualitative and case study research. It combines NIS and OIE, drawing from institutional theory.

Sandeep Gunjal [10], examined ERP's change management impact on manufacturing companies. The main findings, conclusions, and recommendations are in this article. Overall, the study showed that ERP helps manufacturing organizations manage change. To achieve this, change management factors must be adopted. ERP is a substantial switch from old to integrated systems. Transitions are difficult. Taking care of the CSFs can make the implementation successful and yield macro and micro results. Companies must also address Reimplementation gaps.

## 3. Scope of the Project

Scope of ERP for College fee management System through blockchain is explained below:

### 3.1 ACADEMIA

Academia University Management System (UMS) is an advanced education ERP software designed to automate and streamline all tasks within a university. With its comprehensive features, Academia UMS brings end-to-end automation to academic, non-academic, and administrative operations, allowing university staff to focus on high-priority tasks. As a one-stop solution, Academia UMS dramatically enhances the lives of all stakeholders involved in university management. It offers a wide array of modules, including pre-admission, admission, Student Information System (SIS) – attendance, program and courses, fees and finances, examinations, data analytics, and other core operations critical to the functioning of a university. Manage your needs by having highly dynamic and configurable features: add a field on the academia screen, define workflows, create your document templates and certificates, and a lot more.

**Reference**: https://www.academiaerp.com/university-management-system-software

### 3.2 MASTERSOFT

Fees collection is the most tedious task for any educational institution and requires precise attention for calculations such as pending fees status, fees concessions, scholarships & discounts, etc. Moreover, the manual fees calculations & collection process doesn't guarantee 100% accuracy. The chances of errors while managing fees manually are tremendous which may impact the overall work procedure adversely. This is why switching to automated fee collection software is a smart decision for any institution. It not just delivers accurate fees-related calculations but also saves enormous time & effort of the administrative staff. A fee management system is used as task management software that automates collecting fees and generating fee receipts. It eliminates duplicate data entries and minimizes errors when entering entries into school accounts. The system supports all sizes of public and private institutes.

**Reference**: https://www.iitms.co.in/products/fees-management-system/

### 3.3 SKOOLBEEP

Simplify the fee management process and speed up collection with online payments and student loans. A secure, efficient & hassle-free mechanism for fee scheduling, reminders, payment collection, receipt generation and bank reconciliation. Easy for parents, effortless for accountant, auditor and school management. We are an edtech company building solutions that empower schools & teachers, make the learning process enjoyable for students and enable parental aspirations. We strive to break the digital divide in the Indian school education system and create a

brighter future for all children irrespective of their background. SkoolBeep is a trusted technology partner offering high-quality, affordable and scalable solutions to schools across India.

As a company, we are equally passionate about education and technology. Our solutions can empower teachers, enhance learning experiences for students, keep parents involved, and help Indian schools become future-ready. SkoolBeep has a whole range of technology solutions that revolutionize every aspect of running a school from integrated classroom solutions to home learning solutions and school management software. In our journey of 10 years, we have constantly invested in developing new solutions and advancing our existing offerings to support the schools we've partnered with. We aspire to build long-term relationships with schools and become a trusted one-stop technology partner enabling Indian schools to become vibrant, world-class learning centers of excellence.

Reference: https://www.skoolbeep.com/school-fee-management-software/

## 4. METHODOLOGY

The methodology for ERP for College Fee Management System through Blockchain is developed under waterfall model architecture as shown in the below figure 1.

