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Secure E-Chain: Block Chain E-Coupon Service

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ABSTRACT

In response to the vulnerabilities posed by centralized e-coupon services, we propose a novel approach leveraging blockchain technology for enhanced security. Centralized e-coupon servers often face issues like forgery and double-spending, undermining user trust. Our solution entails integrating a blockchain system to fortify e-coupon services. We devise a dedicated server to facilitate the e-coupon service, communicating seamlessly with the blockchain. Through a smart contract embedded within the blockchain, we ensure the integrity of e-coupon logic and information. Our implementation on an Ethereum-based blockchain system showcases the feasibility of our approach. Additionally, we propose an extension utilizing the InterPlanetary File System (IPFS) server to mitigate the cost of storing e-coupon details on the blockchain, thus optimizing resource utilization and reducing expenses.

Keywords: E-Coupon, blockchain

INTRODUCTION

In the realm of electronic commerce, electronic coupons (e-coupons) have emerged as a potent marketing tool, offering convenience to both providers and consumers. However, the centralized management of e-coupon information poses significant security challenges, including forgery and fraudulent usage. To address these issues, we propose an innovative e-coupon service leveraging blockchain technology for enhanced security. Our approach involves designing a dedicated server and implementing a smart contract on the blockchain to ensure the integrity of both e-coupon operations and information. By deploying this service on the Quorum blockchain system, we demonstrate its efficacy in improving security with minimal performance overhead. Our contributions encompass investigating existing e-coupon mechanisms, proposing a secure e-coupon trading service, and validating its effectiveness through experimentation.

LITERATURE SURVEY

R. Rivest*et al*

The MD5 hashing algorithm, initially intended for cryptographic security, has faced scrutiny due to vulnerabilities in its design. While it was once utilized for digital signature authentication, MD5 is now deprecated for cryptographic purposes due to its susceptibility to attacks. However, it still serves a role in verifying data integrity and detecting accidental corruption as a noncryptographic checksum. Despite its limitations in cryptographic applications, MD5 remains relevant in ensuring data integrity, albeit in a nonsecure capacity. As technology evolves, alternative hashing algorithms have emerged to address the shortcomings of MD5 and enhance overall security in digital authentication processes.

R. G.-P. M.-V. Agarwal and N. Modaniet al

In the realm of marketing management, coupons play a crucial role in various functions, including sales and brand promotion, as well as inventory management. As online shopping becomes increasingly prevalent, the demand for electronic counterparts to traditional paper coupons has surged. However, with this transition comes a pressing need to address security concerns inherent to electronic coupons, such as tampering, duplication, and double spending. While these issues may seem akin to those faced by electronic cash systems, there are notable distinctions that necessitate the development of unique protocols for secure coupon transactions. Hence, innovative solutions are required to safeguard the integrity of electronic coupon systems in the digital landscape.

N. Szaboet al

Contracts, representing agreements formed through mutual understanding, serve as the cornerstone of formalizing relationships, whether in business dealings or personal unions like marriages. While commonly associated with commercial transactions, contracts extend their significance into political realms, embodying both social contract theories and the fundamental role of contract enforcement within capitalist governance structures. Beyond delineating obligations and responsibilities, contracts symbolize trust and accountability, fostering stability and coherence in various spheres of human interaction. Thus, the meticulous drafting and judicious enforcement of contracts underpin the fabric of society, shaping the dynamics of relationships and governance frameworks alike.

