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Semester: ..... Program: ..... Branch: ..... Specialization: .....

Date: .....

Applied and Action Learning

(Learning by Doing and Discovery)

Name of the Experiement : Mine It – Basic Proof-of-Work Simulation

Objective/Aim:

Demonstrate how Proof-of-Work (PoW) functions by simulating mining via nonce searching and hash validation, illustrating how block integrity and chain linkage are maintained.

Apparatus/Software Used:

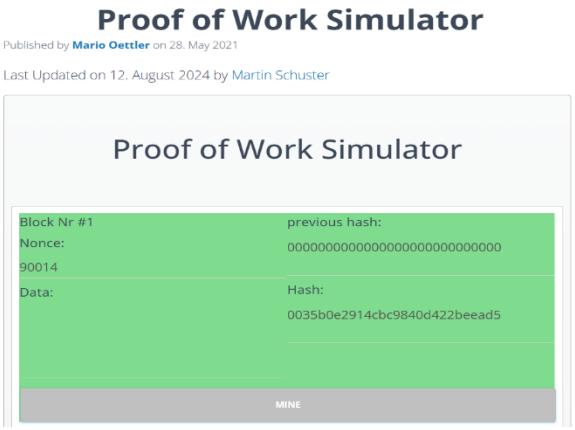
- Web Browser
- Proof of Work Simulator from Blockchain Academy (https://blockchain-academy.hs-mittweida.de/2021/05/proof-of-work-simulator/)
- PC/Laptop

Theory/Concept:

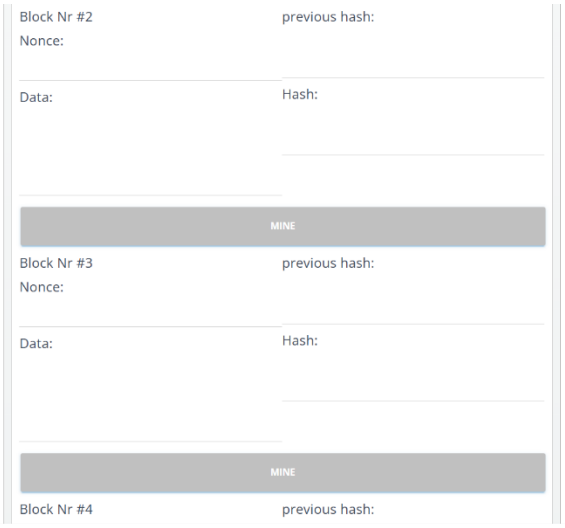
Proof-of-Work is a consensus mechanism where miners compute a nonce that, when combined with block data and the previous block's hash, produces a hash meeting a specific requirement—typically starting with a certain number of zeros. This process requires computational effort but is easily verifiable, securing the blockchain by linking blocks via hashes.

Procedure:

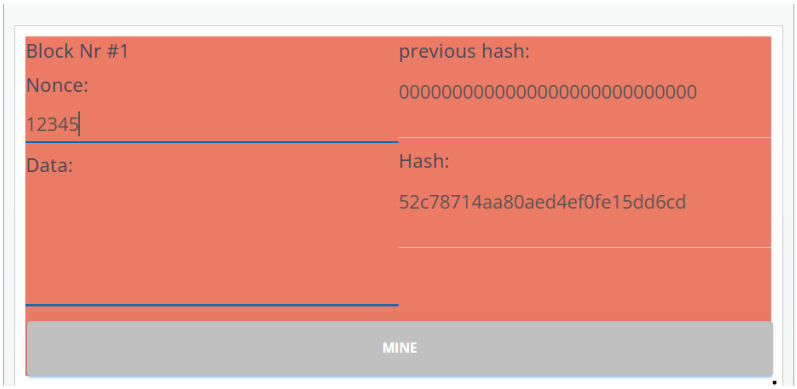
1. Open the **Proof of Work Simulator** from the Blockchain Academy toolkit.



2. Observe the simulator's interface, which includes multiple blocks (e.g., Block #1, Block #2), each showing fields for **Nonce**, **Data**, **Previous Hash**, and **Hash**, with buttons labeled **"Mine"** and **"Clear"**.

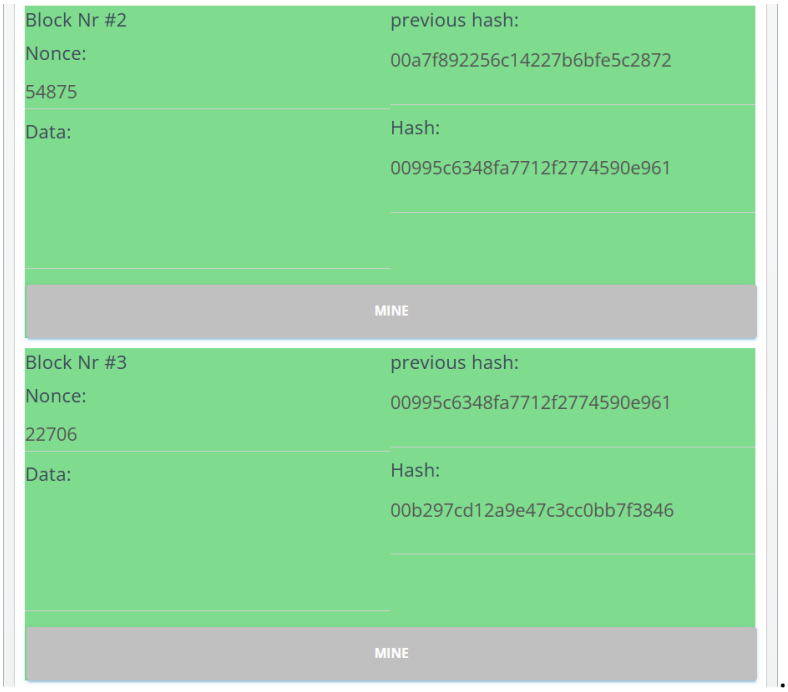


3. The simulator starts with the first block already "mined"—its hash satisfies the condition (e.g., begins with two zeros) and appears **green**.
4. Modify the **Data** or **Nonce** in Block #1 and observe how the block becomes **red**, indicating an invalid hash.



5. Click **Mine** on Block #1 to automatically search for a valid nonce that generates a matching hash. Once found, the block turns **green** again.

6. Proceed to **mine subsequent blocks** sequentially—each block's "Previous Hash" is set to the hash of the prior block, demonstrating the chain dependency.



7. Use the **Clear** button to reset the entire simulation and generate a new genesis block along with clean state for all following blocks.

Observation Table:

- The PoW requirement makes a block valid only when its hash meets the difficulty criteria (e.g., leading zeros), and this is visualized by the block turning **green**.
- Altering prior blocks invalidates all following blocks (they turn **red**), illustrating the interconnected nature of the blockchain.
- Mining each block is a process of trial-and-error to find the correct **nonce** that yields a valid hash.

ASSESSMENT

Rubrics	Full Mark	Marks Obtained	Remarks
Concept	10		
Planning and Execution/ Practical Simulation/ Programming	10		
Result and Interpretation	10		
Record of Applied and Action Learning	10		
Viva	10		
Total	**50**		

Signature of the Student:
Name :
Regn. No. :

Signature of the Faculty: