



A SECURE E-COUPON SERVICE

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Abstract: A system that automates the clearing and settlement of Electronic Coupons (E-Coupons) by leveraging existing technologies and enabling E-Coupon redemption at any merchant having electronic funds transfer (EFT) capabilities. The system reduces opportunities for fraud, reduces or eliminates the need for manual clearing house counting and sorting of coupons and provides an electronic audit trail for coupon redemption, tying a specific purchase to a specific coupon. A smart contract on the block chain system to provide integrity of the E-Coupon business logic and the E-Coupon's information after registering and selecting coupons, consumers then use an E-Coupon card or account access device at a merchant's point-of-sale (POS) terminal. E-Coupon values are deducted from the consumer's final amount due. Reports on redeemed coupons and consumer profiles can be generated and provided to CPGs or merchants. To enhance the security of E-Coupon, an E-Coupon system using a hash chain which is combined with block chain technology is proposed.

Keywords- E-Coupon, Block Chain, Smart Contract, security.

1. INTRODUCTION

With the growth of the electronic commerce market, electronic coupons (E-Coupons) are being adapted as an effective marketing tool. The electronic nature of E-Coupons not only provides coupon providers, such as sellers and marketers, with an efficient way of management but is also convenient for customers. For example, since an E-Coupon is provided by digital code, E-Coupon providers can distribute the E-Coupon to the customers online and easily collect statistics such as downloading and using E-Coupons. Also, customers can easily manage the E-Coupons via their mobile devices or personal computer.

Although the E-Coupon market evolves and an E-Coupon provides several benefits, there are some challenges. For easy management, most E-Coupon services manage E-Coupon. Information in a centralized system. When an E-Coupon is used, the E-Coupon is validated by using the information in the centralized database system. However, the information can be easily manipulated by an administrator due to the centralization nature so that there can be a forgery and fraudulent usage of an E-Coupon. For example, an E-Coupon may be redeemed multiple times (double spending), or a malicious attacker may manipulate the discount rate.

1.1 Purpose and Scope

1.1.1 Purpose

The E-Coupon security features (non-repudiation, unique usage, decentralized verification, etc.) by using a block chain system and smart contract. In contrast, focus on investigating the performance and cost of development by using E-Coupon smart contract template. In addition, to consider a general purpose E-Coupon system rather than a specific use case (i.e., campus welfare meal voucher system) with E-Coupon smart contract template.

1.1.2 Scope

The block chain prevents the forgery of E-Coupon information via a consensus algorithm. Also, the smart contract stored in the block chain does not allow falsification because all nodes participating in the block chain network perform the smart contract's business logic whether the logic is correct or not. By exploiting this feature of the smart contract, to guarantee the integrity of the E-Coupon business logic. The business logic of an E-Coupon includes E-Coupon operations.

This frame work can be used Smart Contract. Smart contracts are simply programs stored on a block chain that run when predetermined conditions are met. They typically are used to automate the execution of an agreement so that all participants can be immediately certain of the outcome, without any intermediary's involvement or time loss. They can also automate a workflow, triggering the next action when conditions are met. This Framework can be used by hashing algorithm. SHA stands for secure hashing algorithm. SHA is a modified version of Message Digest algorithm 5 and is used for hashing data and certificates. A hashing algorithm shortens the input data into a smaller form that cannot be understood by using bitwise operations, modular additions and compression functions.

2. PROPOSED METHODOLOGY

This section aims to provide a general overview of the solution development process. The solution itself is comprised of seven modules, as demonstrated below:

2.1 Issuer

The service provider has to login by using valid user name and password. After login successful login, one can do some operations, Coupon information, view tested accuracy.

Block Chain stores all transaction states to a smart contract by using Merkle Tree structure. Therefore, when the size of stored states increases, the Tree size also increases. To provide each smart contract for each E-Coupon provider and each Tree in each smart contract manages its own E-Coupon state information. E-Coupon service provides a smart contract template to E-Coupon providers.

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.

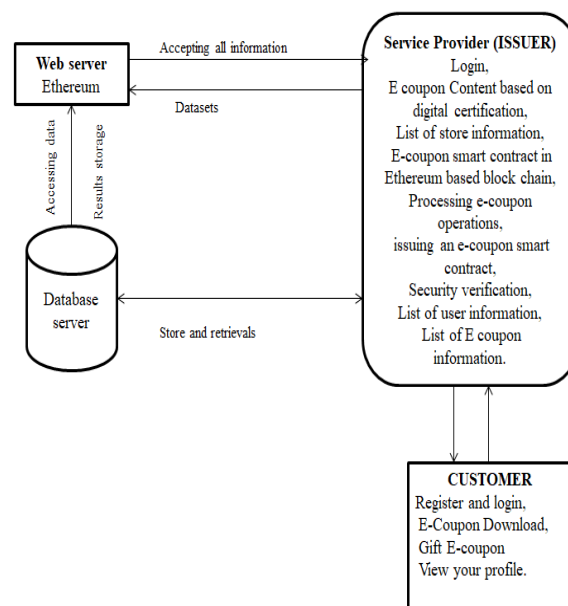


Fig. 1.1 System Architecture

2.2 Customer

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.

2.3 Store

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2.4 E-Coupon Manager

The E-Coupon Manager provides an interface to deploy an E-Coupon smart contract, get an E-Coupon list, download an E-Coupon, use the E-Coupon and provide the E-Coupon to customers. Furthermore, the manager communicates with the block chain to obtain and store E-Coupon information. For example, when an E-Coupon provider issues an E-Coupon, the E-Coupon provider requests to deploy an E-Coupon smart contract to the E-Coupon manager. Then, the E-Coupon manager generates the transaction that deploys the E-Coupon smart contract on the block chain. After then, it stores the E-Coupon information and the smart contract address in the server's database.

