

Report On

Simple ToDo List Using RemixIDE MetaMask

Submitted in partial fulfillment of the requirements of the Course project in
Semester VII of Final year Computer Science and Engineering [Data Science]

by

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CERTIFICATE

This is to certify that the Mini Project entitled “**Simple ToDo list using RemixIDE and MetaMask**” is a bonafide work of **Preet Raut (Roll No.51)**, **Dipanshu Vartak (Roll No. 62)**, **Shubham Warik (Roll No.66)**, submitted to the University of Mumbai in partial fulfillment of the requirement for the award of the degree of “**Bachelor of Engineering**” in Semester VII of Final Year “**Computer Science and Engineering (Data Science)**” .

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Chapter 1

Introduction

1.1 Introduction

A blockchain-powered to-do list application revolutionizes the way we manage tasks by introducing an unprecedented level of security and transparency. Unlike traditional to-do lists hosted on centralized servers, this innovative system stores your tasks in a decentralized and encrypted manner, making them resistant to hacking and data breaches. Every task and its history are recorded on an immutable ledger, ensuring transparency and accountability in task management. Trust in the accuracy of your to-do list is no longer reliant on a central authority but is built into the blockchain's consensus mechanism. This decentralization also guarantees the availability of your tasks even if some network nodes go offline. Additionally, the integration of smart contracts automates task-related processes, while you retain complete ownership and global accessibility of your data. In summary, a blockchain-based to-do list empowers you with a secure, transparent, and trustworthy platform to streamline your daily activities. Furthermore, smart contracts can be used to automate creating and deleting tasks as well as marking them as complete. This ensures that information related to tasks is protected and accessible only to authorized users.

1.2 Problem Statement

Traditional to-do list applications face numerous challenges that our blockchain-based solution aims to tackle. These issues include security vulnerabilities stemming from centralized data storage, a lack of transparency and accountability, heavy reliance on single service providers, and limited user control. Furthermore, the lack of transparency makes it challenging to verify the accuracy and integrity of the tasks listed, opening the door to unauthorized changes and manipulation. Users are at the mercy of a single service provider, risking service interruptions or data loss if the provider encounters issues or decides to discontinue the service. Manual ToDo lists are vulnerable to tampering and prone to human errors. Hence development of a new system is necessary.

To solve this problem, we need to design a decentralized application (DApp) that utilizes blockchain technology, such as Ethereum or a similar platform, to create a secure and transparent ledger for managing tasks. This DApp should allow users to create task, remove task, and mark it as complete with the assurance that their data remains private, secure, and tamper-proof. Additionally, the use of smart

contracts can introduce control mechanisms, ensuring that only authorized users can add or delete tasks, and that access can be automatically revoked when necessary.

1.3 Objectives

The objective of building a blockchain-based to-do application is to harness the security, transparency, and decentralization features of blockchain technology to enhance task management. By utilizing a blockchain, this application can provide an immutable and tamper-proof ledger of tasks, ensuring that once a task is added or marked as completed, it cannot be altered or deleted. Furthermore, the decentralized nature of the blockchain removes the need for a central authority, making the application resistant to downtime or data loss. Users can have full control over their tasks, and the transparency of the blockchain ensures that all actions are verifiable. This not only improves the trustworthiness of the to-do list but also opens up possibilities for shared task lists, collaborative projects, and incentivization mechanisms through tokens or smart contracts. In essence, a blockchain-based to-do application aims to revolutionize task management by offering a secure, transparent, and decentralized platform for individuals and teams to manage their responsibilities effectively. Additionally, the automation introduced through smart contracts enhances control over stored tasks, ensuring that data is only accessible to those with the proper permissions.

