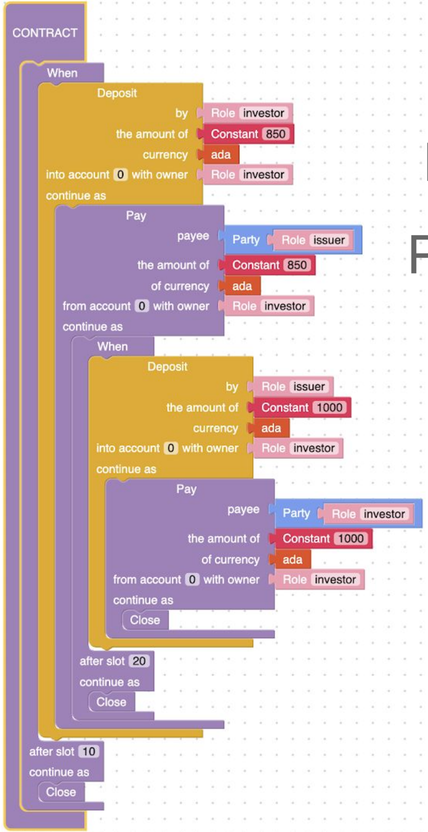
Cardano challenge: **Actus in Marlowe**



```
CONTRACT
  When
    Deposit
      by  Role investor
      the amount of  Constant 850
      currency  ada
      into account 0 with owner  Role investor
      continue as
        Pay
          payee  Party  Role issuer
          the amount of  Constant 850
          of currency  ada
          from account 0 with owner  Role investor
          continue as
            When
              Deposit
                by  Role issuer
                the amount of  Constant 1000
                currency  ada
                into account 0 with owner  Role investor
                continue as
                  Pay
                    payee  Party  Role investor
                    the amount of  Constant 1000
                    of currency  ada
                    from account 0 with owner  Role investor
                    continue as
                      Close
            after slot 20
            continue as
              Close
  after slot 10
  continue as
    Close
```

Project Title: Marlowe EasyRead

Project Goal: Enhance Actus in Marlowe by visualizing how Actus contracts operate, utilizing easy to read on and off chain contracts.

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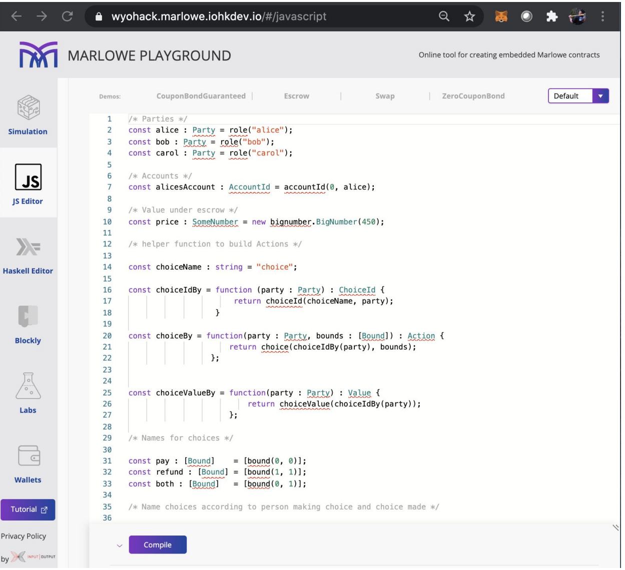
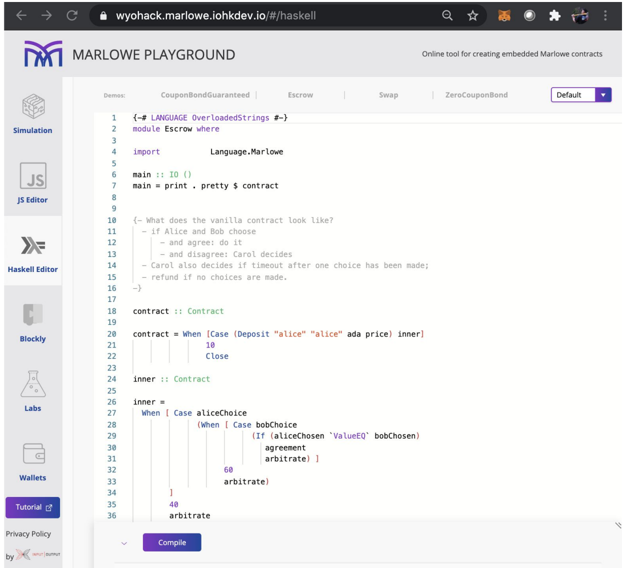
Cardano enthusius, love grandkids, Wyoming, learning and teaching blockchain technologies