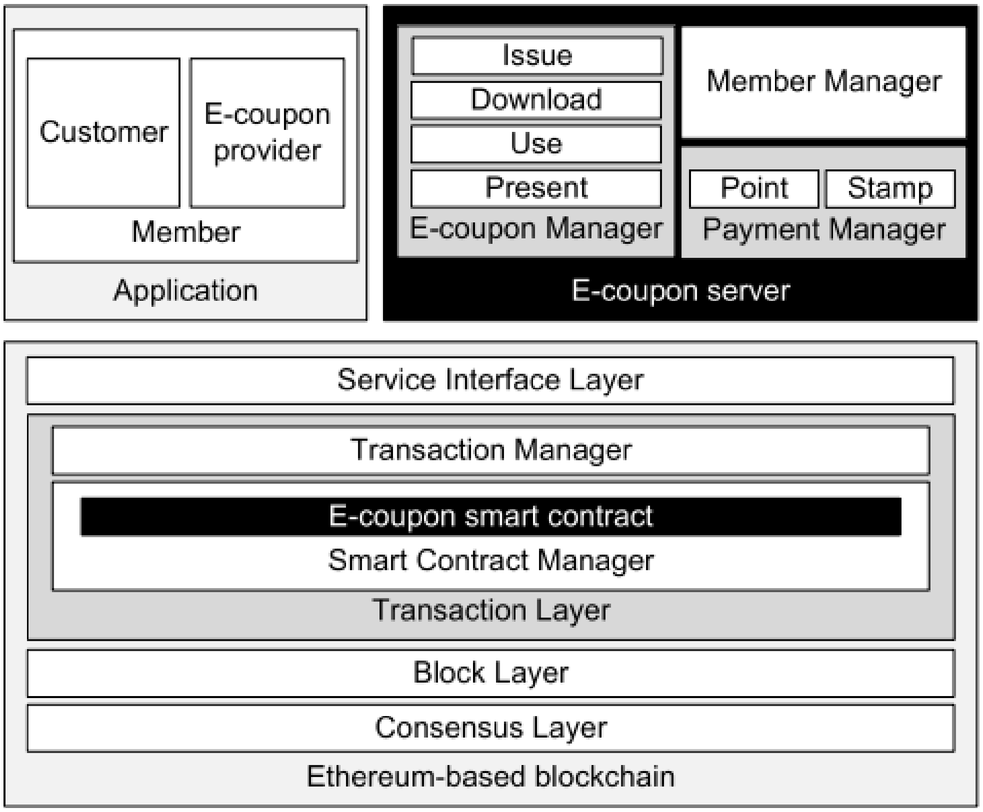
PROBLEM STATEMENT:

Existing E-commerce applications are using Centralized Database server which can be monitor and controlled by Administrator of the companies and this administrator will have full access to the database and he can alter Redeem coupon status to available status and then that coupon can be redeem again and again and this will result into company loss as database can be alter by admin. Another problem If centralized server down then E-Coupons cannot be redeem.

PROPOSED METHOD:

To avoid such database manipulation in propose paper author employing Blockchain technology which has inbuilt support for data encryption and verification and support immutable (data once stored cannot be alter in any manner) data storage. Blockchain support distributed data storage which allow to maintain data at multiple nodes and if one node down then data can be access from other working nodes. So coupon can be redeem at any time.

ARCHITECTURE:



METHODOLOGY:

1. Web Application Development: Utilizing Django, we develop user-friendly interfaces accessible to both administrators and customers. Administrators can manage coupon issuance, validation, and view transaction details, while customers can log in to access their coupon information.

2. Smart Contracts Implementation: Using Solidity, we develop smart contracts to govern the issuance, validation, and redemption of e-coupons. These contracts are deployed on a blockchain network, ensuring transparency and immutability.

3. IPFS Integration: The InterPlanetary File System (IPFS) is utilized for decentralized storage of coupon-related files and data. This ensures data integrity and availability across the network.

4. Blockchain Network Utilization: The blockchain network serves as the backbone for transaction processing and maintaining the integrity of coupon-related data. Transactions are securely recorded on the blockchain, providing a tamper-proof audit trail.

Key Modules:

- E-Coupon Manager: This module handles the deployment of smart contracts on the blockchain and manages the creation and issuance of new coupons.

