

Blockchain-based E-commerce App

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degree

BACHELOR OF ENGINEERING IN INFORMATION TECHNOLOGY

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Abstract

The growth of the Internet introduced new ways on how customers receive services and how companies run their operations. In the current days internet connection and relevant services that it provides are essential for the majority of people. One of those services or industries is ecommerce. E Commerce involves transferring a large amount of sensitive data such as private customer's information or financial information. As a result, it attracts cybercriminals who are willing to breach into the system and steal the data. The number of cyberattacks increases along with the ecommerce growth and therefore it raises the concern in the secureness of databases of the ecommerce platform. Organizations must ensure the secureness of the data as it contains private information of customers, working staff and transaction records. The data breach not only significantly damages the company's profits but also it will sabotage the clients' trust to the platform. In order to solve this problem, enhance data security and protect valuable data, a blockchain database management system is proposed. The proposed system addresses the issue by introducing blockchain nodes concept into the database and inheriting data secureness of distributed peer to peer connection.

Our proposal is to revolutionize the crowdfunding industry through the implementation of blockchain technology. Currently, traditional crowdfunding platforms suffer from high fees, lack of transparency, and limited accessibility. Our solution is to build a decentralized platform on a blockchain network, which will enable secure and transparent transactions without intermediaries.

CHAPTER 1

1.1 Introduction

The Internet has changed the way we live our life. Every minute of our life is augmented by its use for sharing our view, virtual engagement on social networking sites, digital entertainment, marketing and even buying and selling. If organizations want to take advantage of the latest Internet technologies, then they should take strategic initiative. One of the most significant areas where a company can focus on is Ecommerce. Electronic commerce is a revolutionary era which is growing and continuously changing the way business has been managed. Moreover, it becomes the base for a new form of business around the world. E-commerce is built on the foundation of Electronic Data Interface and other supported technology like the Internet, the World Wide Web, and Networks. Further, in the recent history blockchain is considered the remarkable technological advancement. It is based on disruptive computing, the science of cryptographic, and various forms of software. It can be defined as the chain of online transactions saved as a shared ledger across the many computers on a peer to peer network. According to the World Economic Forum, blockchain has the potential to become a powerful tool for transactions that increases trust, empower users and reduce corruption. The article aims to discuss the potential applications of blockchain technology in the e-commerce industry.

1.2 Literature review

A number of researches were investigated to have a stronger rationale for the proposed solution. The online e-commerce business grows with internet usage and it has contributed to people shopping routines (Tam, C. et al., 2019). Nowadays, customers can purchase almost everything they want from online platforms easily. It is convenient and accessible for online users, customers can purchase online wherever they are and whenever they require the goods or services. As online business platforms grow, the number of cybercriminals increases at the same time. The high risk is coming from the fact that e-commerce databases inevitably store a large amount of personal information leakage which may directly affect the safety of the person. Therefore, Blockchain technology is recommended for the database system of e-commerce business platforms.

Data breaches in e-commerce

Roberts, S. (2019) mentioned, most of the companies underestimated the damages of data breaches issues might lead to and lacking actions of prevention of the issues. There are more than 90% of online business platforms experiencing login attempts from hackers (Detrixhe, J., 2018). That means the data breaches problem is getting serious and the e-commerce businesses are targeted by unauthorized entities.

Trust factor with blockchain

One of the greatest impacts on e-commerce that Blockchain solution introduces, is related to public trust and loyalty. The study conducted by Rajesh Ramachandiran declares that existing investigations addressing trust-related problems focused mostly on blockchain ability to introduce rules and policies without necessarily having arbitrary control (2018). The proposed

solution can ensure the trust of e-commerce platform users by applying a blockchain network into the company's database system. The integration of blockchain technology and the database system of the company promotes data transparency as all parties may view their own information, including e-commerce platform providers, suppliers and clients. In the end, it increases the privacy and confidentiality of e-commerce platform users' which in return undoubtedly increases loyalty and trust to the organization behind it

1.3 Problem Definition

In our e-commerce project transaction is done using ethereum, the buyer and seller would transact directly with each other through a decentralized network that records and verifies the transaction.