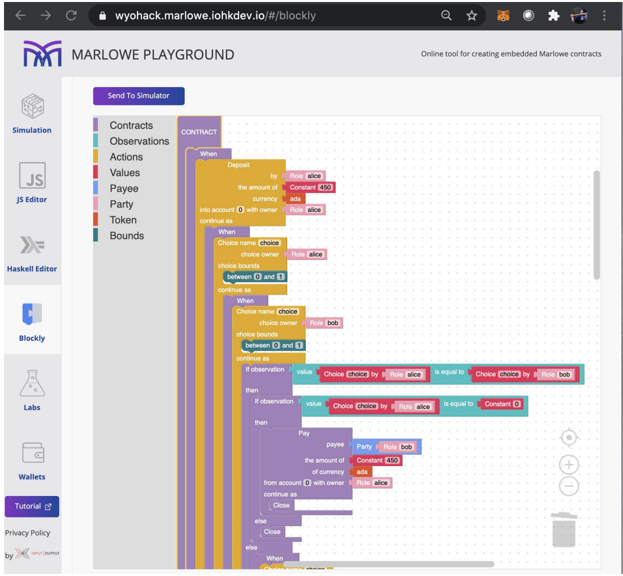
Problem Although you can create contracts in Javascript, Haskell, or Blockly within Marlowe



```
/* Parties */
const alice : Party = role("alice");
const bob : Party = role("bob");
const carol : Party = role("carol");

/* Accounts */
const alicesAccount : AccountId = accountId(0, alice);

/* Value under escrow */
const price : SomeNumber = new bignumber.BigNumber(450);

/* helper function to build Actions */

const choiceName : string = "choice";

const choiceIdBy = function (party : Party) : ChoiceId {
                        return choiceId(choiceName, party);
                    }

const choiceBy = function(party : Party, bounds : [Bound]) : Action {
                       return choice(choiceIdBy(party), bounds);
                   };


const choiceValueBy = function(party : Party) : Value {
                          return choiceValue(choiceIdBy(party));
                      };

/* Names for choices */

const pay : [Bound]    = [bound(0, 0)];
const refund : [Bound] = [bound(1, 1)];
const both : [Bound]   = [bound(0, 1)];

/* Name choices according to person making choice and choice made */

```



```
{-# LANGUAGE OverloadedStrings #-}
module Escrow where

import           Language.Marlowe

main :: IO ()
main = print . pretty $ contract


{- What does the vanilla contract look like?
  - if Alice and Bob choose
      - and agree: do it
      - and disagree: Carol decides
  - Carol also decides if timeout after one choice has been made;
  - refund if no choices are made.
-}

contract :: Contract

contract = When [Case (Deposit "alice" "alice" ada price) inner]
                10
                Close

inner :: Contract

inner =
  When [ Case aliceChoice
              (When [ Case bobChoice
                          (If (aliceChosen `ValueEQ` bobChosen)
                             agreement
                             arbitrate) ]
                    60
                    arbitrate)
        ]
        40
        arbitrate
```

