Homework of Lecture 4

> [Lecture 4 - Homework & Resources]()
>
> > Homework is done by a group.

Conflux Studio

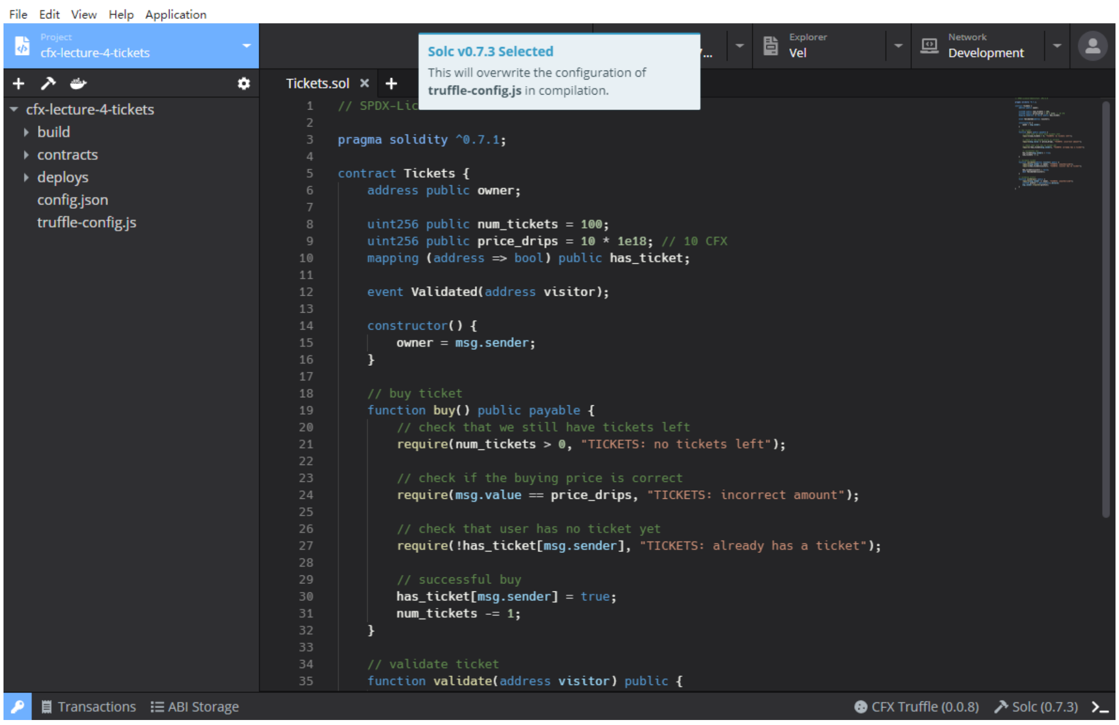
3.1 Basic usage of Conflux Studio

Download and install Conflux Studio and all the components required.

- Docker: [https://docs.docker.com/get-docker 12]()
- Conflux Studio: [https://github.com/ObsidianLabs/ConfluxStudio/releases/tag/v0.4.1 12]()
- Conflux Truffle, conflux-rust, solc: Install through Conflux Studio

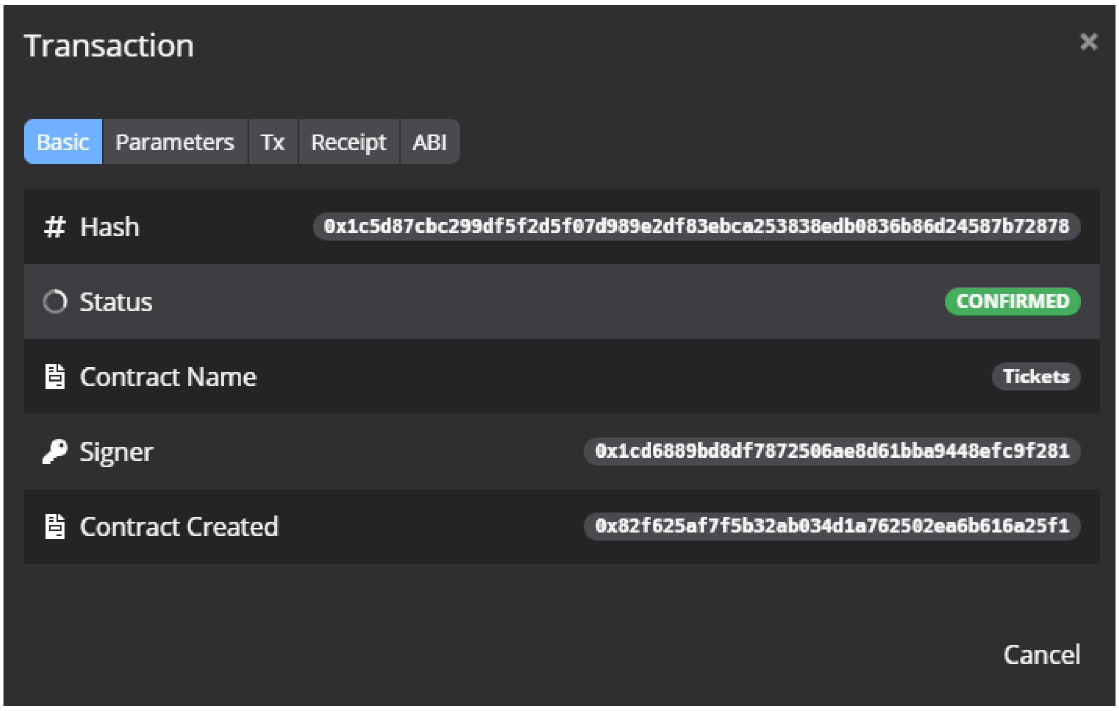
> Done.

Download the Tickets project from the lecture ([https://github.com/Thegaram/cfx-uma-resources/raw/master/cfx-lecture-4-tickets.zip]()) and import it into Conflux Studio.

> Done.
>
> 
>
>
> **Solc v0.7.3 Selected**
> This will overwrite the configuration of **truffle-config.js** in compilation.
>
> ```
> // SPDX-Lic
>
> pragma solidity ^0.7.1;
>
> contract Tickets {
>     address public owner;
>
>     uint256 public num_tickets = 100;
>     uint256 public price_drips = 10 * 1e18; // 10 CFX
>     mapping (address => bool) public has_ticket;
>
>     event Validated(address visitor);
>
>     constructor() {
>         owner = msg.sender;
>     }
>
>     // buy ticket
>     function buy() public payable {
>         // check that we still have tickets left
>         require(num_tickets > 0, "TICKETS: no tickets left");
>
>         // check if the buying price is correct
>         require(msg.value == price_drips, "TICKETS: incorrect amount");
>
>         // check that user has no ticket yet
>         require(!has_ticket[msg.sender], "TICKETS: already has a ticket");
>
>         // successful buy
>         has_ticket[msg.sender] = true;
>         num_tickets -= 1;
>     }
>
>     // validate ticket
>     function validate(address visitor) public {
> ```

Deploy an instance of the contract on Conflux Oceanus (hint: you can send CFX from your Conflux Portal account to your Conflux Studio account).

