PUNE VIDYARTHI GRIHA'S COLLEGE OF ENGINEERING AND SHRIKRISHNA S. DHAMANKAR INSTITUTE OF MANAGEMENT, NASHIK - 422004

PRESENTATION ON

SMART CONTRACT ENABLED ONLINE EXAMINATION SYSTEM BASED ON BLOCKCHAIN NETWORK

SAVITRIBAI PHULE PUNE UNIVERSITY

GROUP 13

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1. Introduction

- Motivation

- Problem Definition

Motivation

- The cloud-based system are widely adopted by many educational organizations. Many government examinations are conducted on this platform. But there are lots of challenges that are generated.

- One of the biggest challenges is the security of data .We Know there are lots of hackers present on the network, steals the data, for which we use the firewalls for security Reasons, but this is not enough.

- Due to the many Firewalls and anti-virus systems increase costs. And expenditure.

- And the third issue is user authentication, i.e., The only valid candidate in the examination system is present.

Problem Definition

In this system, we're attempting to create a cost-effective online exam system by integrating blockchain technology into an already-existing system, which will improve the security of administering such exams.

2. Literature Survey

Sr. No	Name of paper	Authors	Publication	Year	Abstract
1	A Blockchain-Based Smart Contract Towards Developing Secured University Examination System	1.Ashis Kumar Samanta 2. Bidyut Biman Sarkar 3. Nabendu Chaki	Springer Open	2021	The emergence of online examination systems has brought many advantages to the education sector, including convenience, flexibility, and cost-effectiveness. However, these systems face various security threats, including hacking, impersonation, and cheating. Blockchain technology can offer a potential solution to these challenges by providing a transparent, decentralized, and tamper-proof platform for conducting online exams. This research paper proposes a blockchain-based smart contract solution for developing a secured university examination system.

Literature Survey

Sr. No	Name of paper	Authors	Publication	Year	Learnings
2	An advanced and secure framework for conducting online examinations using the blockchain method	1. Md Rahat Ibne Sattar a 2. Md. Thowhid Bin Hossain Efty a 3. Taiyaba Shadaka Rafa a	Science Direct	2023	Online examination systems have become increasingly popular due to their numerous benefits, such as convenience, flexibility, and cost-effectiveness. However, these systems face significant security threats, including cheating, hacking, and impersonation. Blockchain technology can provide a potential solution to these challenges by providing a transparent, decentralized, and tamper-proof platform for conducting online exams.

Literature Survey

Sr. No	Name of paper	Authors	Publication	Year	Learnings
3	BSSSQS: A Blockchain-Based Smart and Secured Scheme for Question Sharing in the Smart Education System	1. Anik Islam 2. Md. Fazlul Kader 3. Soo Young Shin	arxiv	2018	In recent years, smart education systems have become increasingly popular due to their ability to provide flexible, convenient, and efficient learning experiences. However, these systems face various challenges, including the secure sharing of educational resources, such as questions and quizzes. Blockchain technology can provide a potential solution to these challenges by providing a transparent, decentralized, and tamper-proof platform for sharing educational resources.

Literature Survey

Sr. No	Name of paper	Authors	Publication	Year	Learnings
4	An Innovative and Secure Platform for Leveraging the Blockchain Approach for Online Exams	Albert Manawar	ATT	2022	Online exams have become increasingly popular in recent years, offering benefits such as flexibility, convenience, and cost-effectiveness. However, these exams face significant security challenges, including cheating, hacking, and impersonation. Blockchain technology provides a potential solution to these challenges by offering a transparent, decentralized, and tamper-proof platform for conducting online exams.

3. Software Requirements Specification

1) Project Scope

2) Functional Requirements

3) External Interface Requirements

4) Non-Functional Requirements

5) System Requirements

6) Analysis Model: SDLC Model to be applied

7) System Implementation Plan

Project Scope

1. Developing a user-friendly online examination system integrated with smart contracts and blockchain technology.

2. Automating exam processes such as exam creation, participant enrolment, answer submission, and result calculation through smart contracts.

3. Enhancing transparency, security, and efficiency in the examination process while providing immediate result notifications and comprehensive reporting.

Functional Requirements

- ### **System Feature 1**
  Easy to adapt with the system architecture and user interface.

