assignment04IBC

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Section: **A**

Questions

III. Anyone can view items, write a function named `listItems` which returns the list of items.

Hint (or distraction): Iterating through items consumes a lot of gas and even the string concatenation is
not straightforward in Solidity.

A: View and Pure functions, if made external do not cost gas.

```
function listItems() external view returns(Item[] memory) {
   return items;
}
```

VI. Should the `listItems` function be made a pure function? If so, update the function signature in the previous part. What is the difference between constant, pure and view functions?

A: No, the `listItems` function is not a pure function. It is a view function.

A view function promises not to change/modify the state variables. Constant and View modifiers were used to mean the same thing. In newer versions of Solidity, use of constant is deprecated.

On the other hand, pure functions are view functions with added restriction that they neither read
nor write any variables in storage.

`listItems` reads data from the storage so it is a view function.

Screenshots

Scenario: 1 Case of unsuccessful purchase or Refund

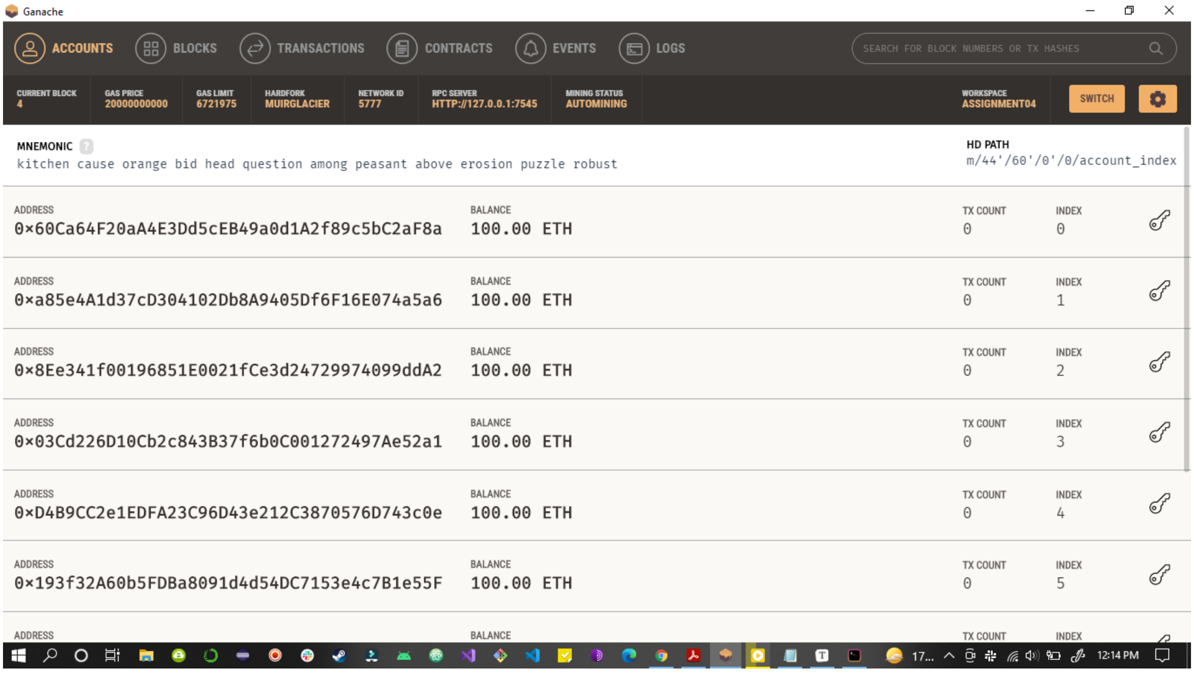
1.1 Creating an instance of the contract

```
C:\My Data\Sem7\Blockchain\Ehtesham Zahoor\assignment04IBC>truffle console
truffle(ganache)> let instance = await EscrowPayments.deployed()
undefined
truffle(ganache)> instance.owner().then(value=>value.toString())
'0x60Ca64F20aA4E3Dd5cEB49a0d1A2f89c5bC2aF8a'
truffle(ganache)> instance.addTTP(accounts[2])
{
  tx: '0x8e10ba1ee750779104151cddde1573d6053d015a2c6867e148aa46742e1ef8c3',
  receipt: {
    transactionHash: '0x8e10ba1ee750779104151cddde1573d6053d015a2c6867e148aa46742e1ef8c3',
    transactionIndex: 0,
    blockHash: '0xec3b395ca2885504118a5b350416e5e9a8403c24cbb9381a854594d66a886062',
    blockNumber: 4,
    from: '0x60ca64f20aa4e3dd5ceb49a0d1a2f89c5bc2af8a',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 46336,
    cumulativeGasUsed: 46336,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
```