> get CFX from faucet: wallet.confluxscan.io/faucet/dev/ask?address={address}
>
> > To **make sure the deploying account has enough CFXs to pay transaction fees**.
> >
> > Or (send CFX from your Conflux Portal account to your Conflux Studio account)
>
> And Deploy~

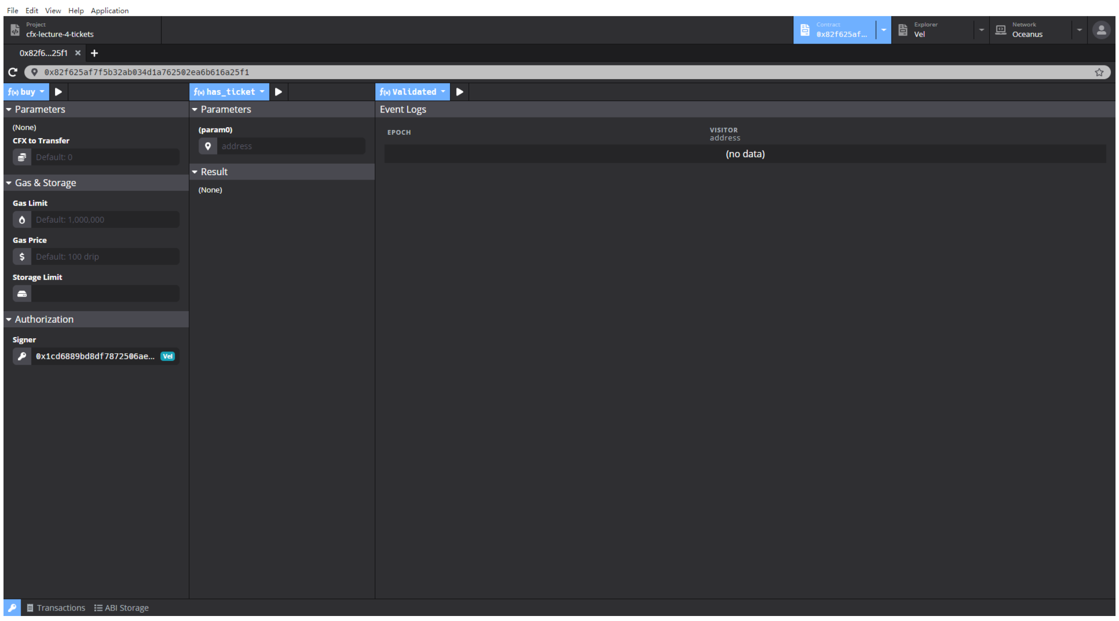

Transaction

Basic | Parameters | Tx | Receipt | ABI

# Hash	0x1c5d87cbc299df5f2d5f07d989e2df83ebca253838edb0836b86d24587b72878
Status	CONFIRMED
Contract Name	Tickets
Signer	0x1cd6889bd8df7872506ae8d61bba9448efc9f281
Contract Created	0x82f625af7f5b32ab034d1a762502ea6b616a25f1

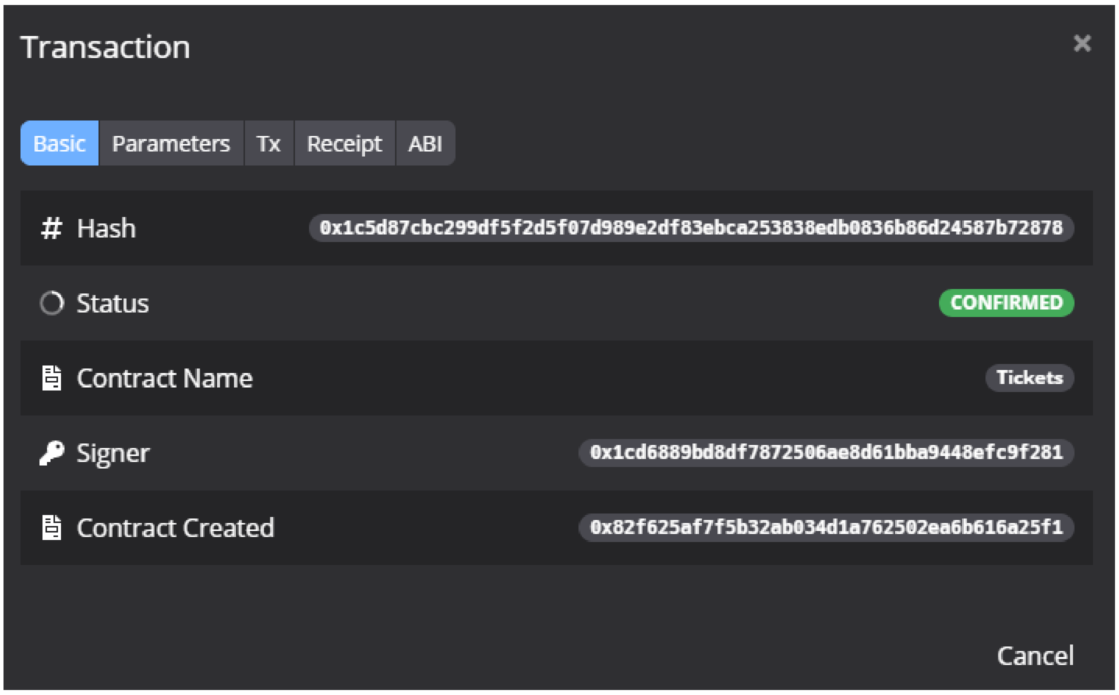
Cancel

Buy a ticket from another account. Validate the ticket with the owner. Withdraw the profits.

> First, find the contract we deployed, which leads us to the contract method's panal:
>
> 
>
> Project: cfx-lecture-4-tickets
>
> Contract: 0x82f625af... | Explorer: Vel | Network: Oceanus
>
> 0x82f625af7f5b32ab034d1a762502ea6b616a25f1
>
> f(x) buy
> - Parameters: (None)
> - CFX to Transfer: Default: 0
> - Gas & Storage
>   - Gas Limit: Default: 1,000,000
>   - Gas Price: Default: 100 drip
>   - Storage Limit
> - Authorization
>   - Signer: 0x1cd6889bd8df7872506ae... Vel
>
> f(x) has_ticket
> - Parameters: (param0) address
> - Result: (None)
>
> f(x) Validated
> - Event Logs
>
> | EPOCH | VISITOR address |
> |---|---|
> | (no data) | |
>
>
>
> And we just buy, validate, and withdraw.

