

Experiment 1

Aim: Study bitcoin and ethereum explorer and various terms. Create a metamask wallet, mine test ethers and perform crypto transactions.

Theory:

Blockchain is a decentralized and distributed digital ledger that records transactions in a secure and immutable manner. Transactions are grouped into blocks, and blocks are linked together using cryptographic hashes, forming a chain. Once data is recorded on the blockchain, it cannot be altered, ensuring transparency and trust.

Blockchain explorer:

A blockchain explorer is a web-based tool that allows anyone to view, search, and analyze blockchain data. Blockchains are public ledgers, and explorers provide transparency.

They allow you to:

- Track transactions
- View wallet balances
- Inspect blocks
- Analyze gas fees
- Verify smart contract activity

Bitcoin Key Terms

- **Address:** A Bitcoin address is a unique identifier used to receive bitcoins. It is similar to an email address and is recommended to be used only once per transaction to enhance privacy.
- **Bit:** A bit is a sub-unit of bitcoin. 1 Bitcoin (BTC) = 1,000,000 bits.
- **Bitcoin / bitcoin:** Bitcoin (capital B) refers to the protocol and network, while bitcoin (lowercase b) refers to the currency unit. It is commonly abbreviated as BTC.
- **Blockchain:** The Bitcoin blockchain is a public ledger containing all confirmed transactions in chronological order. It prevents double spending and ensures transaction validity.
- **Block:** A block contains multiple verified transactions. A new block is added to the blockchain approximately every 10 minutes through mining.
- **BTC:** BTC is the standard unit symbol representing one bitcoin.
- **Confirmation:** A transaction is said to be confirmed when it is included in a block. Each additional block added afterward increases the number of confirmations, making the transaction more secure.

- **Cryptography:** Cryptography secures Bitcoin transactions by ensuring data integrity, authentication, and ownership of funds through encryption and digital signatures.
- **Double Spending:** Double spending is the attempt to spend the same bitcoins more than once. Bitcoin prevents this using blockchain consensus and mining.
- **Hash Rate:** Hash rate measures the total computational power of the Bitcoin network, indicating its security and processing capability.
- **Mining:** Mining is the process of validating transactions and adding new blocks to the blockchain. Miners are rewarded with newly created bitcoins and transaction fees.
- **P2P (Peer-to-Peer):** Bitcoin operates on a peer-to-peer network where users transact directly without intermediaries like banks.
- **Private Key:** A private key is a secret cryptographic value that allows users to access and spend bitcoins from a wallet.
- **Signature:** A digital signature is generated using a private key to prove ownership and authorize transactions without revealing the private key.
- **Wallet:** A Bitcoin wallet stores private keys and enables users to send, receive, and manage bitcoins.

