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# A Safe Transaction using E Coupon Service Built on Blockchain

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**Abstract:** *Electronic coupon (e-coupon), which is convenient and portable, has becoming increasingly common as e-commerce gains popularity. The majority of e-coupon services manage the e- coupon data on a single server. The centralised nature of e- coupon services, however, makes them frequently susceptible to security problems. It becomes challenging to match the user and the owner of the e-coupon, for instance, when the e-coupon information kept on a centralised e-coupon server is falsified..It is possible to repeatedly use coupons and expired online coupons. is employable (i.e., double spending).We suggest a new e-coupon service to address this issue, enhancing the service's security by utilising the blockchain technology. First, we create a server that will operate the e-coupon service and interact with the blockchain system..Second, to provide e-coupon business logic and the integrity of e-coupon data, we construct a smart contract in a blockchain system. On an Ethereum-based blockchain system, we have developed the suggested service. According to experimental findings, our proposed service offers a significant security upgrade over the current e-coupon service while incurring only a little performance penalty.*

**Keywords:** E-Coupon, Blockchain, Smart Contract

## I. INTRODUCTION

As the online retail sector grows, electronic coupons, often known as e-coupons, are becoming a popular marketing tool. E-coupon suppliers, like merchants and marketers, have an efficient way to administer their coupons thanks to the electronic format, which is also convenient for customers. Because an electronic coupon is provided via a digital code, for example, e-coupon providers can instantly distribute the electronic coupon to consumers online and get data on how many people download and utilise e-coupons. There are still certain issues, despite the fact that the e- coupon industry is expanding and has many benefits. The handling of e-coupon data is typically centralised by e- coupon providers for user convenience. When an e-coupon is used, the information from the central database is used to verify it. However, because of the centralised nature, a manager can easily alter the information, enabling the fabrication and fraudulent usage of an e-coupon. For instance, a hostile attacker may alter the discount percentage or make several purchases using an electronic voucher. In this work.

we propose an e-coupon platform on a blockchain system to improve the service security. To do this, we must first build a server that can interface with the blockchain and support e-coupon service. Then, we create the smart contract for the blockchain system to guarantee the precision of the procedures and the data associated with e-coupons. Additionally, we promptly deploy the smart contract on the blockchain for the user's convenience.

## II. LITERATURE SURVEY

Rui Liu , Jun Son , Zhiming Huang , Jianping Pan , The main contribution of this paper is a fragment coding visual cryptography based approach for QR codes. And then the QR is enhanced. Then the enhanced QR code scheme with a higher security, which is inspired by the fragment coding and commitment technique. It proposed a secure e-coupon transaction framework EQRC, which relies on the enhanced QR codes with digital signature and commitment.

Ching-Sheng Hsu, Shu-Fen Tu, his study explores using blockchain and cryptography to create a secure e voucher system for social welfare. The proposed application model integrates blockchain with vouchers and meets security requirements. The Hyperledger Fabric platform and Kafka ordering services were used to implement a welfare meal

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voucher system, and the system performed well. The study has implications for theory and management and contributes to meeting UN Sustainable Development Goals.

Steven M. Schneider, Kirsten A. The constantly evolving nature of the Web presents challenges for scholars seeking to develop methodological approaches for studying Web phenomena. This is due to the unique combination of the ephemeral and permanent nature of the Web, as well as increasingly complex Web applications that challenge traditional approaches to social research. New methods are needed to analyze Web-based media, including their form, content, and production processes. Three sets of approaches have been employed in Web-related research over the last decade, each with its own strengths and weaknesses. By distinguishing between these approaches, attention can be focused on the methodological challenges associated with the field of Web studies

Shailak Jani, Smart contracts are computer programs that enable the automation and execution of contractual agreements without the need for a third-party intermediary. Platforms like Ethereum, Hyperledger Fabric, Corda, Rootstock(RSK), EOS, and Stellar offer different features and benefits. Smart contracts can help businesses cut costs, improve efficiency, and reduce risks. However, challenges such as the need for technical knowledge and the immutability of the blockchain must be addressed. Despite these challenges, smart contracts have the potential to transform industries ranging from supply chain management to financial services.

Rahul Garg , Parul Mittal ,Vikas Agarwal , Natwar Modani, The paper presents a system for generating and verifying secure electronic coupons for marketing purposes.

Traditional paper coupons have been replaced by electronic coupons due to the rise of online shopping, but security issues like tampering and duplication need to be addressed. The proposed solution uses a centralized coupon mint to prevent double spending, but the mint is unaware of promotion details, making it scalable and able to be provided by semi-trusted third parties. The system allows manufacturers to choose their own promotion policies independently and offers new types of coupons not possible with traditional paper or electronic cash protocols.

