

Assignment 1 Report

Name: Sumera Malik

Roll No: 21i-1579

Part 1 – Blockchain Implementation (Go + React)

For Question 1, I implemented a simple blockchain in Go, which supports:

- Adding transactions
- Mining blocks using Proof-of-Work
- Searching transactions by keyword

I also created a React frontend to interact with the blockchain.

The blockchain initializes with a genesis block that includes my name and roll number (21i-1579).

Key Features:

- Genesis block with "Sumera Malik" and roll number 21i-1579
- REST API endpoints: /view, /tx, /mine, /search
- React UI to add transactions, mine blocks, and search data
- Automatic UI refresh after transactions or mining

Screenshots:

- React frontend running at <http://localhost:3000> showing the blockchain dashboard
- Search box, Add Transaction form, and Mine Block button working
- Blockchain displaying blocks with hashes, nonce, and stored data

Sumera Malik Blockchain

Add Transaction
Enter transaction text (e.g., 'Alice pays Bob \$1')
Add Pending: 0

Mine Block (Proof of Work)
Mine

Search Transactions
Type text to find (e.g., '21i-1579')
Search

Blockchain

Block #0
Hash: 07f12a4523cc4ae7c9b7e02a6023d94496162a0a9b895591b2ae8362a93dd2ec
Prev: 0
Nonce: 0 MerkleRoot: 5434def831cb27f6b4296bca188107b5959ccddc12d7941c3f6a2b3a931afdd5a
Data:

- o Genesis: Sumera Malik Blockchain

Block #1
Hash: 000020ee3637afa8e04951405ff041bde30c03ee001b3c92e02fd45c2498071c
Prev: 07f12a4523cc4ae7c9b7e02a6023d94496162a0a9b895591b2ae8362a93dd2ec
Nonce: 53450 MerkleRoot: c25fed85ee120ef594487c0651a5e78f239aeb7936304b1405ea18b3c984faa
Data:

- o 21i-1579

Owner: Sumera Malik - First TX: 21i-1579.

