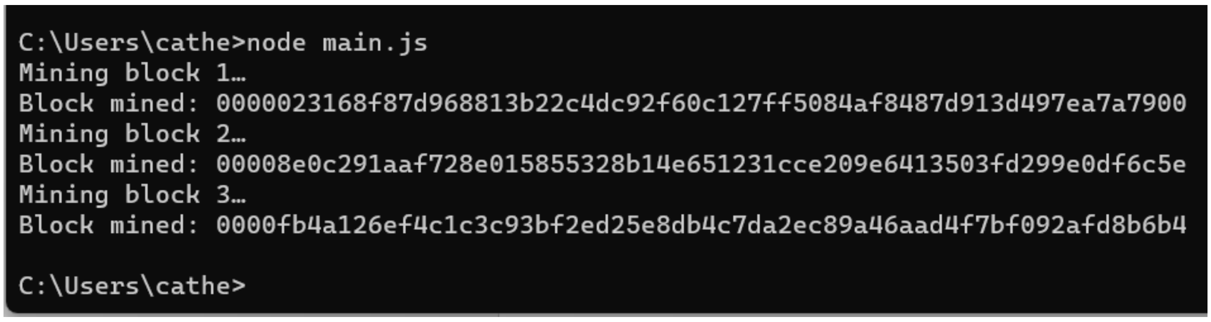
```
//Install node.js to test the code
const { createHash } = require('crypto');
class Block{
    constructor (index, timestamp, data, previousHash=''){

        //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
lenght 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}));
```



```
C:\Users\cathe>node main.js
Mining block 1…
Block mined: 0000023168f87d968813b22c4dc92f60c127ff5084af8487d913d497ea7a7900
Mining block 2…
Block mined: 00008e0c291aaf728e015855328b14e651231cce209e6413503fd299e0df6c5e
Mining block 3…
Block mined: 0000fb4a126ef4c1c3c93bf2ed25e8db4c7da2ec89a46aad4f7bf092afd8b6b4

C:\Users\cathe>
```

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

//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
lenght 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");
    }
```

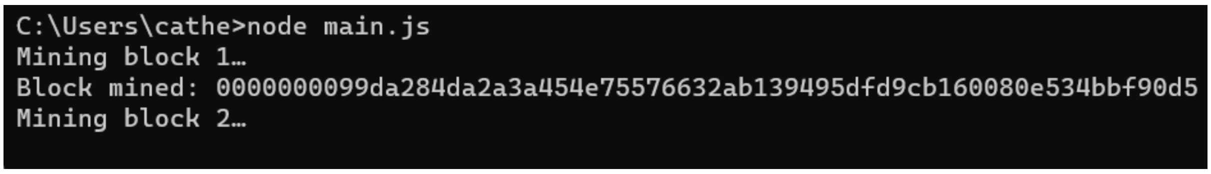
```
getlatestBlock(){
    return this.chain[this.chain.length - 1];
}

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}));
```

………………..

10.24am – 10.30am(6min to mine block1)

10.30am- more than 11 min (to mine block2 and so on…)



```
C:\Users\cathe>node main.js
Mining block 1…
Block mined: 0000000099da284da2a3a454e75576632ab139495dfd9cb160080e534bbf90d5
Mining block 2…
```