1.2 Setting TTP

```
  tx: '0x8e10ba1ee750779104151cddde1573d6053d015a2c6867e148aa46742e1ef8c3',
  receipt: {
    transactionHash: '0x8e10ba1ee750779104151cddde1573d6053d015a2c6867e148aa46742e1ef8c3',
    transactionIndex: 0,
    blockHash: '0xec3b395ca2885504118a5b350416e5e9a8403c24cbb9381a854594d66a886062',
    blockNumber: 4,
    from: '0x60ca64f20aa4e3dd5ceb49a0d1a2f89c5bc2af8a',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 46336,
    cumulativeGasUsed: 46336,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)> instance.ttp().then(value=>value.toString())
'0x8Ee341f00196851E0021fCe3d24729974099ddA2'
truffle(ganache)>
```

1.3 Account addresses in Ganache vs Instance



1.4 Adding items

```
C:\WINDOWS\system32\cmd.exe - truffle console
truffle(ganache)> instance.addItem('ItemC',30)
{
  tx: '0xaad6e5e1443777ab488acdea998b1d98cdbb2368192bbc28aacb554f35e971b2',
  receipt: {
    transactionHash: '0xaad6e5e1443777ab488acdea998b1d98cdbb2368192bbc28aacb554f35e971b2',
    transactionIndex: 0,
    blockHash: '0x6bee0bc94e5dfdc9cf7cb60aebc210863bb73df83ba9bba1236c2809b33f73e4',
    blockNumber: 7,
    from: '0x60ca64f20aa4e3dd5ceb49a0d1a2f89c5bc2af8a',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 93576,
    cumulativeGasUsed: 93576,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
0000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)>
```

1.5 Listing Items

```
truffle(ganache)> instance.listItems().then(value=>value.toString())
'ItemA,10,0x41,0x0000000000000000000000000000000000000000,ItemB,20,0x41,0x0000000000000000000000000000000000000
000,ItemC,30,0x41,0x0000000000000000000000000000000000000000'
truffle(ganache)>
```

1.6 Buying Item

```
C:\WINDOWS\system32\cmd.exe - truffle console

truffle(ganache)> instance.buyItem('ItemC', {value:web3.utils.toWei('30','ether'), from:accounts[1]})
{
  tx: '0x74aac11521f3133977b52d01d69aed59f7ced228f6a6137135be450d2a458475',
  receipt: {
    transactionHash: '0x74aac11521f3133977b52d01d69aed59f7ced228f6a6137135be450d2a458475',
    transactionIndex: 0,
    blockHash: '0xd8b697b6a793ee4dd00f0e587f7eeff15d18ed5f99c187a5314fed94e5b7d394',
    blockNumber: 8,
    from: '0xa85e4a1d37cd304102db8a9405df6f16e074a5a6',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 55898,
    cumulativeGasUsed: 55898,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)>
```

```
truffle(ganache)> instance.listItems().then(value=>value.toString())
'ItemA,10,0x41,0x0000000000000000000000000000000000000000,ItemB,20,0x41,0x0000000000000000000000000000000000000000
000,ItemC,30,0x50,0xa85e4A1d37cD304102Db8A9405Df6F16E074a5a6'
truffle(ganache)>
```

`buyItem` changes the status of `ItemC` and the account of buyer is debited. `listItem` before `buyItem` displayed 0x41 as the status of `ItemC`. After buying the item, `listItem` displays 0x50 as `ItemC's` status.

- 0x41 in hex is equivalent to A (Available).
- 0x50 in hex is equivalent to P (Pending).

```
truffle(ganache)> web3.eth.getBalance(accounts[1])
'69998882040000000000'
truffle(ganache)>
```

1.7 Confirming Purchase

```
C:\WINDOWS\system32\cmd.exe - truffle console

truffle(ganache)> instance.confirmPurchase('ItemC',false, {from:accounts[1]})
{
  tx: '0x2adaed91e19799cc0d47dad7316b7bd82e011d00f6846336e62b94a6eb97475d',
  receipt: {
    transactionHash: '0x2adaed91e19799cc0d47dad7316b7bd82e011d00f6846336e62b94a6eb97475d',
    transactionIndex: 0,
    blockHash: '0x6f4e74bc08bd1eb74d066e17b3737605f0701398714f677acbab2de2ca95dba8',
    blockNumber: 9,
    from: '0xa85e4a1d37cd304102db8a9405df6f16e074a5a6',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 64582,
    cumulativeGasUsed: 64582,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)>
```

```
truffle(ganache)> instance.listItems().then(value=>value.toString())
'ItemA,10,0x41,0x0000000000000000000000000000000000000000,ItemB,20,0x41,0x0000000000000000000000000000000000000
000,ItemC,30,0x44,0xa85e4A1d37cD304102Db8A9405Df6F16E074a5a6'
truffle(ganache)>
```

- 0x44 in hex is equivalent to D (Delayed).

status of `ItemC` is D (delayed) as the buyer has passed false in status of `confirmPurchase`