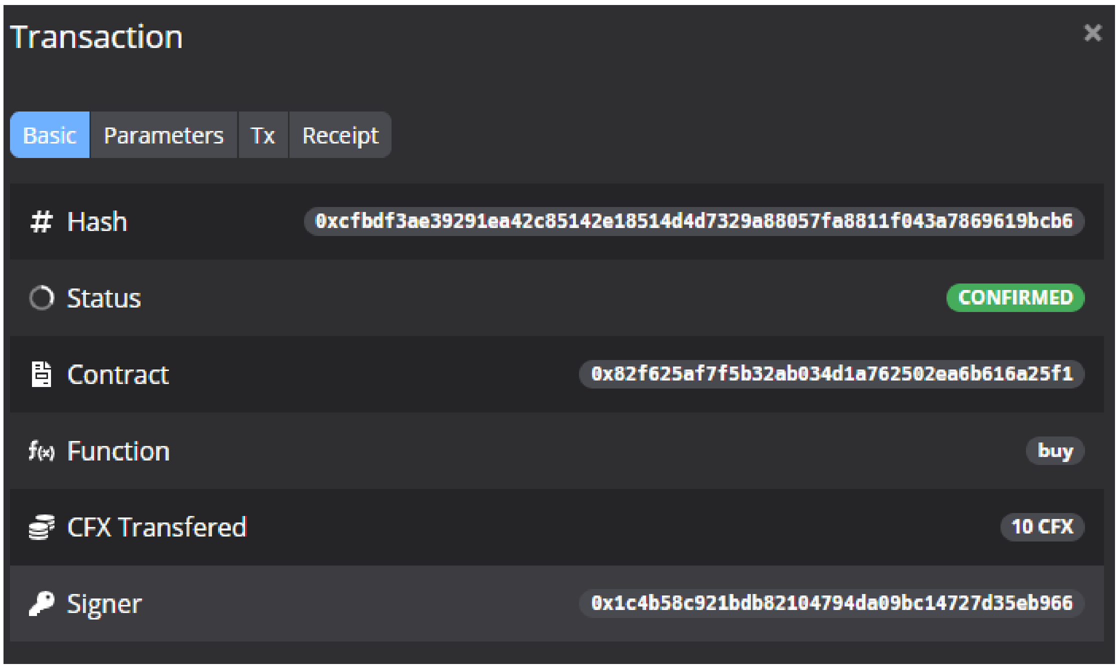
Send us the address of the contract, the 4 transaction hashes (deploy, buy(), validate(), withdraw()), and screenshots of how you sent them from Conflux Studio.

> **deploy**: `0x1c5d87cbc299df5f2d5f07d989e2df83ebca253838edb0836b86d24587b72878`


Transaction

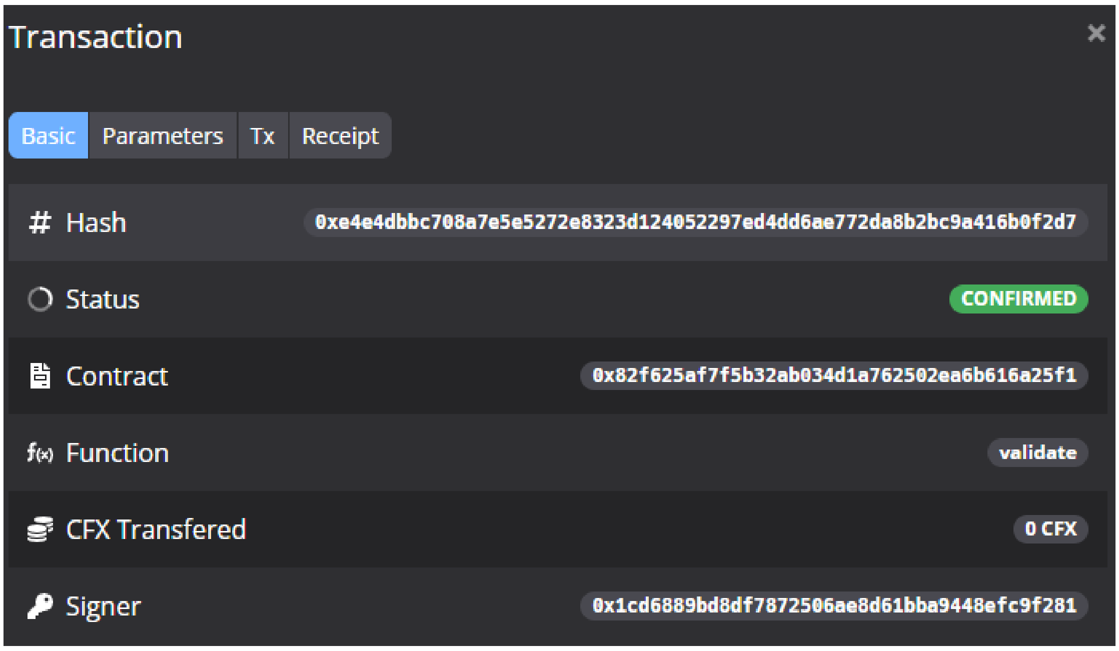
# Hash	0x1c5d87cbc299df5f2d5f07d989e2df83ebca253838edb0836b86d24587b72878
Status	CONFIRMED
Contract Name	Tickets
Signer	0x1cd6889bd8df7872506ae8d61bba9448efc9f281
Contract Created	0x82f625af7f5b32ab034d1a762502ea6b616a25f1

buy: `0xcfbdf3ae39291ea42c85142e18514d4d7329a88057fa8811f043a7869619bcb6`


Transaction

# Hash	0xcfbdf3ae39291ea42c85142e18514d4d7329a88057fa8811f043a7869619bcb6
Status	CONFIRMED
Contract	0x82f625af7f5b32ab034d1a762502ea6b616a25f1
Function	buy
CFX Transfered	10 CFX
Signer	0x1c4b58c921bdb82104794da09bc14727d35eb966