Hung Dang, Tien Tuan Anh Dinh, The work proposes using sharding, a technique used in databases, to scale blockchain systems for non-cryptocurrency applications. The authors enhance consensus protocols, design an efficient shard formation protocol using trusted hardware, and propose a distributed transaction protocol. Evaluation shows their design outperforms state-of-the-art solutions and can handle Visa-level workloads, making it the largest reported in a realistic environment.

Wang Jiaping, Wang Hao, The Asynchronous Consensus Zones are a technique put out in this study for linearly scaling blockchain systems without sacrificing decentralisation or security. To divide the workload and guarantee a manageable burden for each node as the network increases, the method runs numerous concurrent instances of single-chain consensus systems known as zones, with minimal communication. Transaction atomicity between zones is guaranteed by the proposed eventual atomicity, and effective mining power in each zone is guaranteed by Chu-ko-nu mining. The testbed has 48,000 nodes supported by 1,200 virtual computers globally, and the testing results show that the system reaches 1,000_ throughput and 2,000_ capacity over the Bitcoin and Ethereum networks.

Maurer, Ueli A global public-key infrastructure (PKI), the parts of which will soon start to appear, is necessary for distributed system security and electronic commerce. The objective of this study is to present a strategy for simulating and considering a PKI from the viewpoint of user Alice. Her point of view consists of assertions about the entities and public keys she believes to be authentic and trustworthy, as well as a collection of certificates and recommendations she has obtained or retrieved from the PKI and used to draw inferences about the veracity of other entities' public keys and, potentially, their credibility.

S. T. Nakamoto, The idea is to create a peer-to-peer electronic cash system that does away with the requirement for a reliable third party to prevent double-spending. Use of a network that timestamps transactions through a continuous chain of hash-based proof-of-work provides a record that cannot be modified without repeating the proof-of-work is the answer. The longest chain is taken as evidence of the order of things seen and the biggest CPU pool. Nodes can leave and rejoin the network at any time, accepting the longest proof-of-work chain as evidence of what occurred while they were away. The network just needs a minimal amount of structure..

Muni Lavanya, B. The potential of blockchain is reshaping the financial and technology sectors. A distributed ledger of all transactions in a bitcoin mining operation is called a blockchain. Bitcoin's underlying technology is called blockchain. Blockchain offers confidentiality, anonymity, and data integrity without the need for an intermediary

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organisation, which increases interest in blockchain research. From the standpoint of blockchain applications, the goal of this study is to comprehend the existing research areas, difficulties, and future directions of blockchain technology. Additionally, blockchain has the ability to play a crucial role in building the Internet of Things' infrastructure.

## III. EXISTING SYSTEM

We look at the security and trading aspects of the current e-coupon system. However, because of their centralization, e-coupon systems are frequently security- vulnerable. For instance, when e-coupon data stored in a centralised e-coupon server is falsified, it becomes challenging to identify the user and e-coupon owner, and the e-coupon can be used repeatedly.

The most crucial responsibility is to verify an e-coupon because fraudulent assaults might cause financial difficulties by forging or manipulating e-coupons These vulnerabilities can result in the misuse of coupons, the repeated use of expired coupons, and challenges in identifying users and owners, leading to financial losses and harm to reputation.

## IV. PROPOSED SYSTEM

By utilising an e-coupon smart contract on a blockchain system, our proposed system provides a secure platform for e-coupons. To ensure increased security and dependability for all transactions, the e-coupon smart contract is automatically installed. This method of managing e-coupons offers a more dependable and effective method that can be advantageous to both the coupon issuer and the users. Our suggested service's initial phase is creating a server that can support the e-coupon service and create contact with the blockchain system. In order to ensure a seamless and secure integration of the e-coupon smart contract, this server acts as a bridge between users and the blockchain network..The creation of a blockchain smart contract that ensures the accuracy of the e-coupon business logic and data is the next phase in our process. This will allow for the secure and reliable management of e-coupons based on specified rules and conditions. We put our suggested service into practise on the Ethereum blockchain, enabling safe and open e- coupon trade via the e-coupon smart contract. The Ethereum blockchain's decentralised and tamper-proof design improves the e-coupon service's overall security and dependability. Our tests show that the proposed service offers improved security with little performance impact, making it a practical and efficient replacement for current e- coupon systems. Our method offers considerable advantages to both issuers and customers by utilising blockchain technology for e-coupon management and trading. Users of PCs or mobile devices can easily handle the e-coupons.

## V. SYSTEM ARCHITECTURE

Upon first registration, the user will need to complete additional steps. In a database, these details will be kept. If the user has previously registered with the programme, he or she can login immediately using their email address and password. Following login, users can view and buy a variety of things. It will produce a coupon code and send it to the user's email once they have made a purchase of a specific amount. When the user receives a coupon code, they must use it before the expiration date, otherwise, the coupon will become invalid. The e-coupon manager provides an interface for deploying the e-coupon smart contract, getting a list of e-coupons, using e-coupons, and dispensing e- coupons to clients.

