Centurion University
Shaping Lives... Empowering Communities...

School: ..... Campus: .....

Academic Year: ..... Subject Name: ..... Subject Code: .....

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

Date: .....

Applied and Action Learning

(Learning by Doing and Discovery)

Name of the Experiement :

* Coding Phase: Pseudo Code / Flow Chart / Algorithm

ALGORITHM:

1.Start

2.Collect transaction data to form a block.

3.Set a **target difficulty** (a limit for the hash value).

4.Initialize a **nonce = 0**.

5.Combine block data + nonce → apply **hash function (SHA-256)**.

6.Check if the **hash < target difficulty**:
- If **yes**, block is successfully mined.
- If **no**, increment nonce and repeat Step 5.

7.Broadcast the mined block to the network.

8.Other nodes verify the hash and add the block to the blockchain.

9.Stop

* Softwares used

Bitcoin Core – the original full-node and mining software for Bitcoin.

CGMiner – popular open-source mining software supporting ASIC and GPU mining.

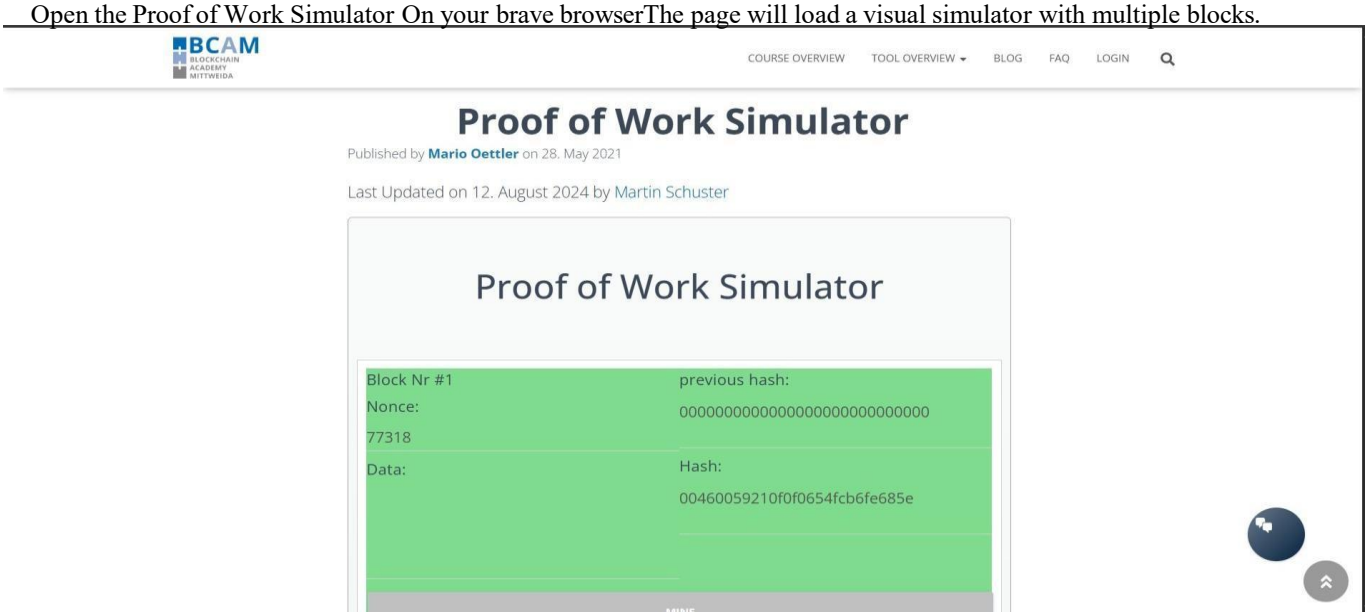
BFGMiner – modular miner for ASIC/FPGA devices, allows remote monitoring.

NiceHash Miner – beginner-friendly software that automatically selects profitable algorithms.