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{"blocks": [{"index": 0, "timestamp": "2025-09-15T16:59:37+05:00", "data": ["Genesis: Sumera Malik Blockchain"]}, {"index": 1, "timestamp": "2025-09-15T16:59:37+05:00", "data": ["21i-1579"]}], "prevHash": "", "hash": "07f12a4523cc4ae7c9b7e02a6023d94496162a0a9b895591b2ae8362a93dd2ec", "nonce": 0, "merkleRoot": "5434def831cb27f6b4296bca188107b5959ccddc12d7941c3f6a2b3a931afdd5a"}, {"index": 2, "timestamp": "2025-09-15T16:59:37+05:00", "data": ["21i-1579"]}], "prevHash": "07f12a4523cc4ae7c9b7e02a6023d94496162a0a9b895591b2ae8362a93dd2ec", "hash": "000020ee3637afa8e04951405ff041bde30c03ee001b3c92e02fd45c2498071c", "nonce": 53450, "merkleRoot": "c25fed85ee120ef594487c0651a5e78f239aeb7936304b1405ea18b3c984faa"}], "difficulty": 4, "displayName": "Sumera Malik Blockchain", "pendingTx": []}
```

Sumera Malik Blockchain

Add Transaction

 Pending: 0

Mine Block (Proof of Work)

Mined block #2

Search Transactions

- In block #1 — matches: 21i-1579

Blockchain

Block #0	2025-09-15T16:59:37+05:00
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Sumera Malik Blockchain

Add Transaction

 Pending: 0

Mine Block (Proof of Work)

Mined block #2

Search Transactions

- In block #1 — matches: 21i-1579

Blockchain

Block #0	2025-09-15T16:59:37+05:00
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The screenshot shows a web browser window with multiple tabs open. The active tab displays the blockchain history for the 'Sumera Malik Blockchain'. It lists three blocks:

- Block #0**:
 - Nonce: 0 MerkleRoot: 5434def831cb27f6b4296bca188107b5959cddc12d1941c3f6a2b3a931afdd5a
 - Data:**
 - Genesis: Sumera Malik Blockchain
- Block #1**:
 - Hash: 000020ee3637afa8e04951405ff0418de30c03ee001b3c92e02fdac5c2498071c
 - Prev: 07f12a4523cc4ae7c9b7e02a6023d94496162a0a9b895591b2ae8362a93dd2ec
 - Nonce: 53450 MerkleRoot: c25fed85ee120ef594487c0651a5e78f239aeb7936304b1405eae18b3c904faa
 - Data:**
 - 21i-1579
- Block #2**:
 - Hash: 0000c29ad84152ffb3ffb0af6152bfa03ede04827def533cb8acea6f37c2c75
 - Prev: 000020ee3637afa8e04951405ff0418de30c03ee001b3c92e02fdac5c2498071c
 - Nonce: 32402 MerkleRoot: c48e7a31b7bb44e5e89716a5cddf2601191f2105ecdc5adb1567b565aaa36436
 - Data:**
 - Block test transaction

Owner: **Sumera Malik** • First TX: 21i-1579

At the bottom of the browser window, the taskbar shows various application icons and the system status bar indicates it's 5:16 pm on 15/09/2025.

The screenshot shows a web browser window with multiple tabs open. The active tab displays the 'Sumera Malik Blockchain' interface. It includes the following sections:

- Add Transaction**: A form with a text input field containing 'Test' and a 'Pending: 0' status indicator. A 'Add' button is present.
- Mine Block (Proof of Work)**: A section with a 'Mine' button and the message 'Mined block #2'.
- Search Transactions**: A search bar containing '21i-1579' and a 'Search' button. Below it, a message states '• In block #1 — matches: 21i-1579'.
