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Blockchain Based E-Commerce Online Application

K. Sneha Latha[1], Zaheer Hussain[2], K. Manikanta[3], S. Rohith[4], M.Haritha[5], R.Dinesh kumar[6]

[1,2,3,4] Student Scholars, Computer Science & Engineering Department, Siddhartha Institute of Technology & Sciences, Hyderabad, India

[5,6]Professor, Computer Science & Engineering Department, Siddhartha Institute of Technology & Sciences, Hyderabad, India

Abstract

In existing e-commerce applications, all customer and product details will be stored and managed on a single centralised server, and if this server crashes due to too many requests or if the server is hacked, then services will not be available to other customers. And to overcome this problem, we are migrating our e-commerce application to the blockchain, which will maintain data at multiple nodes or servers, and if one node goes down, customers can get data from other working nodes. Another advantage of blockchain is that it has inbuilt support for data encryption, is immutable (data cannot be altered by unauthorised users), and will consider each record as a block or transaction and associate each block storage with a unique hash code before storing new records. Blockchain will verify the hash code of previous blocks, and if all nodes block verification is successful, then the data is considered secure.To implement this project, we have used blockchain, Ethereum, and Truffle to store e-commerce data. Blockchain cannot store images, so we are storing product images inside an IPFS (interplanetary file storage) server, and this server will store the image and return the hash code of the stored image. and by giving that hash code, we can retrieve images from IPFS.

1. Introduction

A blockchain is a type of distributed database or ledger—one of today's top tech trends—which means the power to update a blockchain is distributed between the nodes, or participants, of a public or private computer network. This is known as distributed ledger technology. A blockchain is a type of distributed database or ledger—one of today's top tech trends—which means the power to update a blockchain is distributed between the nodes, or

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participants, of a public or private computer network. This is known as distributed ledger technology. Fig 1. depicts the function of blockchain architecture.

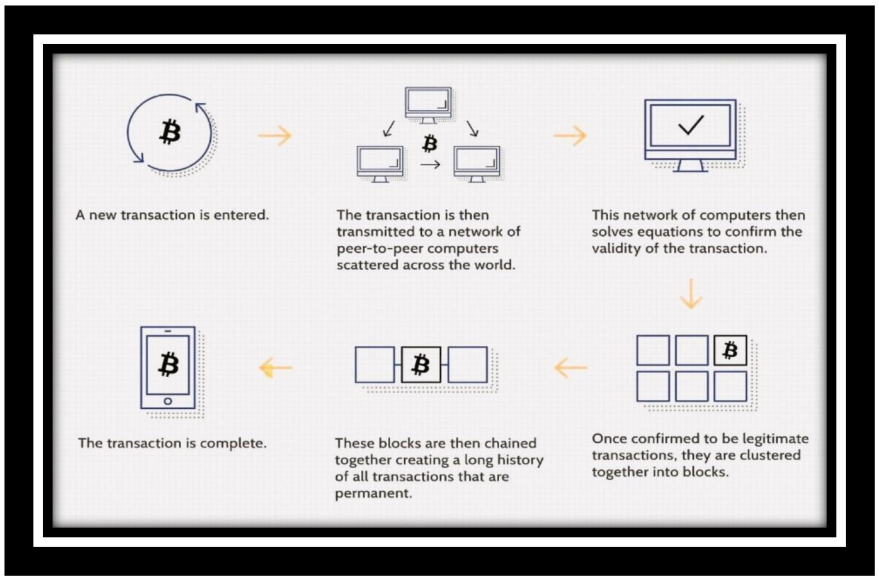

Fig 1. Blockchain

The necessity for online services has considerably increased, and the internet has become an essential aspect of daily life. The worldwide e-commerce industry has been significantly influenced by the computerized world. The idea of blockchain and similar technologies was previously discussed only in specialized computer science and cryptography communities without having any significant impact on society, industry, or the economy. More specifically, their aim is to eliminate all significant intermediaries from peer-to-peer transactions. E-commerce refers to the process of transferring, exchanging, or purchasing and selling goods, services, and/or information over computer networks, such as the internet. Online business platforms offer convenience and flexibility to a broad range of network users from various stores.

2. Literature Survey

Bitcoin is starting to come into its own as a digital currency, but the blockchain technology behind it could prove to be much more significant. Blockchain is in position to become the fifth disruptive computing paradigm after mainframes, PCs, the Internet, and mobile/social networking. Author Melanie Swan, Founder of the Institute for Blockchain Studies, explains

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that the blockchain is essentially a public ledger with potential as a worldwide, decentralized record for the registration, inventory, and transfer of all assets not just finances, but property and intangible assets such as votes, software, health data, and ideas [1] [2].

It provides an overview of the potential benefits of blockchain technology for e-commerce[3] . The authors explore the ways in which blockchain can address current challenges faced by the e-commerce industry such as fraud, privacy, and trust. The chapter discusses the use cases of blockchain in e-commerce, including supply chain management, payments, and customer data management [4]

It offers a fresh method for overcoming the difficulties associated with cross-border e-commerce. The authors suggest a blockchain-based e-commerce system that can make cross-border transactions easier by giving buyers and sellers a safe and transparent platform to transact on[5]. The suggested system's architecture is described in full in the paper, including how smart contracts are used to automate procedures and maintain parties' trust in one another. The advantages of the suggested approach, such as enhanced efficiency, lower transaction costs, and more transparency, are also covered by the authors. In order to solve the issues of trust and transparency in cross-border trade, the paper finishes by underlining the potential of the proposed blockchain-based e-commerce system to revolutionise it [6].

A blockchain is essentially a distributed database of records, or public ledger of all transactions or digital events that have been executed and shared among participating parties. Each transaction in the public ledger is verified by consensus of a majority of the participants in the system. Once entered, information can never be erased [7]. The blockchain contains a certain and verifiable record of every single transaction ever made. Bitcoin, the decentralized peer-to-peer digital currency, is the most popular example that uses blockchain technology. The digital currency bitcoin itself is highly controversial but the underlying blockchain technology has worked flawlessly and found wide range of applications in both financial and non-financial world. The main hypothesis is that the blockchain establishes a system of creating a distributed consensus in the digital online world. This allows participating entities to know for certain that a digital event happened by creating an irrefutable record in a public ledger. It opens the door for developing a democratic open and scalable digital economy from a centralized one [8].

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Blockchain has numerous benefits such as decentralisation, persistency, anonymity and auditability. There is a wide spectrum of blockchain applications ranging from cryptocurrency, financial services, risk management, internet of things (IoT) to public and social services. Although a number of studies focus on using the blockchain technology in various application aspects, there is no comprehensive survey on the blockchain technology in both technological and application perspectives[9]. To fill this gap, we conduct a comprehensive survey on the blockchain technology. In particular, this paper gives the blockchain taxonomy, introduces typical blockchain consensus algorithms, reviews blockchain applications and discusses technical challenges as well as recent advances in tackling the challenges [10][11].

3. Data Flow Diagram:

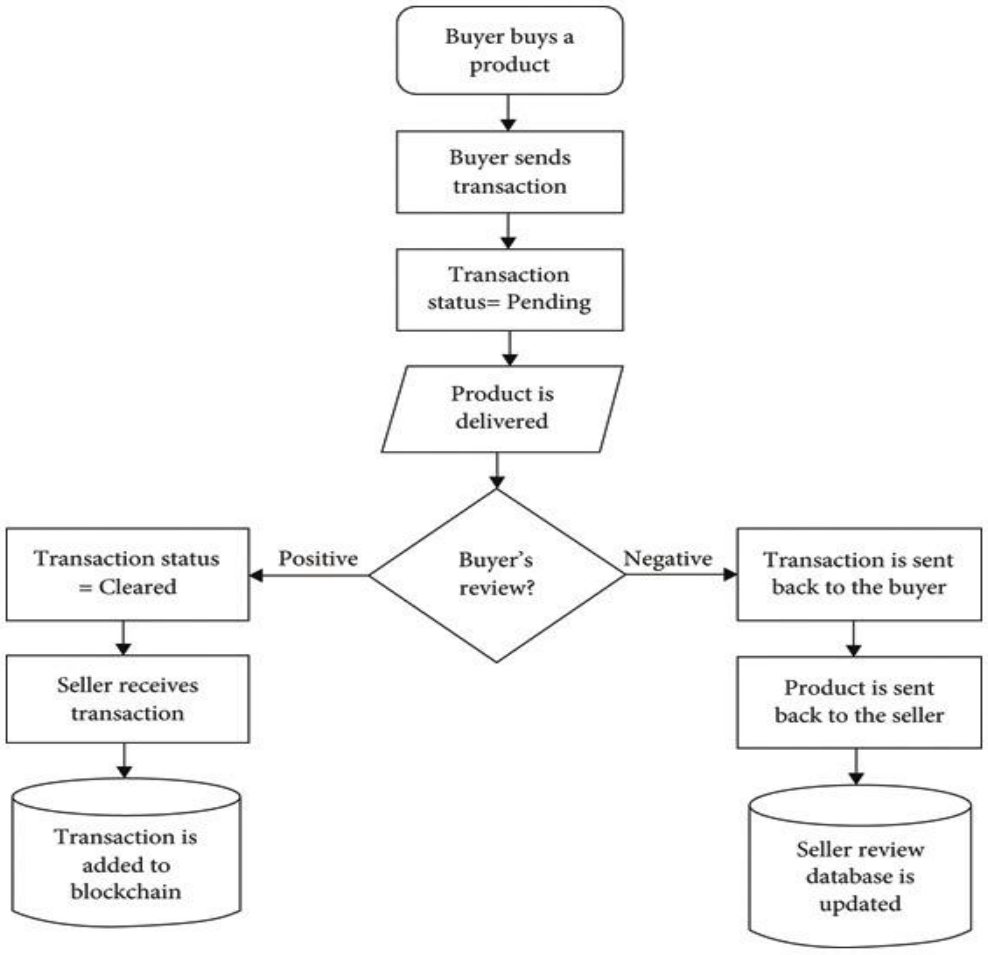

Fig 2. Data flow diagram

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A data-flow diagram depicts how data moves through a process or system is shown in Fig 2.. DFDs are also referred to as data flow graphs or bubble charts. The customer purchases a thing and transmits the transaction to the supplier, which is the method. The transaction status will remain pending as long as the product is not delivered. The customer is required to post a review of the goods after it has been delivered. The seller will be notified of the purchase and the transaction status will be cleared following receipt of a favourable buyer evaluation. This transaction is recorded on the blockchain. If the customer's review is unfavourable, the transaction is reversed and the money is returned to the customer. Consequently, the item given to the customer or buyer.

4. Implementation

1) **Login:** using this module product suppliers and consumers (customers) can login to application.

Fig 3.Login Screen

Fig 3.depicts the login screen of the user

2) **Add Product:** using this module supplier can add new product details with images in Blockchain.

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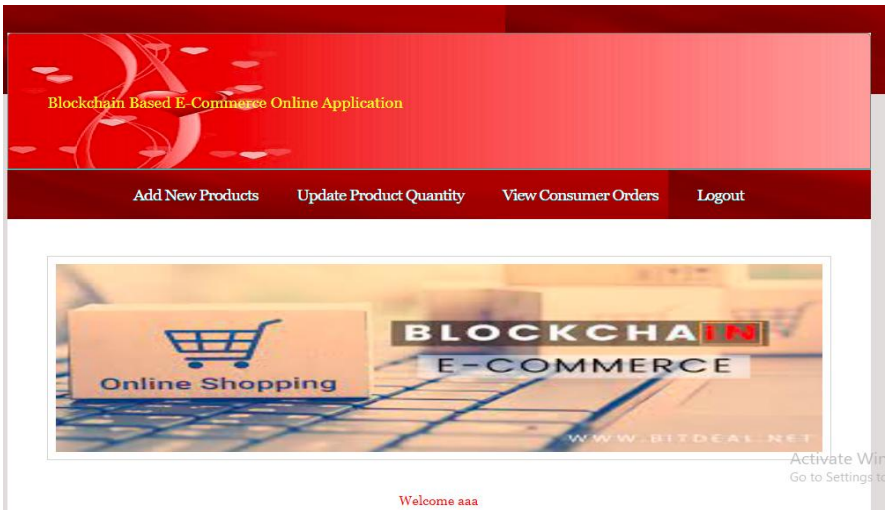

Fig 4. Add product

Fig 4.depicts 'Add New Products' link to add new product details

3) **Update quantity:** using this module supplier can update quantity for the product in Blockchain.