- ### **System Feature 2**
  An system Blockchain is used as a tamper proof storage for unchanged, accurate results

Nonfunctional Requirements

1. Performance Requirements

2. Safety Requirements

3. Security Requirements

4. Software Quality Attributes

System Requirements

- **Database Requirements**

  SQL Database – MySQL

- **Software Requirements**
  1. PHP
  2. MongoDB (NoSQL)
  3. MySQL
  4. Blockchain
  5. Ethereum
  6. Remix-IDE
  7. Solidity
  8. MetaMask
  9. Ganache

- **Hardware Requirements**
  1. RAM – 8GB or higher
  2. Minimum 128 GB SSD/ 256 GB HDD
  3. Intel i3 8th Generation or Equivalent
  4. 64 bit System

Analysis Model: SDLC to be Applied
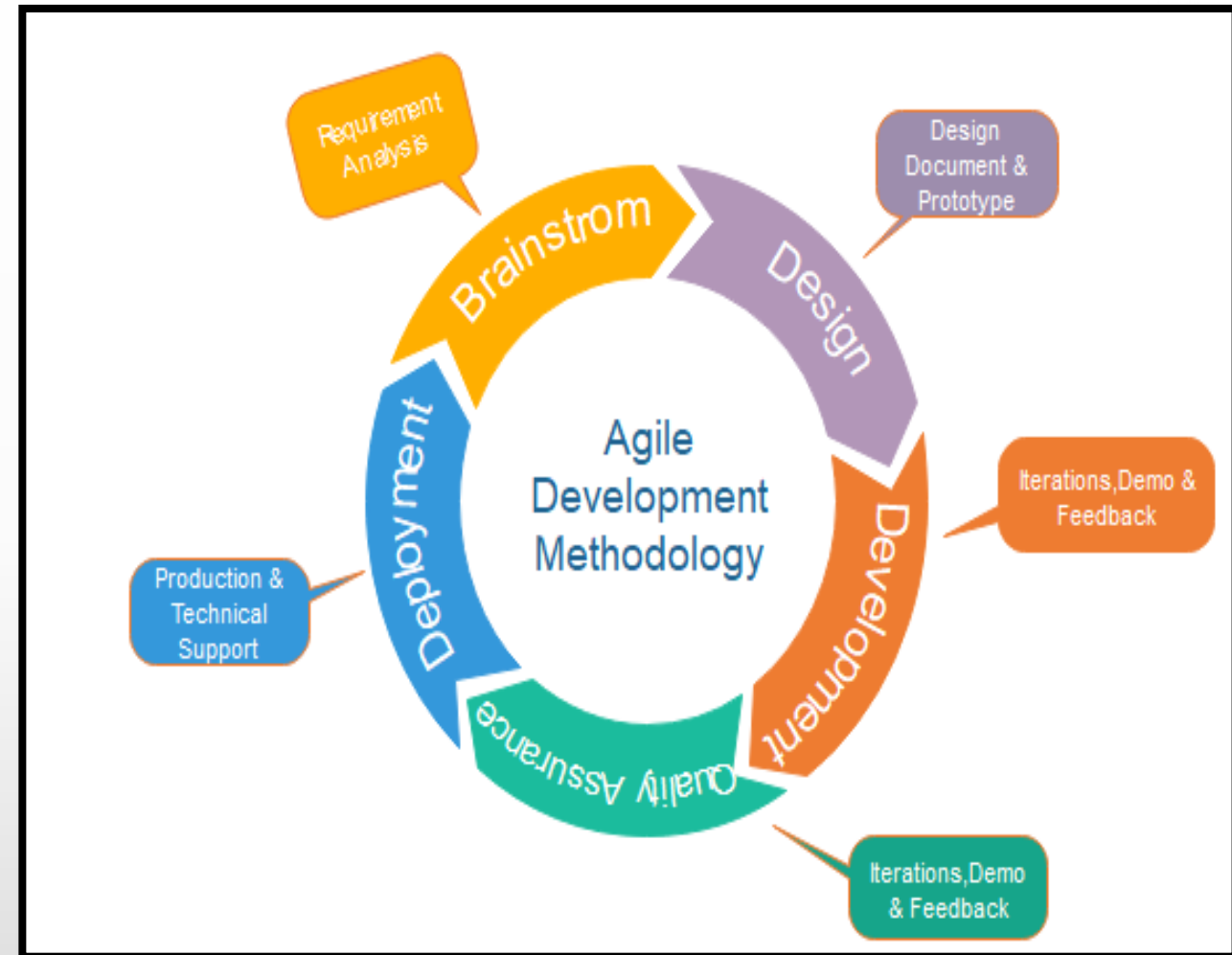
Figure 01 : Agile Development Methodology

System Implementation Plan

- Planning is the very important step involved in system implementation.