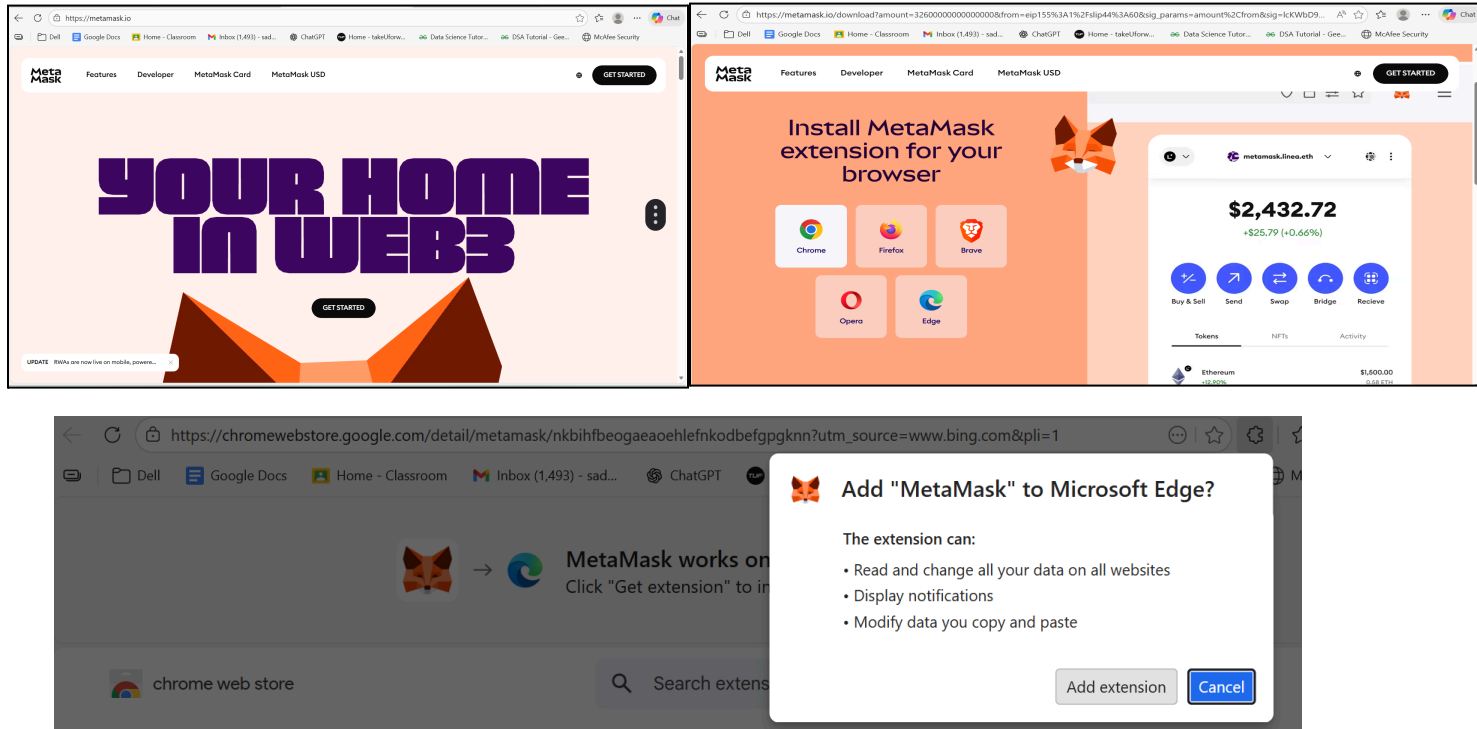
Ethereum Key Terms

- **Ethereum Account:** An Ethereum account is used to store ETH and interact with the blockchain. It can be either an externally owned account or a smart contract account.
- **ABI (Application Binary Interface):** ABI defines how smart contracts communicate with external applications by encoding and decoding data for Ethereum Virtual Machine (EVM) execution.
- **Consensus:** Consensus is the process by which all nodes agree on the current state of the blockchain. Ethereum uses different consensus mechanisms depending on the network.
- **Smart Contract:** A smart contract is a self-executing program stored on the Ethereum blockchain that automatically enforces rules and agreements.
- **Validator:** A validator is a node that verifies transactions and participates in block validation under Ethereum's consensus mechanism.
- **Proof of Authority (PoA):** PoA is a consensus algorithm where authorized nodes are responsible for validating and producing blocks, commonly used in private networks.
- **Tokenization:** Tokenization is the process of representing digital or real-world assets on the blockchain using smart contracts.
- **Wallet (Ethereum):** An Ethereum wallet stores private keys and allows users to interact with ETH, tokens, and decentralized applications.

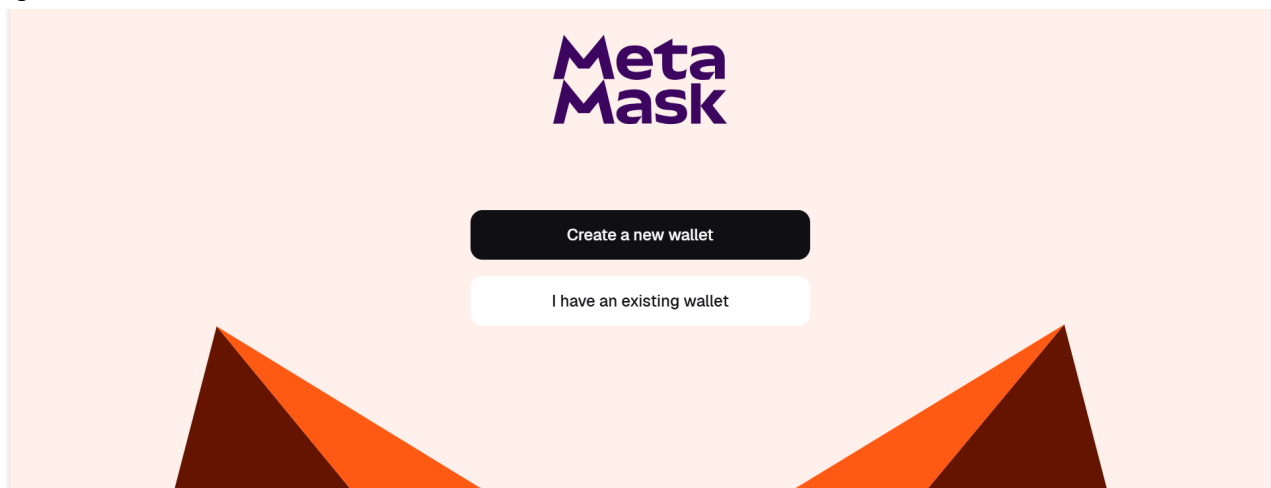
Implementation:

Creation of Metamask Account

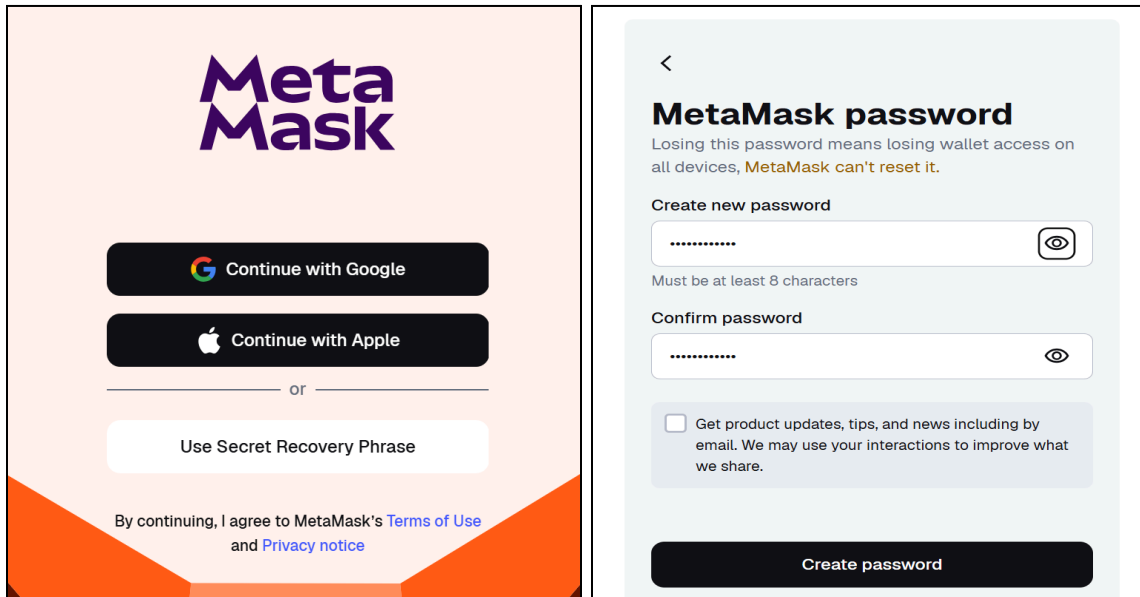
Step1: Go to the official MetaMask website and download the MetaMask extension for your browser (Chrome, Firefox, Brave, or Edge) or install the MetaMask app from your device's App Store or Play Store.



Step2: Open the MetaMask extension or app and click Get Started. Select Create a Wallet to set up a new account.



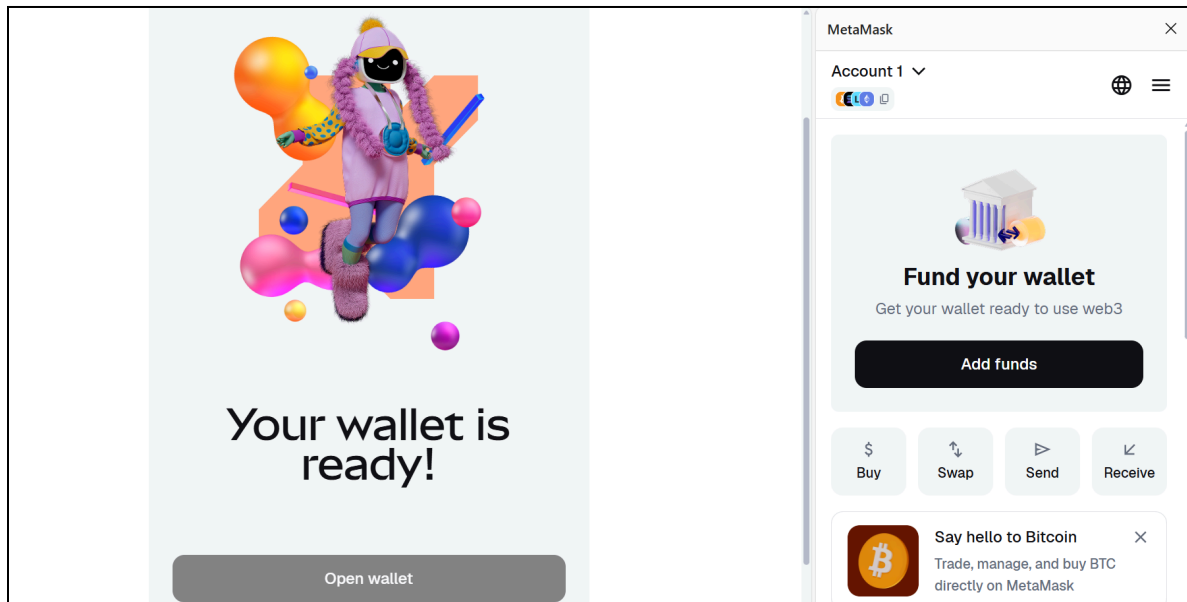
Step 3: Select continue with google then create a strong password, confirm it, and agree to the terms of use.

