Hash puzzle

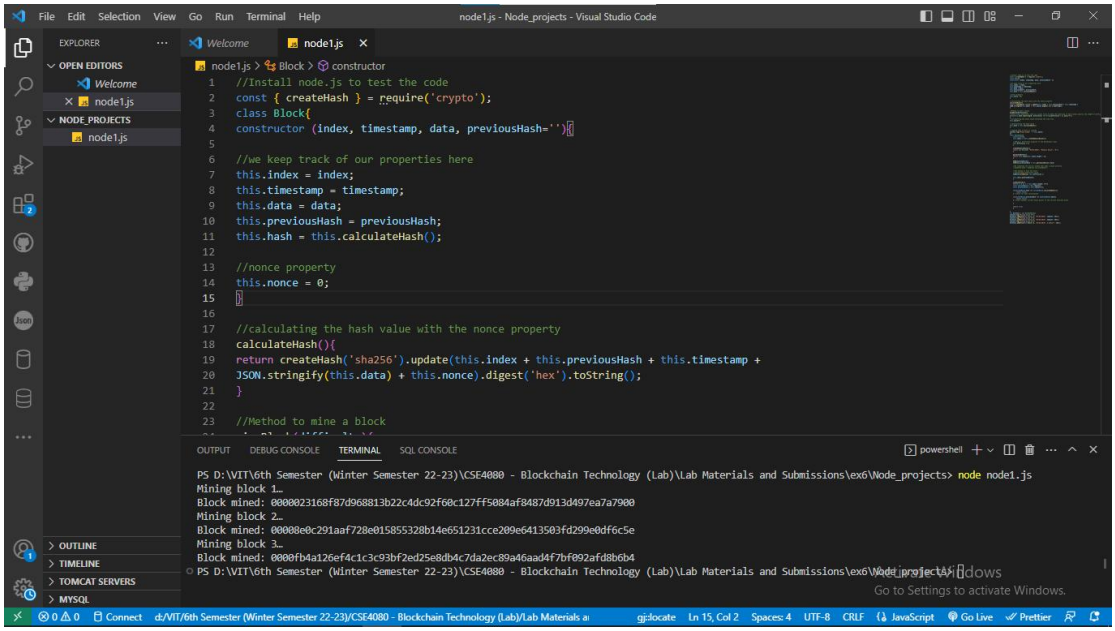
Code:

```
//Install node.js to test the code
const { createHash } = require('crypto');
class Block{
constructor (index, timestamp, data, previousHash=''){

//we keep track of our properties here
this.index = index;
this.timestamp = timestamp;
this.data = data;
this.previousHash = previousHash;
this.hash = this.calculateHash();

//nonce property
this.nonce = 0;
}

//calculating the hash value with the nonce property
calculateHash(){
return createHash('sha256').update(this.index + this.previousHash + this.timestamp
+
JSON.stringify(this.data) + this.nonce).digest('hex').toString();
}

//Method to mine a block
mineBlock(difficulty){
//while loop conditional used is a quick trick to make the substring of hash values
exactly the length of difficulty
while(this.hash.substring(0, difficulty) !== Array(difficulty + 1).join("0"))
{
//incrementing the nonce value everytime the loop runs.
this.nonce++;

//recalculating the hash value
this.hash = this.calculateHash();
}

//logging when a block is created
console.log("Block mined: " + this.hash);
}}
class Blockchain{
    constructor(){
    this.chain = [this.createGenesisBlock()];

    //adding a difficulty property to the Blockchain class
```

```
    this.difficulty = 4;
    }

    createGenesisBlock(){
    return new Block(0, "02/01/2018", "Genesis Block", "0");
    }

    getlatestBlock(){
    return this.chain[this.chain.length - 1];
    }

    addBlock(newBlock){
    newBlock.previousHash = this.getlatestBlock().hash;

    //We commented the earlier method that adds a block directly
    //newBlock.hash = newBlock.calculateHash();

    //New method to mine the block
    //Customizable difficulty value
    newBlock.mineBlock( this.difficulty );

    this.chain.push(newBlock);
    }

    isChainValid(){
    for(let i = 1; i < this.chain.length; i++){
    const currentBlock = this.chain[i];
    const previousBlock = this.chain[i-1];

    if(currentBlock.hash !== currentBlock.calculateHash()){
        return false;
    } //check for hash calculations

    if(currentBlock.previousHash !== previousBlock.hash){
        return false;
    } //check whether current block points to the correct previous block

    }

    return true;
    }

}
let koreCoin = new Blockchain();
console.log('Mining block 1…');
koreCoin.addBlock(new Block (1, "01/01/2018", {amount: 20}));
console.log('Mining block 2…');
koreCoin.addBlock(new Block (2, "02/01/2018", {amount: 40}));
```

```
console.log('Mining block 3…');
koreCoin.addBlock(new Block (3, "02/01/2018", {'amount': 40}));
```

Output:



//Observe the zeros above-5 zeros and hence met the target of 4

Code:

```
//increase difficulty level to 7
const { createHash } = require('crypto');
class Block{
 constructor (index, timestamp, data, previousHash=''){

 //we keep track of our properties here
 this.index = index;
 this.timestamp = timestamp;
 this.data = data;
 this.previousHash = previousHash;
 this.hash = this.calculateHash();

 //nonce property
 this.nonce = 0;
 }

 //calculating the hash value with the nonce property
 calculateHash(){
 return createHash('sha256').update(this.index + this.previousHash + this.timestamp
+
JSON.stringify(this.data) + this.nonce).digest('hex').toString();
 }
```

```
 //Method to mine a block
 mineBlock(difficulty){
 //while loop conditional used is a quick trick to make the substring of hash
values exactly the length of difficulty
 while(this.hash.substring(0, difficulty) !== Array(difficulty + 1).join("0"))
 {
 //incrementing the nonce value everytime the loop runs.
 this.nonce++;

 //recalculating the hash value
 this.hash = this.calculateHash();
 }

 //logging when a block is created
 console.log("Block mined: " + this.hash);
}}
class Blockchain{
 constructor(){
 this.chain = [this.createGenesisBlock()];

 //adding a difficulty property to the Blockchain class
 this.difficulty = 7;
 }

 createGenesisBlock(){
 return new Block(0, "02/01/2018", "Genesis Block", "0");
 }

 getlatestBlock(){
 return this.chain[this.chain.length - 1];
 }

 addBlock(newBlock){
 newBlock.previousHash = this.getlatestBlock().hash;

 //We commented the earlier method that adds a block directly
 //newBlock.hash = newBlock.calculateHash();

 //New method to mine the block
 //Customizable difficulty value
 newBlock.mineBlock( this.difficulty );

 this.chain.push(newBlock);
 }

 isChainValid(){
 for(let i = 1; i < this.chain.length; i++){
```

```
const currentBlock = this.chain[i];
const previousBlock = this.chain[i-1];

if(currentBlock.hash !== currentBlock.calculateHash()){
return false;
} //check for hash calculations

if(currentBlock.previousHash !== previousBlock.hash){
return false;
} //check whether current block points to the correct previous block

}

return true;
}

}
let koreCoin = new Blockchain();
console.log('Mining block 1…');
koreCoin.addBlock(new Block (1, "01/01/2018", {amount: 20}));
console.log('Mining block 2…');
koreCoin.addBlock(new Block (2, "02/01/2018", {amount: 40}));
console.log('Mining block 3…');
koreCoin.addBlock(new Block (3, "02/01/2018", {'amount': 40}));
```

Output: