BLOCKCHAIN AS A SECURITY BRICK FOR SOFTWARE APPLICATIONS

BLOCKCHAIN [FOR] SECURITY WEBINAR – OWASP - 5/12/2020

WHO'S WHO

ODDO BHF

- Head of Life-Insurance & Post-Trade Software Development
- 18+ years experience : System Engineer, DBA , DATA Architect , Software Dev Manager & Blockchain Enthusiast since 2014

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AGENDA

- Blockchain Definition (Technical/Conceptual)
- Blockchain or How to clone Physical transaction to Digital transaction
- Distributed Database vs Distributed Ledger
- Blockchain & Internet OF VALUE
- Blockchain Security Design
- Blockchain Security for IOT
- ICO Dapp demo

BLOCKCHAIN DEFINITION (TECHNICAL)

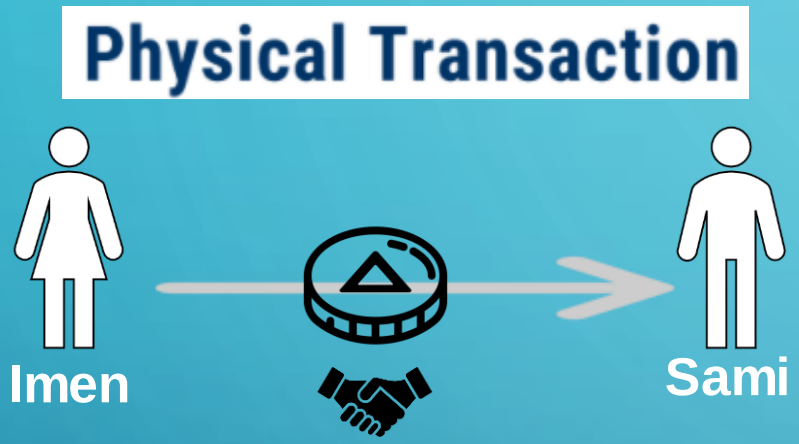
- ✓ **Append-only** Distributed Database (Ledger) shared between multiple non-trusting writers without the need for a Trusted Central Authority.
- ✓ The data integrity of the Ledger is guaranteed by a **Distributed Concensys Algorithm.**

BLOCKCHAIN SOLUTIONS
3 BASIC COMPONENTS

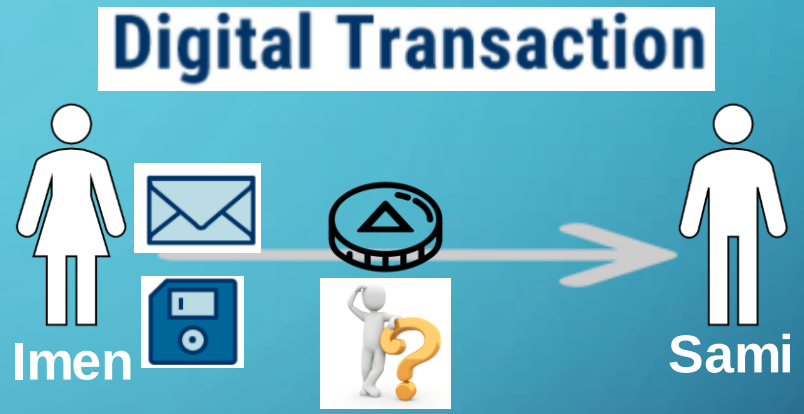
:

1. A **data model** that captures the current state of the ledger.
2. A **language of transactions** that changes the ledger state.
3. A **protocol** used to build consensus among participants around which transactions will be accepted, and in what order, by the ledger.

BLOCKCHAIN OR HOW TO CLONE **PHYSICAL TRANSACTION** TO **DIGITAL TRANSACTION**



- ✓ Easily Verifiable.
- ✓ No need for a third-party to validate the transaction.
- ✓ Imen does not have the money anymore and Sami has it in his hands.
- ✓ Instant transfer of the asset



- ✓ What if the third trusted party duplicates the asset?
- ✓ He can even add to his account whenever he wants.
- ✓ He can impose high commissions
- ✓ What If his service is hacked : service unavailable (SPOF)
- ✓ The end user does not have the means to check by himself

