Web3 and Blockchain Basics: Setup Wallet a and Explore DApps

by

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Web3 and Blockchain Basics: Setup Wallet and Explore DApps

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Course: B.Tech – Computer Science and Engineering
Domain: Blockchain Technology
Difficulty: Beginner
Network: Sepolia Testnet
Wallet: MetaMask
DApp: Uniswap (Testnet)
Asset: Test Ether (ETH)

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“Exploring the decentralized future — from wallets to Web3 DApps.”

Objective

Perform practical blockchain operations by configuring MetaMask, acquiring test Ether from a faucet, and executing a transaction on a DApp within a testnet environment to understand blockchain and decentralized systems.

Learning Goals

- Understand the fundamentals of blockchain technology and the concept of decentralization.
- Learn the purpose and working of crypto wallets such as MetaMask.
- Explore test networks (testnets) and verify transactions using block explorers like Etherscan.
- Gain hands-on experience by interacting with decentralized applications (DApps).
- Develop awareness of wallet security practices, seed phrase protection, and gas fees during transactions.

Overview of Blockchain

Blockchain

1. **Definition:**
   A decentralized digital ledger that securely records transactions across a global network of computers.
2. **Structure:**
   - Data stored in blocks linked using cryptographic hashes.
   - Each block contains transactions, timestamp, and previous block hash.
3. **Key Features:**
   - **Decentralized:** No central authority controls it.
   - **Transparent:** All transactions are visible to everyone.
   - **Immutable:** Data once added cannot be changed.
   - **Secure:** Uses encryption and consensus mechanisms.
4. **Consensus Mechanisms:**
   - **Proof of Work (PoW):** Miners solve puzzles to validate blocks (Bitcoin).
   - **Proof of Stake (PoS):** Validators are chosen based on staked tokens (Ethereum 2.0).
5. **Smart Contracts:**
   - Self-executing programs on blockchain.
   - Automatically perform actions when preset conditions are met.
   - Used in DApps, NFTs, and DeFi platforms.

Overview of Web3

Definition:
The next generation of the internet built on blockchain, enabling users to own data, identity, and assets.

1.Web Evolution:

- Web1: Read-only (static sites).
- Web2: Read and write (social media, centralized apps).
- Web3: Read, write, and own (decentralized, blockchain-powered).

2.Core Concepts:

- Decentralization: Data spread across multiple nodes.
- User Ownership: Users control assets via crypto wallets.
- Interoperability: DApps can communicate seamlessly.
- Trustless Systems: No need for intermediaries like banks.

3**.Key Components:**

- Crypto Wallets (MetaMask): Store tokens, connect to DApps.
- DApps: Blockchain-based decentralized applications.
- Tokens: Digital currencies (ETH, BTC) and NFTs.
- DAOs: Community-driven organizations run by smart contracts.

4.Applications:

- Finance (DeFi): Uniswap, Aave, Compound.
- NFTs & Art: OpenSea, Rarible.
- Gaming: Axie Infinity, Decentraland.
- Storage: IPFS, Filecoin.

Implementation Steps

1. **Install MetaMask**
   Add MetaMask browser extension or mobile app.
   Create or import a wallet and securely store your seed phrase.

   Switch network to **Sepolia** or **Goerli Testnet** in MetaMask.
   Add the test network manually if not visible (via Chainlist or MetaMask settings).

3. **Get Testnet Tokens (ETH)**
   Visit a **Faucet** (e.g., https://sepoliafaucet.com).
   Paste your MetaMask address and claim free test ETH.

4. **Connect Wallet to a DApp**
   Go to a DApp like **Uniswap Testnet** or **OpenSea Testnet**.
   Click **"Connect Wallet"** and choose **MetaMask**.
   Approve the connection in MetaMask popup.

5. **Interact with the DApp**
   Uniswap: Swap test ETH for test USDC/DAI.
   OpenSea: Browse NFT collections or try minting/listing test NFTs.
   Confirm wallet prompts for approval and gas estimation.

6. **Observe the Transaction Process**
   MetaMask shows **transaction fee (gas)** and total value.
   Click **Confirm** to submit the transaction.
   Wait for confirmation (pending → success).

7. **Verify on Etherscan**
   Copy your transaction hash.
   Paste it on **https://sepolia.etherscan.io**.
   Review on-chain details: sender, receiver, value, gas, and contract info.

