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An E-Coupon Service That Is Secure And Is Based On Blockchain Systems

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ABSTARCT_ An electronic coupon (e-coupon) is used frequently as e-commerce becomes more and more popular because of its portability and ease. The majority of e-coupon services manage e-coupon data on a single server. However, due of its centralization, e-coupon services are frequently susceptible to security problems. For instance, it might be challenging to match the user and the owner of an expired e-coupon when the information that is maintained in a centralised e-coupon server is falsified. This practise is known as double-spending. We suggest a new e-coupon service to address this problem, enhancing the service's security by utilising a blockchain technology. To accomplish this, we must first create a server that can run the e-coupon service and interact with the blockchain network. To ensure the integrity of the e-coupon business logic and its information, we secondly create a smart contract on the blockchain system. On a blockchain system built on Ethereum, we put the suggested service into practise. The experimental findings demonstrate that, in comparison to an existing e-coupon service, our suggested service enhances higher security with a minimal performance overhead.

1.INTRODUCTION

As the market for electronic commerce expands, electronic coupons, or e-coupons, are becoming more and more popular as a useful marketing tool [1, 2]. The electronic idea of e-coupons not just gives coupon suppliers, like dealers and advertisers, with a proficient method of the board but at the same time is advantageous for clients. For instance, since an e-coupon is given by computerized code, e-coupon suppliers can appropriate the e-coupon to the clients on the web and effectively gather measurements, for example, downloading and utilizing e-coupons. Likewise, clients can undoubtedly deal with the e-coupons by means of their cell phones or computers. As a result of these benefits of

e-coupons, Worldwide Portable Coupons Market 2016-2020 reports that the worldwide versatile coupon market will develop to a build yearly development rate (CAGR) of 73.14% north of 2016-2020 [3] Albeit the e-coupon market advances and an e-coupon gives a few advantages, there are a few difficulties. For simple administration, most e-coupon administrations oversee e-coupon data in a brought together framework. At the point when an e-coupon is utilized, the e-coupon is approved by involving the data in the brought together data set framework. Nonetheless, the data can be handily controlled by a manager because of the centralization nature with the goal that there can be an imitation and deceitful utilization of an e-coupon. For instance, an e-coupon might be recovered on different occasions (twofold spending), or a malignant aggressor might control the rebate rate. Penn Live estimates that real e-coupon crime incurs annual costs of $300-$600 million in the United States [4]To improve the security of e-coupons, Hsueh et al. [5] propose an e-coupon framework utilizing a hash chain which is joined with block chain innovation. Our review is in accordance with the work as far as giving the honesty of e-coupon data by means of block chain innovation. Interestingly, further-more, we give the uprightness of activities (e.g., overseeing e-coupons, and so on.) as well as the trustworthiness of e-coupon data by contriving a solid brilliant agreement.To enhance the service's security, we present an e-coupon service based on a block chain in this paper. To do this, we first plan a server to empower e-coupon administration and speak with the block chain framework. Second, we devise an e-coupon brilliant agreement in the block tie framework to give the respectability of the activities (i.e., business rationale code [6]) and e-coupon data. Also, we convey an e-coupon savvy agreement to the block chain consequently for client comfort. In order to ensure the safety of e-coupon information and business logic code (i.e., downloading, giving, and using an e-coupon), we apply and implement the proposed service on the Quorum block chain system [7]. Trial results show that the proposed administration further develops security and has a minor exhibition above contrasted and existing ser-indecencies. V _ We investigate the existing e-coupon processing mechanism in terms of security and e-coupon trading. These are the contributions of our work.We propose another help that empowers secure e-coupon exchanging through an e-coupon shrewd agreement on a block chain framework and conveys the e-coupon

savvy contract naturally. We show that the proposed e-coupon administration is safer contrasted and the current administrations