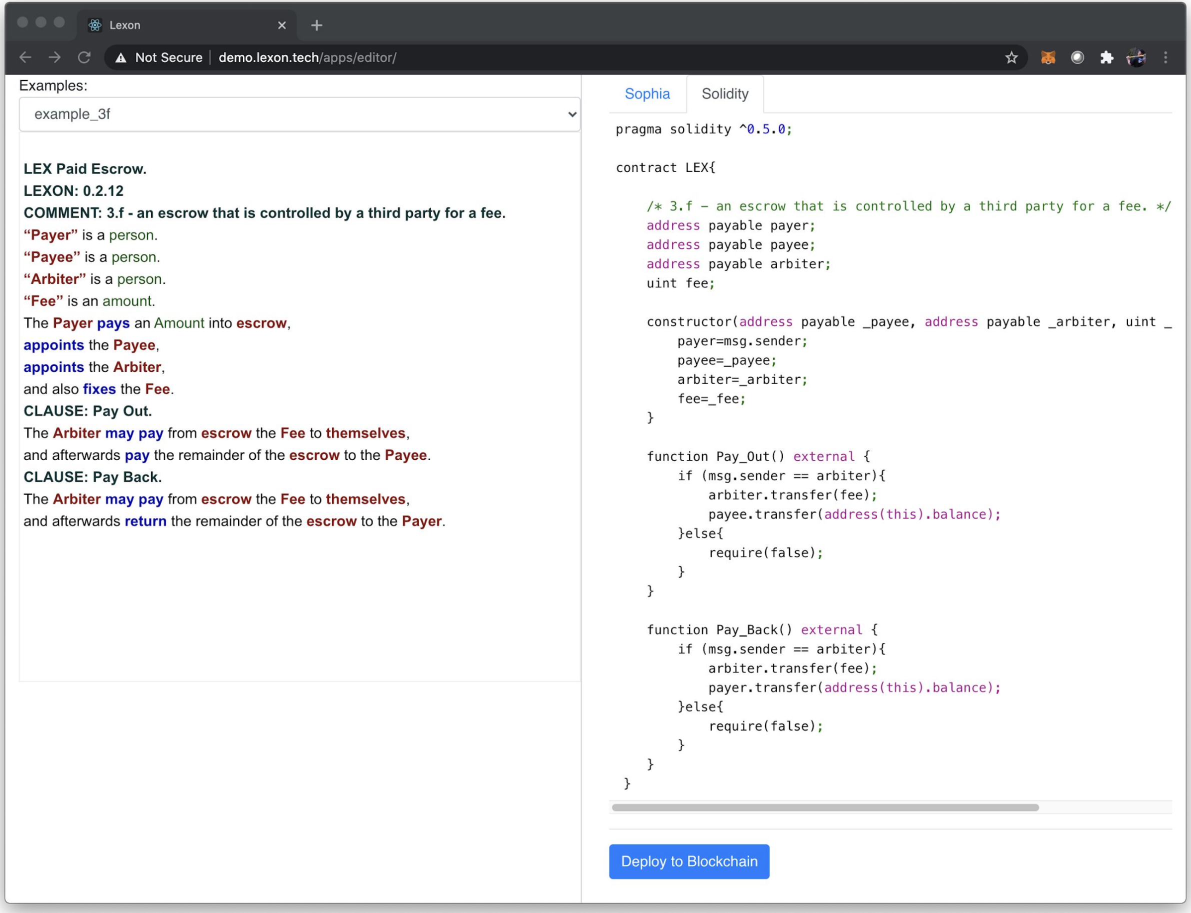


Javascript, Haskell, or even Blockly are not all that readable to a someone without a programing background.

A person entering into a “smart contract” would have a hard time verifying the intent of the contract as even blockly can be a bit hard to interpret without the assistance of a computer programer.

Solution

Integrate the open source **Lexon** language into Marlowe



Examples:

example_3f

LEX Paid Escrow.
LEXON: 0.2.12
COMMENT: 3.f - an escrow that is controlled by a third party for a fee.
"Payer" is a person.
"Payee" is a person.
"Arbiter" is a person.
"Fee" is an amount.
The **Payer pays** an Amount into **escrow**,
appoints the **Payee**,
appoints the **Arbiter**,
and also **fixes** the **Fee**.
CLAUSE: Pay Out.
The **Arbiter may pay** from **escrow** the **Fee** to **themselves**,
and afterwards **pay** the remainder of the **escrow** to the **Payee**.
CLAUSE: Pay Back.
The **Arbiter may pay** from **escrow** the **Fee** to **themselves**,
and afterwards **return** the remainder of the **escrow** to the **Payer**.

```
pragma solidity ^0.5.0;

contract LEX{

    /* 3.f - an escrow that is controlled by a third party for a fee. */
    address payable payer;
    address payable payee;
    address payable arbiter;
    uint fee;

    constructor(address payable _payee, address payable _arbiter, uint _
        payer=msg.sender;
        payee=_payee;
        arbiter=_arbiter;
        fee=_fee;
    }

    function Pay_Out() external {
        if (msg.sender == arbiter){
            arbiter.transfer(fee);
            payee.transfer(address(this).balance);
        }else{
            require(false);
        }
    }

    function Pay_Back() external {
        if (msg.sender == arbiter){
            arbiter.transfer(fee);
            payer.transfer(address(this).balance);
        }else{
            require(false);
        }
    }
}
```