Fig 5.Update quantity

Fig 5. In above screen select any product name and enter new quantity and press button to get below output.

4) **View Orders:** using this module supplier can view orders from the customers.

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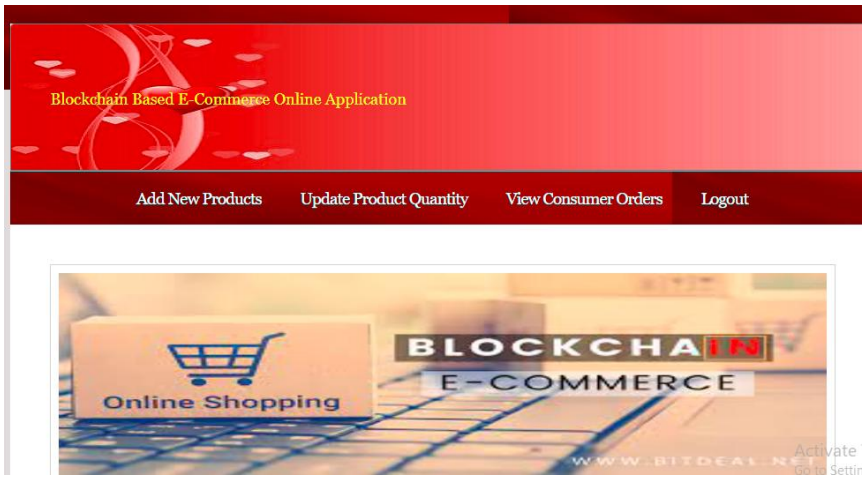

Fig 6. View orders

Fig 6. depicts 'View Consumer Orders' link to get below order detail

5) **Browse Products:** using this module customer can search product and make an order.

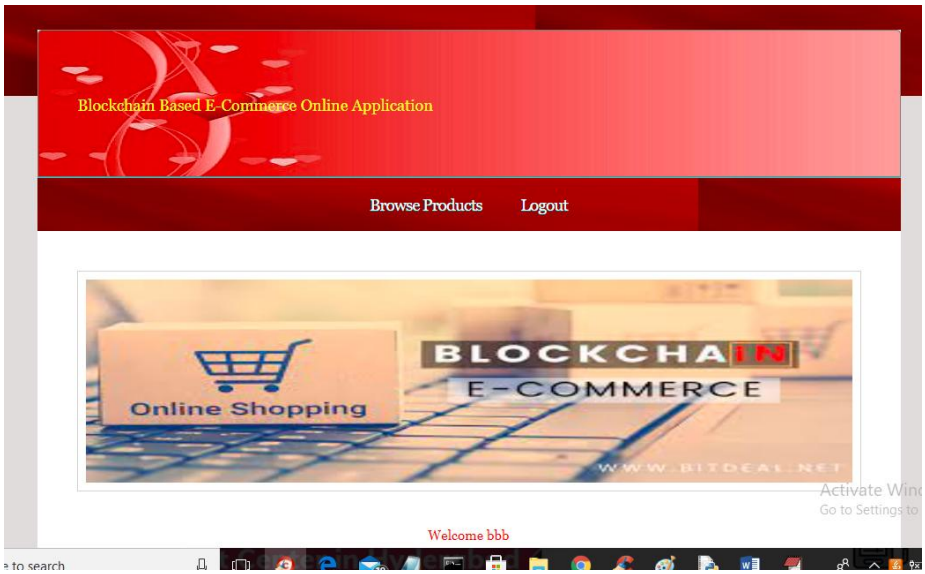

Fig 7. Browse products

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Fig 7.depicts 'Browse Products' link to get list of products

5. Conclusion

All client and product information are saved and controlled on a single central server in existing e-commerce applications. If this server breaks as a result of too many requests or if it is hacked, services will not be provided to other customers. To solve this issue, we are moving e-commerce systems to the blockchain, which will maintain data across numerous nodes or servers, allowing clients to access data from other functional nodes if one node goes down. Since photos cannot be kept on Blockchain or Ethereum with Truffle, we are storing product images on an IPFS (interplanetary file storage) server, which will store the image and then return the hash code of the stored image.

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