AnixSys Pvt Ltd

ANIXSYS
ICT SOLUTIONS SPECIALISTS

BINDURA UNIVERSITY OF SCIENCE EDUCATION

Integrated University Management System

PROJECT PROPOSAL

Authored by: Benson Misi

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ABOUT US

AnixSys Pvt Ltd is a software developing company owned by Mr Benson Misi, a seasoned software developer who holds Honors Degree in Information Systems and studying towards his Masters in Data analytics He has worked on several projects and was part of the team that developed the Bindura University of Science Education (BUSE) management system in question. His role was the lead developer hence he has a comprehensive understanding of the system architecture. Mr. Misi has also developed the Procurement Regulatory Authority of Zimbabwe (PRAZ) public procurement portal that has seen the institution increasing its efficiency in handling public procurement processes. In 2019 he registered his own company called AnixSys Pvt Ltd which specializes in the provision of software solutions. The company has worked on the following projects including:

1. **Morgan Zintec College**: We managed to develop and host on our cloud platform the institutions website and customized Moodle LMS. We are currently in the process of developing the institution's College Management System

2. **Securities and Exchange Commission of Zimbabwe**: we developed a barcode printing system that allows them to easily tag and manage their inventory and assets

3. **Payment aggregator platform**: we developed a platform that will allow our clients to receive formatted data from their bank accounts. This allows easier and faster identification of RTGS and ZIPIT payments

MEET THE TEAM

Name: Benson Misi

Role: Team Leader

Qualifications: Honors Information System, Masters Data analytics

Experience: 11 years

Duties: Mr. Misi's has vast experience in application development hence his role is to lead the team in developing a tested and documented system that meets the institutions requirements

Name: Shakemore Chinofunga

Role: Project Coordinator

Qualifications: MSc Information Systems development, BSc Information Systems, DPhil Information Technology

Experience: 15years
Mr. Chinofunga is the current ICT director at
Chinhoyi University who played an active role   in the development of the institution   's current system. His vast experience in developing CUT's system and
other will applications will be of great value in the development of the proposed system

Name: Innocent Tauzeni

Role: Full stack Developer

Qualifications: Certifications in Software development, Diploma in science Education

Experience: 3 years

Duties: Mr. Tauzeni is a talented full stack developer who is knowledgeable in latest development tools

Name: Perseverance Mudzinganyama

Role: Full stack Developer

Qualifications: Certifications in Software development, Diploma in science Education

Experience: 5years

Duties: Mr. Mudzinganyama is a talented full stack developer who is knowledgeable in latest development tools

EXECUTIVE SUMMARY

This is a proposal for an integrated system software restructuring at Bindura University of Science Education. This purpose of this proposal is to clearly outline the challenges being faced by the institution's main registry system, reasons why those problems have arisen over time and proffer possible timelined solutions to ensure improved service delivery and business continuity. The project will mainly involve software development. Implementation of modules and testing of results will be done continuously and in stages. This system restructuring will result in improved operational efficiency and systems precision.

1.2 PROJECT DESCRIPTION

1.2.1 BACKGROUND
In 2012, Bindura University of Science Education embarked on an exercise to develop a customized and home grown Integrated University Registry Management System. The in-house development successfully automated most of the institution's business processes. The system interconnects all university registry processes on one application.