- Member Manager: Responsible for mapping coupons to user wallets, ensuring seamless integration between users and their respective coupons.
- Payment Manager: Validates and redeems coupons by checking their existence and authenticity on the blockchain, facilitating secure transactions.
- Admin/Manager Module: Administrators can log in to the application to issue, validate, and view the list of coupons, ensuring efficient management of the coupon ecosystem.
- Customer/User Login: Users can log in using their customer ID provided by the admin during coupon issuance, allowing them to access and view their coupon details.
- Transaction Time Graph: This module enables the visualization of transaction execution times for each coupon issuance, providing insights into system performance and optimization opportunities.

Blockchain Integration:

- Smart Contracts: Solidity smart contracts define the business logic for coupon issuance, validation, and storage, ensuring transparency and security.
- Web3.js Integration: The Web3.js library facilitates communication between the web application and the blockchain network, enabling seamless interaction with smart contracts.
- Contract Deployment: Smart contracts are deployed on the blockchain network, such as Ethereum, leveraging its decentralized infrastructure for transparent and immutable transaction processing.

EVALUATION:

TimeGraph Function:

This function creates a bar graph to represent the execution time of blockchain transactions.

labels are the names for each transaction.

height contains the execution time of each transaction.

It then plots the bar graph using plt.bar() from Matplotlib.

Payment Graph Function:

Similar to Time Graph, this function creates a bar graph to compare payment types.

height contains the total payment for each payment type (propose_cost and extension_cost).

It plots the bar graph using plt.bar().

Update Coupon Function:

This function updates coupon data on the blockchain.

It takes the coupon code and the array of coupon data as input.

It iterates through the coupon data array to find the coupon with the matching code.

If found, it updates the status of the coupon to "Used" and then updates the coupon data on the blockchain using updateCouponBlockchain().

ValidateCouponAction Function:

This function validates a coupon submitted by a user.

It reads coupon details from the blockchain and checks if the submitted coupon code exists and is available.

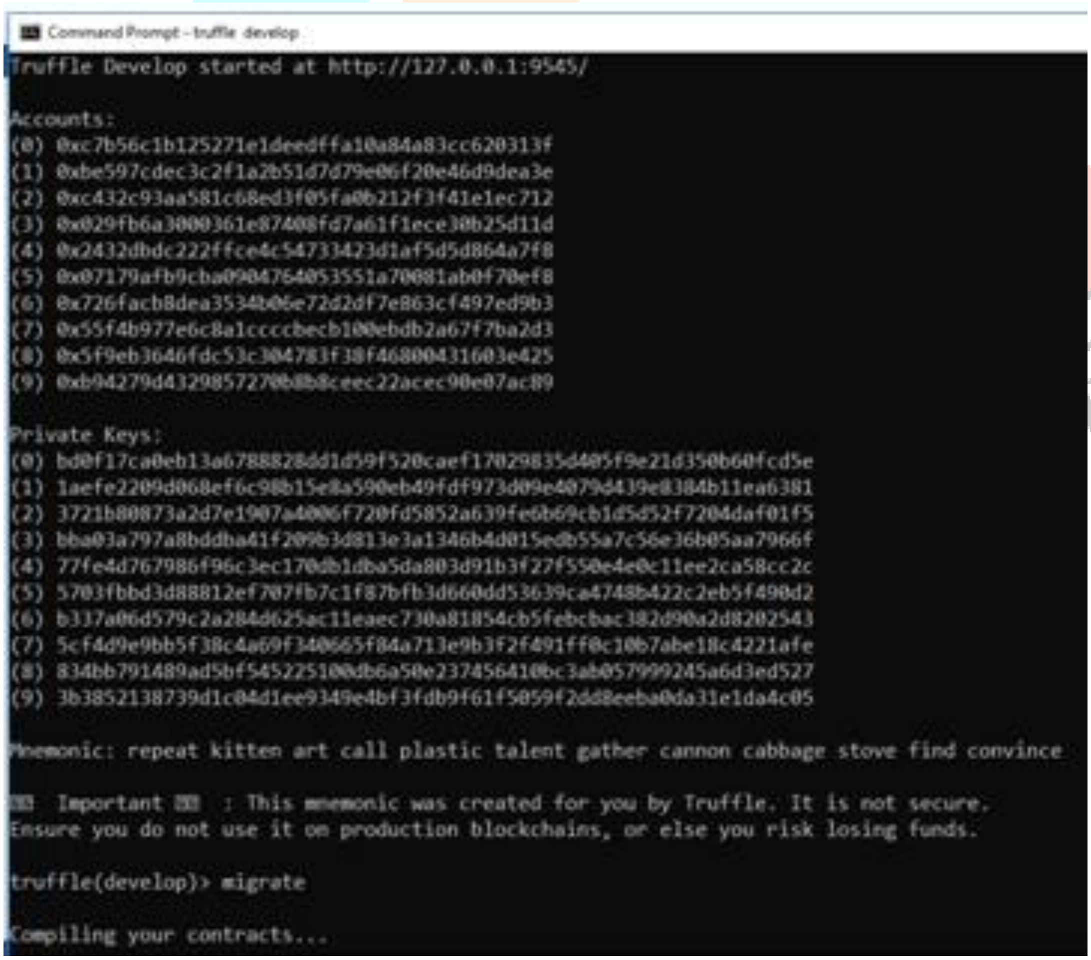
If the coupon is available, it updates its status to "Used" using the updateCoupon function.