- The first and most crucial stage in implementing a system is planning. It is the most fundamental role and successfully answers the problems of how, where, and when the objectives can be achieved, or it acts as a framework for direction. Planning entails carefully evaluating both the resources that are already available and any obstacles that the team may face in achieving its business objectives or goals

4. System Design

1. System Architecture

2. Data Flow Diagrams

3. Entity Relationship Diagram

4. UML Diagram

System Architechture
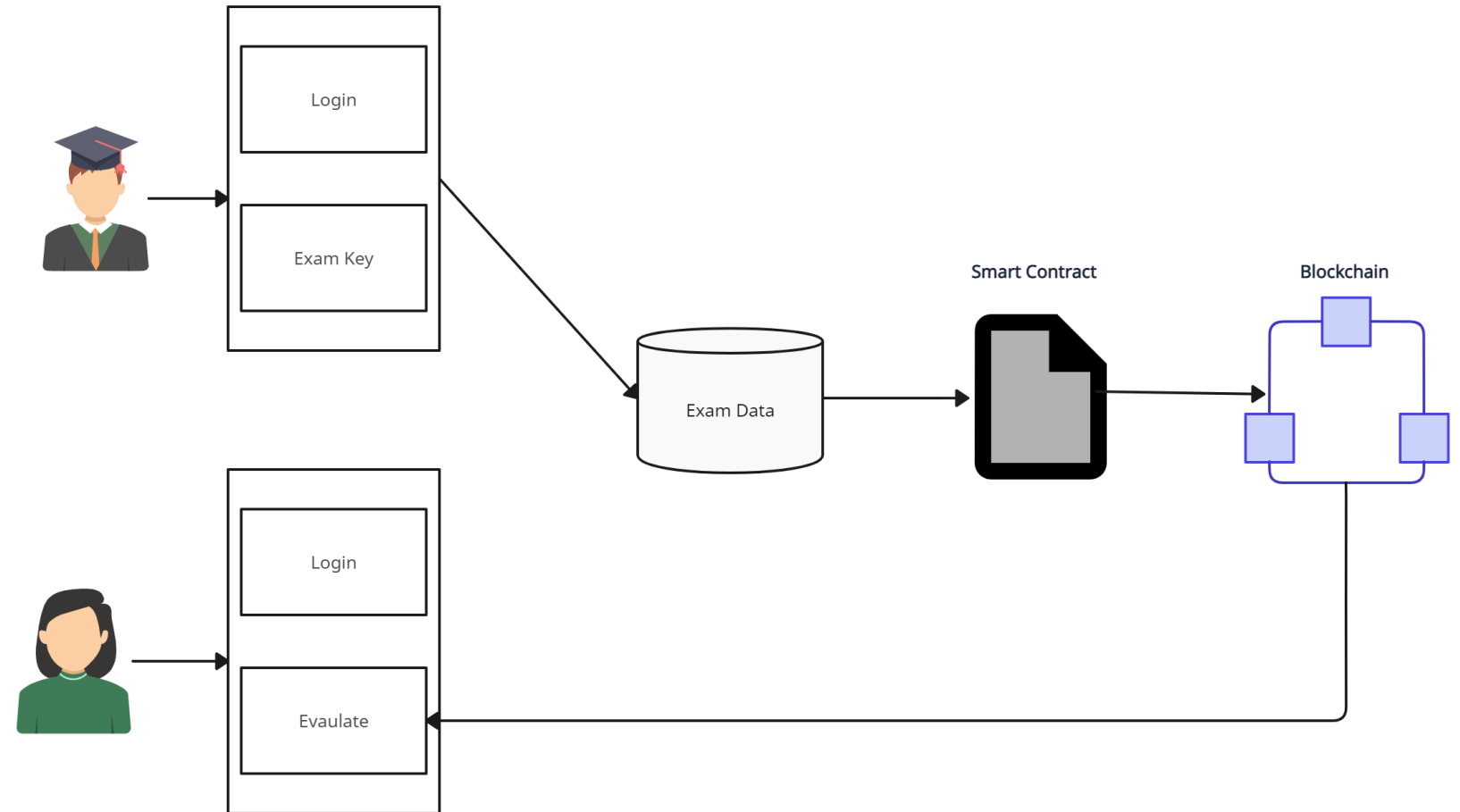
Figure 02 : System Architecture