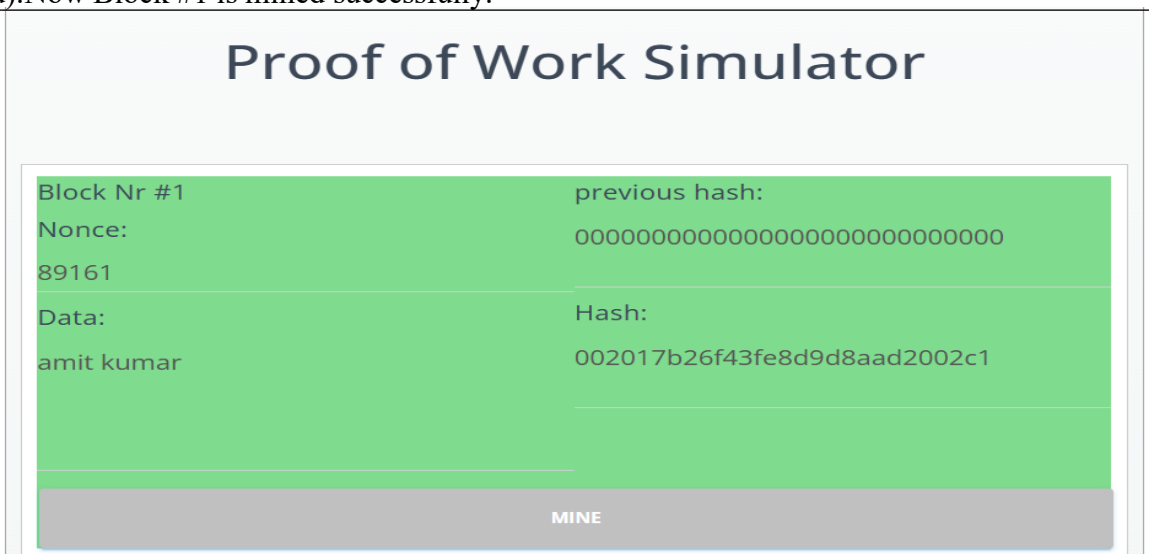
*As applicable according to the experiment.
Two sheets per experiment (10-20) to be used.

* Testing Phase: Compilation of Code (error detection)

Open the Proof of Work Simulator On your brave browserThe page will load a visual simulator with multiple blocks.



Understand the Layout You'll see blocks labeled Block #1, Block #2, etc.
Each block has:Data (text field),Nonce (number),Previous Hash (link to previous block),Hash (current block hash),Mine button.
Mine the First Block Click the "Mine" button on Block #1.The simulator will start calculating a valid nonce.Once the hash of the block starts with required zeroes (like 00...), the block turns green (valid).Now Block #1 is mined successfully.



Mine the Next Block (Block #2),Block #2 takes the hash of Block #1 as its "Previous Hash".
Click the "Mine" button on Block #2.Again, the simulator finds a valid nonce and turns the block green once it's valid.