1.8 Handling Dispute

```
C:\WINDOWS\system32\cmd.exe - truffle console

truffle(ganache)> instance.handleDispute('ItemC','0x52',{from:accounts[2]})
{
  tx: '0xa4b69bd2b6bb97f594c842da197988f3430e3721c93061c463a5fc8fc8cfe6fb',
  receipt: {
    transactionHash: '0xa4b69bd2b6bb97f594c842da197988f3430e3721c93061c463a5fc8fc8cfe6fb',
    transactionIndex: 0,
    blockHash: '0xfb99d96c3dc77e375d590c4bb18907d5f4b0ff4bc2cd40bd8169d9473638f8f5',
    blockNumber: 10,
    from: '0x8ee341f00196851e0021fce3d24729974099dda2',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 65435,
    cumulativeGasUsed: 65435,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)>
                                                                                                         110x26
```

```
truffle(ganache)> instance.listItems().then(value=>value.toString())
'ItemA,10,0x41,0x0000000000000000000000000000000000000000,ItemB,20,0x41,0x0000000000000000000000000000000000000
000,ItemC,30,0x52,0xa85e4A1d37cD304102Db8A9405Df6F16E074a5a6'
truffle(ganache)>
```

status of `ItemC` is updated.

1.9 Receiving Payment

```
C:\WINDOWS\system32\cmd.exe - truffle console

truffle(ganache)> instance.receivePayment('ItemC', {from:accounts[1]})
{
  tx: '0xc82f652c982d8057a570c58c0bbe5c3fedd812726f91cd3c327fedb106a15ae1',
  receipt: {
    transactionHash: '0xc82f652c982d8057a570c58c0bbe5c3fedd812726f91cd3c327fedb106a15ae1',
    transactionIndex: 0,
    blockHash: '0x51dfcbc4e0e90367bca46006fba0b9322d46792446e0151b29f2188bfde73376',
    blockNumber: 11,
    from: '0xa85e4a1d37cd304102db8a9405df6f16e074a5a6',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 78098,
    cumulativeGasUsed: 78098,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)>
                                                                                                         110x26
```

```
truffle(ganache)> web3.eth.getBalance(accounts[1])
'99996028440000000000'
truffle(ganache)>
```

Scenario: 2 Case of successful purchase

We do not need redo all the steps from the start. Let us buy another item but this item while confirming, pass true to the function.

2.1 Buying Item

Let's buy `ItemA` this time and give 1 ether as tip.

```
C:\WINDOWS\system32\cmd.exe - truffle console

truffle(ganache)> instance.buyItem('ItemA', {value:web3.utils.toWei('11','ether'), from:accounts[1]})
{
  tx: '0x6af3c21472cfb9ea931416c58e4223690de80557caa154381acfdfcdc5b5ed85',
  receipt: {
    transactionHash: '0x6af3c21472cfb9ea931416c58e4223690de80557caa154381acfdfcdc5b5ed85',
    transactionIndex: 0,
    blockHash: '0x50ef759e0697e9fdcbe52b65162062220d7af31378f86920ce2ea5f58a6a158f',
    blockNumber: 12,
    from: '0xa85e4a1d37cd304102db8a9405df6f16e074a5a6',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 41115,
    cumulativeGasUsed: 41115,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)>
110x26
```

2.2 Confirming Purchase

```
C:\WINDOWS\system32\cmd.exe - truffle console

truffle(ganache)> instance.confirmPurchase('ItemA', true, {from:accounts[1]})
{
  tx: '0x6b57bd4c4c982053a5d0e898e9cf891d46570138ef81e0630fdabfad2545739e',
  receipt: {
    transactionHash: '0x6b57bd4c4c982053a5d0e898e9cf891d46570138ef81e0630fdabfad2545739e',
    transactionIndex: 0,
    blockHash: '0xaa66c725fe1730336ada249b6547a180cb608497c802e6931230546778ee793d',
    blockNumber: 13,
    from: '0xa85e4a1d37cd304102db8a9405df6f16e074a5a6',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 42427,
    cumulativeGasUsed: 42427,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)>
110x26
```

2.3 Receiving Payment

```
C:\WINDOWS\system32\cmd.exe - truffle console

truffle(ganache)> instance.receivePayment('ItemA', {from:accounts[0]})
{
  tx: '0xa0c63a6b06540adb47f3ea2824b00be6024a9de211227aaa6582b42eed8f84c3',
  receipt: {
    transactionHash: '0xa0c63a6b06540adb47f3ea2824b00be6024a9de211227aaa6582b42eed8f84c3',
    transactionIndex: 0,
    blockHash: '0x8da86057b4d1ab72a24af48aa01ef94274fbcb401cf0b39c4c8a34848b50ab59',
    blockNumber: 15,
    from: '0x60ca64f20aa4e3dd5ceb49a0d1a2f89c5bc2af8a',
    to: '0x4d4d19d80cb74039dbbad6c4cadb086d5d088411',
    gasUsed: 53176,
    cumulativeGasUsed: 53176,
    contractAddress: null,
    logs: [],
    status: true,
    logsBloom: '0x000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000
00000000000000000000000000000000000000000000000000000000000000000000000000000000000000',
    rawLogs: []
  },
  logs: []
}
truffle(ganache)>
```

```
truffle(ganache)> web3.eth.getBalance(accounts[0])
'109949694960000000000'
truffle(ganache)> web3.eth.getBalance(accounts[1])
'88994357600000000000'
truffle(ganache)>
```