Using blockchain technology in e-commerce transactions can provide several benefits, such as increased security, transparency, and efficiency. Blockchain's decentralized nature eliminates the need for intermediaries, such as banks or payment processors, which can reduce transaction costs and processing times. Additionally, the use of blockchain-based cryptocurrencies can provide a secure and transparent method of payment, reducing the risk of fraud or chargebacks.

1.4 Objectives

1. Develop a block-chain based e-commerce app-The goal of the project is to create a platform that uses blockchain technology to improve the transaction system.

2. Cryptographic algorithms, which are nearly impossible to hack or manipulate. This can provide a more secure method of payment compared to traditional payment methods that rely on centralized intermediaries such as banks or credit card companies.

3. Faster transaction processing: Blockchain-based transactions can be processed quickly and efficiently, without the need for lengthy processing times associated with traditional payment methods.

4. Lower transaction costs: By using blockchain technology, e-commerce transactions can be completed without the need for intermediaries such as banks or payment processors. This can reduce transaction costs and increase efficiency.

5. Improved transparency: Transactions on a blockchain are transparent and immutable, meaning that they cannot be altered or deleted. This can increase transparency in e-commerce transactions, as buyers and sellers can verify the details of a transaction and ensure that it has been recorded accurately.

Overall, the advantages of using blockchain technology in e-commerce include increased security, transparency, and efficiency, as well as the potential for decentralized marketplaces that can reduce transaction costs and increase efficiency.

1.5 Proposed System

Our proposed system aims to develop a simple Ethereum based e-commerce application where a user can do a transaction. The cryptocurrency that the app used is Ether as medium of exchange.

Use a public blockchain: Public blockchains like Ethereum or Bitcoin are decentralized, meaning that no one entity controls the network. This makes it difficult to manipulate data or transactions on the blockchain, making it a suitable choice for a ecommerce website. Transactions can be recorded on the blockchain, providing transparency and ensuring that all transactions are immutable.

Implement a smart contract: A smart contract is a self-executing contract with the terms of the agreement written into code. Smart contracts can be used to automate transactions and

1.6 Technology Used

Developing a blockchain-based crowdfunding platform requires the use of various technologies. Below are some of the technologies that will be used in this project:

Remix: Remix is an open-source web-based Integrated Development Environment (IDE) that enables developers to write, test, and deploy smart contracts on the Ethereum blockchain. It provides a user-friendly interface and a variety of features such as code highlighting, debugging, and testing tools. Remix also allows developers to connect to multiple blockchain networks and test their contracts in a simulated environment before deploying them to the live blockchain network.

Ganache: Ganache is a personal blockchain for Ethereum development that allows developers to create and test their smart contracts locally before deploying them to the main Ethereum network. It provides a local development environment with configurable options such as gas price, block time, and account balances, making it easy to simulate real-world scenarios for testing purposes. Ganache is often used in conjunction with other Ethereum development tools such as Truffle and Remix, and it is available as a desktop application as well as a command-line tool.

Truffle: Truffle is a development framework for building decentralized applications (dApps) or smart contracts on the Ethereum blockchain. It provides a suite of tools and utilities for managing the development life cycle of Ethereum-based applications, including tools for compiling, deploying, and testing smart contracts, as well as a development environment for building and testing dApps. Truffle is written in JavaScript and comes with built-in support for the Solidity smart contract programming language.

Hardhat: Hardhat is a popular development environment for building, testing, and deploying smart contracts on the Ethereum blockchain. It is an open-source tool that provides a comprehensive set of developer tools and services, including a local blockchain network, smart contract testing framework, debugging and console tools, and deployment scripts.

ReactJS: ReactJS (also known as React) is an open-source, front-end JavaScript library for building user interfaces or UI components. React allows developers to build reusable UI components and manage the state of those components, making it easier to build large-scale, complex user interfaces. It uses a virtual DOM (Document Object Model) to optimize the rendering of changes to the UI, resulting in better performance and faster updates.

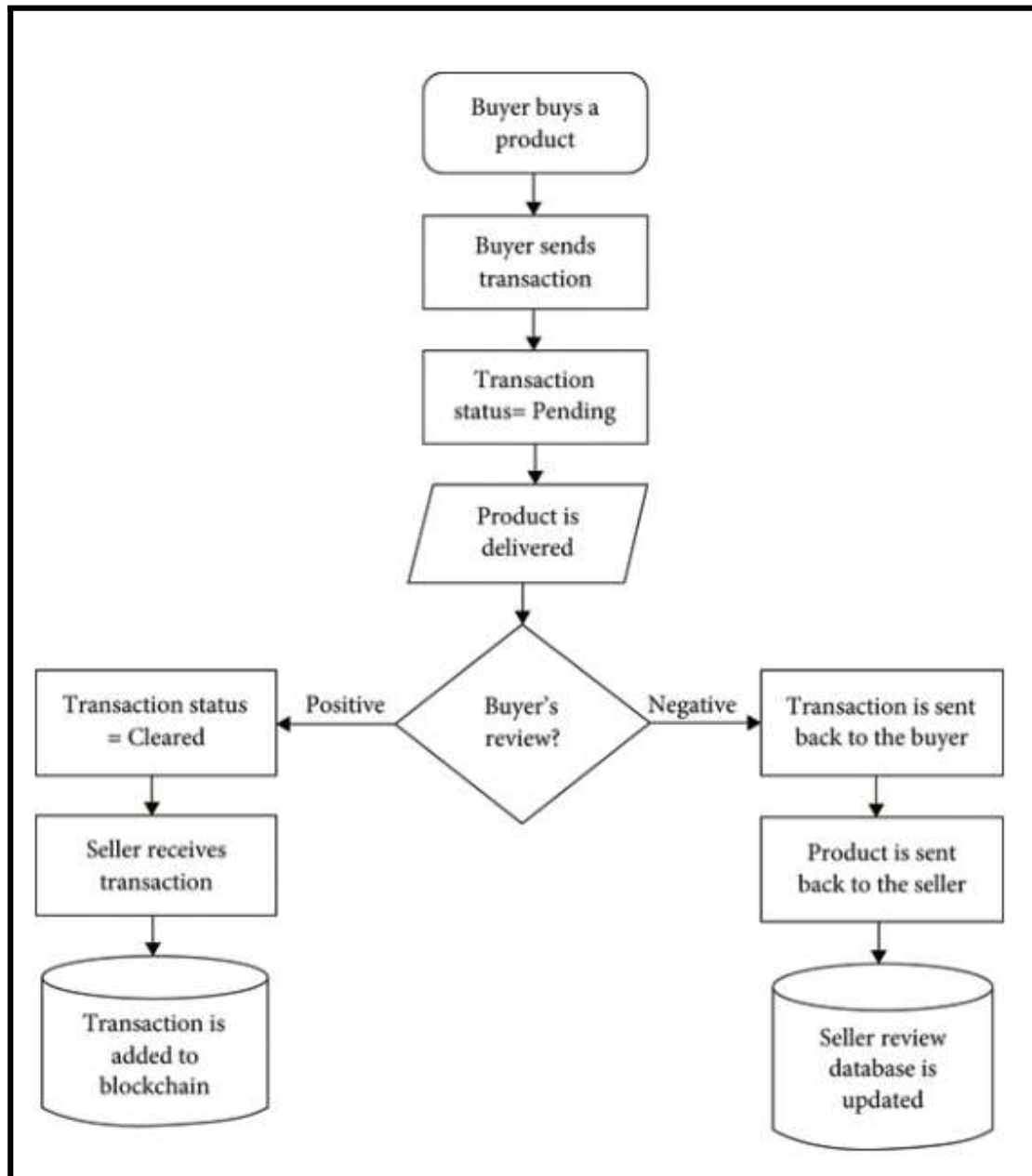
Metamask: Metamask is a browser extension that allows users to interact with the Ethereum blockchain and use Ethereum-based decentralized applications (dApps). It serves as a digital wallet that stores the user's private keys and allows them to sign transactions without the need to expose their keys to the web page.