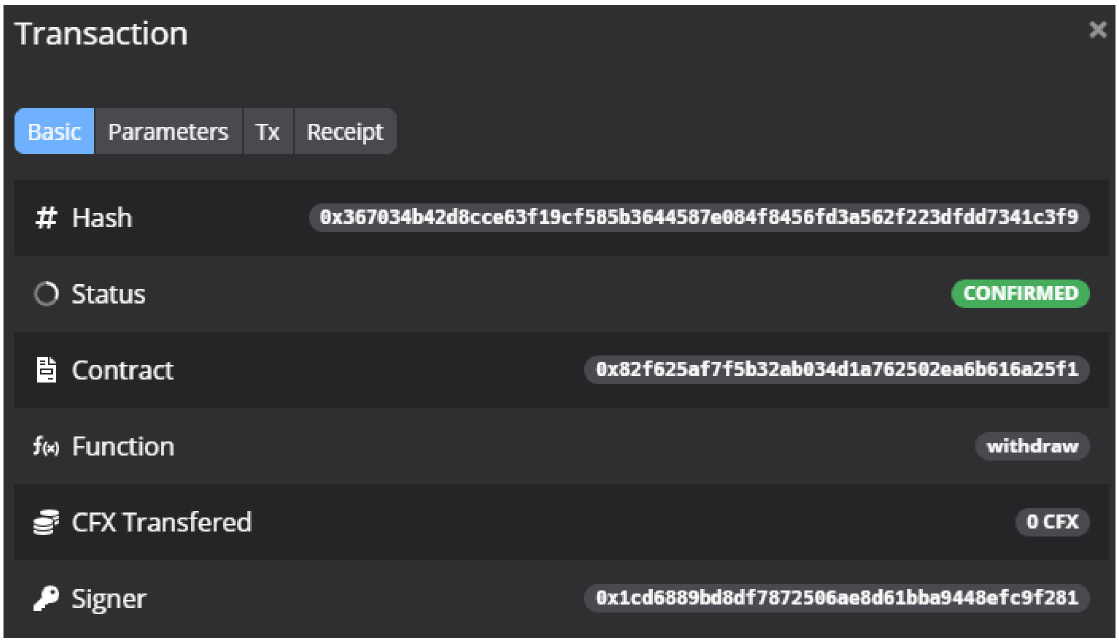
validate: `0xe4e4dbbc708a7e5e5272e8323d124052297ed4dd6ae772da8b2bc9a416b0f2d7`


Transaction

Basic | Parameters | Tx | Receipt

# Hash	0xe4e4dbbc708a7e5e5272e8323d124052297ed4dd6ae772da8b2bc9a416b0f2d7
Status	CONFIRMED
Contract	0x82f625af7f5b32ab034d1a762502ea6b616a25f1
Function	validate
CFX Transfered	0 CFX
Signer	0x1cd6889bd8df7872506ae8d61bba9448efc9f281

withdraw: `0x367034b42d8cce63f19cf585b3644587e084f8456fd3a562f223dfdd7341c3f9`


Transaction

Basic | Parameters | Tx | Receipt

# Hash	0x367034b42d8cce63f19cf585b3644587e084f8456fd3a562f223dfdd7341c3f9
Status	CONFIRMED
Contract	0x82f625af7f5b32ab034d1a762502ea6b616a25f1
Function	withdraw
CFX Transfered	0 CFX
Signer	0x1cd6889bd8df7872506ae8d61bba9448efc9f281

Tickets.sol

3.2 Customizing Tickets.sol

Update Ticket.sol so that it becomes possible to **set the number of tickets and the price per ticket** when you deploy a contract.

For instance, for event A, I want to sell 10 tickets of 100 CFX each. For event B, I want to sell 1000 tickets for 2 CFX each.

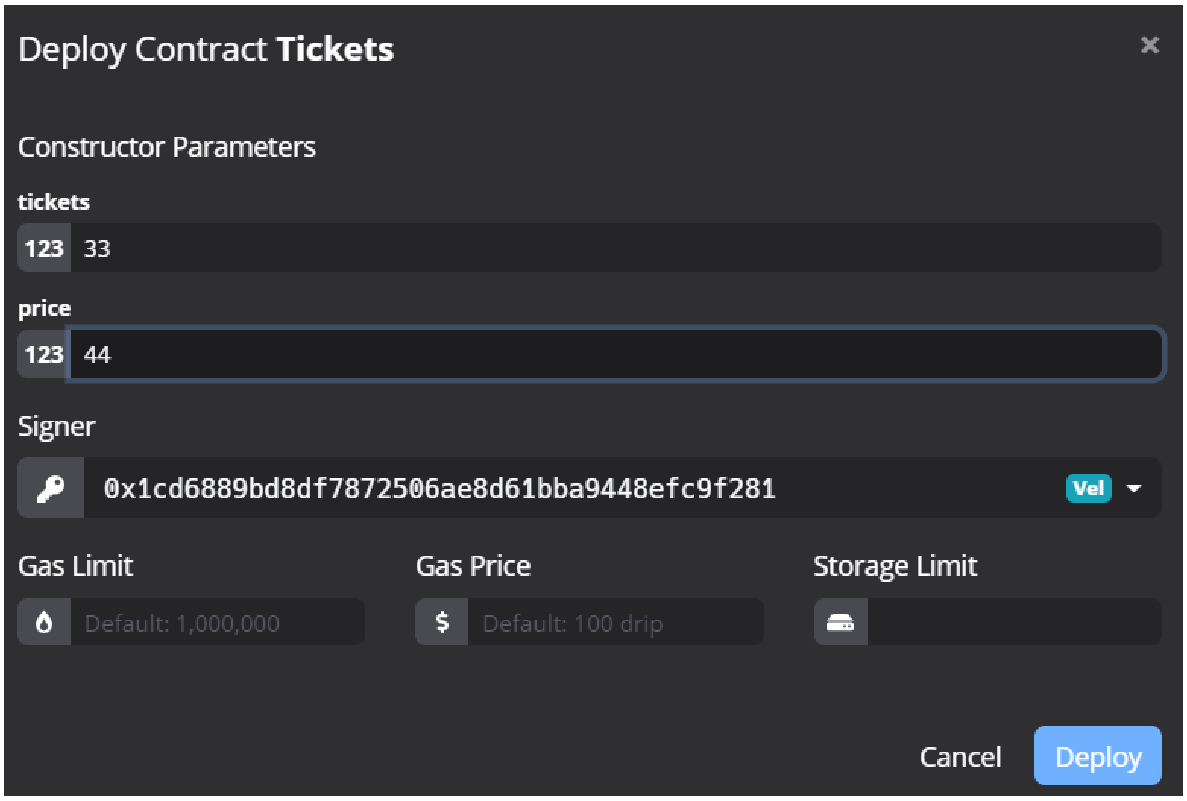
Test your solution on a local development network.

Send us the source code and a screenshot of deploying a contract with 33 tickets for 44 CFX each.

> Just set a few constructor's parameters and all is OK.

```
constructor(uint256 tickets, uint256 price) {
    owner = msg.sender;
    num_tickets = tickets;
    price_drips = price * 1e18;
}
```

> Then we get a panal with adjustable number of tickets and price for each.