Data Flow Diagram
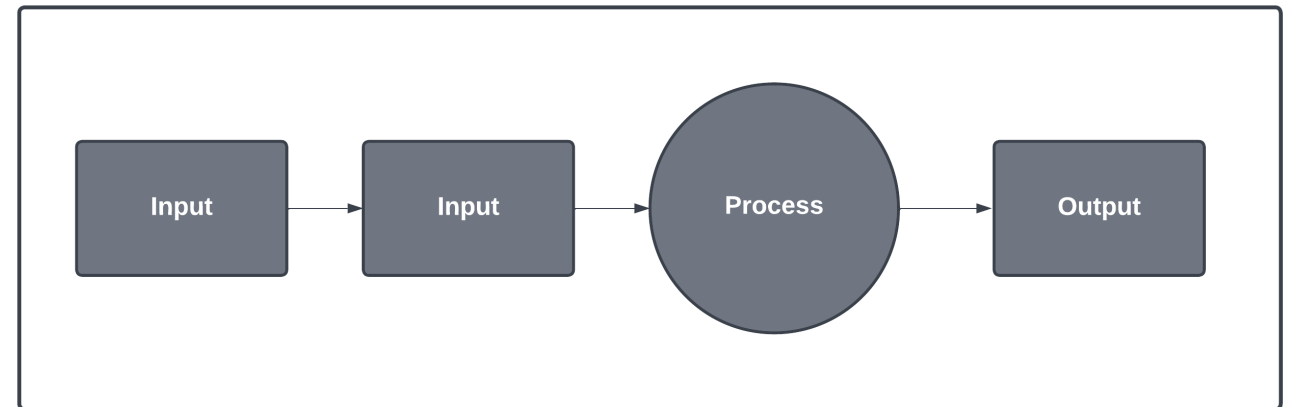
Figure 03 : Data Flow Diagram – lvl 0

Data Flow Diagram
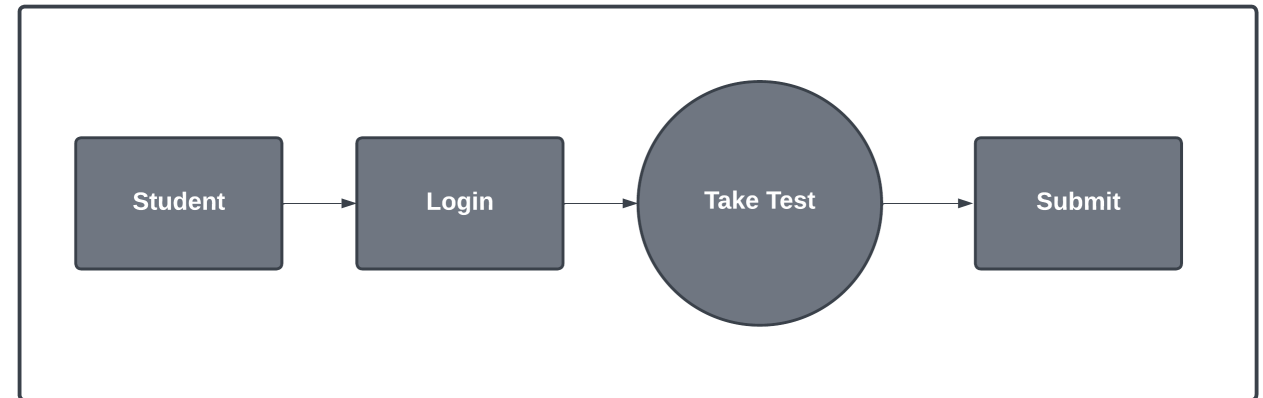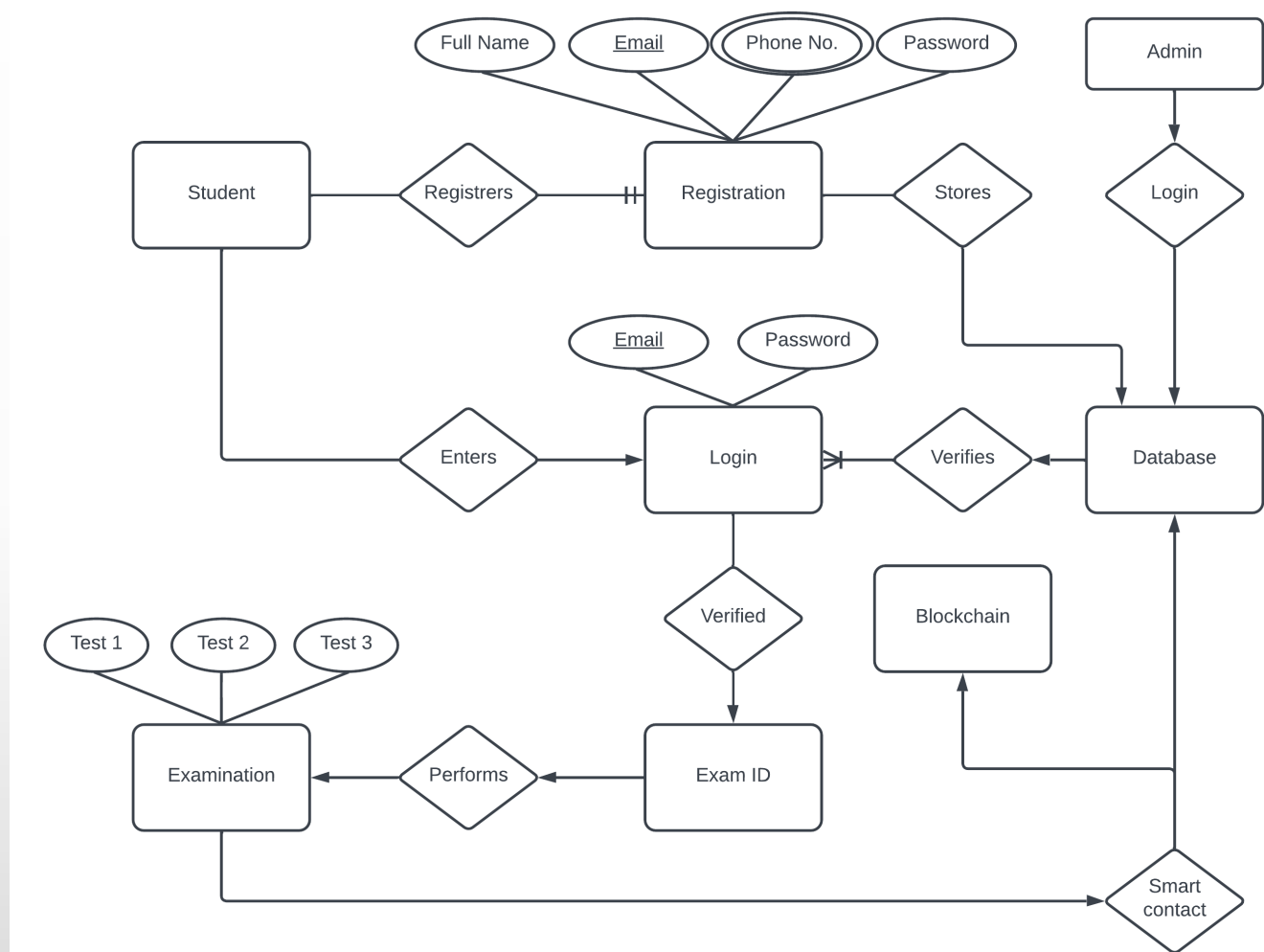