Blockchain: The basic technology that will be used in the project is blockchain. Blockchain technology provides a decentralized and secure platform that can automate transactions, provide transparency and increase accessibility. Ethereum, one of the most popular blockchain platforms, will be used in this project to create smart contracts that will manage the crowdfunding process.

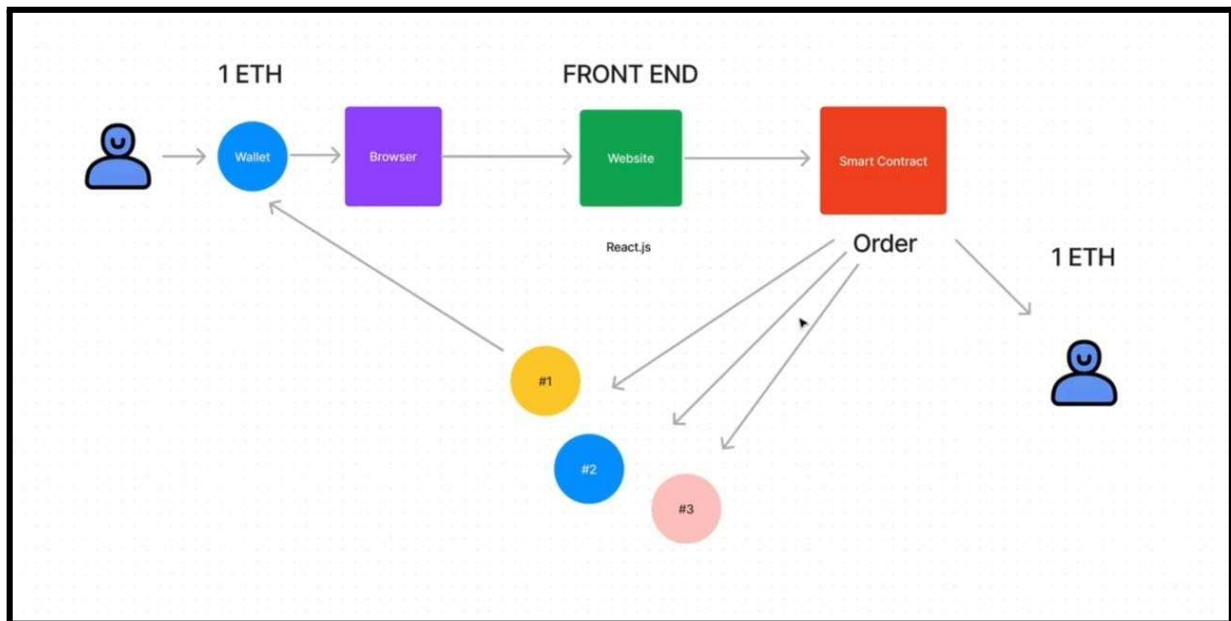
Smart Contracts: Smart contracts are self-executing contracts that automatically enforce rules and regulations agreed upon by both parties. Here, smart contracts will be used to automate the investment process, distribute rewards, and ensure that funds are used as intended.

CHAPTER-2

2.1 Block diagram



2.2 Flow chart



2.3 Software Requirements

1.HTML CSS and JavaScript: They are used to create the platform's user interface. Web development tools such as Visual Studio Code, Atom, etc. can be used to write code and preview the interface.

2.Remix: Remix is an open-source web-based Integrated Development Environment (IDE) that enables developers to write, test, and deploy smart contracts on the Ethereum blockchain.

3.Web3.js: Web3.js is a JavaScript library that allows interaction with the Ethereum blockchain. It is used to send and receive transactions and communicate with smart contracts.

4.ReactJS: ReactJS (also known as React) is an open-source, front-end JavaScript library for building user interfaces or UI components. React allows developers to build reusable UI components and manage the state of those components, making it easier to build large- scale, complex user interfaces.

