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19BCE245

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BlockChain Technology

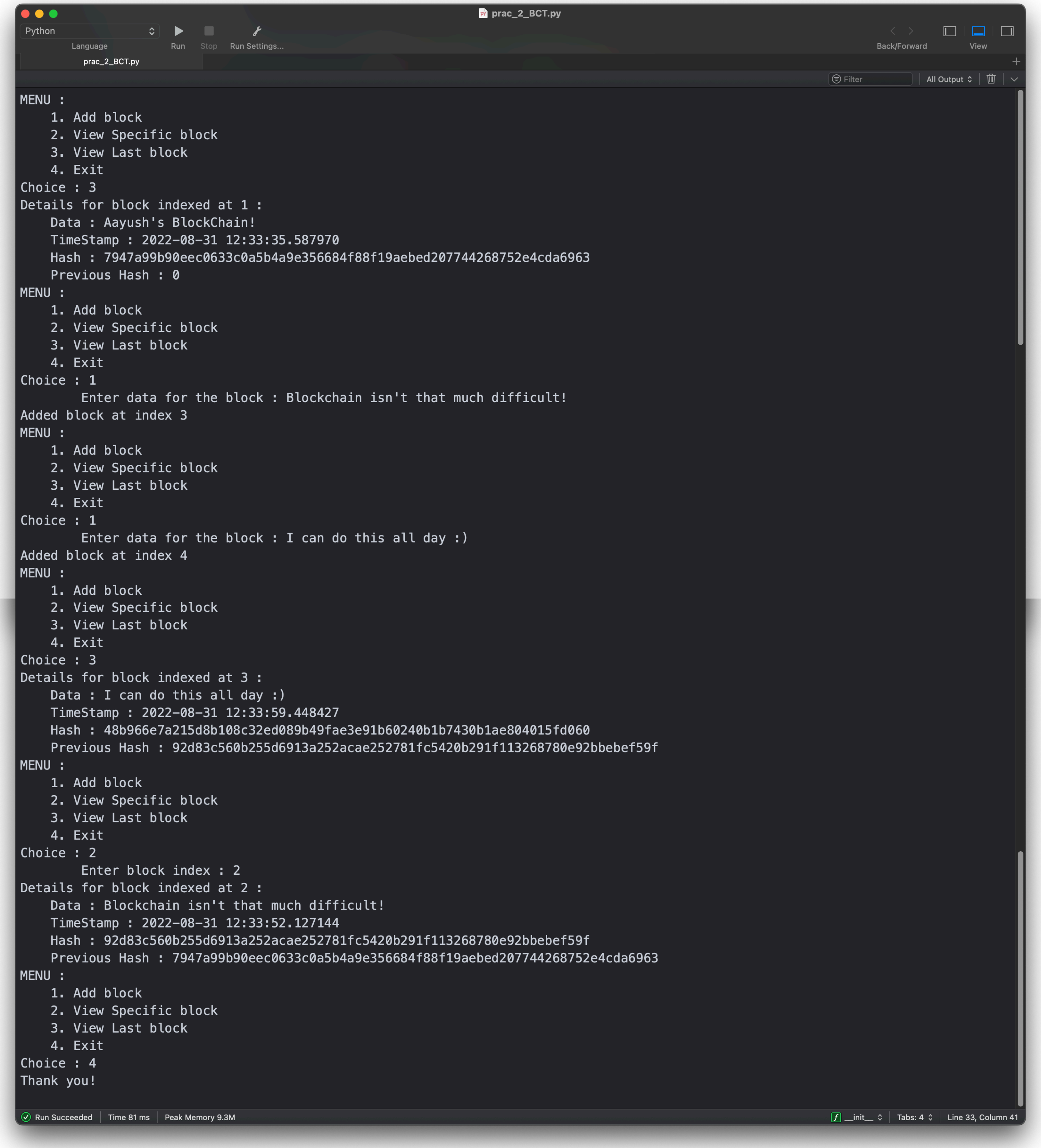
Practical 2

To create a blockchain and implement replay attacks on blockchain

- **Code :**

```
# 19BCE245 - Aayush Shah
# To create a blockchain and implement replay attacks on blockchain

import datetime
import hashlib
import json
# import JSON
# from flask import jsonify

def compute_hash(index, previous_hash, timestamp, data):
      return hashlib.sha256((str(index) + str(previous_hash) +
str(timestamp) + json.dumps(data)).encode('utf-8')).hexdigest()

class Block:
      def __init__(self, index, data, previous_hash):
            self.index = index
            self.data = data
            self.previous_hash = previous_hash
            self.timestamp = str(datetime.datetime.now())
            self.hash = compute_hash(self.index, self.previous_hash,
self.timestamp, self.data)

      def print_block_details(self):
            print(f'Details for block indexed at {self.index} : ')
            print(f'\tData : {self.data}')
            print(f'\tTimeStamp : {self.timestamp}')
            print(f'\tHash : {self.hash}')
            print(f'\tPrevious Hash : {self.previous_hash}')

class BlockChain:
      # chain = []
      def __init__(self):
            self.chain = []
            genesis_block = Block(len(self.chain)+1,'Aayush\'s 
BlockChain!',0)
            self.chain.append(genesis_block)
      def add_block(self, data):
            new_block = Block(len(self.chain)+1, data, self.chain[-1].hash)

      def get_previous_block(self):
            return self.chain[-1]

      def get_specific_block(self,index):
            return self.chain[index]

      def print_block(self, block):
            block.print_block_details()

if __name__ == "__main__":
      myBlockChain = BlockChain()
      while True:
            print("""MENU :
      1. Add block
      2. View Specific block
      3. View Last block
      4. Exit""")
            choice = int(input("Choice : "))
            try:
                  if choice==1:
                        data = input('\t\tEnter data for the block : ')
                        myBlockChain.add_block(data)
                        print(f'Added block at index 
{len(myBlockChain.chain)+1}')
                  elif choice==2:
                        index = int(input('\t\tEnter block index : '))
                        try:

myBlockChain.print_block(myBlockChain.get_specific_block(index-1))