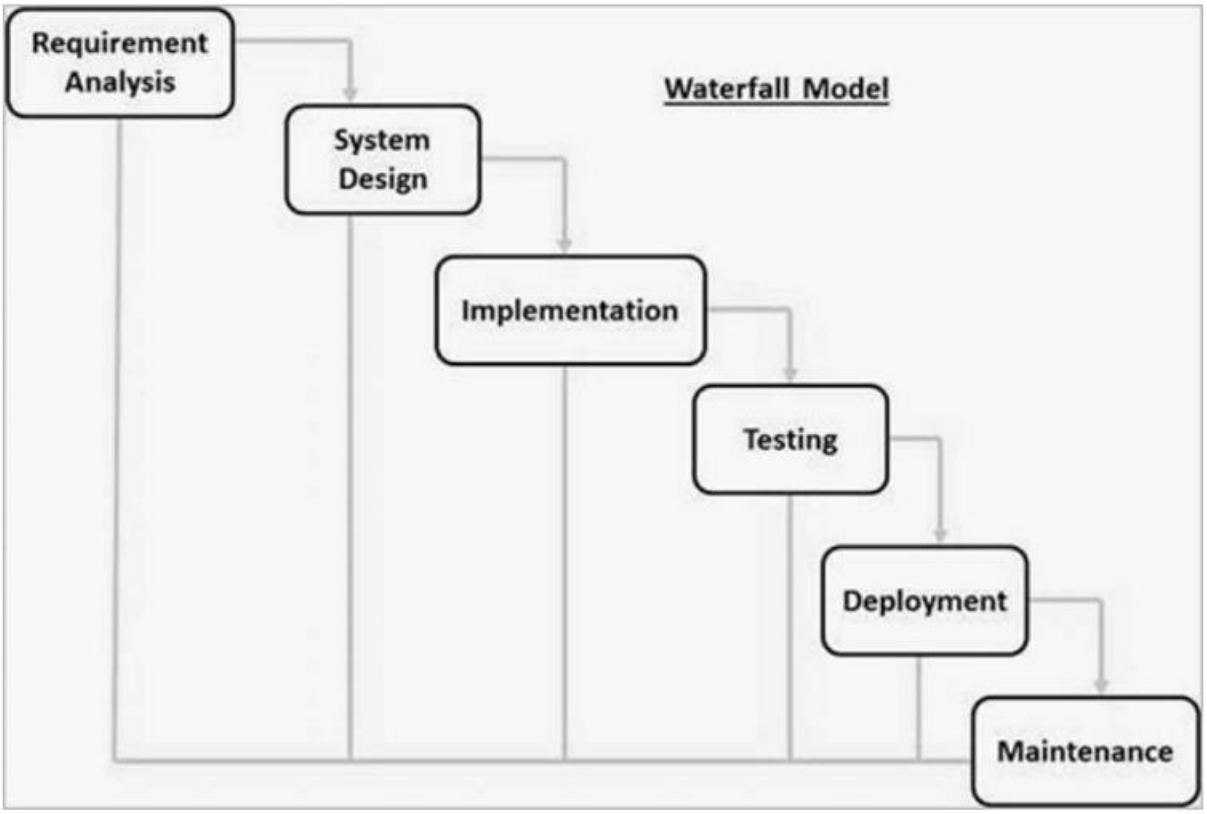


Fig 1: Water fall model Architecture.

**4.1 REQUIREMENT ANALYSIS –** Here requirement analysis is done based on following points:

- ✓ Base paper for ERP for college fee management system through blockchain
- ✓ Studying on Blockchain

**4.2 SYSTEM DESIGN:**

The System of ERP for college fee management system through blockchain is designed by using the following hardware and software.

Minimum Hardware Specification:

- CPU: Core i5
- RAM: 8 GB
- HDD: 500 GB

Software Specification:

- Coding Language: Java
- Development Kit : Java SDK
- Front End : Java.swing
- Development IDE: NetBeans 8.2
- Database Server : MySQL Server

**4.3 IMPLEMENTATION:**

Proposed system is designed by using the following modules:

**4.3.1 Module A: Staff**

- Registration
- Login
- Student Fee Details
- Store in Database

**4.3.2 Module B: Student Registration**

- Student Registration
- Student Login
- Access Fee Detail
- Pay the fees
- Get NOC

The proposed model for the ERP for College Fee management system can be elaborated with the following steps with the considered actors:

**Step 1: Admin –** The College admin officer gains access to the the ERP for College Fee management system for which the valid credentials are generated through the registration process. The admin can do the registration on their own, where the attributes of the admin are provided and generate the login credentials for the admin by entering their respective details. Using the generated credentials provided the admin gains access into the system after successful authentication. The admin can perform a number of different tasks after gaining access as mentioned below.

1.1 Profile Updation – Here admin can update his/ her profile data in the system to maintain the security and secrecy of the profile.

1.2 New admission – Here Admin will add the new admission details of the students to successfully store into the records.

1.3 View admission details and edit – Admin can view the added admission details of the student and edit the same if he/ she required doing so.

1.4 Paying student fees – Here is the main step of the ERP model, where admin will fill the details of the fees to be paid by the students by seeking the permission of the principal(if required).

***Step 2: Principal*** – After completing the registration process, the college principal will have the necessary credentials to access the ERP for College Fee management system, which is used to manage academic fees system of the college. It is possible for the principal to register independently, with the necessary information about the principal supplied, and then create his/ her own login credentials. The principal is able to access the system after successful authentication by using the credentials that were generated. Once granted access, the principal can carry out a variety of tasks, some of which are detailed below.

2.1 Profile Updation – Here Principal can update his/ her profile data in the system to maintain the security and secrecy of the profile.
2.2 View and Grant, the permission – Here Principal can view the request of the student sent by the admin for the partial payment of the fees. Then by taking the decision the principal can reply to the request through the system for the partial payment of the fees.