1.2.2 CURRENT ARCHITECTURE
The current University Management System was developed using a monolithic architecture which means that all components of a system are interconnected to form one single application. This type of application has its advantages and disadvantages:
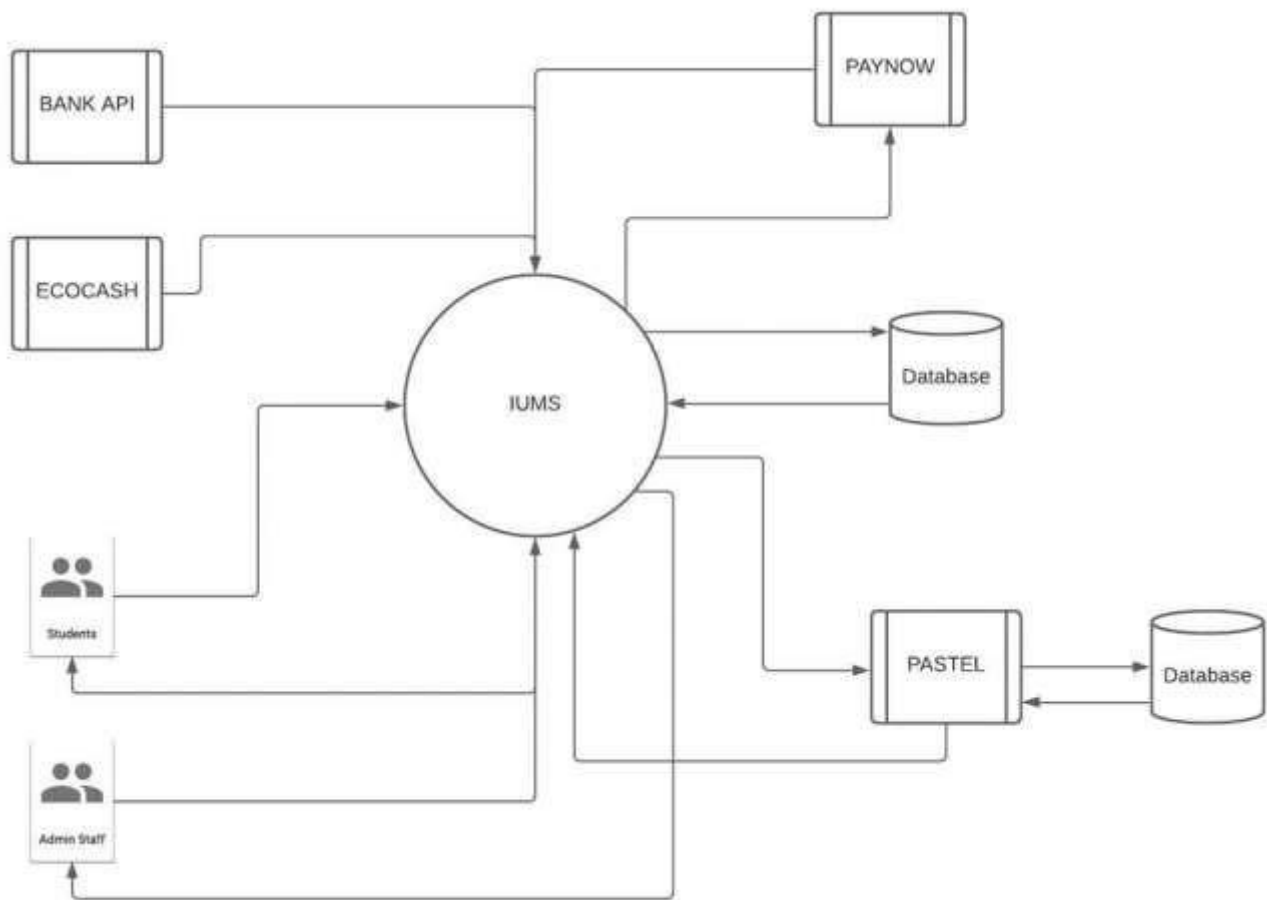
Figure 1: The Current IUMS Structure

Management Ease

This approach is easy to develop, deploy and requires limited human resources, this is why the developer was able to develop and deploy the application as a single developer. This approach becomes difficult to maintain and manage as the system grows in data. As depicted in the picture above currently IUMS handles all the requests ranging from payments coming in from the bank, posting to pastel accounting package, retrieving data from pastel and computing balances. IUMS is currently processing results publication and student registrations.

Performance

The system has been able to generate huge volumes of data, this means that before a record is saved in a database the system has to validate through huge volumes of records if that record exists, this greatly results in a decrease in the performance of the application as all other components of the system have to wait until a request has been processed.

Duplication of Transactions

The system is concurrently running background tasks to post transactions to pastel, retrieving data from pastel and publishing results. This background task is currently running after every 5 minutes, but because of the huge volumes of records the background task would initiate more tasks before the first task is completed mainly because of interconnectedness of components within the system resulting in duplicated records.

Downtime

The current system was generating huge volumes of logs if a certain automated task failed such as sending an email or retrieving data from an external application like pastel. These due log files would consume a greater portion of the server disk space, this left the application with little resources to use hence resulted in the system crushing or being very slow.

1.2.3 PROBLEM DEFINITION

Traditionally, systems should be subjected to continuous development infusing chief among them, new technologies, performance tuning the database integration with new packages on the market and ensuring that they are safe from cyber threats (fool proof). This has not happened with the BUSE system in a long time, hence the duplicated transactions, increased downtime, and slowness in processing key business transactions among other issues. The BUSE system should be highly available, cyber secure, fault-tolerant, distributed, use atomic actions (atomic transactions), consistent and implement replication services.

1.2.4 OVERALL OBJECTIVES

This purpose of this proposal is to:

- Clearly outline the challenges being faced by the institution's main registry system,
- Give reasons why those problems have arisen over time and

- Proffer possible time-lined solutions to ensure improved service delivery and business continuity.

2.1 TARGETED ACTIVITIES, OUTPUTS AND METHODS OF IMPLEMENTATION

From the experience that I obtained developing the current system and working on other bigger projects, I propose to lead my team in developing a fully documented robust Integrated University Management System using current technologies. The system should be easily scaled to accommodate an increase in volumes of data request and data generation, allow for data integrity tests, and cyber secure.

2.1.1 PROPOSED STRUCTURE OUTPUT

We are proposing that the institution adopts a modular architecture or a micro services architecture. This approach will result in the following outputs:

1 Portal Services

This service will be accessed by the public, students, lecturers and integrations to payment platforms. This application will be connected to its own database which will act as a slave database to the Administration Services master database.