2.LITERATURE SURVEY

2.1 SERVING E-COUPONS ON A Brought together SERVER

With the development of cell phones and the improvement of internet business, the utilization of e-coupon is expanding [8]-[10]. Not at all like customary paper coupons, the e-coupons permit coupon suppliers to gather and deal with the coupon data effectively (e.g., the quantity of coupons, the quantity of downloads, arrangements of clients, or whether coupons have been utilized). What's more, e-coupons give clients to utilize and deal with the e-coupons through site or cell phone [11]. As displayed in Figure 1, most e-coupons are given by a concentrated server to dealing with the e-coupon data since the data on the unified server can be overseen and gathered productively. The e-coupon administrations have the accompanying system to recover an e-coupon: 1) To download an e-coupon, a client enlists the client data to an e-coupon guarantor. 2) The client downloads an e-coupon from the guarantor by means of a cell phone or PC. 3) When a client utilizes the e-coupon, the client sends the e-coupon to the store (i.e., e-coupon supplier). 4) The store demands the backer to check the e-coupon. Also, the guarantor checks the legitimacy of this e-coupon as per the information base. Verifying an e-coupon is the most crucial step in the e-coupon service process because forged or manipulated e-coupons can cause financial issues. To forestall this fraud of e-coupons, past works [2], [12]-[15] propose systems to approve the e-coupons by means of message-digest calculation 5 (MD5), message validation code (Macintosh), and one-way hash capability. Nonetheless, they don't give the procedures to forestall the distortion of the data on a unified server. All in all, phony of e-coupons doesn't happen during information transmission, in the mean time, fraud of e-coupon data put away in the e-coupon data set can happen while utilizing the above strategies. Additionally, any e-coupon information can be altered for personal gain by an e-coupon server administrator. In this manner, our review means to present another e-coupon administration that portion not permit unapproved producing of e-coupons and control of data on the e-coupon server. To this end, we devise an e-coupon administration in view of a blockchain framework. B. BLOCKCHAIN The blockchain innovation [16], [17] is an alluring answer for address security issues (e.g., information respectability) in circulated frameworks. To resolve the

issues, most blockchain frameworks keep a period stepped chain of the blocks with each taking an interest client. There is a block header and a block body in the block. The block body incorporates exchanges. The block header incorporates a past block hash and the foundation of the Merkle tree [18] produced with the exchanges of the block body, and so forth. The blocks are fastened together by the past block hash and another block must be added to the furthest limit of the chain. With these highlights, the exchanges put away in the blockchain can not be refreshed or erased because of the chain of verifiable exchanges. Hence, a blockchain framework can give the Byzantine adaptation to internal failure (BFT) [19] and between individual exchanges without a transitional substance. Among the blockchain frameworks, Ethereum is a one of famous blockchain-based stage that gives savvy contracts. A shrewd agreement is a bunch of commitments in a computerized structure which clients perform [20]. A shrewd agreement can run reliably on all the Ethereum hubs without the mediation of a confided in element in light of the fact that the business rationale code and status esteem (which is the consequence of a savvy contract) of the brilliant agreements are put away in the blockchain [21], [22]. With these elements, clients can build appropriated applications (DApps) with secrecy, straightforwardness, instantaneousness, and undeniable level security through the shrewd agreement. Albeit shrewd agreements upgrade.

3.PROPOSED SYSTEM

To increase the service's security, we suggest a blockchain-based e-coupon service. Second, to ensure the accuracy of the operations (i.e., business logic code) and e-coupon data, we design an e-coupon smart contract for the blockchain system.

3.1 IMPLEMENTATION

3.1.1 Issuer

In this module, the Admin has to login by using valid user name and password. After login successful he can do some operations such as Register and Login, View All Users And Authorize, View All Stores And Authorize, Add Category And Sub-Category, View All Products By Block chain, View All E Coupons By Block chain, View All E coupon Requested,

View All Products Details, View All Users Search Transaction Categorized By Search Type, View All Users Search History, View All User Purchased Products, View All Keyword Facet, View Product's Rank In Chart.

3.1.2 Customer

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In this module, there are n numbers of users are present. User should register with group option before doing some operations. After registration successful he has to wait for admin to authorize him and after admin authorized him. He can login by using authorized user name and password. Login successful he will do some operations like Register and Login, My Profile, Manage Accounts, Query Search By Keyword, All My Purchased Products Details, View All Search Transaction, View All My Search History, View Top K Searched Keyword Facets.

3.1.3 Store

In this module, there are n numbers of users are present. Transport Company user should register with group option before doing some operations. After registration successful he has to wait for admin to authorize him and after admin authorized him. He can login by using authorized user name and password. Login successful he will do some operations like Login, My Profile, Add Products, All My Product Details, All My Purchased Products With Total Bill, View All Keyword Facet By Rank.

Algorithm 1 An Example of an E-Coupon Smart Contract

```
1:  function downloadCoupon(msgs)
2:      /* require() is a verification function for a given
    condition */
3:      require(remain_coupons > 0)
4:      require(coupons[msg.sender].downloaded == false)
5:      require(expirationDate >= now)
6:
7:      /* Set a customer and modify the number of coupons
    */
8:      coupons[msg.sender] = Coupon({
9:          downloaded: true,
10:         pendding: false
11:     });
12:     remain_coupons = remain_coupons.sub(1);
13:
14:     DownloadCouponEvent(msg.sender)
15: end function
16:
17: function requestCoupon(msg)
18:     require(coupons[msg.sender].downloaded == true)
19:     require(coupons[msg.sender].pendding == false)
20:     require(expirationDate >= now)
21:     require(startDate <= now)
22:
23:     /* Modify a state to use the e-coupon from the cus-
    tomer */
24:     coupons[msg.sender].pendding = true;
25:
26:     RequestCouponEvent(msg.sender)
27: end function
28:
29: function confirmCoupon(msg, customer)
30:     require(msg.sender === owner)
31:     require(coupons[customer].downloaded == true)
32:     require(coupons[customer].pendding == true)
33:
34:     /* Confirm the use of e-coupon from the customer */
35:     coupons[customer].pendding = false
36:     coupons[customer].downloaded = false
37:
38:     ConfirmCouponEvent(customer, now)
39: end function
```