Deploy Contract **Tickets**

Constructor Parameters

tickets
123 33

price
123 44

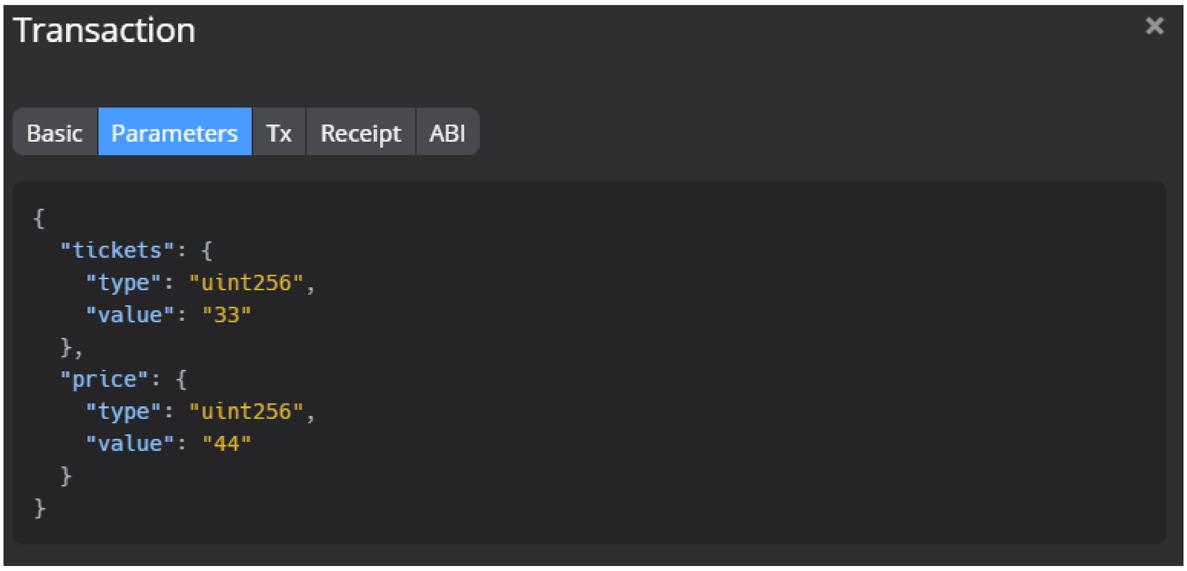
Signer
0x1cd6889bd8df7872506ae8d61bba9448efc9f281

Gas Limit: Default: 1,000,000

Gas Price: Default: 100 drip

Storage Limit

> Send the transaction, and check:



Transaction

```
{
  "tickets": {
    "type": "uint256",
    "value": "33"
  },
  "price": {
    "type": "uint256",
    "value": "44"
  }
}
```

Buy tickets

+1. Buying multiple tickets from one address [OPTIONAL]

Update Tickets.sol so that **one user can buy multiple tickets**. For instance, Bob might want to buy 2 tickets, one for himself and one for his girlfriend.

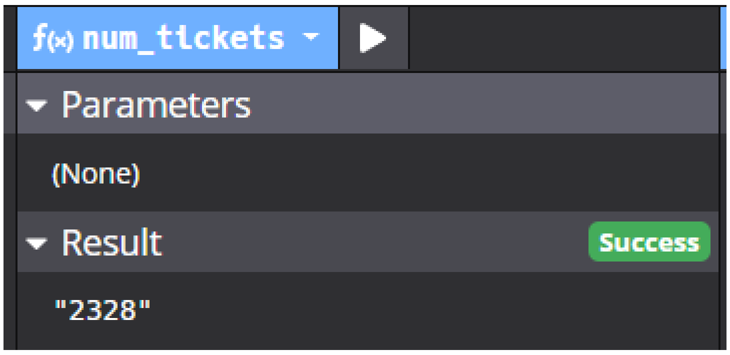
Test your solution on a local development network.

Send us the source code and some screenshots of buying 2 or more tickets from an address and then validating them.

> Source code:

```
// SPDX-License-Identifier: GPL-3.0

pragma solidity ^0.7.1;

contract Tickets {
    address public owner;

    uint256 public num_tickets = 100;
    uint256 public price_drips = 10 * 1e18; // 10 CFX
    mapping (address => uint256) public has_ticket;

    event Validated(address visitor, uint256 tickets);

    constructor(uint256 tickets, uint256 price) {
        owner = msg.sender;
        num_tickets = tickets;
        price_drips = price * 1e18;
    }

    // buy ticket
    function buy(uint256 tickets) public payable {
        // check tickets
        require(num_tickets > 0 && tickets <= num_tickets && tickets > 0,
"TICKETS: illegal operation");

        // check if the buying price is correct
        require(msg.value == tickets * price_drips, "TICKETS: incorrect
amount");

        // successful buy
        if( has_ticket[msg.sender] != 0 )
            has_ticket[msg.sender] += tickets;
        else
            has_ticket[msg.sender] = tickets;
        num_tickets -= tickets;
    }

    // validate ticket
    function validate(address visitor) public {
        require(msg.sender == owner, "TICKETS: unauthorized");
        require(has_ticket[visitor] > 0, "TICKETS: visitor has no ticket");

        uint256 tickets = has_ticket[visitor];
        has_ticket[visitor] = 0;
        emit Validated(visitor, tickets);
    }

    // withdraw profit
    function withdraw() public {
        require(msg.sender == owner, "TICKETS: unauthorized");
        uint256 profit = address(this).balance;
        msg.sender.transfer(profit);
        }
}
```

> We set tickets_num to `2333`, and price to `1` CFX. (And buy 5 tickets.)



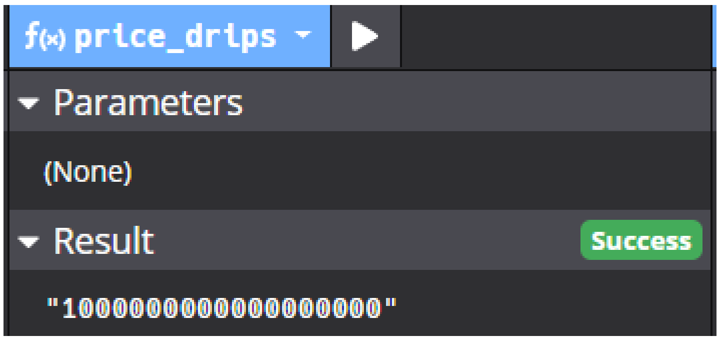
f(x) num_tickets

Parameters

(None)