Figure 03 : Data Flow Diagram – lvl 1

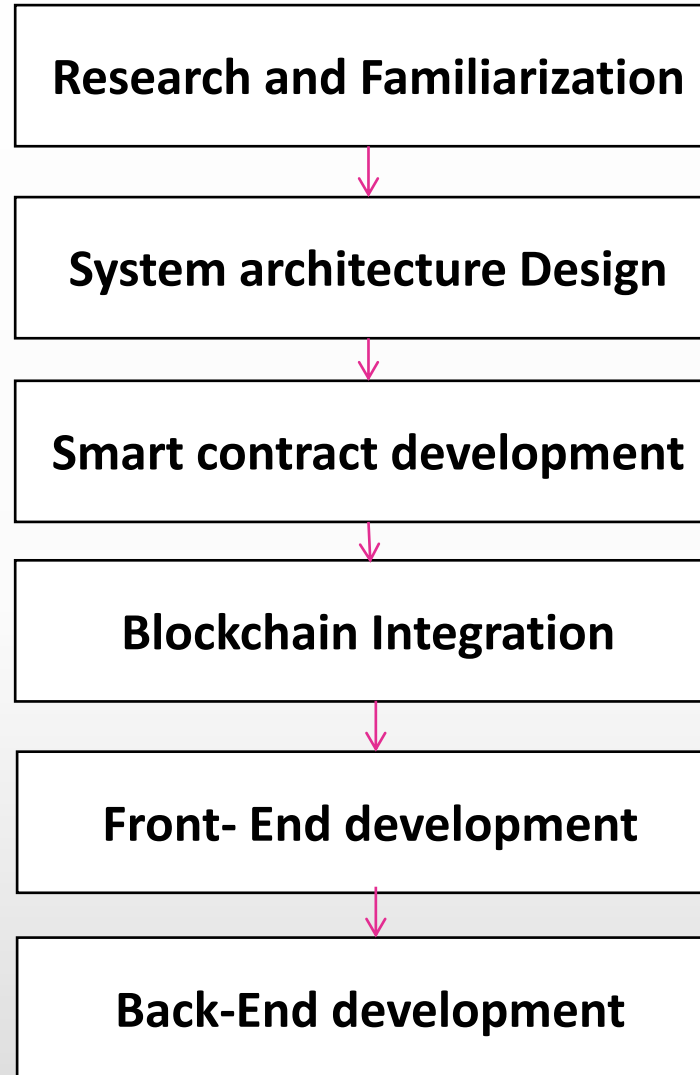# Data Flow Diagram
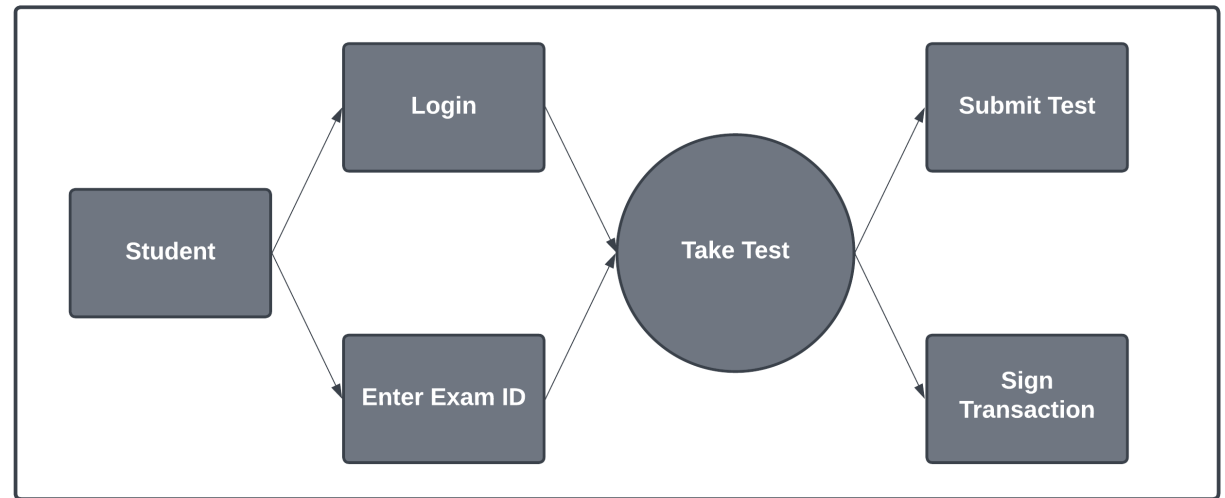
Figure 03 : Data Flow Diagram – lvl 2

Entity Relationship Diagram

Figure 04 : Entity Relationship Diagram

5. Project plan

Research and Familiarization

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System architecture Design

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Smart contract development

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Blockchain Integration

↓

Front- End development

↓

Back-End development

Figure 06 : Project Task Set

6.
Implementation

Overview Of Project Modules:

1.   User Management

2.   Exam Creation and Management

3.   Smart Contract Integration

4.   Online Exam Taking

Implementation

Tools And Technologies Used:

1. PHP
2. MongoDB (NoSQL)
3. MySQL
4. Blockchain
5. Ethereum
6. Remix-IDE
7. Solidity
8. MetaMask
9. Ganache

Test cases

Sr. No.	Test case ID	Test case name	Actions	Required data	Expected output	Actual output	Status	Comments
1	**TC_001**	Student Take Exam	1.Enter student login details. 2. Enter the Exam key. 3.Submit the exam	Login details and Exam key	Upon submitting the test the MetaMask wallet should popup to submit the exam through smart contract	After submitting the test the Meta Mask wallet popped up to submit the exam through smart contract	PASS	NIL
2.	**TC_002**	Faculty create exam	1.Enter teacher login details 2. Create exam with scheduled time and publish it.	Faculty login details	Exam created successfull y	Exam created successfull y	PASS	NIL