- Blockchain**: A section titled 'Block #0' with the timestamp '2025-09-15T16:59:37+05:00'. This section contains the same blockchain history as the first screenshot.

At the bottom of the browser window, the taskbar shows various application icons and the system status bar indicates it's 5:16 pm on 15/09/2025.

Part 2 – MetaMask Setup & Test Transaction (Sepolia Testnet)

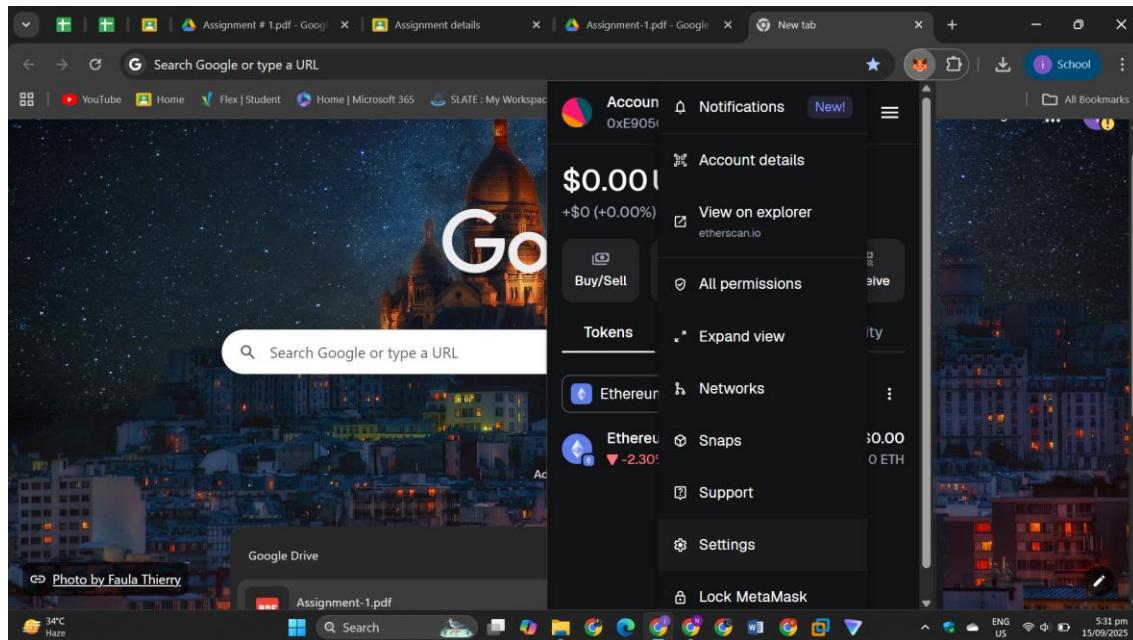
For Question 2, I performed a test transaction on the Sepolia Ethereum Testnet using MetaMask.

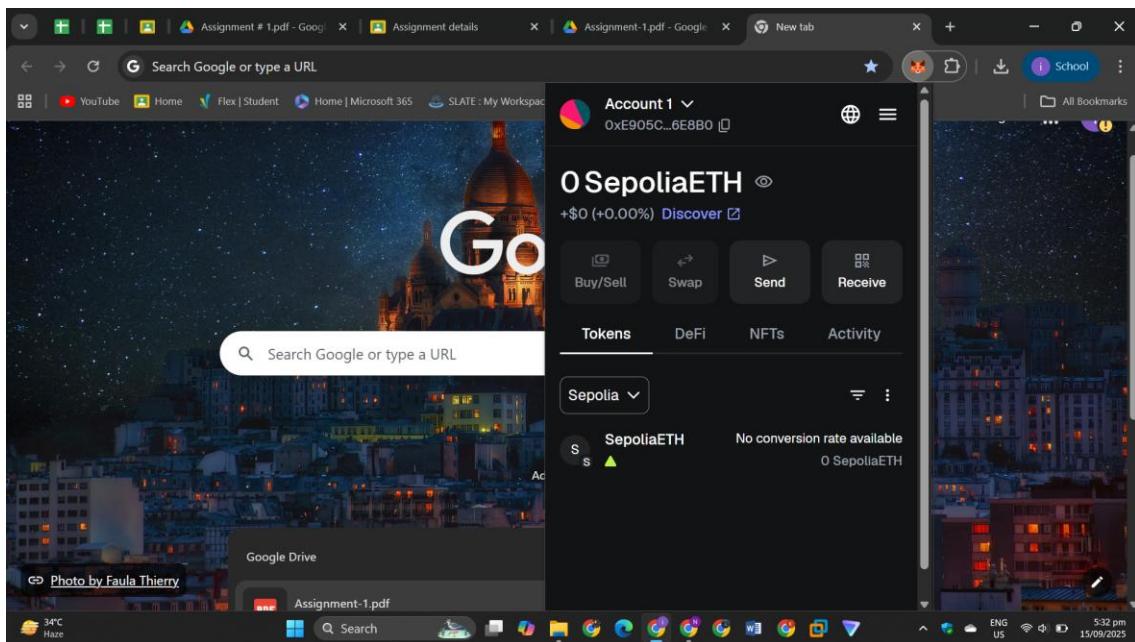
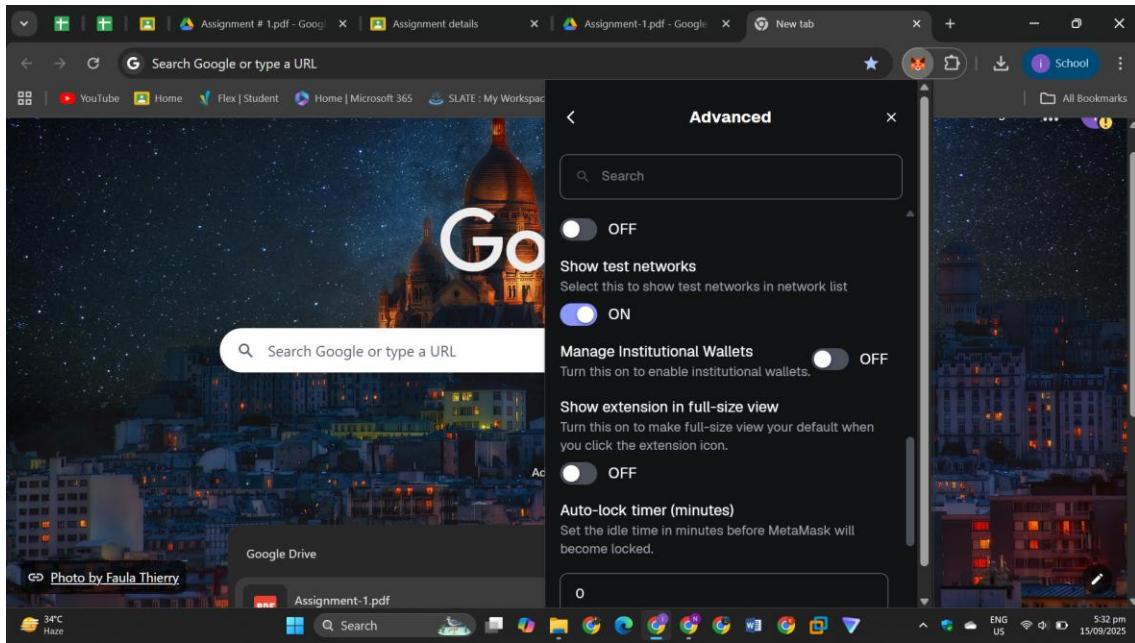
Steps Followed:

1. Installed MetaMask extension and created Account 1
2. Enabled Sepolia test network in MetaMask
3. Received free ETH from a Sepolia PoW faucet
4. Created Account 2 and copied its address
5. Sent 0.01579 SepoliaETH from Account 1 → Account 2
6. Verified the transaction status as Confirmed on Sepolia Etherscan
7. Confirmed the balance increase in Account 2

Transaction Proof

- Faucet confirmation showing 0.052 SepoliaETH received
- MetaMask screenshot before sending
- Send transaction screen showing 0.01579 ETH amount
- Transaction confirmation screen
- MetaMask Activity tab showing Confirmed status
- Account 2 showing the received 0.01579 SepoliaETH





The screenshot shows the Sepolia PoW Faucet interface. At the top, there's a banner featuring a pixelated cat and the text "Fork me on GitHub". Below the banner, the page displays mining statistics:

Target Address:	0xE905C1b5B4115Ca40e65C79d12A1F4C527D6E8B0
Your Mining Reward:	0.006 SepETH
Current Hashrate:	202.2 H/s
Number of Workers:	12 / 12
Minimum Claim Reward:	0.05 SepETH
Maximum Claim Reward:	2.5 SepETH
Remaining Session Time:	11h 56min
Total Shares:	3
Avg. Reward per Hour:	0.113 SepETH/h
Reward Boost:	+ 0% <button>Boost</button>

At the bottom right, it says "v2.4.0". The taskbar at the bottom shows various icons and the date/time: 5:38 pm, 15/09/2025.

The screenshot shows the Sepolia PoW Faucet claim interface. It features a large green header with the text "Sepolia PoW Faucet". Below the header, a message states: "The faucet is currently experiencing unusually high mining activity (>561 kH/s). For higher rewards, I recommend visiting again when the activity is lower." Underneath this message, there's a section titled "Claim Rewards" with the following details:

Wallet:	0xE905C1b5B4115Ca40e65C79d12A1F4C527D6E8B0
Amount:	0.052 SepETH
Timeout:	2025-09-16 17:35 (23h 43min)

Below the details is a large green button labeled "Claim Rewards". At the bottom right, it says "v2.4.0". The taskbar at the bottom shows various icons and the date/time: 5:52 pm, 15/09/2025.

The screenshot shows a web browser window with multiple tabs open. The active tab is titled "Sepolia PoW" and displays the "Sepolia PoW Faucet" page. The page content includes:

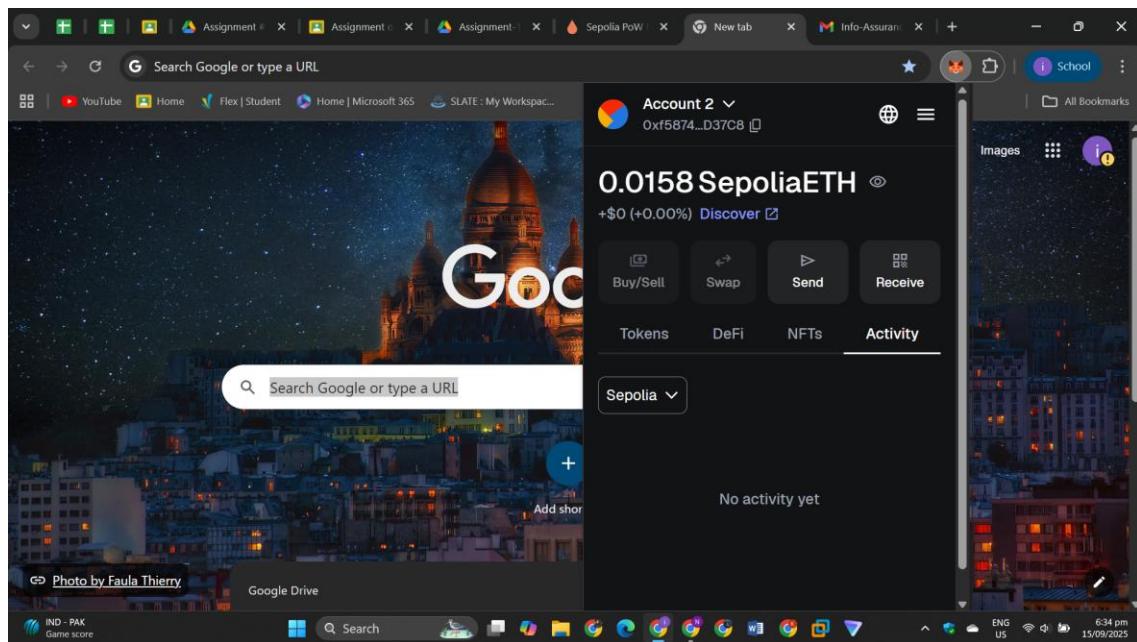
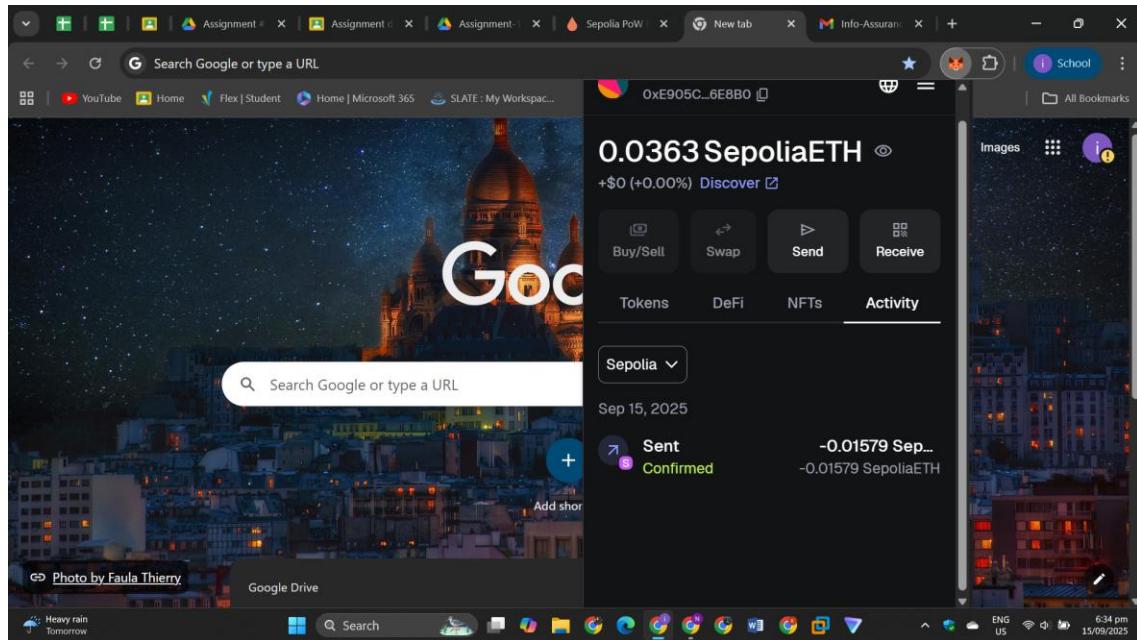