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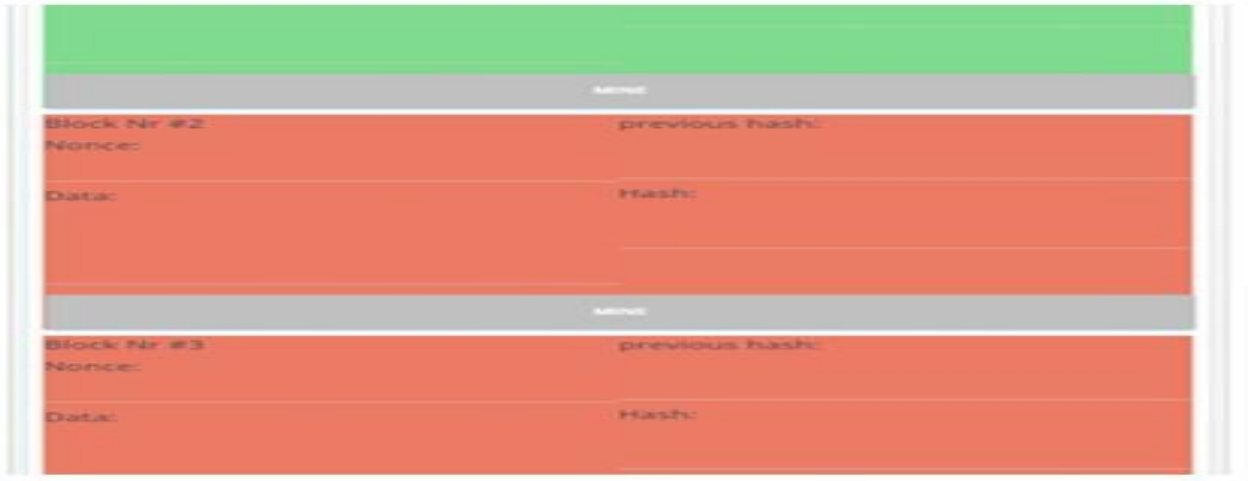
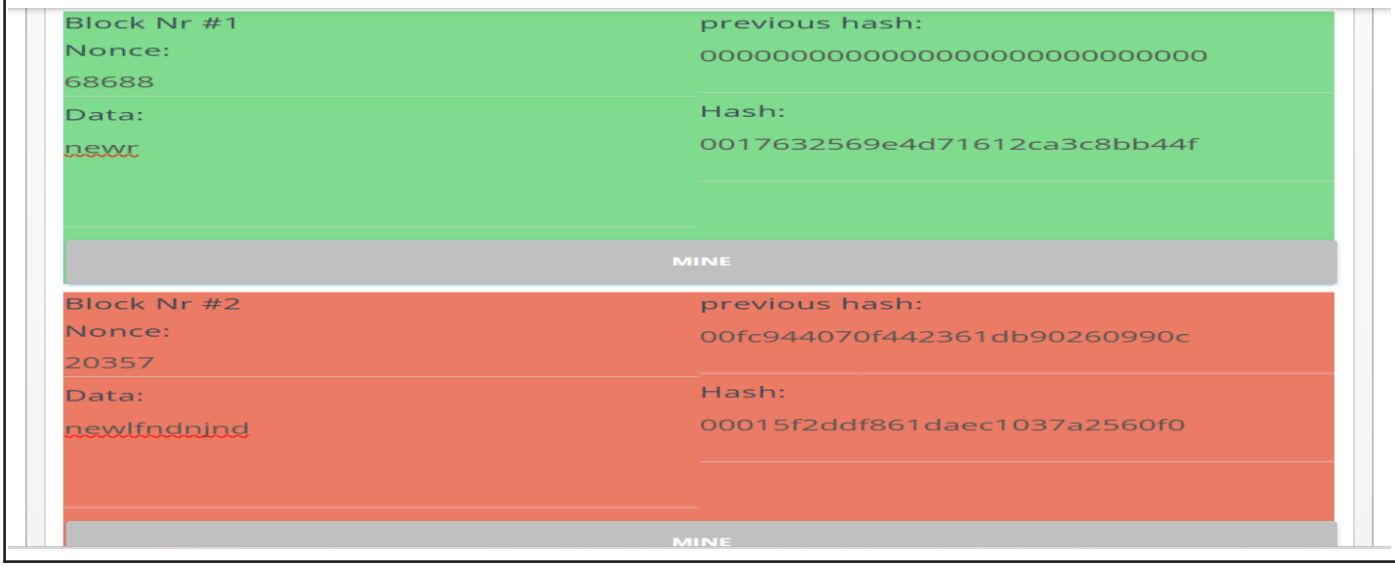
* Testing Phase: Compilation of Code (error detection)



Continue Mining All Blocks Repeat the process for Block #3 and Block #4. Each block is dependent on the hash of the previous block.
Modify the Block Data Now try changing the Data field in Block #1.You'll see that the hash changes, and Block #1 and all blocks after it turn red.This shows the chain is broken due to tampering—this is how blockchain ensures immutability.



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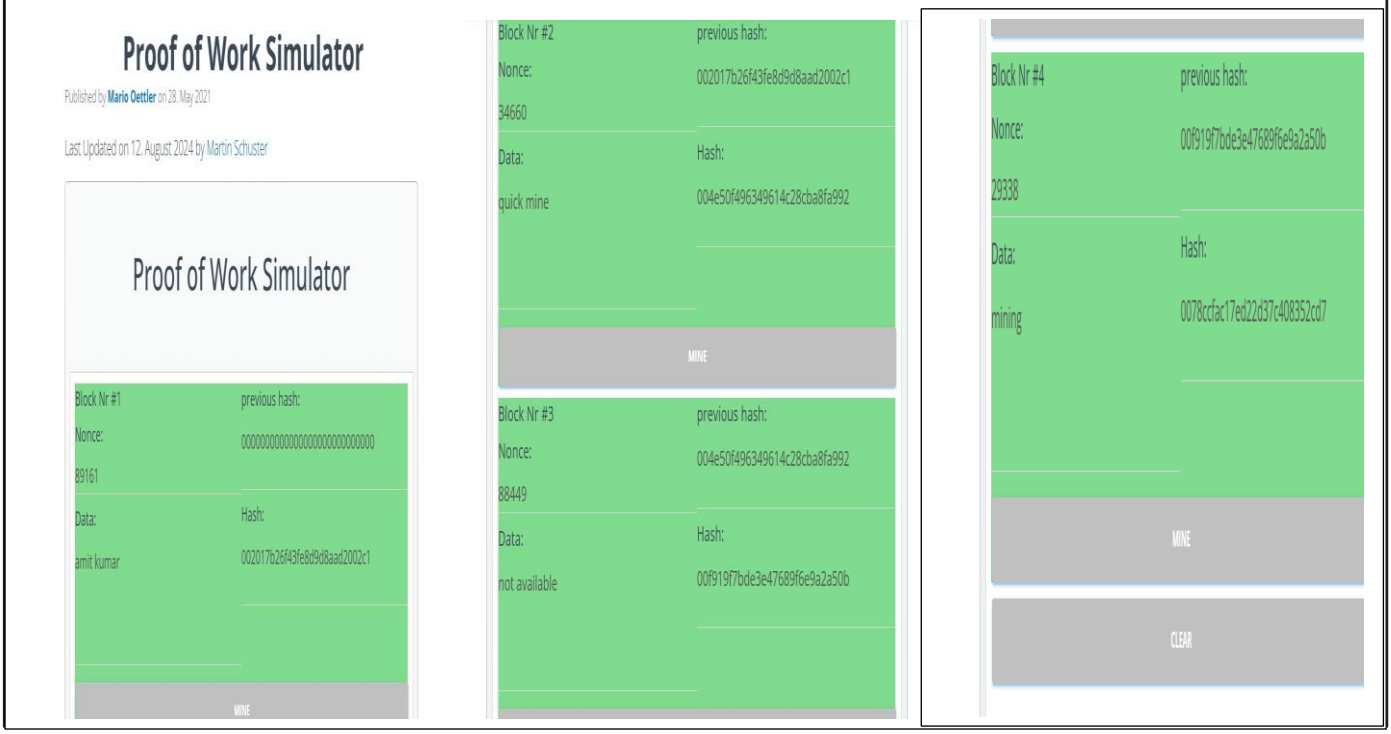
* Implementation Phase: Final Output (no error)

Now you see i successfully completed the mining of all the blocks



* Observations

>Mining requires **high computational power** to solve complex hash puzzles.
>Nonce value changes continuously until the correct hash is found.
>The **hash output** must be below the target difficulty.
>More powerful hardware increases the chance of mining a block.
>Mining consumes **a large amount of electricity**.
>Once a valid block is mined, it is **broadcast and verified** by other nodes.
>The successful miner receives a **block reward** (cryptocurrency + transaction fees).

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. :

**As applicable according to the experiment. Two sheets per experiment (10-20) to be used.*

Signature of the Faculty:

**As applicable according to the experiment.*
Two sheets per experiment (10-20) to be used.