It then returns a message indicating the result of the validation.

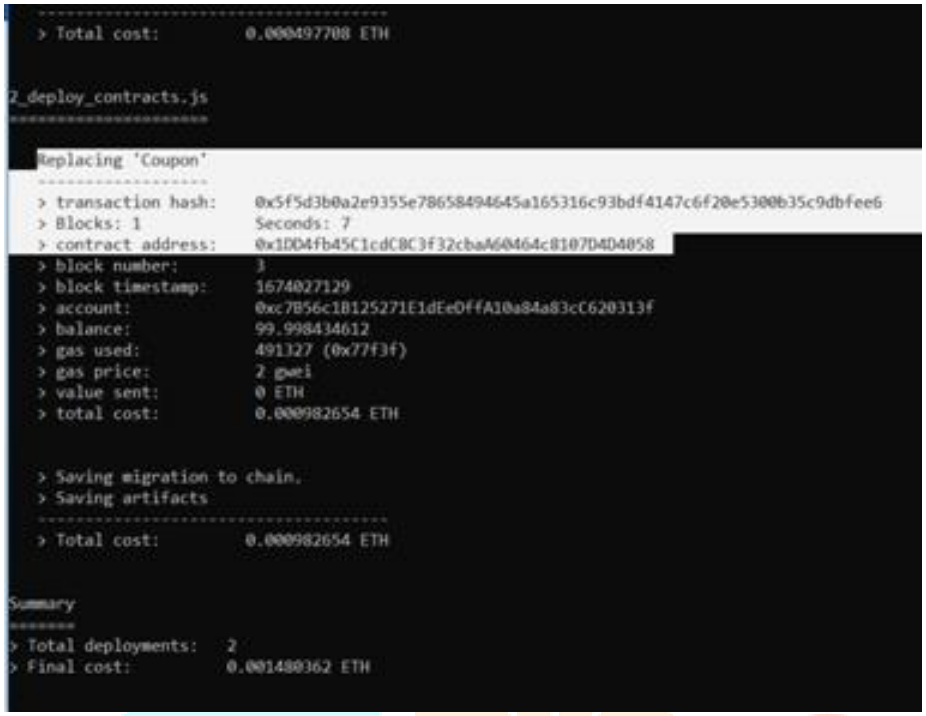
Issue Coupon Action Function:
This function handles the issuance of a coupon.

It generates a unique customer ID and coupon code.
It calculates the discount based on the type of coupon.
It creates coupon data and saves it to the blockchain using save Data Block Chain().
It measures the transaction time and calculates the propose and extension costs.
Finally, it returns a message with the coupon details.

