



Blockchain-Enabled Prawn Quality Tracking System

Assignment:1

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Submitted to:

Sabrina Alam

Lecturer

Department of Computer Science and Engineering

Independent University, Bangladesh

Submitted by:

Name	Id	Section
Md Asif Intesar	2022430	2
Mohammad Azwad Saadat Sarwar	1910902	3
Taiseer Rakiin Ahad	1911242	3
Avijit Saha	1930109	3
Md Yakub Hossain	1830968	3

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1) Project Name: Blockchain-Enabled Prawn Quality Tracking System.

2) Project Goal and Objectives:

The aim of this initiative is to improve the clarity, trackability, and legitimacy of shrimp products within Bangladesh's fishing supply chain through the integration of a database built on blockchain technology. The specific objectives of the project are as follows:

- **Reduce Corruption and Adulteration:** The prawn industry's corruption and adulteration are the main targets of this initiative. The technology will prevent fraudulent actions and guarantee the accuracy of product information by documenting the whole route of prawns from its source to the shop on a safe and unchangeable blockchain.
- **Improve Food Safety and Consumer Health:** Ensuring the shrimp's traceability across the supply chain will allow for the quick detection of any potential fraud or contamination. Consumers can feel more confident in the security and caliber of the prawns they buy by reducing food fraud and ensuring product authenticity.
- **Enhance Supply Chain Efficiency:** By providing real-time data at each level of the process, the implementation of blockchain technology will simplify the prawn supply chain. Increased transparency will result in more effective decision-making, fewer delays, and overall supply chain operations that are optimized.
- **Establish Consumer Trust:** Consumers will have more faith in the prawn industry if it provides complete openness and easy access to information about the prawns they purchase. They can confirm the shrimp's origin, handling, and processing specifics, building a tighter bond between producers and consumers and boosting sales.
- **Foster Sustainable Fishing Practices:** By enabling the tracking of the shrimp's origin, fishing techniques, and adherence to pertinent legislation, the blockchain system will encourage sustainable fishing methods. By identifying and addressing unsustainable fishing practices, this information can support environmental conservation.

3) History Leading to Project Request:

The decision to implement blockchain technology for the shrimp industry in Bangladesh stems from the concerning decline in shrimp sales and the prevalence of food fraud and lack of authenticity. Despite prawns making up a large portion of Bangladesh's GDP, sales have been falling as a result of consumer mistrust and worries about the items' provenance and quality.

The fishing supply chain's current systems and technology have shown to be insufficient for solving the crucial issues of traceability, dependability, trust, privacy, and security. Consumer confidence has been eroded as a result of traditional record-keeping and paper-based tracking systems that left potential for corruption and data tampering.

The proposed initiative intends to use blockchain technology to address these problems. The project aims to create a strong and tamper-resistant database that securely stores the full path of prawns, from catch to consumption, by utilizing blockchain's decentralized and immutable properties. By implementing this blockchain-based system, the shrimp supply chain will be completely transparent, accurate, and trustworthy, reviving the shrimp sector and fostering customer confidence in shrimp-based products.

4) Identify Problems, Solutions and opportunities:

Problem	Solution
Food Fraud and Adulteration: The prawn sector in Bangladesh suffers from food adulteration and fraud, which damages consumer confidence and reduces sales. To increase their profits, many farmers may mislabel, combine, or substitute prawn products, so jeopardizing their originality and quality.	Blockchain-based Traceability: Shrimp traceability issues will be resolved by implementing a blockchain-based database. From the time the prawn is captured until it is delivered to the store, every step of its journey will be immutably recorded on the blockchain. As a result, stakeholders will be able to confirm the legitimacy and provenance of the prawns at any stage of the supply chain.
Lack of Traceability: It is challenging to trace the origin, handling, and processing of prawns due to the traditional supply chain systems' lack of thorough traceability. The inability to clearly identify the origins of contamination or negligence makes it difficult to ensure the safety of food.	Smart Sensors and IoT Integration: Smart sensors and Internet of Things (IoT) devices can be installed at various points throughout the shrimp's route to improve data collection. The blockchain will be used to store the relevant data that these sensors will automatically collect, such as temperature, location, and handling circumstances. All parties concerned will have access to correct and current information thanks to this connection.
Inefficient Supply Chain: The existing supply chain operations are inefficient and sluggish as a result of paper-based procedures and manual record-keeping. Decision-making and resource allocation are less than ideal as a result of the lack of real-time data exchange and openness.	Decentralized Data Access: The decentralized nature of blockchain will give a variety of parties, such as customers, suppliers, processors, and regulators, secure access to the data they require. By fostering trust and collaboration among participants, this transparency will improve supply chain management.