To obtain and store e-coupon data, the management also works with blockchain. For instance, when issuing an e-coupon, a provider of e-coupons may request that the management of e-coupons implement the e-coupon smart contract. The transaction that activates a smart contract for an electronic coupon on blockchain is created by the e-coupon manager. The address of the smart contract and the information about the e-coupon are then saved in the server database. By utilising the information from the database, the e-coupon manager provides clients with access to e-coupon data. The e-coupon data is solely saved on the server to be displayed to the application. Data modification requires the use of transaction processing and data from the blockchain.

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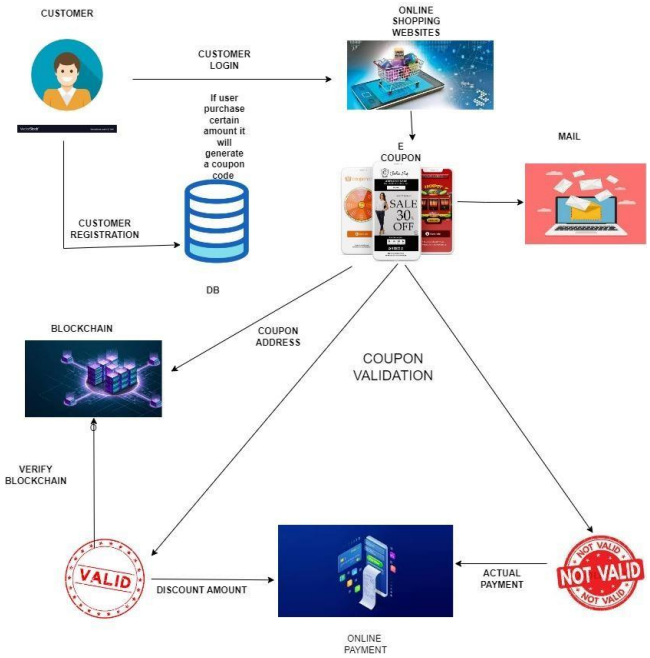


## VI. METHODOLOGY

The platform is designed for both seller and buyer and it begins with the sign-up and login process. Once the buyer and seller have successfully signed up and logged in, buyer can buy the products and the seller can manage the buyer registration details and coupon details using block chain. Next, seller can manage and upload product's image, categories, description. The buyer can know the details of the customers, also they can know how many coupons have been used using ganache software and smart contract.

### A. Admin Registration

- Login: Using their username and password, the admin can access the website.
- Add Product: The site administrator can include a new product. This include giving a name, a description, a price, and any other pertinent information.
- View Product List: The administrator has access to a list of every product that is currently offered on the website.
- Update Product: The administrator is able to change any existing product's information. This includes altering the name, summary, cost, or any other information.
- Delete Product: Any current product that is no longer required may be deleted by the admin.

### B. User Registration

Now a user may register on the website by submitting their information, which a MySQL database will record.

- User registration: The user can access the website after registering by entering their username and password.
- View Products: The user can view the products on the site after logging in.
- Product Purchase: The user can use a secure payment gateway to buy products from the website.

### C. Coupon Generation

A coupon code will be generated and delivered to the user's email if they purchase more than Rs.2000 worth of goods.
Coupon Expires: The coupon code will expire after a certain amount of time. User can apply that coupon code next time they buy another products.
If they apply it within the alloted expiry time then the amount will be redeemed. If not it will be considered as a not valid coupon code

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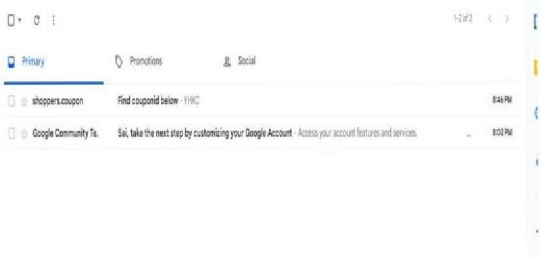
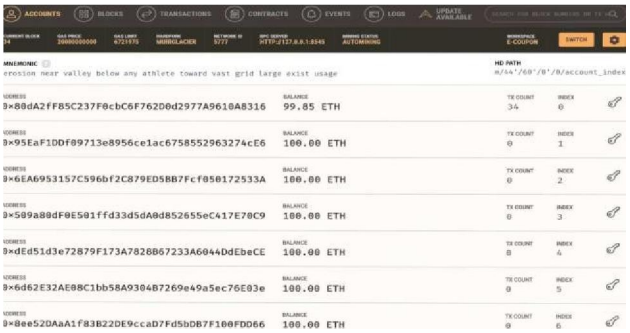



**D. Ethereum Blockchain**

Ethereum is an open-source, open-source, public distributed computing platform and operating system based on a blockchain that enables the creation and execution of distributed applications without the danger of downtime, fraud, control, or interference by a third party..A smart contract is a self-executing contract since the terms of the agreement between the buyer and seller are directly written into lines of code. Decentralised blockchain networks are used to distribute the agreements and underlying code. The code controls the execution of transactions, which are tracable and irreversible.