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Fig 1:Algorithm

Below architecture diagram represents mainly flow of request from the users to database through servers. In this scenario overall system is designed in three tiers separately using three layers called presentation layer, business layer, data link layer. This project was developed using 3-tier architecture.

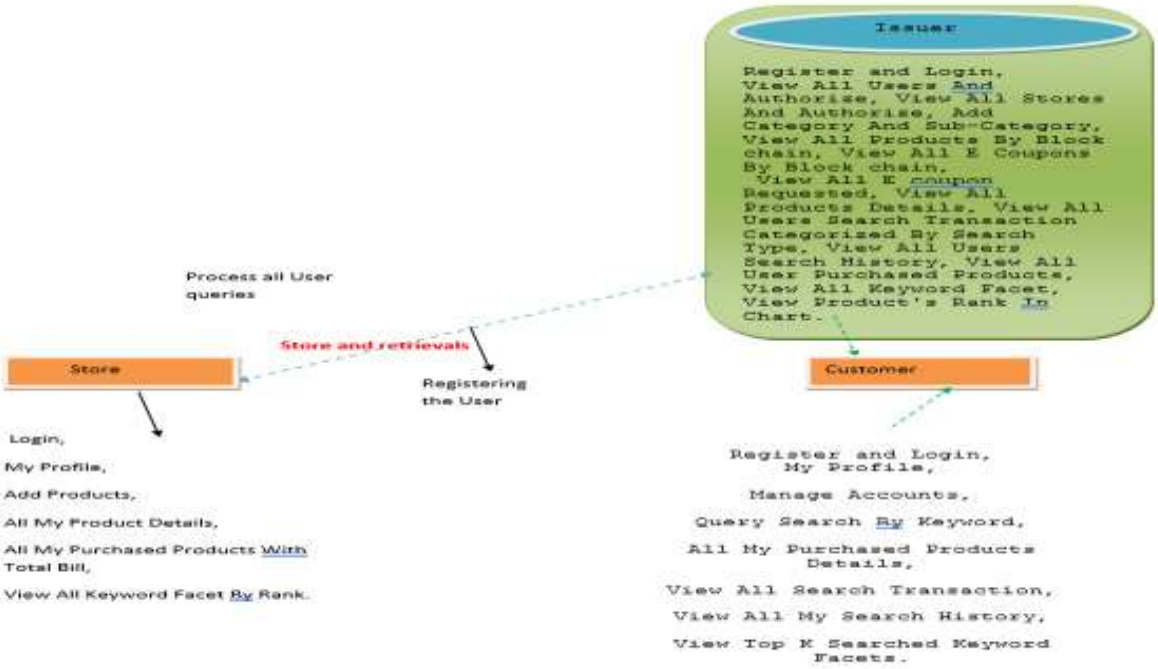

Figure 2: Architecture diagram

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4.RESULTS AND DISCUSSION

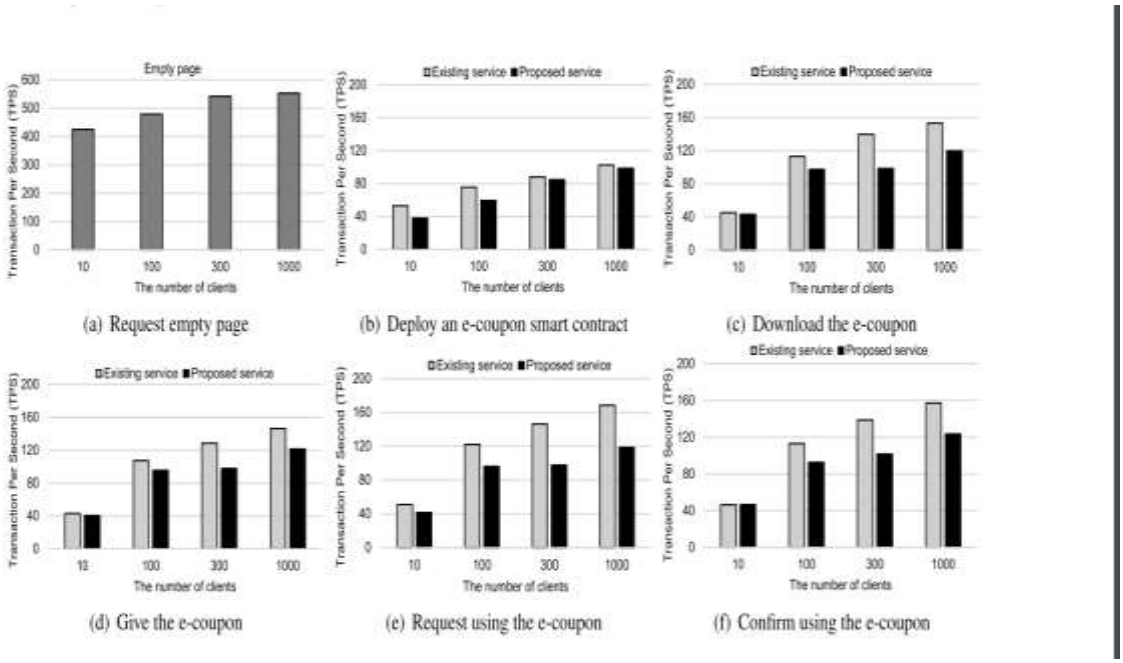

FIGURE 3. Performance result

Figure 3 shows the presentation results for every activity in the current and proposed administrations. For exploratory boundaries, we set the quantity of clients as 10, 100, 300, and 1000 at each examination. Every client produces an exchange, and the quantity of client is same as the quantity of exchanges. What's more, the exhibition metric is exchange each second (TPS). Note that Figure 3(a) shows a pattern execution through mentioning void page to e-coupon server. It depicts the performance between 425 and 532 TPS. Nonetheless, other trial results show the presentation of 38 TPS to 168 TPS in both existing and proposed plans as displayed in Figure 3(b), 9(c), 9(d), 9(e), and 9(f). This is on the grounds that every activity has an above to store information into a data set or execute different business rationale, and so forth. In general, Figure 3 shows that the presentation increments when an enormous number of solicitations is given. This is because as the number of threads processed by the server increases, parallelism increases. As displayed in Figure 3(b), on account of the convey activity, the presentation of the proposed administration is decreased by up to 28%, 21%, 3%, and 3% contrasted and the current help (without blockchain) when the

quantity of clients is 10, 100, 300, and 1000, separately. This is on the grounds that the proposed administration utilizes the e-coupon shrewd agreement in the blockchain to further develop security. Particularly, the consequence of conveying an e-coupon shrewd agreement as portrayed in Figure 3(b) shows a couple of lower throughput than different tasks, for example, downloading, giving, mentioning, and Affirming of an e-coupon. This is on the grounds that the send activity stores more information and requires more advances like approval of all the e-coupon data. With