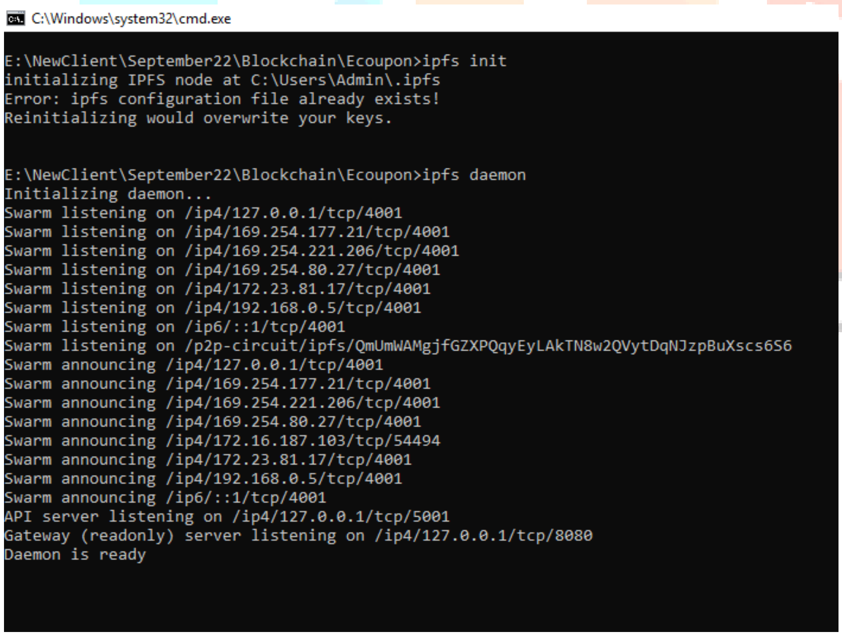
RESULTS:



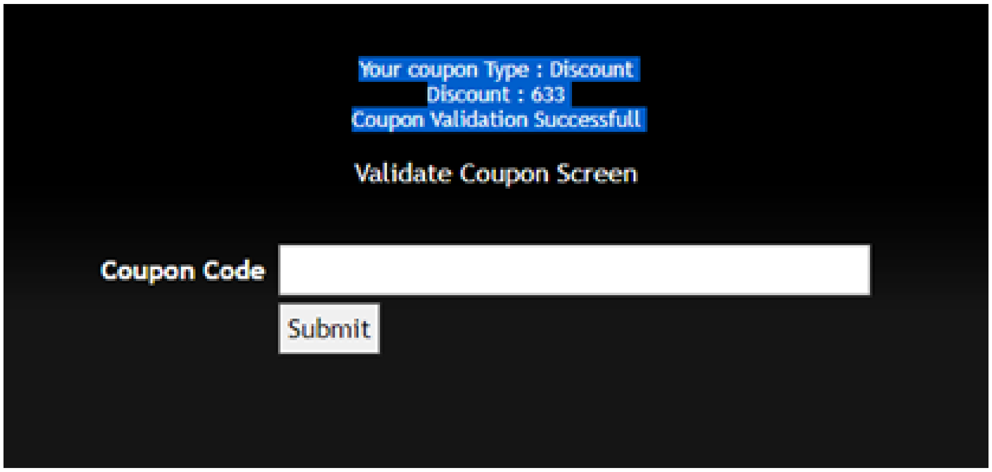
Blockchain Ethereum with default account and private keys



