Reward the Miner

BLOCKCHAIN DEVELOPMENT

Time: 60 mins

Introduction

In this class, the student/s will learn how to add transactions to the mining pool and calculate the reward for the miners.

New Commands Introduced

No new commands introduced.

Vocabulary

- **Bitcoin** is a cryptocurrency which was released in 2009.
- **ASIC** Application-Specific Integrated Circuits are built for specific purposes they cannot be used for other applications.
- **Mining** is the process of validating and addition transactions to the blockchain network.
- **Miner** is a person or a group of people who are responsible for validating and processing blockchain transactions.
- **Mining Pool** is a group of miners who share their computaional resources over a network to mine blocks.
- **Reward** is the amount or the number of cryptocurrency a miner gets for successfully mining a block on the blockchain network.
- **Wallet** is an encrypted online account that allows you to store, transfer and accept cryptocurrencies.

Learning Objectives

Student/s should be able to:

- ***Recall*** how a block is created when multiple transactions are added.
- ***Explain*** how transactions are mined in a blockchain.
- ***Describe*** how to add transactions and miners to the mining pool.
- ***Demonstrate*** how to mine transactions and calculate reward for the miner.

Activities

1. **Class Narrative:** *(2 mins)*

- Brief the student/s that the transactions are stored in a mining pool which are then picked by the miners based on the transaction speed. The miners are rewarded for adding new blocks to the blockchain network.

2. **Concept Introduction Activity:** *(5 mins)*

    - Let the student/s undertake the explore-activity to observe that the transaction are sent to a mining pool, the three miners in the mining pool, and the miner's balance being updated after a block is created.
    - Guide the student/s to do the following for the explore activity:
        - Add three or more transactions, these will be added to the mining pool.
        - Student/s can choose any one of the three miners to mine the transactions.
    - Inform the student/s that anyone with a regular PC could mine a block when Bitcoins was first introduced. Also, explain how ASICs were built to find the hash as the difficulty level increased.
    - Using the slides, explain that the student/s will learn:
        - to add transactions to the mining pool.
        - to add miners.
        - to update the reward balance.

3. **Activity 1:Add Transactions to the Mining Pool** *(10 mins)*

    Student Activity: *(10 mins)*

    - Explain how to add transactions to the mining pool by appending a new transaction to the pending transaction list.
    - Guide the student/s to write a function to add transactions to the mining pool and render on the web page.

4. **Activity 2: Add the Miners** *(20 mins)*

    Teacher Activity: *(10 mins)* .

    - Explain how to add miners by creating a miner class to store address and balance of the miners.
    - Demonstrate how to create a miner class.

    Student Activity: *(10 mins)*

    - Explain how to create a block using the first 3 transactions from the pending transactions list.

- Guide the student/s to debug the code to add miners and mine the pending transaction on the POST method call.

5. **Activity 3: Update the Reward Balance***(10 mins)*

   Student Activity: *(10 mins)*

   - Explain how the block reward is calculated as the sum of based reward and sum of transactions fees.
   - Guide the students to calculate and display the block reward on the miner's wallet by setting a base reward and adding it to the sum of transaction fees..

6. **Introduce the Post class project:** *(2 min)*

   - Create a mining pool and miners for the real estate tracker.

7. **Test and Summarize the class learnings:** *(5 mins)*

   - Check for understanding through quizzes and summarize learning after respective missions.
   - Summarize the overall class learning towards the end of the class.

8. **Additional activities:**

   - Encourage the student/s to add new miners to the mining pool.
   - Encourage the student/s to reduce the base reward after every block is mined.

9. **State the Next Class Objective:** *(1 min)*

   - In the next class, student/s will learn to create different peer nodes and copies of block chain for these nodes.

U.S. Standards:

CSTA: 2-AP-11, 2-AP-12, 2-AP-13, 2-AP-14, 2-AP-19

Links Table		
Activity	**Activity Name**	**Link**
Class Presentation	Reward the Miner	https://s3-whjr-curriculum-uploads.whjr.online/97263bb7-141f-446b-b935-18362fd64693.html

Explore Activity	Reward the Miner	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS-BP
Student Activity 1	Add Transactions to the Mining Pool	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS-BP
Teacher Reference: Student Activity 1 Solution	Add Transactions to the Mining Pool	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS
Teacher Activity 2	Add the Miners	https://github.com/Tynker-Blockchain/TNK-M12-C94-TAS-BP
Teacher Reference: Teacher Activity 2 Solution	Add the Miners	https://github.com/Tynker-Blockchain/TNK-M12-C94-TAS
Student Activity 2	Add the Miners	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS-BP
Teacher Reference: Student Activity 2 Solution	Add the Miners	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS
Student Activity 3	Update the Reward Balance	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS-BP
Teacher Reference: Student Activity 3 Solution	Update the Reward Balance	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS
Student's Additional Activity 1	Add New Miners	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS-BP
Teacher Reference: Student's Additional Activity 1 Solution	Add New Miners	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS
Student's Additional Activity 2	Reduce Miner Reward	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS-BP
Teacher Reference: Student's Additional Activity 2 Solution	Reduce Miner Reward	https://github.com/Tynker-Blockchain/TNK-M12-C94-SAS
Post Class Project	Mine Transactions and Calculate Reward	https://github.com/Tynker-Blockchain/TNK-M12-C94-PCP-BP
Teacher Reference: Post Class Project Solution	Mine Transactions and Calculate Reward	https://github.com/Tynker-Blockchain/TNK-M12-C94-PCP