

## **Subscription based server using Blockchain with Web3 Technology**

Priyanka Shannigrahi, Krishnendu Manna, Subhajit Dutta, Md Moinul Haque sk,

Miss Mayumi Mukherjee.

Department of B. Tech (CSE)

(Pailan College of Management & Technology)

(Bengal Pailan Park, Kolkata - 700104)

{Corresponding author's email:

[priyankashannigrahi@gmail.com](mailto:priyankashannigrahi@gmail.com)

[krishnendumanna02@gmail.com](mailto:krishnendumanna02@gmail.com)

[subhajitdutta.vivo.2002@gmail.com](mailto:subhajitdutta.vivo.2002@gmail.com)

[sbadsha700@gmail.com](mailto:sbadsha700@gmail.com)}

***Abstract – SubWain is a decentralized application (dApp) designed to manage subscriptions using blockchain technology. The dApp offers customers an easy-to-use platform that provides a secure and transparent subscription management system for both manager and customer. Using blockchain, all subscription data is stored immutably and transparently. Smart contracts automate subscription payments and manage subscription-related events such as renewals and cancellations. Additionally, the dApp features a transparent rating and feedback system, enabling customers to rate and review subscription services. Ultimately, this dApp offers a reliable and decentralized solution to manage subscriptions while promoting trust and transparency between customers and service providers.***

***Keywords – Subscription based application; Web3 Technology; Blockchain.***

### **1. Introduction**

In recent years, subscription-based services have gained immense popularity. These services allow users to pay a recurring fee for access to products or services on a regular basis. However, these services are often centralized and rely on third-party payment processors, which can result in increased costs and reduced security. To address these challenges, this paper proposes a decentralized application (dApp) using blockchain technology that allows users to create their own subscription plans and accept payments directly from their customers.

Subscriptions have become a preferred way for businesses to monetize their offerings. However, the traditional centralized subscription model poses challenges such as high fees, data security issues, and lack of flexibility. To overcome these challenges, we have built a decentralized application (dApp) named SubWain, which is a subscription-based service using blockchain technology. SubWain allows users to create their own subscription plans and customers can pay directly to the user, thus eliminating the need for intermediaries.

## History of Blockchain Technology:

- The concept of blockchain was first introduced in 2008 by Satoshi Nakamoto in his paper. "Bitcoin: A Peer-to-Peer Electronic Cash System." -- Ethereum is an open-source, decentralized blockchain platform that enables developers to build decentralized applications (DApps) on top of it. Ethereum was proposed in 2013 by Vitalik Buterin, a programmer and cryptocurrency enthusiast, and it was launched in 2015.[Ref. (i), (ii)]
- "Smart Contracts: 12 Use Cases for Business & Beyond" by Deloitte (2016) -- This report from Deloitte explores various use cases for smart contracts on the Ethereum blockchain, including supply chain management, digital identity, and voting systems. The report also provides an overview of Ethereum's architecture and discusses some of the challenges and opportunities associated with using smart contracts.[Ref. (iii)]
- "Ethereum: Blockchains, Digital Assets, Smart Contracts, Decentralized Autonomous Organizations" by Henning Diedrich (2018) -- This book provides a comprehensive introduction to Ethereum, covering its history, architecture, programming languages, and applications. The book also includes chapters on smart contracts, decentralized autonomous organizations (DAOs), and the Ethereum Virtual Machine (EVM).[Ref. (iv), (vii)]

This study generally aimed at how to use languages present in Computer Science and the softwares of various types to create our own apps and make use of it for better use in a modified version. We have used various softwares and computer languages to carry out a specific task which gave us the confidence of creating more such projects using various softwares and languages.

## 2. Blockchain Technology:

Blockchain technology is an ideal platform for implementing a subscription-based service as it provides a decentralized and secure environment to manage subscriptions. The proposed dApp SubWain builds on this technology to provide a more secure and cost-effective way for businesses to manage their subscriptions.

Subscription services can benefit from the use of blockchain technology in several ways. Here are a few examples:

- I. **Secure payment processing:** Blockchain can be used to securely process payments for subscription services, reducing the risk of fraud and chargebacks. Smart contracts can be used to automate payment processing and ensure that payments are made on time.
- II. **Improved customer data management:** Blockchain can help subscription services manage customer data more securely and efficiently. With blockchain, customers can have control over their own data, which is encrypted and stored in a decentralized network. This can help prevent data breaches and protect customer privacy.

- III. **Transparent subscription tracking:** Blockchain can be used to create a transparent and immutable record of subscription services. This can help customers track their subscriptions and ensure that they are being charged correctly. It can also help subscription providers better manage their customer base and provide more personalized services.
- IV. **Loyalty rewards management:** Blockchain can also be used to manage loyalty programs for subscription services. A loyalty program can be created using blockchain, where customers can earn and redeem loyalty points or tokens. These tokens can be traded on an exchange or used to access exclusive products or services.

Overall, blockchain can help subscription services improve their customer experience, streamline operations, and reduce costs associated with payment processing and customer data management.

### 3. Proposed Methodology:

The dApp will be implemented using truffle, Metamask, ethers.js, remix ide, and Vs code. Truffle will be used to compile and deploy the smart contracts, while Metamask will be used to interact with the blockchain network. Ethers.js will be used to connect the dApp to the blockchain, while Remix ide will be used to test and debug the smart contracts. Vs code will be used to write the smart contracts and front-end code.

- **Testing:**

Testing is a method to check whether the actual software product matches expected requirements and to ensure that software product is Defect free. It involves execution of software/system components using manual or automated tools to evaluate one or more properties of interest. The purpose of software testing is to identify errors, gaps or missing requirements in contrast to actual requirements. These are some of the software to test the program.

- **Truffle** – Truffle (Fig: 1) serves as the development environment, testing framework and asset pipeline based on the Ethereum Virtual Machine. Truffle or hardhat both check for perfect deploy and compile



Fig: 1

- **Goerli test network:** Goerli is a proof of authority (PoA) testnet web3 developers use to test blockchain applications before launching them on the Ethereum Mainnet. Goerli is a public test network for the Ethereum blockchain. It is one of several test networks that developers and users can use to test and deploy smart contracts and decentralized applications (dApps) without incurring the high costs associated with using the Ethereum mainnet.

- **Ganache:** (Fig: 2) is actually a component of the Truffle Suite framework along with the other components, Truffle and Drizzle. Ganache is used for setting up a personal Ethereum Blockchain for testing your Solidity contracts.

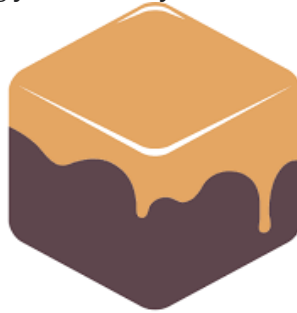


Fig: 2



Fig: 3

- **Alchemy** (Fig: 4) is a powerful blockchain developer platform providing a suite of developer tools. Developers building apps which interact with Ethereum can use Alchemy's powerful APIs to supercharge their apps. Alchemy is the leading blockchain API. It can be used on popular blockchains such as Ethereum or Polygon to do common operations like consult gas price, get blocks and send transactions.



Fig: 4

- **MetaMask** (Fig: 5) is a decentralized, non-custodial Ethereum-based wallet that allows users to store, buy, send, convert, and swap crypto tokens.



Fig: 5

- **Library:**

A programming library is a collection of prewritten code that programmers can use to optimize tasks. This collection of reusable code is usually targeted for specific common problems. A library usually includes a few different pre-coded components.

**Ether.js or Web3.js:** Ethers.js (Fig: 6) is a library that helps developers creates

decentralized applications, while Web3.js is a library that helps developers connects to the Ethereum network. Web3.js is a javascript based library which is used to implement dAap. Ethers.js allows the storage of private keys with the client, as you have the assurance of safety and security.



Fig: 6

#### 4. Proposed implementation:

**SubWain will consist of the following components:**

- **User Registration:** Users will be able to register on the dApp and create their own subscription plans. They can set the subscription price and duration, and customize the terms and conditions of their plans.
- **Subscription Management:** Customers will be able to subscribe to the plans created by the users. They will be able to view the available plans and select the one that suits their needs. Once subscribed, the customer will be able to access the product or service provided by the user.
- **Payment Processing:** Payments will be processed using blockchain technology, eliminating the need for third-party payment processors. Customers will be able to pay for their subscriptions using cryptocurrency, which will be transferred directly to the user's account.

#### 5. Conclusion:

The SubWain dApp provides a decentralized and secure platform for creating and managing subscription-based services. By leveraging blockchain technology, users can eliminate the need for intermediaries and reduce costs associated with payment processing. With the implementation of this dApp using truffle, MetaMask, ethers.js, remix ide, and VS code, users can create their own subscription plans and accept payments directly from their customers. This will pave the way for a new era of subscription-based services that are decentralized, secure, and cost-effective.

## 6. Reference:

Fortune. "Who Is Satoshi Nakamoto, Inventor of Bitcoin? It Doesn't Matter". Retrieved 22 July 2019.

Satoshi Nakamoto (17 November 2008). "Re: Bitcoin P2P e-cash paper 2008-11-17 16:33:04 UTC". Satoshi Nakamoto Institute. Archived from the original on 7 December 2016. Retrieved 4 December 2016.

Binance.com. Binance. "All You Need to Know About NFT Smart Contracts". Retrieved 26 September 2022.

Foundation, Ethereum (30 July 2015). "Ethereum Launches". Blog.ethereum.org. Archived from the original on 11 August 2015. Retrieved 9 January 2020.

Sigalos, MacKenzie. "Ethereum's massive software upgrade just went live — here's what it does". CNBC. Retrieved 15 September 2022.

Vigna, Paul (3 June 2021). "DeFi Is Helping to Fuel the Crypto Market Boom—and Its Recent Volatility". The Wall Street Journal. Retrieved 14 August 2021.

Bloomberg.com. "Ethereum Upgrade Adds to Crypto Mania Sparked by Bitcoin's Surge". 25 November 2020. Archived from the original on 28 November 2020. Retrieved 28 November 2020.