***Step 3: Staff*** – Staff is also an important actor in this ERP system. After providing the staff details he/ she will register in to the system successfully to perform the following tasks.

3.1 Profile Updation – Here staff can update his/ her profile data in the system to maintain the security and secrecy of the profile
3.2 View details – Here staff can view the student admission details as well as student fees details.

***Step 4: Student*** – Student is also an actor in this ERP system. After providing the Student details he/ she will register in to the system successfully to perform the following tasks.

4.1 Profile Updation – Here students can update his/ her profile data in the system to maintain the security and secrecy of the profile.
4.2 View details – Here students can view the student admission details as well as student fees details.

**4.3.3 Implementation Diagram**

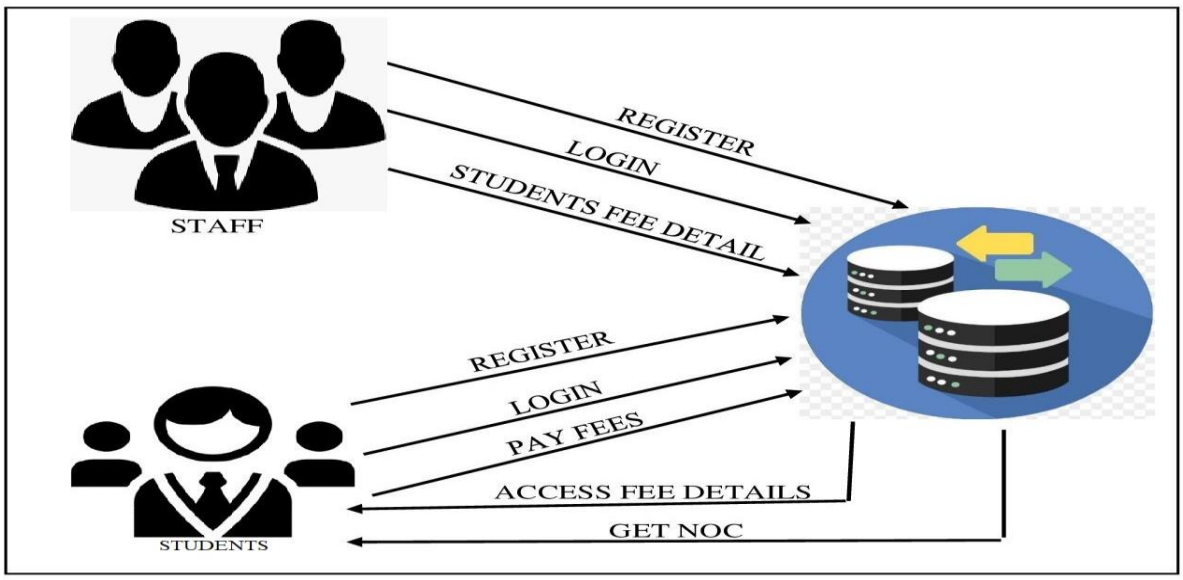


Figure 2. System Overview

**4.4 Deployment of the system:**

The developed software is deployed in the laptop of above-mentioned configuration with the help of the mentioned software.

**4.5 Maintenance of the system:**

As this software is tested for quick recovery, maintenance of the system is not a challenging task. This is because the tools and the software used are open source, so there is no question of licensing the required software.

## 5.CONCLUSIONS

We made an automated framework for college fees management as part of this project. This makes it easy for colleges to do all of their many tasks. The project is built around web apps and mobile apps for parents, teachers, and kids. Both of these apps can work on the same information. Most of the work is done by the Windows program, which makes the plan, makes transcripts and report cards, and lets students sign up online. The app also makes it easy for teachers to see which students are present and for students, teachers, and parents to look at records and find out how their children are doing.

It's very easy to solve the timetabling problem. Following the set schedule is done with the help of data structures. The scheduler picks a subject teacher at random from the database, then looks up all of that teacher's classes, makes sure they don't have more work than they can handle, picks a day at random based on how many lessons are in that subject, and finally finds a time that works for the lesson. It does this over and over again until the teacher is done with their work and all the teachers in the database have been seen.

Putting the answer in a database is the last step. This is a good way to keep track of information about students and their parents, quickly find information about them again, and make papers like transcripts, report cards, and schedules. It not only makes a master plan that works, but it also makes a schedule for each teacher. It has also been shown that the framework's web application helps teachers keep track of which students are present. Parents can use the college's Internet or Intranet to see how their children are doing.

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