                        except:
                              print('# Invalid index entered!')
                  elif choice==3:

myBlockChain.print_block(myBlockChain.get_previous_block())
                  elif choice==4:
                        print('Thank you!')
                        break
                  else:
                        print('# Invalid choice!')
            except:
                  print('# Integer value expected!')
```

- **Output :**



```
MENU :
    1. Add block
    2. View Specific block
    3. View Last block
    4. Exit
Choice : 3
Details for block indexed at 1 :
    Data : Aayush's BlockChain!
    TimeStamp : 2022-08-31 12:33:35.587970
    Hash : 7947a99b90eec0633c0a5b4a9e356684f88f19aebed207744268752e4cda6963
    Previous Hash : 0
MENU :
    1. Add block
    2. View Specific block
    3. View Last block
    4. Exit
Choice : 1
        Enter data for the block : Blockchain isn't that much difficult!
Added block at index 3
MENU :
    1. Add block
    2. View Specific block
    3. View Last block
    4. Exit
Choice : 1
        Enter data for the block : I can do this all day :)
Added block at index 4
MENU :
    1. Add block
    2. View Specific block
    3. View Last block
    4. Exit
Choice : 3
Details for block indexed at 3 :
    Data : I can do this all day :)
    TimeStamp : 2022-08-31 12:33:59.448427
    Hash : 48b966e7a215d8b108c32ed089b49fae3e91b60240b1b7430b1ae804015fd060
    Previous Hash : 92d83c560b255d6913a252acae252781fc5420b291f113268780e92bbebef59f
MENU :
    1. Add block
    2. View Specific block
    3. View Last block
    4. Exit
Choice : 2
        Enter block index : 2
Details for block indexed at 2 :
    Data : Blockchain isn't that much difficult!
    TimeStamp : 2022-08-31 12:33:52.127144
    Hash : 92d83c560b255d6913a252acae252781fc5420b291f113268780e92bbebef59f
    Previous Hash : 7947a99b90eec0633c0a5b4a9e356684f88f19aebed207744268752e4cda6963
MENU :
    1. Add block
    2. View Specific block
    3. View Last block
    4. Exit
Choice : 4
Thank you!
```

- **Learning Outcomes :**

From this practical, I learned about how to create a blockchain from scratch.

I have implemented a user-oriented function through which user can add blocks in the blockchain as well as view any specific blocks. Basically, every block contains the index, data, it's own hash value along with previous block's hash value and time stamps.

This blockchain is usually linked-list type structure in which every block is connected through chain with each other.