Result Success

"2328"



f(x) price_drips

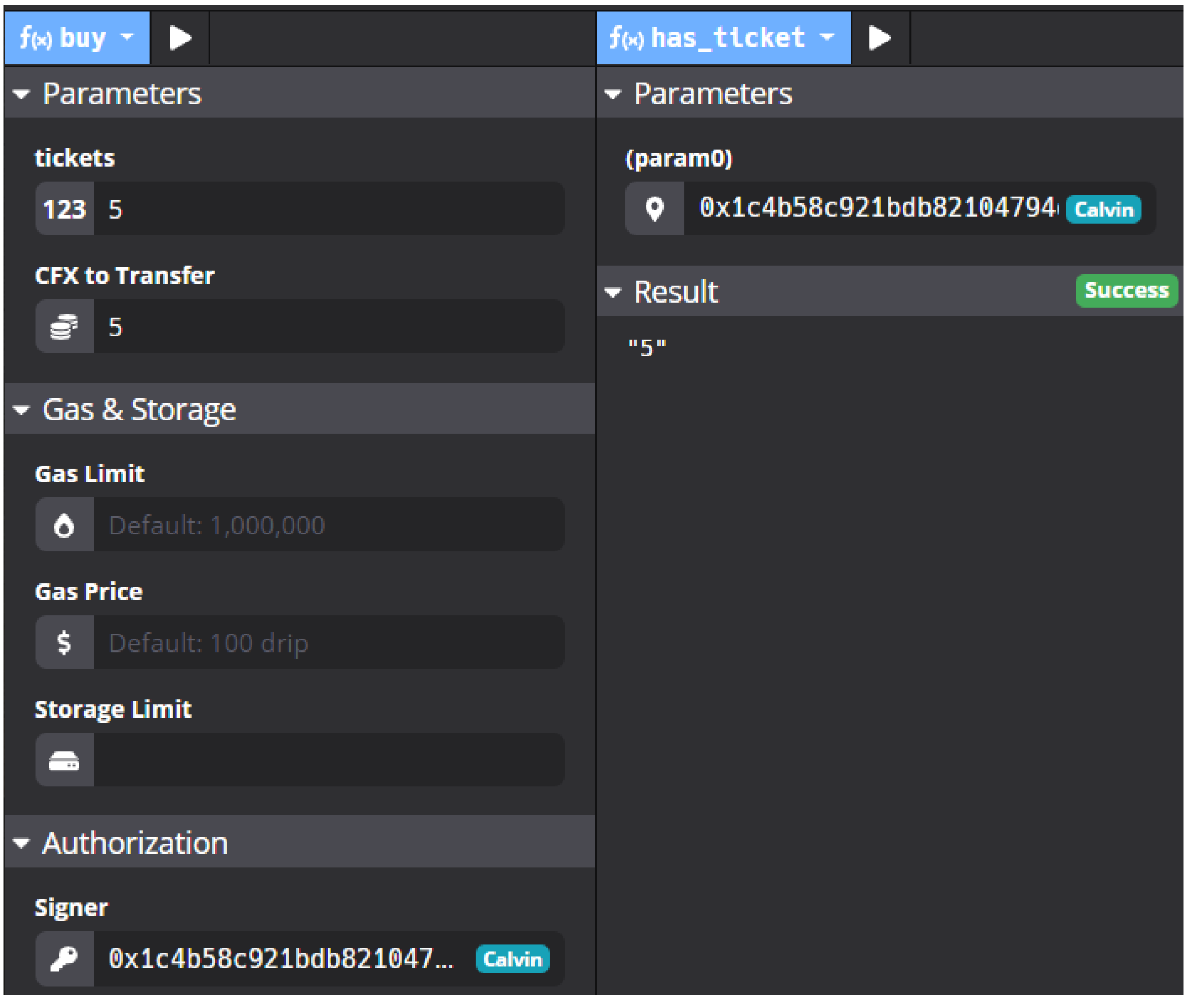
Parameters

(None)

Result Success

"1000000000000000000"

> buying 2 or more tickets from an address:



f(x) buy

Parameters

tickets: 5

CFX to Transfer: 5

Gas & Storage

Gas Limit: Default: 1,000,000

Gas Price: Default: 100 drip

Storage Limit:

Authorization

Signer: 0x1c4b58c921bdb821047... Calvin

f(x) has_ticket

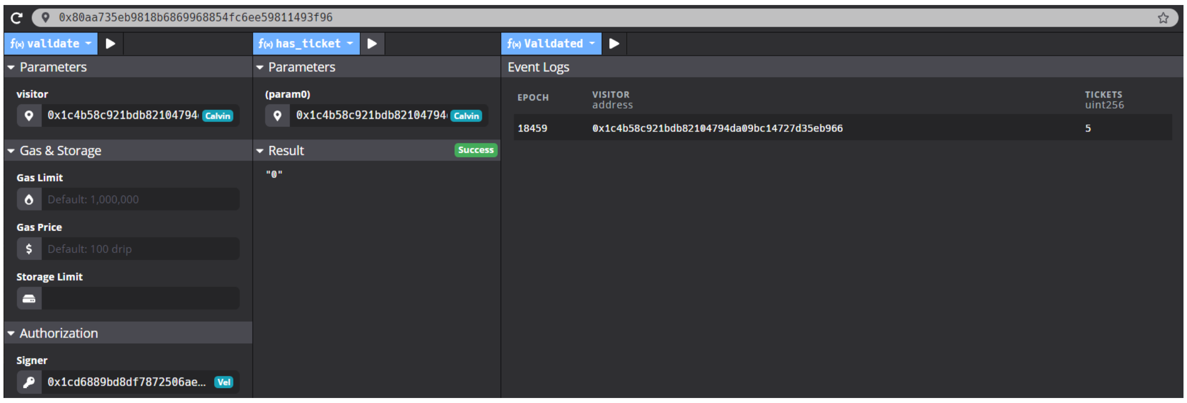
Parameters

(param0): 0x1c4b58c921bdb82104794 Calvin

Result Success

"5"

> validating them:



0x80aa735eb9818b6869968854fc6ee59811493f96

f(x) validate

Parameters

visitor: 0x1c4b58c921bdb82104794 Calvin

Gas & Storage

Gas Limit: Default: 1,000,000

Gas Price: Default: 100 drip

Storage Limit

Authorization

Signer: 0x1cd6889bd8df7872506ae... Vel

f(x) has_ticket

Parameters

(param0): 0x1c4b58c921bdb82104794 Calvin

Result — Success

```
"0"
```

f(x) Validated

Event Logs

EPOCH	VISITOR address	TICKETS uint256
18459	0x1c4b58c921bdb82104794da09bc14727d35eb966	5

Time of the event

+1. Time of the event [OPTIONAL]

Update Tickets.sol so that the organizer can set the time of the event.

Allow users to **buy tickets up to 2 hours before the event**. E.g. if the event is on 2020.12.01 19:00, you cannot buy tickets after 2020.12.01 17:00.

Allow the organizer to **withdraw the profits 1 day after the event**. E.g. if the event is on 2020.12.01 19:00, the organizer cannot withdraw the profits before 2020.12.02 19:00.