5.Solidity Compiler: Solidity is a programming language used to develop smart contracts on the Ethereum blockchain. Solidity Compiler is required to compile smart contract code. Remix IDE is a popular Solidity compiler and development environment.

2.4 Cost estimation

The cost to develop an e-commerce-based blockchain project can vary greatly depending on a number of factors such as project scope, features and functionalities, technology stack, development team size, and location. Here are some key cost components to consider:

Development team: The cost of hiring a development team will depend on the size and expertise of the team. The team may consist of blockchain developers, front-end and back-end developers, UI/UX designers, and project managers.

Technology stack: The cost of developing an e-commerce blockchain project will depend on the technology stack used. Some popular blockchain platforms for e-commerce include Ethereum, EOS, and Hyperledger Fabric. Each of these platforms has different development costs and requirements.

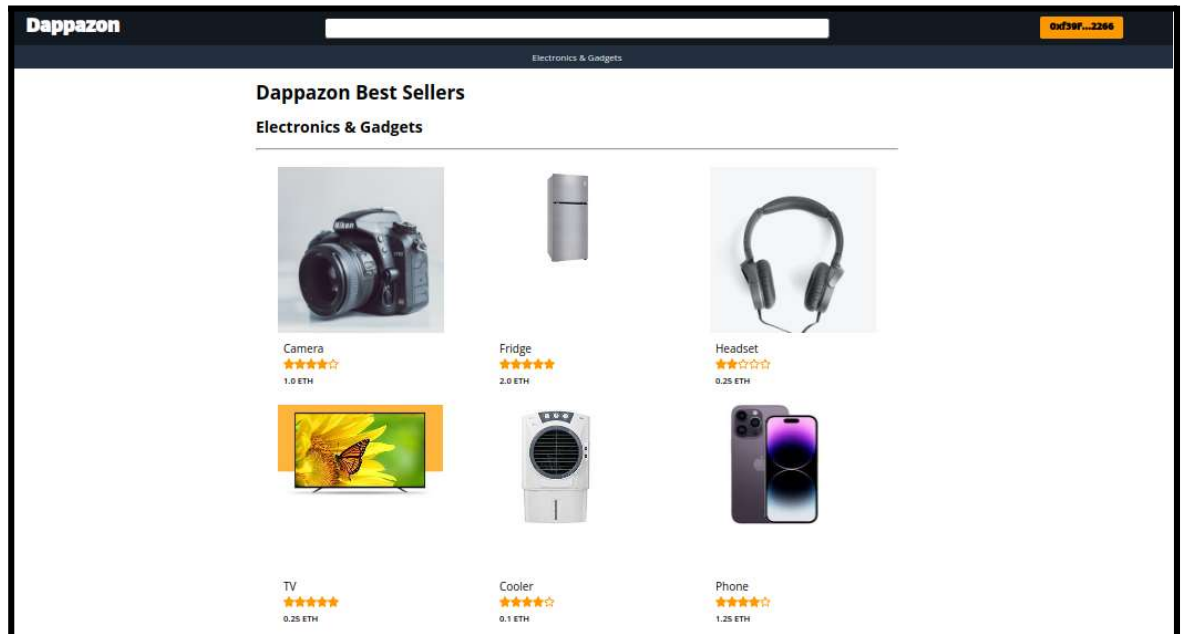
Features and functionalities: The complexity of the features and functionalities required for the e-commerce platform will impact the cost of development. Some examples of features and functionalities include payment gateways, order management, inventory management, and user authentication.

Testing and quality assurance: Testing and quality assurance are essential components of any software development project. The cost of testing and quality assurance will depend on the complexity of the project and the scope of testing required.