- A message box stating: "The faucet is currently experiencing unusually high mining activity (>539 kh/s). For higher rewards, I recommend visiting again when the activity is lower."
- A "Claim Rewards" section showing:
 - Wallet: 0xE905C1b5B4115Ca40e65C79d12A1F4C527D6E8B0
 - Amount: 0.052 SepETH
 - Timeout: -
- A green box indicating: "Claim Transaction has been confirmed in block #9208652!" with TX: [0xf30c816f749e0c266566ea50b7d9b28b576b560d17fa26cd2ffc1cf454dad3d2](#)
- Buttons for "Tweet" and "Post" on social media.
- A "Return to startpage" button.

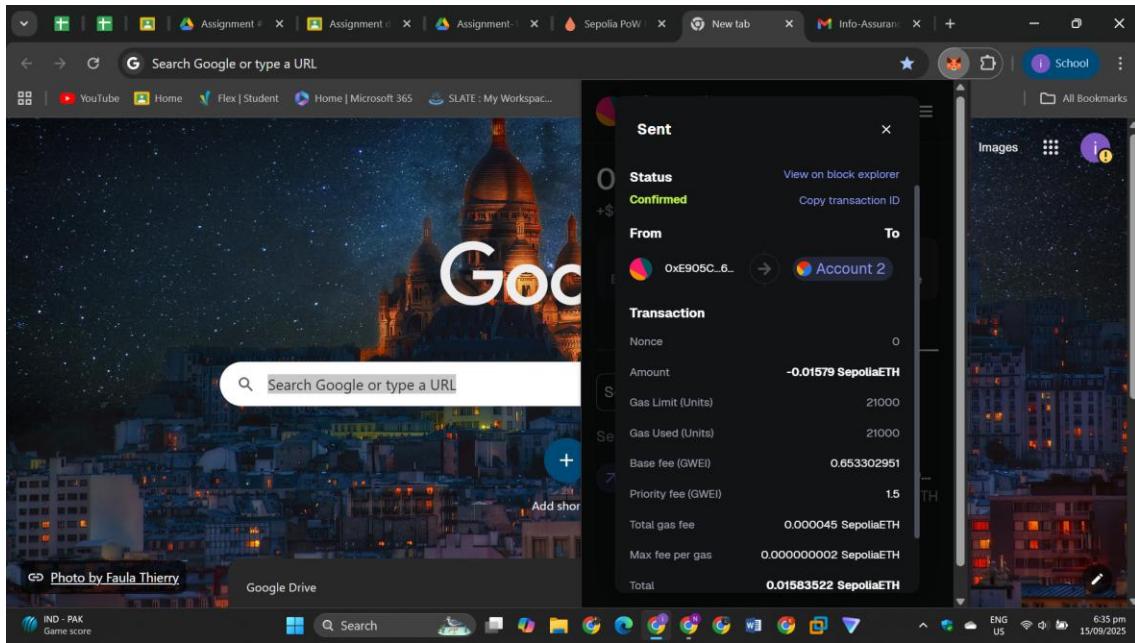
The browser interface includes a toolbar at the top with various icons and a status bar at the bottom showing system information like temperature, battery level, and date/time.

The screenshot shows a web browser window with a transaction confirmation dialog box overlaid on a background image of a city skyline at night. The dialog box contains the following information:

- Amount: 0.0158 SepoliaETH
- From: Account 1
- To: Account 2
- Network: Sepolia
- Network fee: 0 s SepoliaETH
- Speed: Market ~12 sec

At the bottom of the dialog are "Cancel" and "Confirm" buttons. The browser interface and system status bar are visible at the top and bottom of the screen respectively.





Conclusion

Both parts of the assignment were successfully completed.

- The blockchain application runs locally with a working React UI.
- The Sepolia test transaction successfully transferred 0.01579 SepoliaETH from Account 1 to Account 2 and was verified on Etherscan.