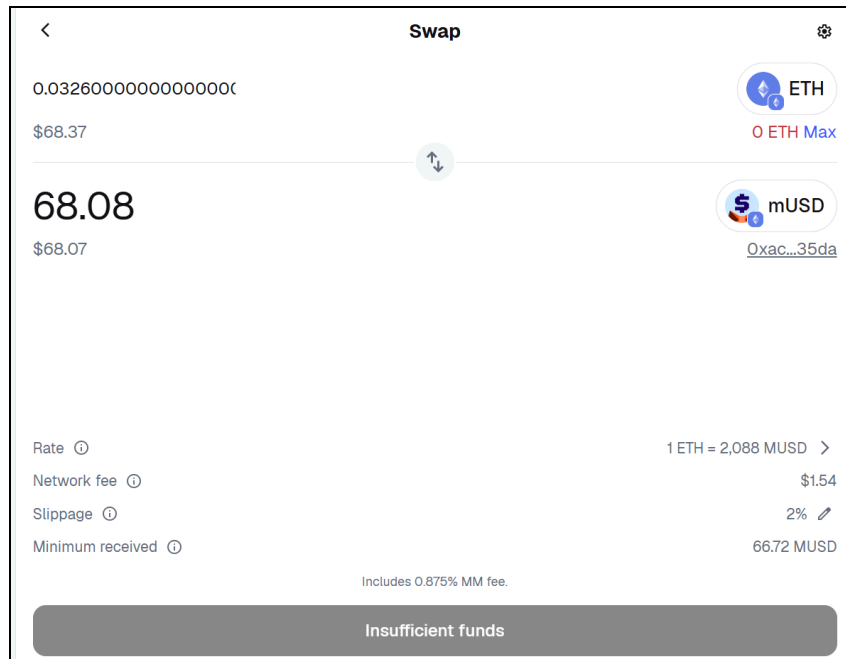


The image shows two side-by-side screenshots of the MetaMask mobile app setup process. The left screenshot is the initial welcome screen with the MetaMask logo at the top. It features three main options: 'Continue with Google' (with a Google logo), 'Continue with Apple' (with an Apple logo), and 'Use Secret Recovery Phrase'. Below these options, a line of text reads 'By continuing, I agree to MetaMask's [Terms of Use](#) and [Privacy notice](#)'. The right screenshot is the 'MetaMask password' creation screen. It has a back arrow at the top left. The title is 'MetaMask password', followed by a warning: 'Losing this password means losing wallet access on all devices, **MetaMask can't reset it.**'. There are two password input fields: 'Create new password' and 'Confirm password', both with eye icons for toggling visibility. A note below the first field says 'Must be at least 8 characters'. Below the second field is a checkbox with the text 'Get product updates, tips, and news including by email. We may use your interactions to improve what we share.' At the bottom is a large 'Create password' button.

Now click on create password.

Once completed, you will be redirected to the MetaMask wallet interface, where you can start managing your crypto assets.





Conclusion:

This experiment helped in understanding the fundamentals of blockchain technology, Bitcoin and Ethereum explorers, and essential cryptocurrency terms. The practical creation of a MetaMask wallet demonstrated how blockchain wallets work, including account creation, security through passwords and private keys, and interaction with the Ethereum network. Overall, the experiment effectively connected theoretical concepts with practical exposure to blockchain applications.