With the help of Ganache software, the smart contract is deployed within the private Ethereum blockchain.




**E. Coupon Validity using Smart Contract**

Smart contract is used here to validate and automatically execute the redemption process depending on the coupon code's valid time.

## VII. PERFORMANCE METRICS

Application performs under varied workloads and environmental factors. Performance bottlenecks must be found and removed in order to ensure that the system can handle the anticipated load and user traffic.

To measure multiple performance indicators including response time, throughput, and resource utilisation, performance testing simulates real-world scenarios and workloads. Performance testing comes in a variety of forms, including as load testing, stress testing, endurance testing, and scalability testing. In order to assess the system's behaviour and performance, load testing requires testing it under both normal and peak loads. Stress testing is performed to evaluate a system's tolerance to heavy loads and pinpoint its limit. The system's stability and performance are evaluated by endurance testing over a long length of time. The system's capacity to manage rising loads and its ability to scale up or down are both tested through scalability testing. Performance testing is crucial for ensuring that a system or application can satisfy user expectations and expected performance standards. Early in the development lifecycle, it can assist in identifying and resolving performance issues, which can help save time and costs. Performance optimisation, quality, and user experience may all be improved with the use of performance testing.

Three actions are involved in the smart contract model: deploying the smart contract, making a request, and using an electronic coupon. To evaluate the performance differences between the two types of services, we contrast the proposed blockchain-based services with the current service that does not use the blockchain. We utilise the load testing tool to measure and analyse the effectiveness of various web application services. Figure 2 displays the performance level for each operation in the current and proposed systems. According to our calculations, there should be between 100 and

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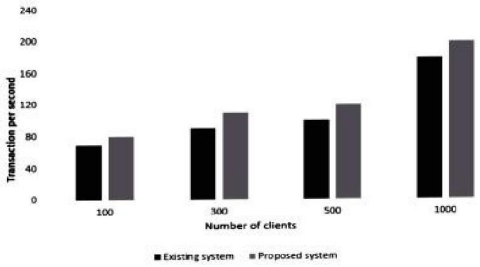
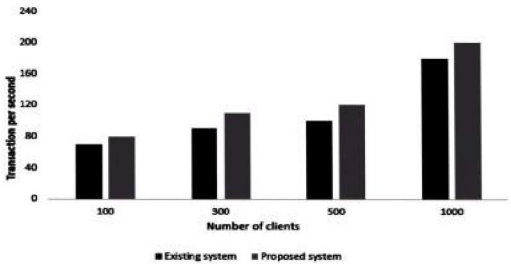
1000 clients per trial, and since each client generates a transfer, the total number of transfers should equal the number of clients.Transfer per second is the performance metric. Comparing the suggested system using blockchain to the current system, the transfer rate is higher in the proposed system. When there are between 100 and 1000 customers, the smart contract deployment's transfer rates are 80, 120, 150, and 210 per second. When the customer number is between 100 and 1000, the transfer per second for utilising the electronic coupon is 82, 140, 180, and 360.




Deploy of e coupon smart contract




Using E Coupon

## VIII. CONCLUSION

In Conclusion, in centralized e-coupon services the risk of fraudulent activities like duplicate spending, counterfeit coupons, and coupon manipulation are decreased by the use of a smart contract on the blockchain system, which guarantees the integrity of the e-coupon business logic and information. A minimal performance overhead was seen during the implementation of the e-coupon service on an Ethereum-based blockchain system, demonstrating that blockchain technology may be used in e-commerce without suffering noticeably from performance trade-offs. This research demonstrates how blockchain technology has the potential to enhance the security and dependability of ecoupon services in e-commerce. The suggested e-coupon service can provide increased security and confidence to both businesses and customers by exploiting the inherent advantages of blockchain, such as immutability, transparency, and decentralisation. The project also offers a framework for investigating further possible uses of blockchain technology in this industry, including supply chain management, digital identity, and payment processing. In conclusion, the study has shown that leveraging blockchain technology to offer safe and dependable e- coupon services in e-commerce is both feasible and effective. Blockchain-based solutions have the potential to completely transform how we conduct transactions and exchange value in the digital economy with more study and developed.

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