2.5 Customer Privacy

The member manager manages user information for communicating between the application and the block chain. For example, the manager maps the wallet address in the Ethereum-based block chain to the user's ID in the applications (e.g., E-Coupon provider or customer). This is because applications perform the transactions based on the wallet address in the block chain, as well as the user's ID on the server. In addition, the manager maps the wallet addresses of the E-Coupon provider and customer to the smart contract addresses of the E-Coupon.

2.6 E-Coupon Smart Contract Based on Block Chain

To exploit the block chain to prevent the forgery of E-Coupon information. Also, the smart contract stored in the block chain does not allow falsification because all nodes participating in the block chain network perform the smart contract's business logic whether the logic is correct or not. By exploiting this feature of the smart contract, guarantee the integrity of the E-Coupon business logic. The business logic of an E-Coupon includes E-Coupon operations (e.g., issue, download, redeem, gift, etc.)

2.7 Reporting Module

- Data Analysis Report
- E-Coupon Data Report
- Store Report
- Customer Report
- Seller Report

3. SAMPLE SCREENS



Fig. 3.1 Customer Home Page

Fig. 3.2 Create Bank Account

Account Number	191010
User Name	jaya
Address	vellore
Email	jaya@gmail.com
Mobile	900000000
Branch	vellore
Amount	80100 > Rs

Fig. 3.3 Customer Account Profile

Fig. 3.4 Add new products

View All Ecoupon Requested..

ID	User Image	User Name	ecoupon_no	ecoupon_status	cat	subcat	dt	code	val	Process	Price	Used Status
5		Devind	334889	Processed	Electronics	Mobile	28/10/2022 12:54:56	709e146d31ef01b2bc37a3832be6ff9e94677d	8	Processed	8	Yes
6		Ranjith	182893	Processed	Home Appliances	Fridge	28/10/2022 13:47:03	8a7183c2de716a1459e623eaf7916db8ca768	7	Processed	8	Yes
7		Manjath	1571338	Processed	Electronics	Laptop	28/10/2022 14:48:51	709e146d31ef01b2bc37a3832be6ff9e94677d	8	Processed	8	Yes
8		sal	4072010	Processed	Home Appliances	Laptop	05/04/2022 14:54:51	8a7183c2de716a1459e623eaf7916db8ca768	10	Processed	8	Yes

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Fig. 3.5 View All E-Coupon Requested

View All Stores Product Details By Blockchain..

Product Block Chain----> Electronics
Product Category Hash Code ---->709e146d31ef01b2bc37a3832be6ff9e94677d

Product Block Chain----> Home Appliances
Product Category Hash Code ---->8a7183c2de716a1459e623eaf7916db8ca768

Product Image	Product Name	Product Rank	Product Rate
	Samsung S22 Ultra	3	
	Samsung S22 Ultra	4	★ ★

Product Image	Product Name	Product Rank	Product Rate
	Samsung S22 Ultra	12	

Back

Image Gallery

Fig. 3.6 View All Store Product Details by Block Chain

View All ECoupons By Blockchain..

ECoupon Block Chain----> Electronics
ECoupon Category Hash Code ---->709e146d31ef01b2bc37a3832be6ff9e94677d

ECoupon Block Chain----> Home Appliances
ECoupon Category Hash Code ---->8a7183c2de716a1459e623eaf7916db8ca768

ID	User Image	User Name	ecoupon_no	ecoupon_status	cat	subcat	dt	code	val
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6		Ranjith	182893	Processed	Home Appliances	Fridge	28/10/2022 13:47:03	8a7183c2de716a1459e623eaf7916db8ca768	7

Fig. 3.7 View All E-Coupon by Block Chain

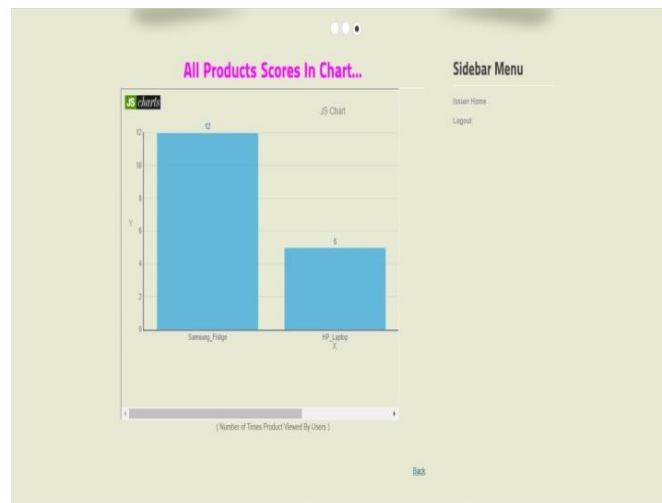


Fig. 3.8 All Products Score In Chart

4. CONCLUSION

E-Coupon service that store e-coupon information on a centralized server. To found that the e-coupon information stored in the server can be manipulated by a malicious attacker or administrator. To handle this issue, to prevent a new E-Coupon service that improves security by exploiting E-Coupon smart contracts in a block chain. The proposed service prevents the manipulation of E-Coupon information with higher security and minor performance overhead.

5. FUTURE ENHANCEMENT

To improve the performance and secure the customer data using block chain. In E-coupon services they used only business login, in future educational logic and customer login can be used.

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