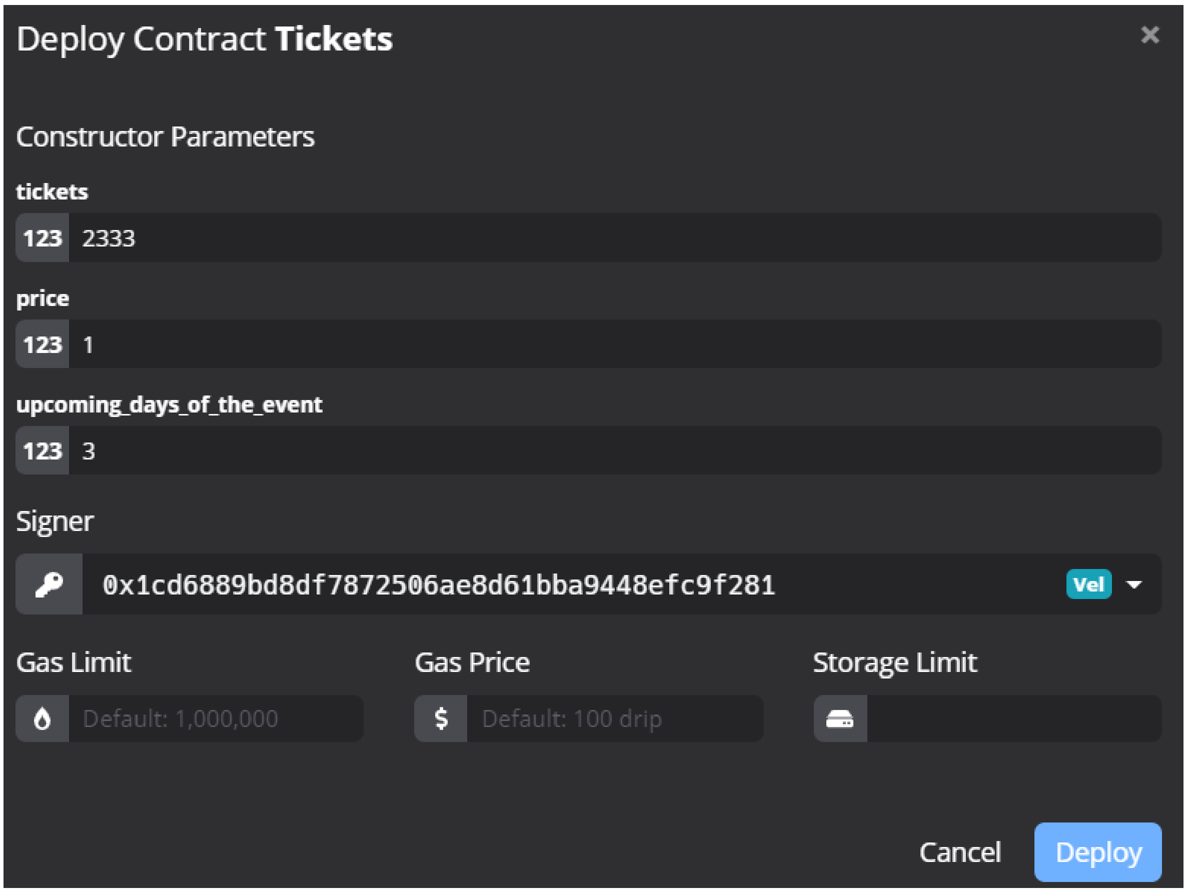
Hints:

- https://solidity.readthedocs.io/en/v0.7.1/units-and-global-variables.html#block-and-transaction-properties 6
- https://solidity.readthedocs.io/en/v0.7.1/units-and-global-variables.html#time-units 6

> Source code:

```
// SPDX-License-Identifier: GPL-3.0

pragma solidity ^0.7.1;

contract Tickets {
    address public owner;

    uint256 public num_tickets = 100;
    uint256 public price_drips = 10 * 1e18; // 10 CFX
    uint256 public start;
    mapping (address => uint256) public has_ticket;

    event Validated(address visitor, uint256 tickets);

    constructor(uint256 tickets, uint256 price, uint256 upcoming_days_of_the_event) {
        owner = msg.sender;
        num_tickets = tickets;
        price_drips = price * 1e18;
        start = upcoming_days_of_the_event * 1 days + block.timestamp;
    }

    // buy ticket
    function buy(uint256 tickets) public payable {
        // check time
        require(block.timestamp <= start - 2 hours, "TICKETS: can't but due to time reasons");

        // check tickets
        require(num_tickets > 0 && tickets <= num_tickets && tickets > 0, "TICKETS: illegal operation");

        // check if the buying price is correct
        require(msg.value == tickets * price_drips, "TICKETS: incorrect amount");

        // successful buy
        if( has_ticket[msg.sender] != 0 )
            has_ticket[msg.sender] += tickets;
        else
            has_ticket[msg.sender] = tickets;
        num_tickets -= tickets;
    }

    // validate ticket
    function validate(address visitor) public {
        require(msg.sender == owner, "TICKETS: unauthorized");
        require(has_ticket[visitor] > 0, "TICKETS: visitor has no ticket");

        uint256 tickets = has_ticket[visitor];
        has_ticket[visitor] = 0;
        emit Validated(visitor, tickets);
    }

    // withdraw profit
    function withdraw() public {
        require(msg.sender == owner, "TICKETS: unauthorized");

        require(block.timestamp >= start + 1 days, "TICKETS: can't withdraw due to time reasons");

        uint256 profit = address(this).balance;
        msg.sender.transfer(profit);
    }
}
```

> Set the start time as 3 days later:



Deploy Contract **Tickets**

Constructor Parameters

tickets

123 2333

price

123 1

upcoming_days_of_the_event

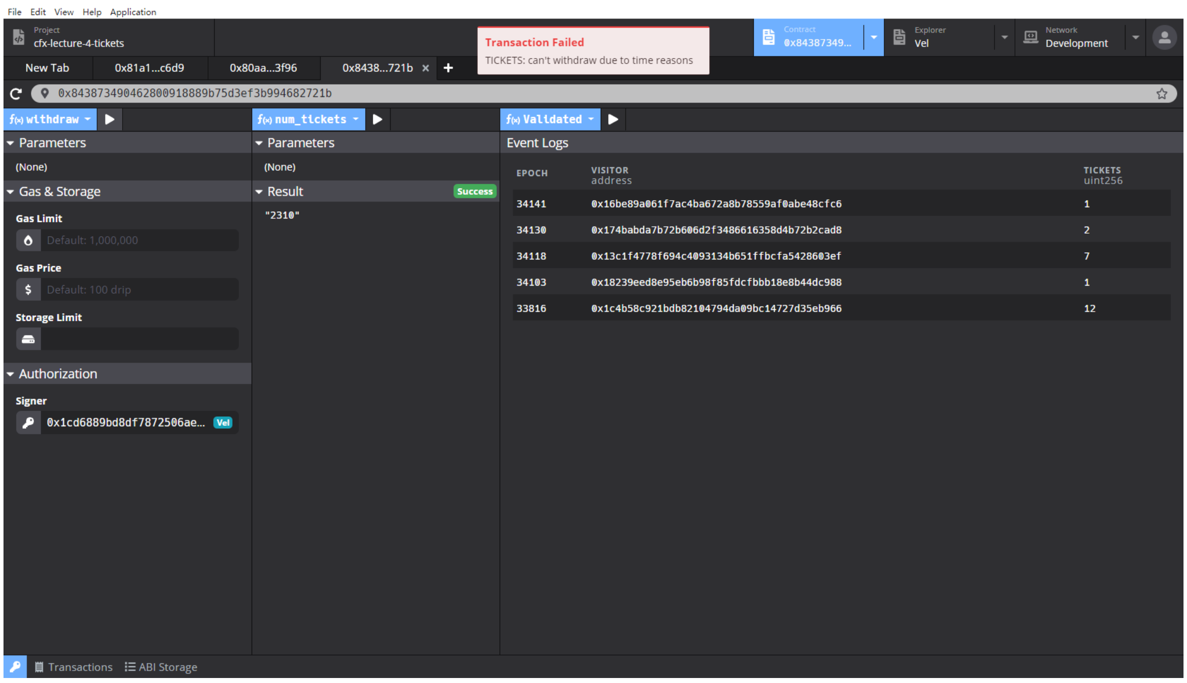
123 3

Signer

0x1cd6889bd8df7872506ae8d61bba9448efc9f281 Vel

Gas Limit	Gas Price	Storage Limit
Default: 1,000,000	Default: 100 drip	

> Let's buy some tickets and test if we can withdraw the money ahead of schdule:



Transaction Failed

TICKETS: can't withdraw due to time reasons

0x84387349046280091889b75d3ef3b994682721b

f(x) withdraw

Parameters

(None)

Gas & Storage

Gas Limit: Default: 1,000,000

Gas Price: Default: 100 drip

Storage Limit

Authorization

Signer: 0x1cd6889bd8df7872506ae... Vel

f(x) num_tickets

Parameters

(None)

Result — Success

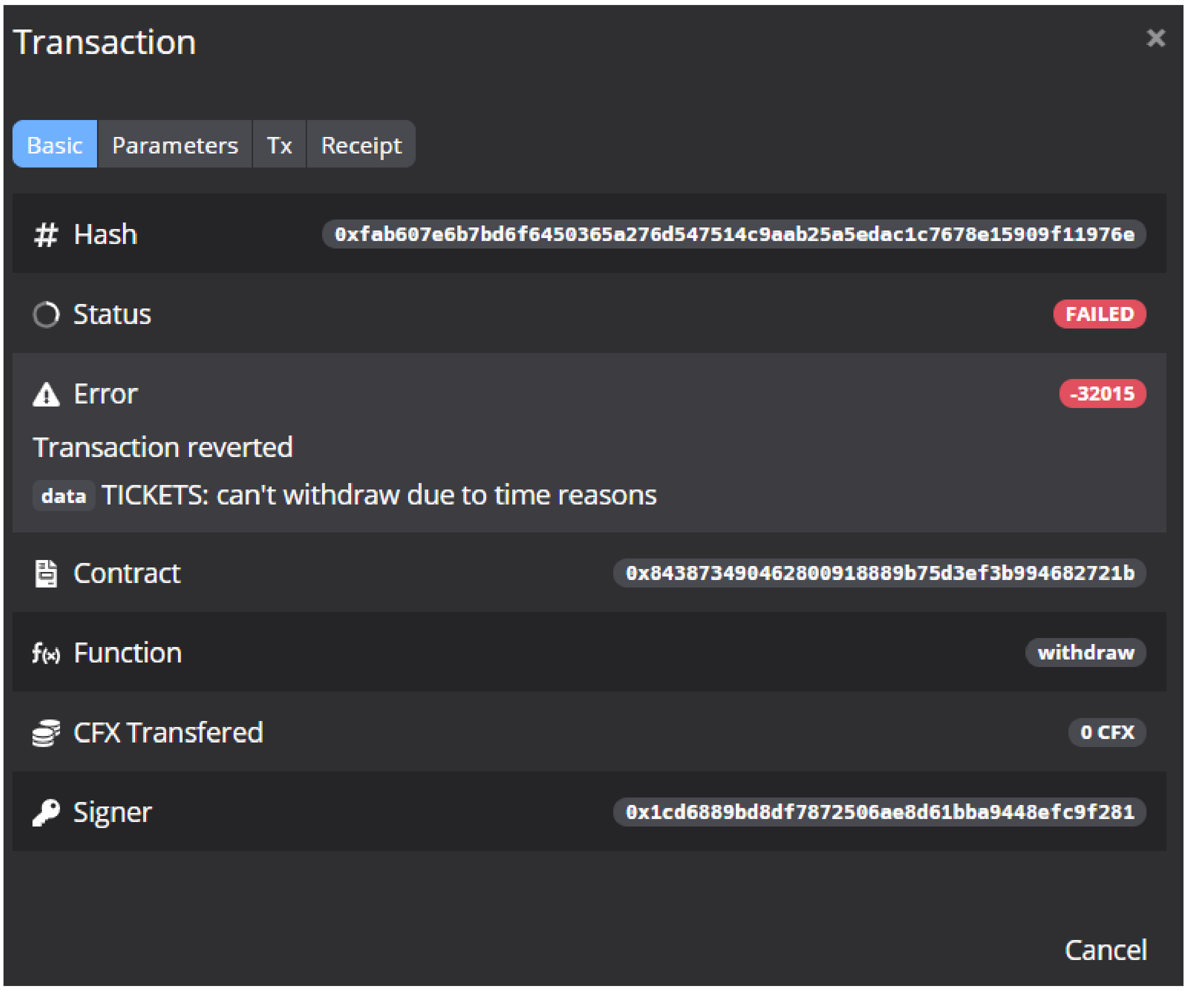
```
"2310"
```

f(x) Validated

Event Logs

EPOCH	VISITOR address	TICKETS uint256
34141	0x16be89a061f7ac4ba672a8b78559af0abe48cfc6	1
34130	0x174babda7b72b606d2f3486616358d4b72b2cad8	2
34118	0x13c1f4778f694c4093134b651ffbcfa5428603ef	7
34103	0x18239eed8e95eb6b98f85fdcfbbb18e8b44dc988	1
33816	0x1c4b58c921bdb82104794da09bc14727d35eb966	12

> Now we can see:
>
> > Transaction reverted
> >
> > **data** TICKETS: can't withdraw due to time reasons



Transaction

Hash	0xfab607e6b7bd6f6450365a276d547514c9aab25a5edac1c7678e15909f11976e
Status	FAILED
Error	-32015

Transaction reverted

data TICKETS: can't withdraw due to time reasons

Contract	0x8438734904628009l8889b75d3ef3b994682721b
Function	withdraw
CFX Transfered	0 CFX
Signer	0x1cd6889bd8df7872506ae8d61bba9448efc9f281