Chapter 2

Literature Survey

2.1 Analysis of Literature

Sr. No.	Title of the Paper	Advantages	Disadvantages
1	Blockchain, a Feasible Technology for ToDO List Administration	Focusing on the benefits of task transparency, automated progress tracking.	This research may require access to real-world project management data
2	Decentralized Task Verification on Blockchain: Ensuring Authenticity and Accountability in To-Do Lists	Explore the implications for trust and responsibility in task management.	This research would need to address privacy concerns related to task verification
3	Blockchain-Powered To-Do Lists in Education: A Case Study on Student Task Management	Explore the impact on student productivity and goal attainment.	Gathering data from educational institutions and ensuring privacy.
4	The Environmental Impact of Blockchain-Based To-Do Lists: A Sustainability Assessment	Investigate the environmental impact of blockchain technology.	This research would require access to energy consumption data of blockchain networks and may involve complex calculations.
5	User Experience and Adoption of Blockchain To-Do Lists: A Human-Centered Approach	Informs about usability, user satisfaction, and barriers to adoption, with a focus on user-centered design principles.	Usability, user satisfaction, and barriers to adoption, with a focus on user-centered design principles.

2.2 Research Gap

An essential research gap in to-do applications lies in the domain of privacy and security, particularly in developing robust methods for securing task data and user information. Many existing to-do apps lack comprehensive privacy features and may compromise user data through centralized storage or weak encryption practices. There is a need for research into privacy-enhancing technologies, such as decentralized data storage, and user-centric authentication management, to ensure the confidentiality of task lists and user information. Additionally, exploring secure sharing and collaborative features in a way that does not compromise privacy can be a key area of investigation. Addressing this research gap can lead to more secure to-do applications that prioritize user data protection.

Moreover, user experience and user interface design often receive limited attention in blockchain-based applications. Research should aim to bridge the usability gap by investigating how to make blockchain-powered ToDo Lists more user-friendly, intuitive, and accessible. Examining design principles and user-centric aspects of these applications could significantly contribute to enhancing user adoption and satisfaction. In summary, there are valuable research opportunities in the realms of security, scalability, and user experience that could pave the way for more secure, efficient, and user-friendly blockchain-based ToDo List application. Another important facet is user adoption and usability. It is crucial to evaluate the usability of blockchain-based to-do list applications.

Chapter 3

Proposed System

3.1 Introduction

Creating a To-Do List application powered by blockchain, Ganache as the local blockchain network, and Metamask as the cryptocurrency wallet presents an innovative approach to task management. The proposed approach for this system begins with defining and gathering user requirements, including features like task creation, task deletion, task completion, tracking, and payments using cryptocurrency. Integration with Metamask is essential for handling cryptocurrency transactions and wallet management securely. Local blockchain network Ganache is employed for providing a stable environment for doing ethereum transactions, ensuring that smart contracts function as intended.

Task creation, completion, deletion, and tracking features are developed, allowing users to manage tasks on the blockchain. Importantly, the system includes secure cryptocurrency transactions, enabling users to make payments in a decentralized manner. Upon successful compilation, the application and smart contracts are deployed, bringing this innovative To-Do List system to life on the live blockchain. This proposed methodology combines the benefits of blockchain technology, local blockchain networks like Ganache, and cryptocurrency integration through Metamask to revolutionize task management in a decentralized and secure environment. The system leverages the core principles of blockchain, such as decentralization, immutability, and security, to create a to-do list platform that transcends the limitations of traditional task management tools. By utilizing distributed ledger technology, this system ensures that tasks are recorded in a tamper-proof and transparent manner, offering users the confidence that their to-do lists are secure and trustworthy.

The blockchain's immutable ledger guarantees that once a task is added, completed, or modified, the history is irrevocably documented, providing a complete audit trail. Additionally, the system employs techniques to safeguard user data, preserving privacy while enabling authorized parties to access task information securely. This project sets the stage for a comprehensive exploration features, and benefits of a blockchain-based to-do list system, as it seeks to revolutionize how individuals and organizations manage their tasks and achieve greater productivity in an ever-evolving digital landscape.

3.1. Process Design

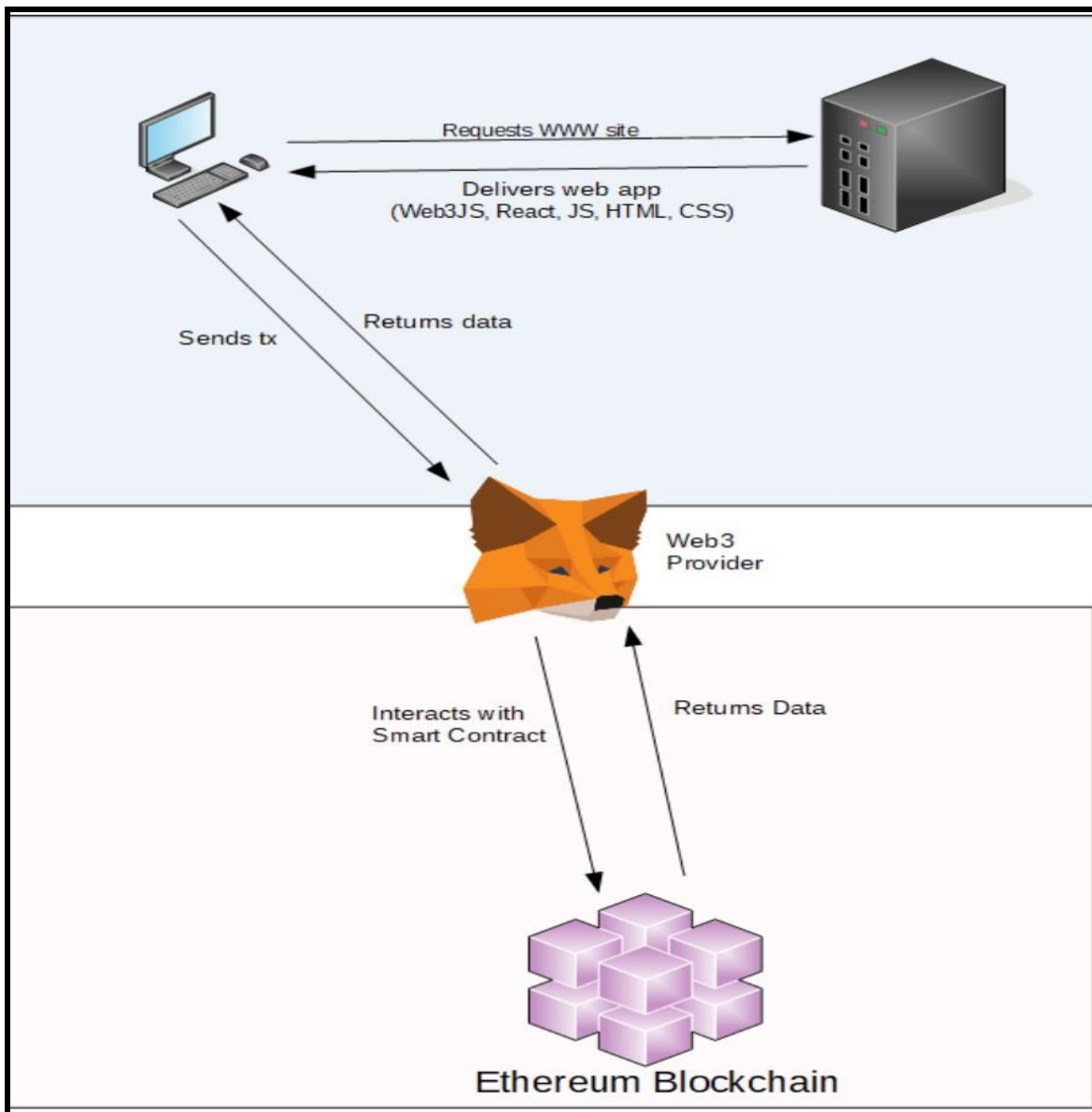


fig.3.1 Transaction process on Metamask

3.1.1 Details of Hardware & Software

- **Hardware requirements:**

- Processor: Intel(R) Core(TM) i5-10300H CPU @ 2.50GHz 2.50 GHz
- Memory (RAM): 8.00 GB DDR4
- Storage: 512 GB SSD