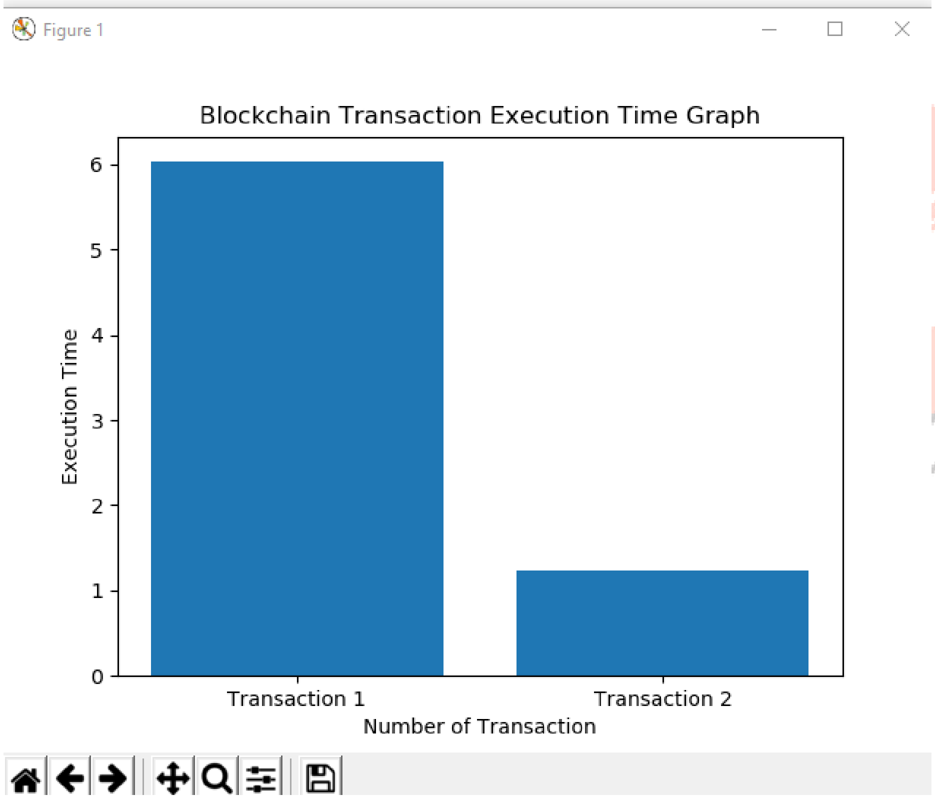
'Coupon' contract deployed and we got contract address and calling those Smart Contract functions to store and retrieve data from Blockchain



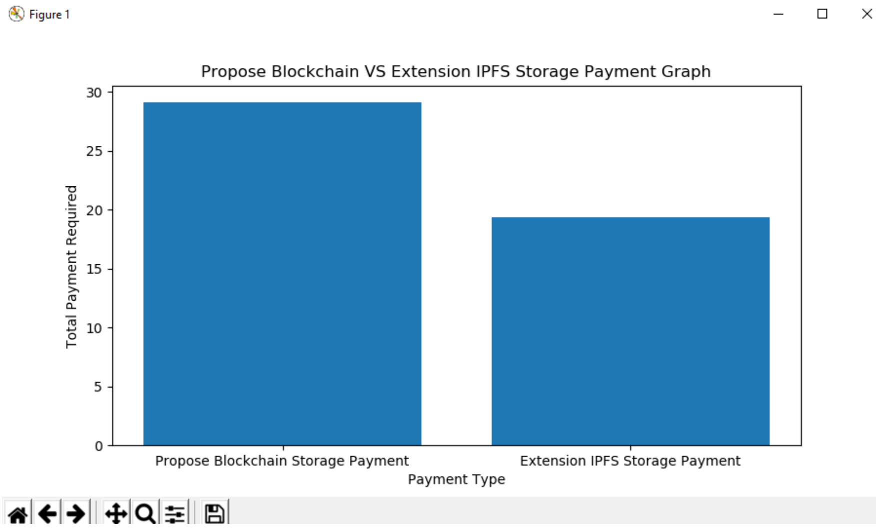
IPFS server to store data



Coupon validation



In above graph x-axis represents number of transactions and y-axis represents Execution time of each transaction



In above graph x-axis represents propose Blockchain storage and extension IPFS storage and if used Extension storage technique then payment will be less and now logout and login as customer to retrieve coupon details from Blockchain

CONCLUSION

We have investigated e-coupon services that store e-coupon information on a centralized server. We found that the e-coupon information stored in the server can be manipulated by a malicious attacker or administrator. To handle this issue, we present a new e-coupon service that improves security by exploiting e-coupon smart contracts in a blockchain system. According to our experimental results, the proposed service prevents the manipulation of e-coupon information with higher security and minor performance overhead.