the exception of the aftereffect of the convey activity, different tasks show comparative execution. On account of downloading, giving, mentioning, and affirming e-coupon, as displayed in Figures 9(b), 9(c), 9(d), 9(e), and 9(f), the proposed administration shows the presentation debasement by up to 18%, 21%, 33%, and 33% contrasted and a current help when the quantity of clients is 10, 100, 300 and, 1000, separately. The outcomes show that this exhibition corruption relies upon the utilization of blockchain. Generally, there is a compromise among execution and security [26]. We penance the presentation of the e-coupon administration. All things being equal, we center around further developing the security level by ensuring the uprightness of e-coupon data. For instance, the current e-coupon administration utilizes a data set framework. Since the administrator has easy access to authority in this system, he or she can maliciously alter the data with relative ease. In the mean time, in our offered support which utilizes a blockchain framework, the head can only with significant effort get the authority since the authority ought to be gotten by the agreement, all things considered. Hence, it is difficult to assume control over the power, and we can forestall the pernicious change. This implies that our proposed plot expands the security level. We make sense of exhaustively in sub-segment IV-C. Likewise, note that many investigations [27], [28] are in progress to work on the exhibition of the blockchain. In this manner, execution issues with blockchain will be alleviated from here on out and we likewise leave the improvement for the presentation of blockchain as future work.

5. CONCLUSION

We have looked into e-coupon systems that maintain e-coupon data on a single server. We discovered that a hostile attacker or administrator might alter the e-coupon data that was saved on the server. We offer a novel e-coupon service that

addresses this problem by utilising e-coupon smart contracts in a block chain system to increase security. We put the suggested service into practise on the Quorum block chain and assessed it against a fake benchmark. Our test results show that the suggested service avoids e-coupon information manipulation with increased security and minimal performance overhead. We'll concentrate on enhancing block chain performance in the future.

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