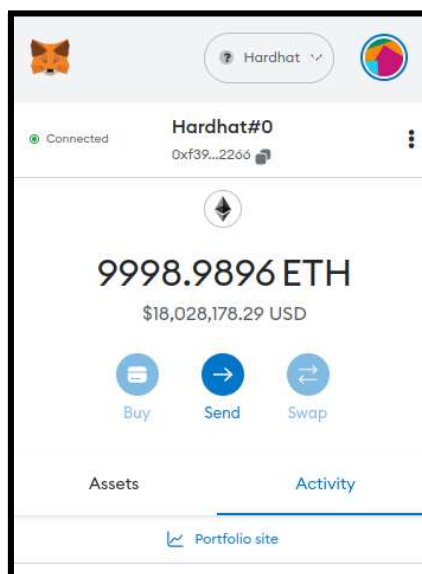
CHAPTER 3

3.1 Implementation Snapshots and it's explanation


3.1.1 Home Page



3.1.2 Metamask Wallet



3.1.3 Buying item



Camera

★★★★☆

1.0 ETH

Overview

Lorem ipsum dolor sit, amet consectetur adipisicing elit. Eum eveniet neque consectetur id corrupti culpa aliquam voluptates ab similique accusamus totam esse quae quidem enim, vel dignissimos maxime repudiandae quos qui nesciunt omnis dolore ex aliquid iusto.

1.0 ETH

FREE Delivery
Thursday, April 6
In Stock.

[Buy Now](#)

Ships from Dappazon
Sold by Dappazon

Item bought on
Sunday 11:24:25 PM

3.1.4 Notification to confirm or reject the order


MetaMask Notification

Hardhat

Hardhat#0 → 0x610...D788

http://localhost:3000

0x610...D788 : BUY ⓘ

 1 ETH
\$1,802.91

DETAILS

DATA

HEX

[Market >](#)

Gas (estimated) ⓘ

\$0.85

0.00047167 ETH

Likely in < 30 seconds

Max fee: 0.00047557 ETH

Total

\$1,803.76

1.00047167 ETH

Amount + gas fee

Max amount: 1.00047557 ETH

[Reject](#)

[Confirm](#)

3.2 Code

Information stored for each item

```
struct Item{
    uint256 id;
    string name;
    string category;
    string image;
    uint256 cost;
    uint256 rating;
    uint256 stock;
}
```

Function to check buy an item

```
function buy(uint256 _id) public payable{
    Item memory item = items[_id];
    require(msg.value>=item.cost);
    require(item.stock>0);
    Order memory order = Order(block.timestamp, item);
    orderCount[msg.sender]++;
    orders[msg.sender][orderCount[msg.sender]] = order;
    items[_id].stock = item.stock - 1;
    emit Buy(msg.sender, orderCount[msg.sender], item.id);
}
```


Deploying contract

```
const { ethers } = require("hardhat")
const hre = require("hardhat")
const { items } = require("../src/items.json")

const tokens = (n) => {
  return ethers.utils.parseUnits(n.toString(), 'ether')
}
```

```
async function main() {
  const [deployer] = await ethers.getSigners();
  const Dappazon = await hre.ethers.getContractFactory("Dappazon");
  const dappazon = await Dappazon.deploy();
  await dappazon.deployed();

  console.log(`Deployed Dappazon Contract at: ${dappazon.address}\n`);

  for(let i=0; i<items.length; i++){
    const transaction = await dappazon.connect(deployer).list(
      items[i].id,
      items[i].name,
      items[i].category,
      items[i].image,
      tokens(items[i].price),
      items[i].rating,
      items[i].stock
    );
    await transaction.wait();
    console.log(`List item ${items[i].id}: ${items[i].name}`);
  }
}
```

```
main().catch((error) => {
  console.error(error);
  process.exitCode = 1;
});
```

CHAPTER 4

4.1 Conclusion

Integrating blockchain technology into e-commerce transactions can provide several advantages such as increased security, transparency, and efficiency. E-commerce blockchain projects can range from small-scale projects with basic features and functionalities to more complex projects with advanced features, functionalities, and decentralized marketplaces. The cost of developing an e-commerce blockchain project will depend on several factors such as project scope, features, functionalities, technology stack, development team size, and location. It's important to work with an experienced development team to accurately estimate the cost of developing an e-commerce blockchain project. Overall, blockchain technology has the potential to revolutionize the e-commerce industry and provide more secure and transparent transactions for buyers and sellers.

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