Introduction to Cardano Smart Contracts

Overview of Cardano Blockchain History

Charles Hoskinson, along with Jeremy Wood, co-founded Cardano, both were part of Ethereum before. In 2015, th

Ouroboros

Ouroboros relies on a **proof of stake** consensus. Rather than requiring nodes to engage in computationally intensi

Cardano Architecture

The blockchain model comprises several components. Users interact with the current ledger state by creating transa

Improvements from Other Blockchains

Cardano offers several advantages over other chains:

Determinism: This feature enables transaction chaining.

Predictable Fees: There is no risk of pending transactions due to fee increases.

Sustainability: Unlike PoW, which is power-intensive, Cardano's approach is more sustainable.

Native Tokens: Tokens are stored on the ledger, allowing smart contracts to interact with them. Users have control ov

Scaling is currently the most significant challenge for the ecosystem. The ability to handle high volumes of users wi

Importance and Applications of Smart Contracts

Smart contracts are a concept born alongside Ethereum, enabling the execution of code and interactions without a

However, history teaches us that some protocols have included backdoors within their smart contracts, leading to fu

Let's start with the basics.

What is a Smart Contract?

A smart contract is decentralized software accessible to users on the blockchain, typically through a website interfac

The essential components of a smart contract are:

Parties: Who can interact with the contract? Is it open to everyone, specific users, or owners of particular assets?

Actions: What operations can users perform with the contract? These could include depositing funds, creating NFTs,

Rules: Define the actions each party can take under specific conditions.

Data Fields: What data is involved in interactions with the contract, and how can each step of the interaction be trac

Applications

In a typical decentralized exchange (DEX) application, the parties are liquidity providers and traders. Liquidity pro

In a marketplace scenario, the parties are sellers and buyers. Sellers can sell assets, while buyers can buy them. Ru

On Cardano, specific actions might include Cancel Listing and Buy. Selling/List is more of a smart contract interac

A smart contract action involves a transaction where the smart contract is invoked in the inputs. If the smart contr

Advantages of Cardano for Smart Contract Development

Two years ago, if you asked me about the advantages of writing smart contracts on Cardano, I would have struggle

Composability: The ability to create a transaction involving multiple contracts and perform actions with each of them

User-Friendly: No longer requiring Haskell, languages like Aiken, Opshin, and more offer a user-friendly experience.

Liquid Staking: Thanks to Cardano staking, smart contracts can delegate ADA or keep funds staked with liquidity pr

UTxO Skills: While much of the focus has been on Ethereum Virtual Machine (EVM) smart contracts, the UTXO mo

If you're still interested in becoming a Cardano smart contract wizard after this introduction, we can continue in th

Installing and Configuring Cardano Development Tools Installing and Configuring Cardano Development Tools The
A hot Wallet: We are going to use a wallet to test our contracts, this wallet will be used in to receive tADA. We'll ne
A indexer account: Indexers are the ones that will provide us the APIs in order to interact with the chain, we won't
Lucid library: Lucid is not mantained anymore as function and has being replaced by COMING SOON, however for t
tADA: How are we going to test without having testnet ADA? let's not mess up real ADA
IDE: Personally I use Visual Studio Code as IDE, but any other editor is ok since we are going to
Cardano Node: This is NOT mandatory at all, however as homework we could try to setup a cardano node and inter
Setting Up and Connecting to Cardano Testnet So let's install a wallet and config for testnet
In this example we'll install Nami wallet that we can find https://www.namiwallet.io/here
Once we install the wallet we'll get 24 seed phrase words
Never share the seedphrase or store it on a cloud, use a paper or different ways to store, software can keep track of
$\text{wallet}_p review$
Let's set Nami to **testnet preview** and we'll finally get our wallet in testnet
In order to receive tADA we can use the official faucet from Cardano at the following https://docs.cardano.org/car
CIP30
In order to connect our wallet with any webpage we'll use CIP30 reference, we can find the list of methods to conn
[scale=0.5]cip30
The steps to interact with a wallet following cip30 are:
cardano.walletName.enable(): we get an API object as promise, this will create a popup message to allow the walle
api.getBalance():using the api object we got before, we get the total amount of lovelace in the wallet (1 ADA = 1000
api.signTx: Signing a tx that was build with Lucid or any other library we sign and interact with the blockchain
EXCERCISE 1: Create a webpage with 2 butttons, 1 to enable the wallet connection, second button to view the a
Interacting with Cardano Node and Wallet APIs
CIP30 is not enough, what if we want to get the informations regarding a specific NFT in our wallet? How to get t
We need an indexer. We could setup one on our own or use a service, in this book we'll use **Maestro** as service pr
Create a Maestro account
Head over https://dashboard.gomaestro.org/loginMaestro login page and create an account, here we'll be able to g
[scale=0.5]maestro.png
Maestro is going to be our key to get all the possible APIs in order to interact with Cardano, here the possible thi
Get the history of an address with this ttps://docs.gomaestro.org/Indexer-API/Addresses/txs-by-addressAPI
Get all the assets of a specific policy
Get the address holding a specific ada handle
Get the history of holders for a specific NFT
and much more
Now that we have a way to interact with a wallet and APIs to query the Cardano blockchain we are ready to put o
Let's code smart contracts.
EXCERCISE 2: Head over http://cnftlab.party/ and connect your testnet wallet, mint a collection of NFTs and th
Glossary
fondue is a very popular dish and is often associated with.

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