Value Proposition

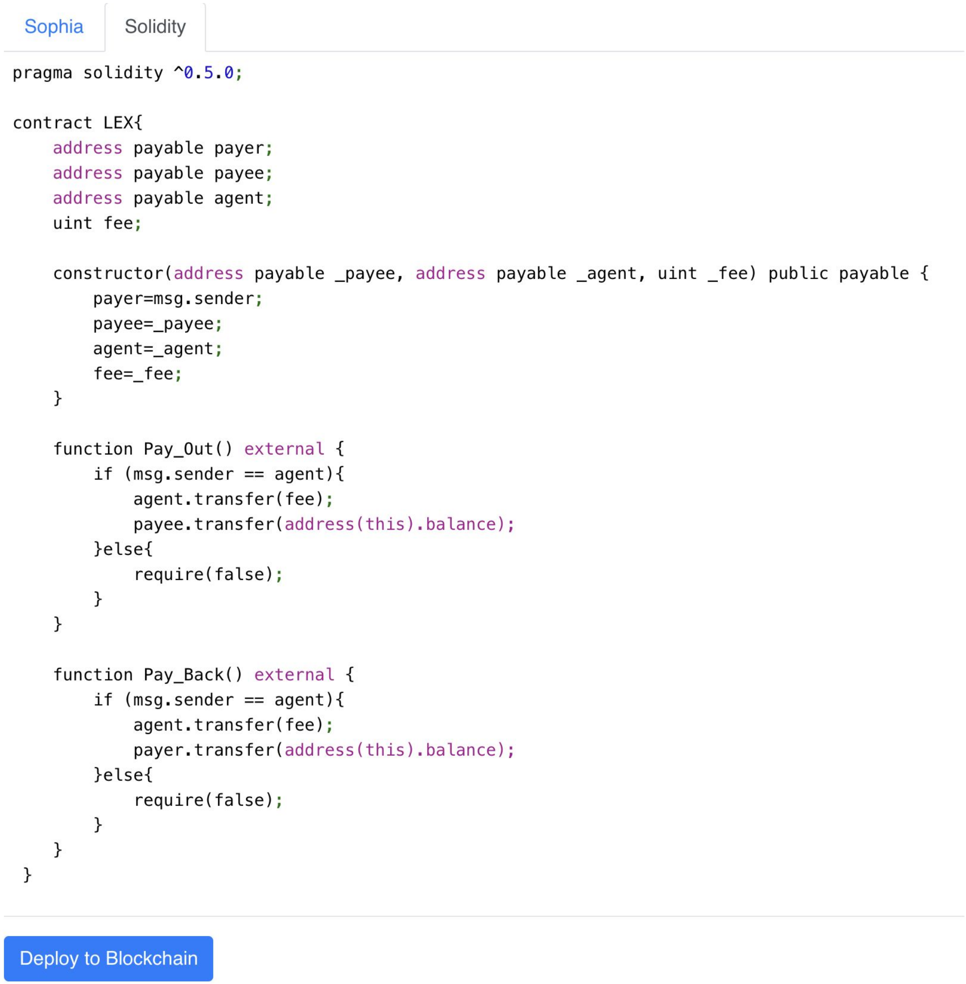
LEX Escrow.

“Payer” is a person.
“Payee” is a person.
“Agent” is a person.
“Fee” is an amount.

The Payer pays an Amount into escrow, appoints the Payee, appoints the Agent, and also fixes the Fee.

CLAUSE: Pay Out.
The Agent may pay from escrow the Fee to themselves, and afterwards pay the remainder of the escrow to the Payee.

CLAUSE: Pay Back.
The Agent may pay from escrow the Fee to themselves, and afterwards return the remainder of the escrow to the Payer.



```
pragma solidity ^0.5.0;

contract LEX{
    address payable payer;
    address payable payee;
    address payable agent;
    uint fee;

    constructor(address payable _payee, address payable _agent, uint _fee) public payable {
        payer=msg.sender;
        payee=_payee;
        agent=_agent;
        fee=_fee;
    }

    function Pay_Out() external {
        if (msg.sender == agent){
            agent.transfer(fee);
            payee.transfer(address(this).balance);
        }else{
            require(false);
        }
    }

    function Pay_Back() external {
        if (msg.sender == agent){
            agent.transfer(fee);
            payer.transfer(address(this).balance);
        }else{
            require(false);
        }
    }
}
```

Benefit

Advantage of using human readable language for code

Text can serve as a legal contract that a contract party, lawer, or judge could understand.

Text can compile directly to an executable smart contract. Languages **Lexon** currently exports to are “Sophia” and “Solidity”. Support for Plutus would be a game changer.

Participation in a DAO (decentralized autonomous organization) would be much more comprehensible if the DAO rules where written out in human readable code.

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