2.   Administration Services

This will be the main application that will be connected to the master database. This master database will receive data periodical from the Slave database being utilized by the portal through replication or event buses.
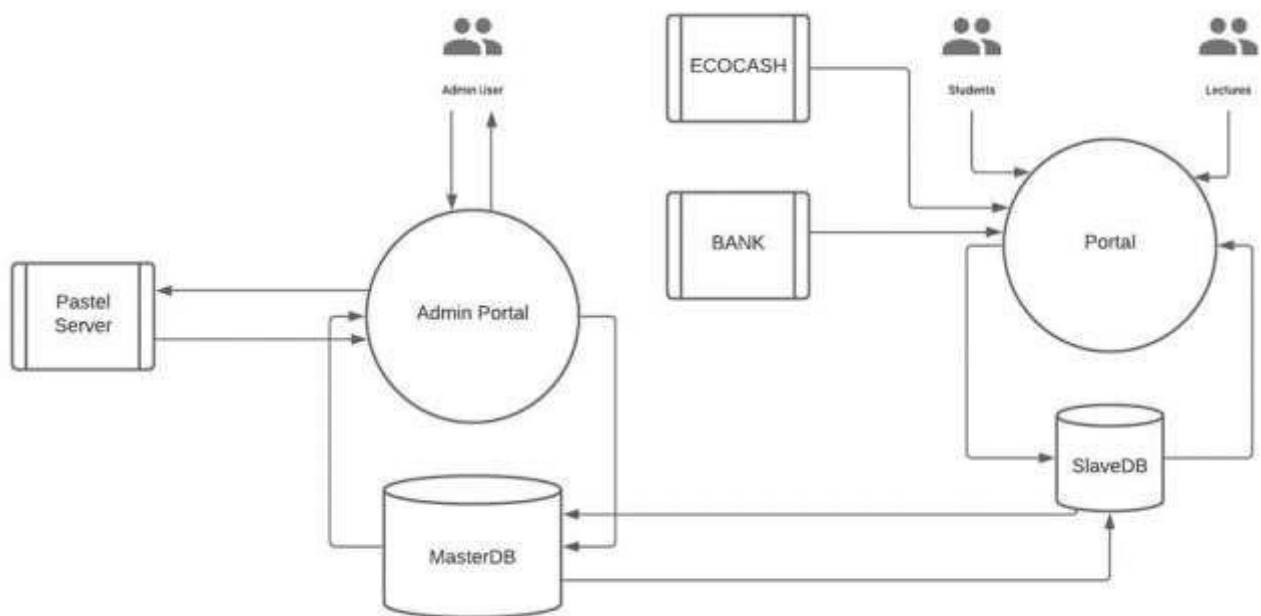
Figure 2: The Proposed IUMS Structure

This separation of services will increase efficiency in the system as the demand for resources vary, an example is when the administration user is publishing results, this operation will not compete for resources with students who are trying to access their results as these will be two different services. The proposed structure will make use of the technologies highlighted in the table below:

Table 1: Technologies to be used

Component	Technology
Database	MySQL
Framework	**NodeJs(Nestjs)**
Development Tools	**Nestjs , C# vuejs**
Reporting Tool	**Crystal Reporting**
Operating Systems	**UBUNTU**
Database Server OS	Ubuntu Linux

2.1.2 PROJECT WORK PLAN

The project proposes that the restructuring activities will occur over the following timeframes shown in Table 2 below:

Table 2: Restructuring Activities Proposed Timeframes

item	Duration
System Requirements Specifications document	1 weeks
Admissions & registration modules	2 weeks
Finance modules & account packages Integrations	2 weeks
Examination modules	2 weeks
Payment Platform Integrations	2 weeks
Learning management systems Integrations	2 weeks
Data cleaning and migration	2 weeks
Inventory management module	2 weeks
Canteen module	2 weeks
Total Timeframe	17 weeks

2.1.3 PROPOSED PROJECT COSTING

The anticipated project costs are outline in Table 3 below. 80% of the total project cost is to be paid on contract signing.

Table 3: Project proposed cost

item	Cost
System Requirements Specifications document	ZWL100000
Admissions & registration modules	ZWL150000
Finance modules & account packages Integrations	ZWL150000
Examination modules	ZWL150000
Payment Gateways Integrations(BANKS, Ecocash, Paynow)	ZWL40000
Learning management systems Integrations	ZWL100000
Data cleaning and migration	ZWL150000
Total Cost	**ZWL840000**

2.1.4 Optional Annual Support Cost

The institution has the option to pay an annual support fee 50% of the total project cost. This will cover any technical support issues, applications upgrade and maintance. Please note any additional modules requested after project sign off will be charged separately

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2.3 CONCLUSION

We look forward to working with BUSE in this project and help to improve its current system which will improve operational efficiency and information processing. A follow up presentation can be made by the presenter to provide clarity on the proposed operations at the institution's request.