Opportunities:

- **Enhanced Consumer Trust:** The blockchain-based approach will boost consumer trust in the sector by giving consumers comprehensive and verifiable information on the prawns they buy. This increased trust may result in greater consumer demand for genuine prawn goods, which would help the market expand. Once this is put into practice, all prawn farmers will be required to utilize this type of authenticity in order to remain in business because if they don't, customers will know they might not be supplying the best products.

- **Sustainable Fishing Practices:** The blockchain will make it easier to track fishing techniques, supporting eco-friendly and sustainable practices. This will open doors for the prawn sector to access premium markets that value ecologically friendly products and accord with global sustainability standards.
- **Data-Driven Decision-making:** The blockchain's accessibility to historical and real-time data will enable stakeholders to take data-driven decisions. While authorities can more effectively enforce adherence to fishing restrictions, producers can optimize their processes based on consumer preferences.
- **Export Market Expansion:** The prawn business in Bangladesh might gain a competitive edge on the international market with improved traceability and transparency. International customers might favor prawn items from a blockchain-enabled supply chain, especially those who are worried about food safety and authenticity.

5) Product Description:

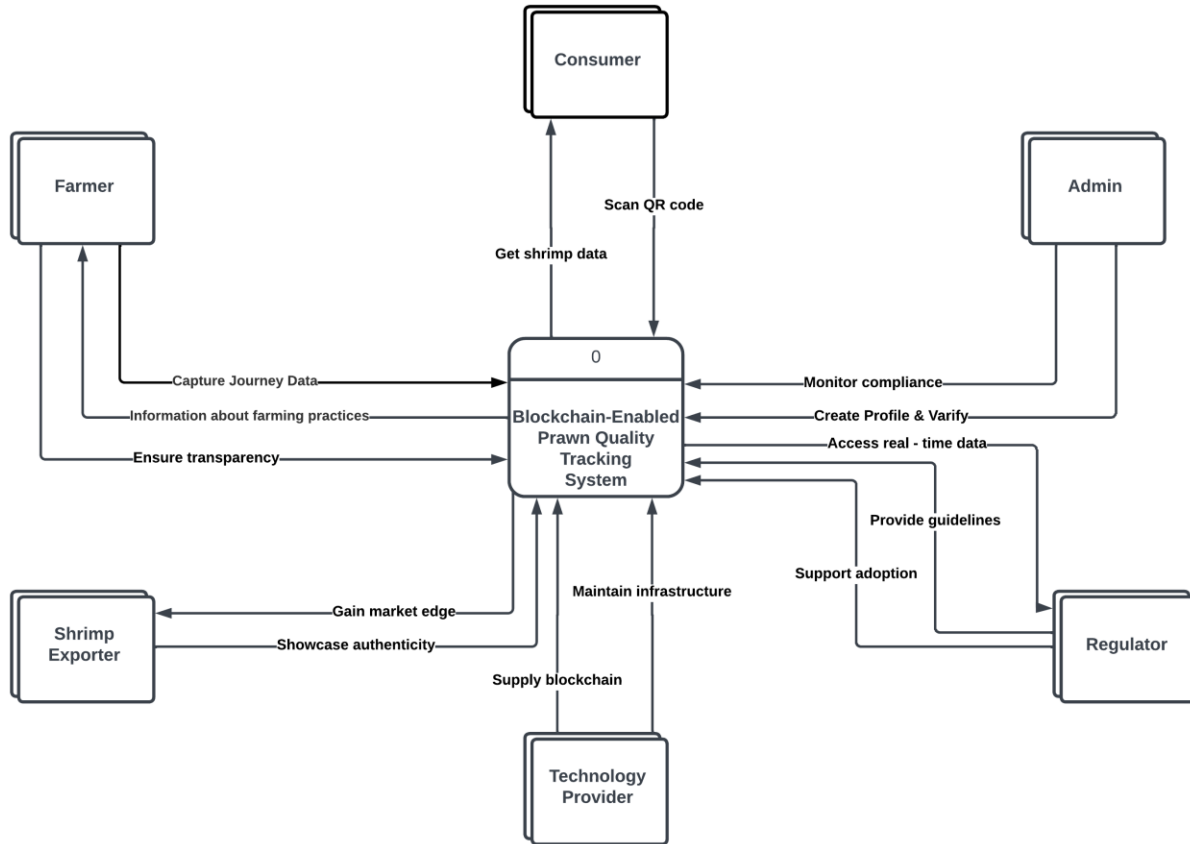
5.a) Product Summary:

A blockchain-based shrimp traceability system is the suggested item, and it seeks to completely transform Bangladesh's shrimp market. By documenting the whole journey of prawns, from catch to consumption, on an immutable blockchain database, it will improve transparency, traceability, and authenticity. At numerous points in the supply chain, smart sensors and Internet of Things (IoT) devices will be used to gather real-time data, ensuring reliable information. The system would make verified data accessible to customers and stakeholders, decreasing corruption and food fraud while assuring food safety. The project's objectives are to increase customer confidence, advance sustainable fishing methods, and spur market expansion for prawns.