REFLECTION

Through this learning activity, I gained a clear understanding of the fundamental ideas behind blockchain and Web3. I learned that a blockchain is a distributed digital ledger where information (like transactions) is stored in blocks, each connected to the previous one using cryptography. This structure makes data tamper-resistant and transparent because every participant in the network holds a copy of the ledger. I also understood the difference between the two main consensus mechanisms: Proof of Work (PoW), where miners solve puzzles to validate transactions, and Proof of Stake (PoS), where validators are chosen based on the amount of cryptocurrency they stake. These systems ensure that no single authority controls the blockchain and that transactions remain secure and verified.

One of the most important takeaways was the difference between centralized and decentralized applications. In traditional (centralized) apps like Paytm or Google Pay, user data and funds are controlled by a central company or bank. In decentralized applications (DApps), there is no central server; data and transactions happen directly between users through smart contracts on the blockchain. This gives users more control over their assets and privacy while removing the need to trust an intermediary. However, it also means users are fully responsible for their own security.
I also learned about smart contracts, which are self-executing programs stored on the blockchain that automatically carry out transactions when predefined conditions are met. They remove the need for third parties and ensure transparency since their code is visible on the blockchain. In DApps, smart contracts handle all logic — such as token transfers, NFT minting, or decentralized trading — making them the “brain” of decentralized systems like Uniswap or OpenSea.

Security was another major aspect I explored. Setting up a MetaMask wallet helped me understand how private keys and seed phrases are crucial for protecting one’s funds. I learned that these recovery phrases must never be shared or stored online and that phishing websites are a serious threat. Only the person with the secret recovery phrase truly “owns” the wallet.
Initially, I faced challenges while setting up MetaMask, connecting to the testnet, and using faucets to get test ETH. I was also confused by blockchain terms like gas fees, network switching, and transaction confirmations. However, by carefully following documentation, experimenting on the testnet, and understanding each error step-by-step, I managed to perform a test transaction successfully. This hands-on experience made the theoretical concepts much clearer. Overall, this exercise gave me a strong foundation in blockchain technology and confidence to explore more advanced Web3 and DApp development in the future.

Key Links & Repository Structure

Public Wallet Address:
0x4a6fb723860278feec090da402f26f297b83ec67

Transaction Hash:
0x0ae8343133f566490700262b1ed1c90b5748d25e666a923482c5b4ee413f75e1

Etherscan Link:
https://sepolia.etherscan.io/

Faucet Used:
Google Cloud Etherum sepolia faucet

Repository Structure:

Folder / File	Description
/screenshots	MetaMask, faucet, DApp, And transaction screenshots
Supriya_Palaparthi_Web3_Basics.pdf	Final report file

Screenshots Section

- MetaMask installation success
- Dashboard
- Network configuration
- Testnet balance
- Etherscan
- Swap
- DApp Connection

LINK:-
https://github.com/palaparthisupriya/Web3-and-Blockchain-Basics-23A91A05H7/tree/main/Screenshots

Technical Summary

Aspect	Details
Network Used	Sepolia Testnet
Wallet	MetaMask
DApp Used	Google Cloud Ethereum Faucet
Type of Transaction	Testnet Token Request (Faucet → Wallet)
Faucet Used	Google Cloud Ethereum Sepolia Faucet
Transaction Hash	0x0ae8343133f566490700262b1ed1c90b5748d25e666a923482c5b4ee413f75e1
Block Explorer	Sepolia Etherscan
Errors Encountered	“Not Enough ETH” message while trying Uniswap token swap
Troubleshooting Outcome	Requested test ETH again via Google Cloud Faucet, confirmed receipt on Etherscan
Final Status	Successful wallet setup and verified DApp interaction

Conclusion & Acknowledgment

Conclusion

Through this activity, I gained a foundational understanding of blockchain, Web3 concepts, and decentralized applications. By setting up a MetaMask wallet, connecting to the Sepolia test network, and interacting with the Google Cloud Faucet DApp, I successfully performed a blockchain transaction and verified it using Sepolia Etherscan. This helped me understand how wallets, transactions, and block explorers work in a decentralized ecosystem.

Acknowledgment

I would like to express my sincere gratitude to the mentors and coordinators of this program for providing this practical learning opportunity. The blockchain hands-on task helped me explore real-world applications of Web3 technology and gain valuable technical exposure.