Genesis Block

Blockchain Technology

Time: 55 mins

Introduction

In this class, the student/s will learn to create a genesis block as the first block in the blockchain, add a new block to the blockchain, and display all the blocks in the blockchain.

New Commands Introduced

No new commands are introduced.

Vocabulary

- **Genesis block** is the first block in the blockchain.

Learning Objectives

Student/s should be able to:

- ***Recall*** how a block is created and its transaction information displayed on a webpage.
- ***Explain*** what a genesis block is and how new blocks are added to create a blockchain.
- ***Demonstrate*** how to display the genesis block and all the blocks in the blockchain.

.

Activities

1. **Class Narrative:** *(2 mins)*
    - Brief the student/s how the blockchain begins with a genesis block and each block of data is connected to the next block using the hash of the previous block.
2. **Concept Introduction Activity:** *(5 mins)*
    - Let the student/s undertake the explore-activity to observe how adding the first transaction creates blocks 0 and block 1. Adding another transaction creates another block adjacent to it. Every transaction, except the genesis block, has a previous hash and a current hash.
    - Explain that the first block in the blockchain is called the genesis block upon which additional blocks in a blockchain are added.
    - Using the slides, explain that the student/s will learn:
        - to create a genesis block
        - to add a new block

- to display the blockchain

3. **Activity 1: Create a Genesis Block** *(14 mins)*

   Teacher Activity: *(7 mins)*

- Explain the structure of blockchain.
- Explain that the genesis block serves as the foundation and starting point of every blockchain network.
- Explain how to create a genesis block:
  - Create an object variable chain to add the blocks into it.
  - Define a function to create a genesis block.
  - Append the genesis block to the blockchain array.
  - Print the information of all the blocks.
  - Create a new chain and call the methods to create a genesis block and print it.

   Student Activity: *(7 mins)*

- Guide the student/s to create a genesis block.

4. **Activity 2: Add a New Block** *(11 mins)*

   Teacher Activity: *(5 mins)* .

- Explain that they need to append new blocks of data to the genesis block.
- Explain that genesis block will be appended first and then the new block will be appended to the blockchain.
- Explain how to append new blocks to the chain by adding a genesis block first:
  - Create a new block.
  - Create the genesis block.
  - Set the previous hash in the new block.
  - Append the new block.

   Student Activity: *(6 mins)*

- Guide the student/s to append new blocks to the chain by adding a genesis block first.

5. **Activity 3: Display the Blockchain** *(18 mins)*

Teacher Activity 3.1: *(4 mins)*

- Explain how to display all the block in the blockchain:
    - Import the blockchain module to create a new blockchain from app.py
    - Create a new block using the block class.
    - Add new block to the chain and print it.

Student Activity 3.1: *(4 mins)*

- Explain how to display all the block in the blockchain:
    - Import the blockchain module to create a new blockchain in app.py
    - Create a new block using the block class.
    - Add new block to the chain and print it.

Teacher Activity 3.1: *(5 mins)*

- Explain how to display all the block in the blockchain on the webpage:
    - Pass the block data along with the length of the chain.
    - Use a for loop to display all the blocks added in the blockchain.
    - Pass the transaction information to the toggleInfoSection function.
    - Show the block index on the block.
    - Receive the transaction data send from the webform.
    - Display the transaction information on the toggle info section.
- Let the student/s observe that the index of the new blocks added is 1.
- Inform the student/s that they would rectify it by setting the index of the new block.

Student Activity: *(5 mins)*

- Guide the students to all the block in the blockchain:
    - Set the index of the first block.
    - Set the index of the new block.
    - Pass the transaction information.
    - Show the block index.
    - Receive the transaction data.
    - Display the transaction data.

6. **Introduce the Post class project:** *(2 min)*
    - Create a blockchain and append the spare part details to the blockchain.

7. **Test and Summarize the class learnings:** *(2 mins)*
    - Check for understanding through quizzes and summarize learnings after each activity.
    - Summarize the overall class learnings towards the end of the class.

8. **Additional activities:**
    - Encourage the student/s to create a genesis class.
    - Encourage the student/s to calculate the hash of the genesis block.

9. **State the Next Class Objective:** *(1 min)*
    - In the next class, student/s will learn to validate the blocks added in the blockchain.

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	Genesis Block	https://s3-whjr-curriculum-uploads.whjr.online/f2fa913c-5e08-4fd8-98e1-8e1d61892b7d.html
Explore Activity	Genesis Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS
Teacher Activity 1	Create a Genesis Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS-BP
Teacher Reference: Teacher Activity 1 Solution	Create a Genesis Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS
Student Activity 1	Create a Genesis Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS-BP
Teacher Reference: Student Activity 1 Solution	Create a Genesis Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS
Teacher Activity 2	Append a New Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS-BP

Teacher Reference: Teacher Activity 2 Solution	Append a New Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS
Student Activity 2	Append a New Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS-BP
Teacher Reference: Student Activity 2 Solution	Append a New Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS
Teacher Activity 3.1	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS-BP
Teacher Reference: Teacher Activity 3.1 Solution	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS
Student Activity 3.1	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS-BP
Teacher Reference: Student Activity 3.1 Solution	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS
Teacher Activity 3.2	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS-BP
Teacher Reference: Teacher Activity 3.2 Solution	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-TAS
Student Activity 3.2	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS-BP
Teacher Reference: Student Activity 3.2 Solution	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS
Student's Additional Activity 1	Create a Genesis Class	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS-BP
Teacher Reference: Student's Additional Activity 1 Solution	Create a Genesis Class	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS
Student's Additional Activity 2	Calculate the Hash of the Genesis Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS-BP
Teacher Reference: Student's Additional Activity 2 Solution	Calculate the Hash of the Genesis Block	https://github.com/Tynker-Blockchain/TNK-M11-C87-SAS
Post Class Project	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-PCP-BP
Teacher Reference: Post Class Project Solution	Display the Blockchain	https://github.com/Tynker-Blockchain/TNK-M11-C87-PCP