- **Software requirements:**

- Ganache
- MetaMask extension
- RemixIDE

3.1.2 Programming Languages:

- Solidity programming language

3.2 Experiment and Results

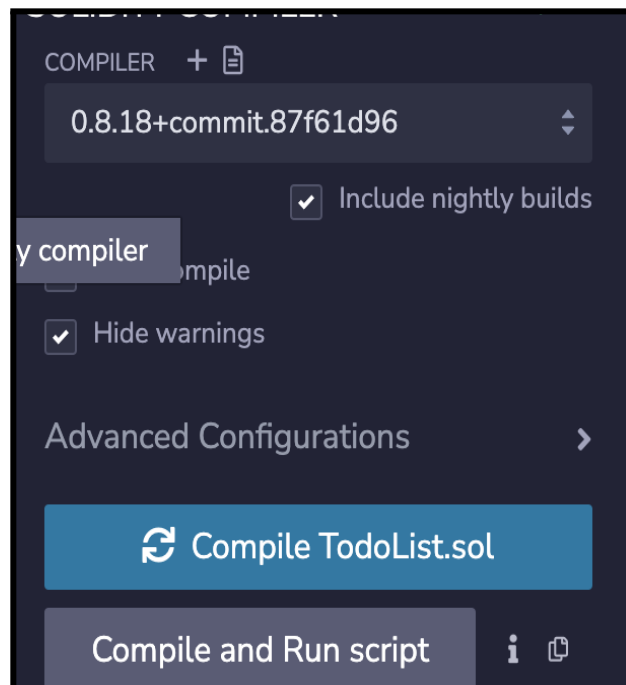


fig 3.3.1 Solidity Compiler in RemixIDE

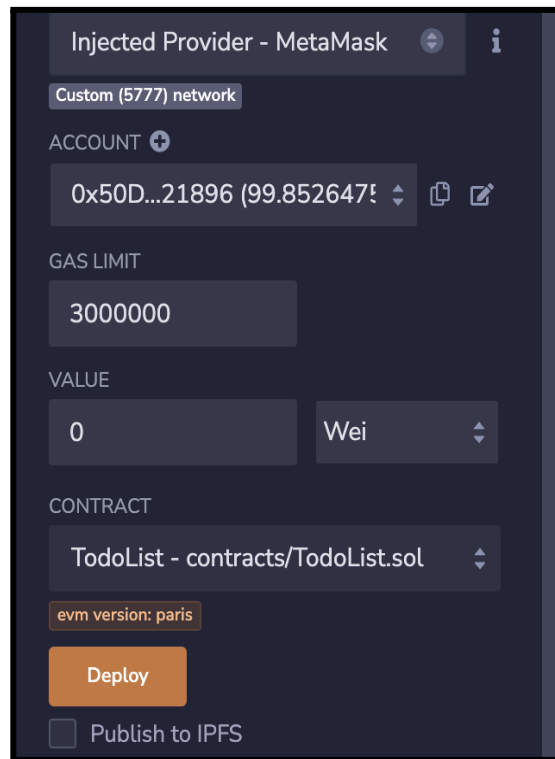


fig 3.3.2 Smart contract deployment

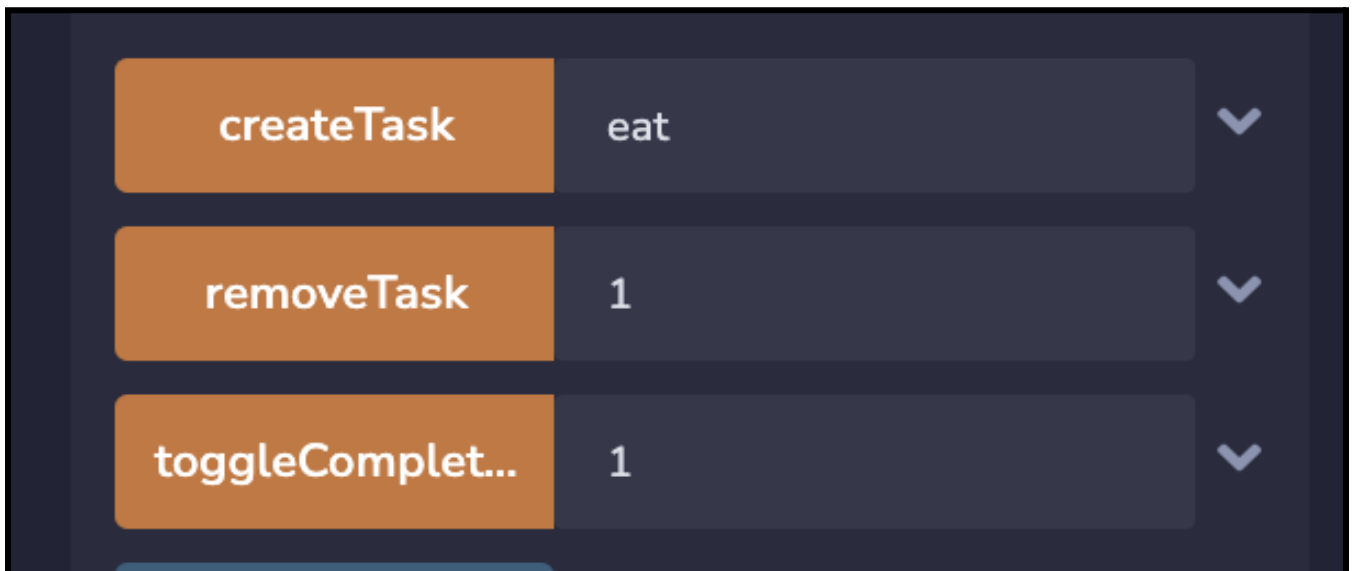


fig 3.3.3 Interface to add, remove and complete task

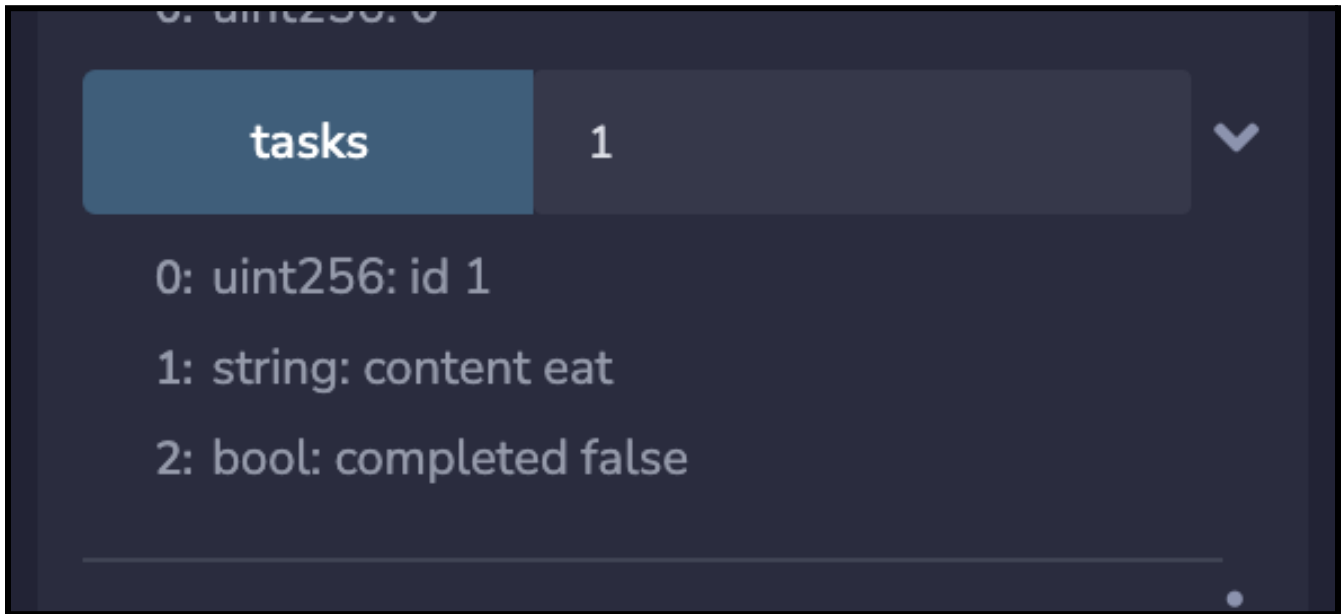


fig 3.3.4 Task details

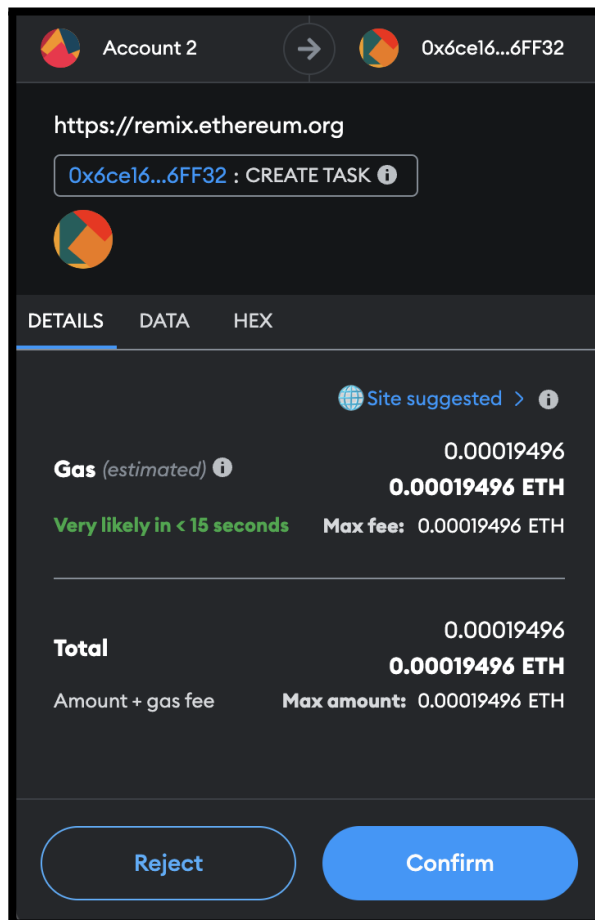


fig 3.3.5 Action confirmation in Metamask

3.5 Result Analysis

A blockchain-based ToDo-List application offers both advantages and challenges in its result analysis. On the positive side, the transparency and immutability inherent to blockchain technology ensure the security and integrity of the data stored in the system, making it resistant to unauthorized changes and tampering. Furthermore, the decentralized and distributed nature of the blockchain network enable manipulating tasks impossible without users permission.

The decentralization aspect, particularly when coupled with tools like Ganache and MetaMask, establishes a resilient system that is resistant to downtime or data loss, ensuring continuous access to task information. However, it's important to assess the impact on user experience, as the integration of blockchain and related tools can introduce complexities. Collaborative features can be beneficial if effectively implemented, and the introduction of smart contracts for automation or incentive mechanisms for task completion can greatly enhance productivity. Data privacy must be a priority, especially when dealing with sensitive information. Performance and scalability should also be examined to ensure that the system can accommodate growth.

3.6 Conclusion

Integration of blockchain into to-do list applications represents a significant step forward in the realm of task management. By leveraging the security, transparency, and trust inherent to blockchain, we have the opportunity to redefine how individuals and organizations organize their daily activities. This innovation enhances the security and integrity of task data, promotes accountability and trust through transparent ledgers, and ensures uninterrupted access to to-do lists. Furthermore, the automation capabilities of smart contracts streamline task management processes, adding efficiency and reliability to the system. Users benefit from increased control and ownership of their data, reducing dependency on centralized service providers and gaining the ability to manage their tasks from anywhere globally. This secure, transparent, and user-centric approach to task management not only enhances productivity but also contributes to a more trustworthy and resilient digital ecosystem.

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