5.b) Product Stakeholders:

- **Farmers:** Entities responsible for catching and harvesting shrimp.
- **Shrimp Exporters:** Organizations engaged in exporting shrimp to international markets.
- **Consumers:** End-users purchasing and consuming shrimp.
- **Regulators:** Ensures proper governance and support for the shrimp industry's. Authorities in charge of regulating and monitoring the fishing sector.
- **Admin:** Admin Can monitor compliance, create profiles & verify them for users.
- **Technology Providers:** Companies providing the blockchain platform and IoT devices.

5. c) Context Level Data Flow Diagram:



5. d) Hardware and Software Details:

Hardware Components:

- **Smartphones:** Fishermen, suppliers, processors, and other stakeholders will utilize smartphones to gather and enter data into the system. These smartphones should be able to interface with QR code readers and smart stickers that support NFC.
- **QR Code Scanners:** Throughout the supply chain, QR code scanners will be used to read the codes on prawn items, providing stakeholders and customers with access to information about the product's provenance, certifications, and other pertinent facts.
- **Smart Sensors and IoT Devices:** These gadgets will be placed at different points along the supply chain to record information about the temperature, location, and handling circumstances.
- **Servers:** To manage data processing and storage, servers will host the blockchain network and related apps.

Software Components:

- **Blockchain Platform:** The foundation of the system will be the chosen blockchain protocol. It will guarantee the security and immutability of the information stored on the blockchain. You could take into account Ethereum, Hyperledger Fabric, or other appropriate blockchain technologies.
- **Data Processing and Analytics:** Software for collecting, processing, and analyzing data for insights and decision-making.
- **Consumer Interface:** To enable customers to access information about the prawn goods they buy, a user-friendly consumer interface will be created, such as a smartphone application or web platform. The blockchain will be used by this interface to retrieve and display pertinent data.
- **Data Collection and Management System:** Before integrating stakeholder data into the blockchain, a data collection and management system should be created to organize and validate it.
- **Hardware Architecture:** A network of smart sensors, IoT devices, and servers will be created by connecting the hardware's component parts. To provide redundancy and fault tolerance, the blockchain nodes will be dispersed over many sites.
- **Software Architecture:** A decentralized blockchain model will serve as the foundation for the software architecture. The network will be secured by the system using a consensus process (such as Proof of Work or Proof of Stake). The use of smart contracts will automate some business logic and improve efficiency and transparency.

5.e) Software Key Technical Features:

- **Immutability:** The immutability of data saved on the blockchain ensures the integrity and validity of any information.
- **Transparency:** The supply chain will be more collaborative and trust-building because all stakeholders will have access to the same information.
- **Real-time Data Collection:** Real-time data will be gathered by smart sensors and IoT devices, giving current information on prawn conditions.
- **Decentralization:** The blockchain's decentralized design guarantees that no single party has control over the entire system, boosting security and resilience.
- **Smart Contract Automation:** Smart contracts will automate specific processes, reducing manual intervention and streamlining operations.
- **Secure Data Access:** To secure data access and safeguard sensitive information, the system will use cryptographic techniques.
- **Scalability:** The architecture will be created to support an expanding number of supply chain actors and transactions.
- **Digital Identity:** Each participant on the blockchain has a distinct digital identity, which promotes accountability and guarantees that only permitted parties can access the network and make contributions.

- **Data Analytics:** The program might include integrated or built-in data analytics tools to draw conclusions from the stored data. As a result, stakeholders' decisions can be better informed, and their operations can be optimized.
- **Mobile Accessibility:** Stakeholders can access and participate in the blockchain from a variety of devices, including smartphones and tablets, thanks to mobile apps or adaptable online interfaces.
- **Notifications and Alerts:** Automated alerts and notifications can be set up to notify stakeholders when certain events occur or when conditions change from what was expected.
- **Encryption and Security:** Using cryptographic methods, data is encrypted and guarded to keep critical information private and shielded from unauthorized access.

The prawn supply chain traceability project can create a reliable and effective system that benefits all stakeholders, from maintaining ethical fishing practices to providing consumers with knowledge about the items they buy, by concentrating on these particular crucial factors.