REFERENCES:

[1] (2019). Wikipedia: E-coupon. [Online]. Available: https://en.wikipedia. org/wiki/E-coupon

[2] C. Blundo, S. Cimato, and A. De Bonis, ‘‘Secure E-coupons,’’ Electron. Commerce Res., vol. 5, no. 1, pp. 117–139, Jan. 2005.

[3] (2016). World Mobile Coupons Market to Grow at 73.1% CAGR to 2020. [Online]. Available: https://www.prnewswire.com/newsreleases/world -mobile-coupons-market-to% -grow-at-7314-cagr-to-2020- 603320306.html

[4] (2017). Coupon Fraud is Crime, Even if it Feels Harmless: Coupon Counselor. [Online]. Available: https://goo.gl/2emab1.

[5] S.-C. Hsueh and J.-H. Zeng, ‘‘Mobile coupons using blockchain technology,’’ in Proc. Int. Conf. Intell. Inf. Hiding Multimedia Signal Process. Springer, 2018, pp. 249–255.

[6] A. Knight and N. Dai, ‘‘Objects and the web,’’ IEEE Softw., vol. 19, no. 2, pp. 51–59, Mar. 2002.

[7] (2018). Quorum. [Online]. Available: https://github.com/jpmorganchase/ quorum

[8] (2017). Coupon Statistics: The Ultimate Collection. [Online]. Available: https://blog.accessdevelopment.com/ultimate-collection-couponstatistic%s

[9] (2017). emphDigital Coupon Marketing—Statistics and Trends. [Online]. Available: https://www.invespcro.com/blog/digital-coupon-marketing

[10] (2019). Digital Coupons Continue to be the Fastest Growing Method of Redemption due to Shoppers' Increased Demand for Convenience. [Online]. Available:

https://www.globenewswire.com/news-release/2019/ 02/13/1724510/0/en/Digi%tal-Coupons-Continue-to-be-the-FastestGrowing-Method-of-Redemption-Due-to-Sho%ppers-IncreasedDemand-for-Convenience.html

[11] (2017). The Coupon Insider: Digital vs. Paper Coupons. [Online]. Available: https://livingonthecheap.com/coupon-insider-digital-papercoupons//

[12] R. G.-P. M.-V. Agarwal and N. Modani, ‘‘An architecture for secure generation and verification of electronic coupons,’’ in Proc. USENIX Annu. Tech. Conf., Boston, MA, USA, Jun. 2001, p. 51.

[13] S.-C. Hsueh and J.-M. Chen, ‘‘Sharing secure m-coupons for peergenerated targeting via eWOM communications,’’ Electron. Commerce Res. Appl., vol. 9, no. 4, pp. 283–293, Jul. 2010.

[14] R. Rivest, ‘‘The MD5 message-digest algorithm,’’ Tech. Rep., 1992.

[15] C.-C. Chang, C.-C. Wu, and I.-C. Lin, ‘‘A secure e-coupon system for mobile users,’’ Int. J. Comput. Sci. Netw. Secur., vol. 6, no. 1, p. 273, 2006.

[16] M. Crosby, P. Pattanayak, S. Verma, and V. Kalyanaraman, ‘‘Blockchain technology: Beyond bitcoin,’’ Appl. Innov., vol. 2, nos. 6–10, p. 71, 2016.

[17] S. Nakamoto, ‘‘Bitcoin: A peer-to-peer electronic cash system,’’ Tech. Rep., 2008.

[18] M. Szydlo, ‘‘Merkle tree traversal in log space and time,’’ in Proc. Int. Conf. Theory Appl. Cryptograph. Techn. Springer, 2004, pp. 541–554.

[19] M. Castro and B. Liskov, ‘‘Practical Byzantine fault tolerance,’’ in Proc. OSDI, vol. 99, 1999, pp. 173–186.

[20] N. Szabo, ‘‘Smart contracts: Building blocks for digital markets,’’ Tech. Rep., 2018.