8. Results

Figure 08 : Faculty Dashboard

Results

Figure 09: Create Exam Screen

Results

Figure 10 : Faculty Evaluation Screen
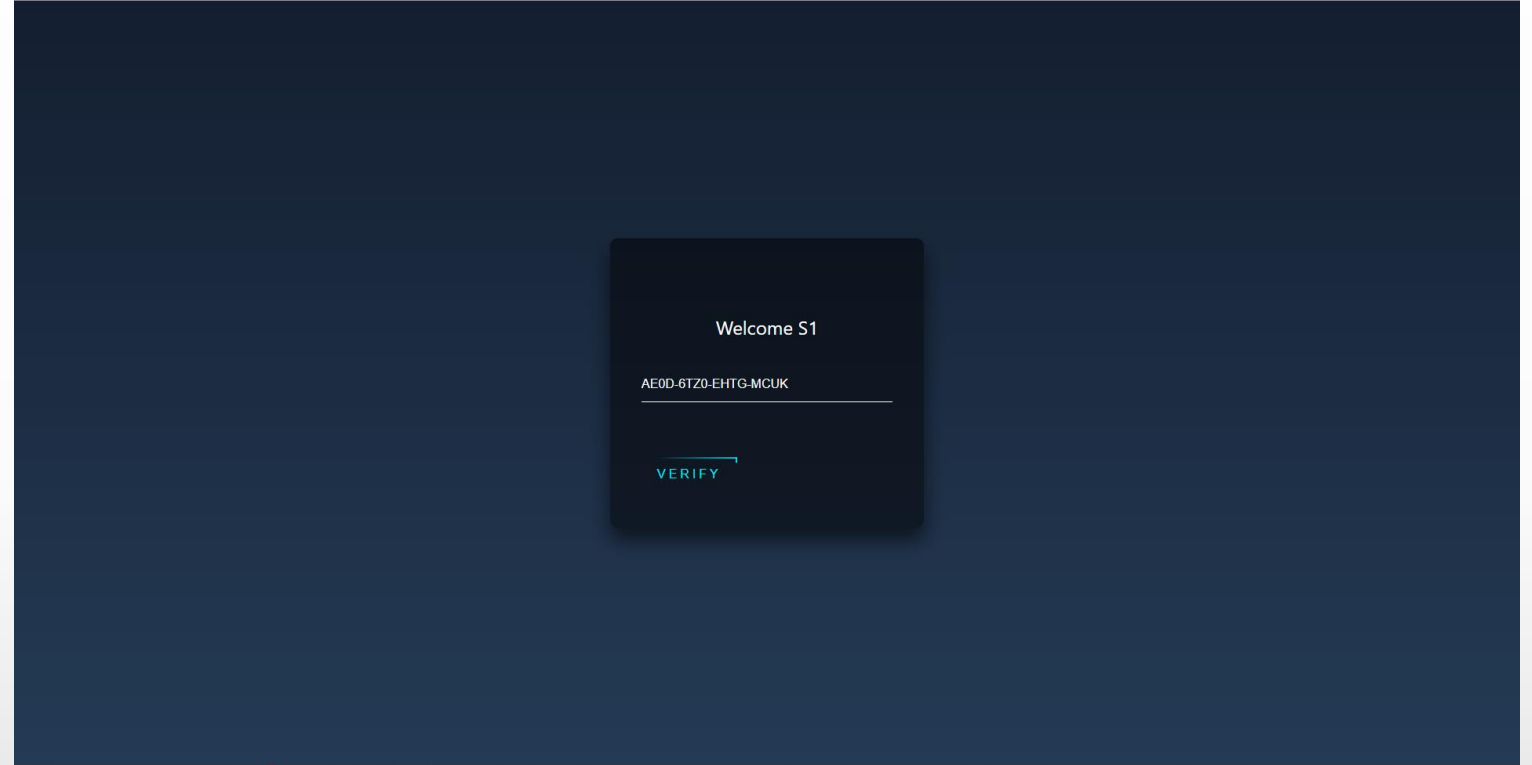
Results
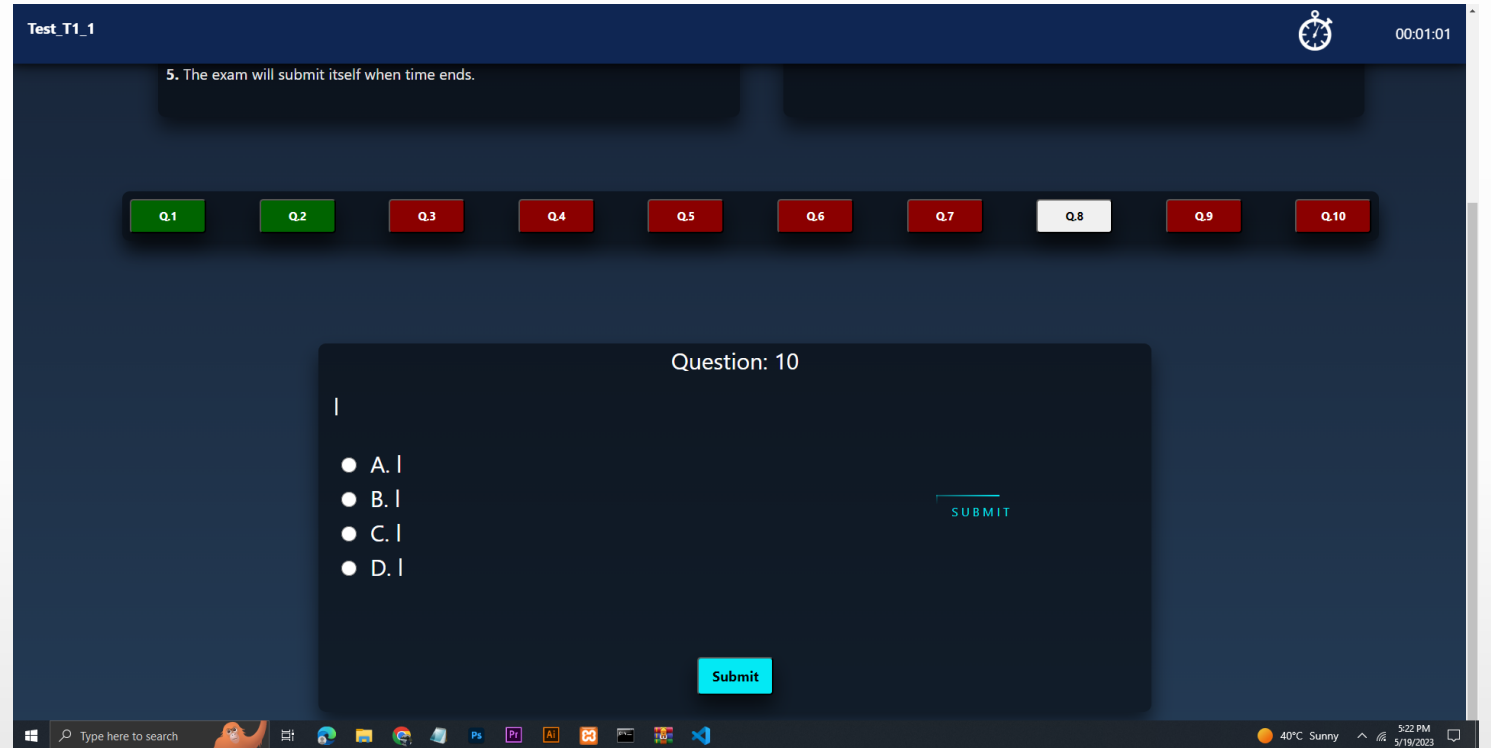

