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Blockchain Practicals

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Practical 2:
A)Creating a blockchain for calculating factorial of a number.

Factchain.js

```
const c = require('crypto');

class Block{
    constructor(i, t , n, ph=''){
        this.i=i;
        this.t=t;
        this.n=n;
        this.ph=ph;
        this.f=this.calFact();
        this.h=this.calhash();
    }

    calFact(){
        let i=1;
        this.f=1;
        if(this.n==0)
            this.f=1;
        else{
            for(this.i=1;this.i<=this.n;this.i++)
                this.f *= this.i;

        }

        return this.f;
    }

    calhash(){
        return
c.createHash('sha256').update(this.i+this.t+this.n+this.ph).digest('hex');

    }
}

class Factchain{
```

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```
    constructor(){
        this.chain = [this.genesisBlock()];



    }

    genesisBlock(){
        return new Block(0, new Date(), 0, '0');
    }

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

    addblock(nb){
        nb.ph=this.getCBlock().h;
    //    nb.f=nb.calFact();
        nb.h=nb.calhash();
        this.chain.push(nb);
    }

}

module.exports = {Block, Factchain};
```

Test.js

```
const {Block, Factchain} = require('./FactChain');
let mb=new Factchain();
mb.addblock(new Block(1, new Date(), 4));
mb.addblock(new Block(2, new Date(), 7));
console.log("Sayed Sukaina, 31031523028");
console.log(JSON.stringify(mb,null,3));
```

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Output:

```
PS C:\Users\admin\Desktop\Blockchain> node test.js
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{
   "chain": [
      {
         "i": 0,
         "t": "2024-08-07T05:53:02.821Z",
         "n": 0,
         "ph": "0",
         "f": 1,
         "h": "3f6fd1face8eab02cfd387c4380e8bf3423b0a8a02f7999f2502a309a74a170e"
      },
      {
         "i": 5,
         "t": "2024-08-07T05:53:02.821Z",
         "n": 4,
         "ph": "3f6fd1face8eab02cfd387c4380e8bf3423b0a8a02f7999f2502a309a74a170e",
         "f": 24,
         "h": "a78d3b171443279efdabb9cb1a738de2afa63f1a1c57f74896db96acb9feeeed"
      },
      {
         "i": 8,
         "t": "2024-08-07T05:53:02.821Z",
         "n": 7,
         "ph": "a78d3b171443279efdabb9cb1a738de2afa63f1a1c57f74896db96acb9feeeed",
         "f": 5040,
         "h": "bf9c14ef6d8e794db0b8c8bbe7d75c52f9064ed0aa051f19aa7cbcd73f634253"
      }
   ]
}
PS C:\Users\admin\Desktop\Blockchain>
```

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B) Creating a blockchain for calculating Happy number.

```
const c = require('crypto')



class Block{
constructor(i, t, n, ph=''){
    this.i = i;
    this.t = t;
    this.n = n;
    this.ph = ph;
    this.f = this.calFact();
    this.n = this.calHappyNumber();
    this.h = this.calhash();



}



calFact(){
let i = 1;
this.f = 1;
if(this.n==0)
    this.f = 1;
else{
    for(this.i = 1; this.i<this.n; this.i++)
        this.f = this.f*this.i;

}
return this.f;
}



calHappyNumber(){
    while(this.n>9){
        let sum = 0;
        while(this.n>0){
            let remainder = this.n % 10;
            this.n = Math.floor(this.n/10);
            let sqr = remainder * remainder;
            sum+=sqr;
```

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```
        }


        this.n = sum;
    }


    if(this.n == 1){
        this.f = "Happy Number";
        console.log("Happy Number")
    }
    else{
        this.f = "Not Happy Number";
        console.log("Not Happy Number")
    }
}


calhash(){
return c.createHash('sha256').update(this.i +  this.t + this.n +
this.ph).digest('hex');
}


}


class FactChain{
    constructor(){
        this.chain=[this.genesisBlock()];
    }


    genesisBlock(){
        return new Block(0, new Date(), 0)
    }


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

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```
    }


    addBlock(nb){
        nb.ph = this.getcurrBlock().h;
        nb.h = nb.calhash();
        this.chain.push(nb);
    }


}


module.exports = {Block, FactChain};
```

Test.js

```
const {Block, FactChain} = require('./FactChain');
let mb=new FactChain();
mb.addBlock(new Block(1, new Date(), 10));
mb.addBlock(new Block(2, new Date(), 49));
mb.addBlock(new Block(3, new Date(), 8));
console.log("Sayed Sukaina, 31031523028");
console.log(JSON.stringify(mb,null,3));
```

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Output:

```
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{
   "chain": [
      {
         "i": 0,
         "t": "2024-08-07T06:31:53.633Z",
         "ph": "",
         "f": "Not Happy Number",
         "h": "55a3baa69ca67b9afce83ff967e8f5b96235b960d89b4abbe561b37f9b4610a0"
      },
      {
         "i": 10,
         "t": "2024-08-07T06:31:53.638Z",
         "ph": "55a3baa69ca67b9afce83ff967e8f5b96235b960d89b4abbe561b37f9b4610a0",
         "f": "Happy Number",
         "h": "70171174073866b6319fce7be5af8a1745aa633f9b8411db6ec27d0a8bfbf91e"
      },
      {
         "i": 49,
         "t": "2024-08-07T06:31:53.638Z",
         "ph": "70171174073866b6319fce7be5af8a1745aa633f9b8411db6ec27d0a8bfbf91e",
         "f": "Happy Number",
         "h": "d3b01db43f0a36a6a2bfd91b43444d82e740142c2e0ad2dff32938e9d7c46428"
      },
      {
         "i": 8,
         "t": "2024-08-07T06:31:53.638Z",
         "ph": "d3b01db43f0a36a6a2bfd91b43444d82e740142c2e0ad2dff32938e9d7c46428",
         "f": "Not Happy Number",
         "h": "4e1a6d9d12ff641f4ff75e4cb2575cdf6eca187367e5a47f831a6438ce59b9a6"
      }
   ]
}
```