Figure 11 : Faculty Evaluation screen

Results

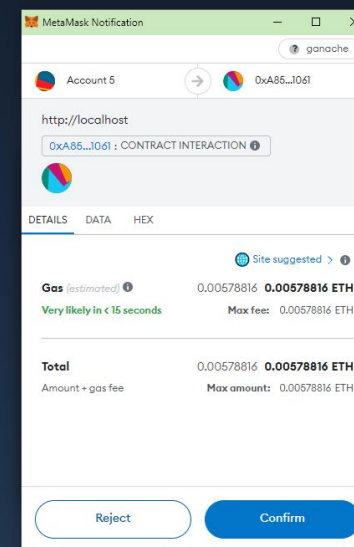**Figure 12: Student Verify Exam code screen**

Results

Figure 12: Student Take Exam window

Results

Figure 12: Student Sign Contract popup

Results

Figure 12: Transaction Confirmed

9. Other Specifications

1. Advantages

2. Limitations

3. Applications

Advantages

● The biggest advantage of blockchain is its decentralized ledger application, which is proof of work, in which all the things are present in ledger form, which is generated automatically without the need of any third parties.

● In the blockchain-based system, there is no need for external equipment requirements like data centers, Data warehouses or firewall extensions like cloud-based systems.

● Blockchain technology overcomes and solves all these cloud-based system issues.

● Blockchain is a highly secured, transparent, and authenticated blockchain network.

Limitations

● It can become an impediment to students' personal, inviolable information if the system faces any major breakdown.

● This system requires a stable internet connection but most households in Bangladesh have no internet access.

● The internet outage can become the reason for an imbalance in the learning management system of individual students while attending the exam.

Applications

- Online university examinations.

- Online entrance tests.

- Company recruitment tests.

Conclusion

In conclusion, the development of a smart contract-enabled online examination system based on blockchain brings numerous benefits and advancements to the field of education and assessment. This project successfully combines the power of blockchain technology, smart contracts, and user-friendly interfaces to create a secure, transparent, and efficient examination process.

Future Scope

Integrating automatic result generation in the examination system presents an exciting avenue for future work and improvement. This feature holds the potential to streamline and expedite the result generation process, enhancing the efficiency and effectiveness of the overall system.

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Thank You

Any Questions?