BLOCKCHAIN OR HOW TO CLONE **PHYSICAL TRANSACTION** TO **DIGITAL TRANSACTION**

Trusted third-party

- ✓ What if the third trusted party duplicates the asset?
- ✓ He can even add to his account whenever he wants.
- ✓ He can request high fees
- ✓ What If his service is hacked : service unavailable (SPOF)
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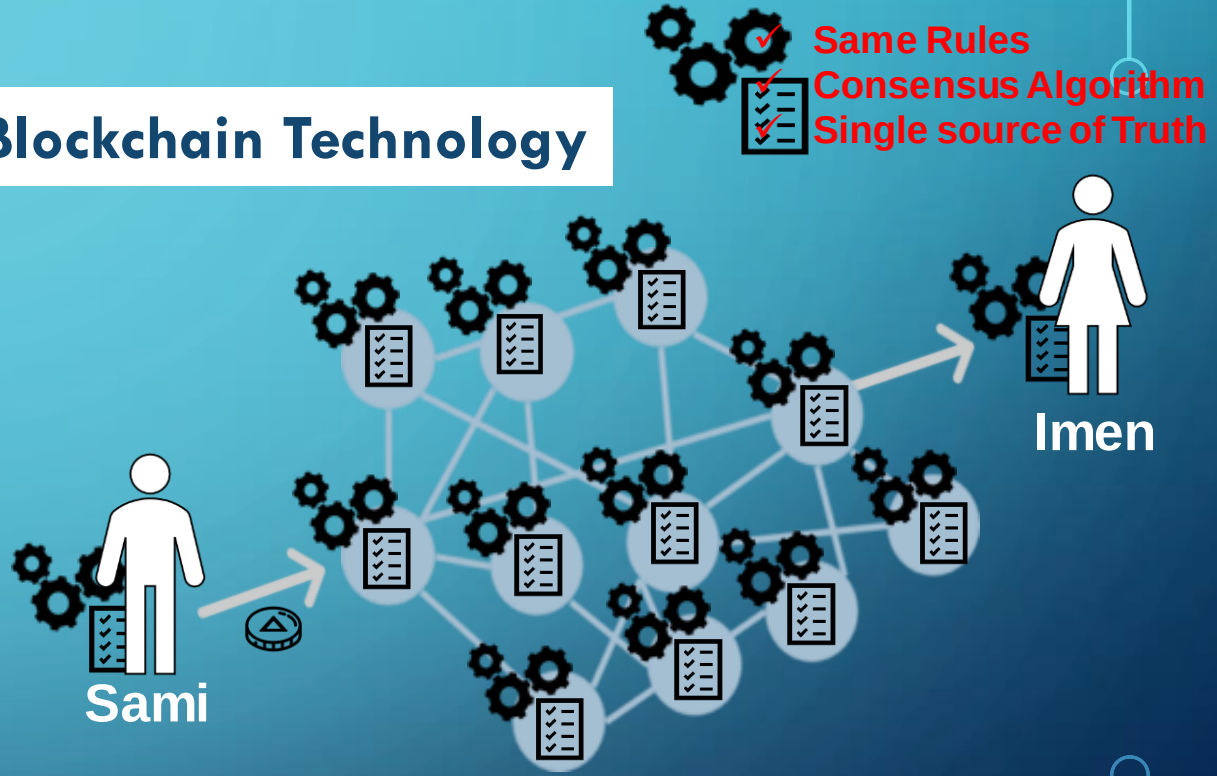
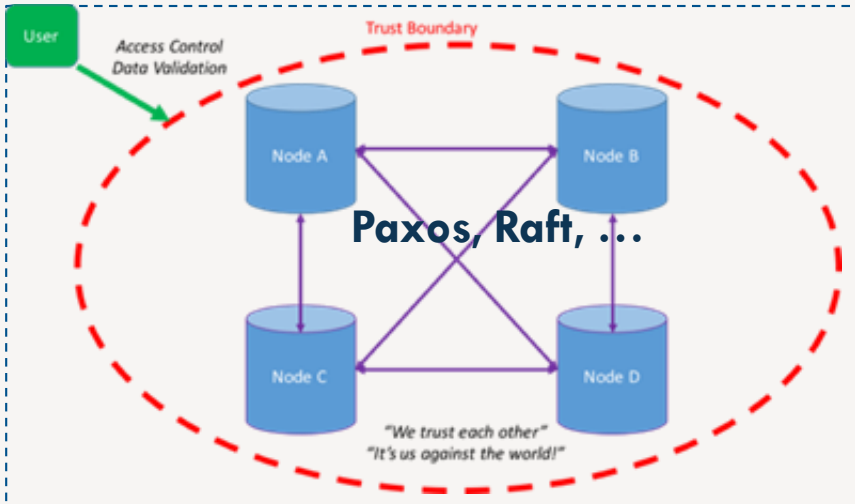
Blockchain Technology



- ✓ The Ledger is no longer owned by a single entity
- ✓ Validation and verification of the Ledger is no longer a monopoly
- ✓ Consensus rules guarantee the security of the Ledger
- ✓ The end-user can even participate in maintaining the Ledger (the purest version of the BC)
- ✓ Actors are incentivized to act "ethically"

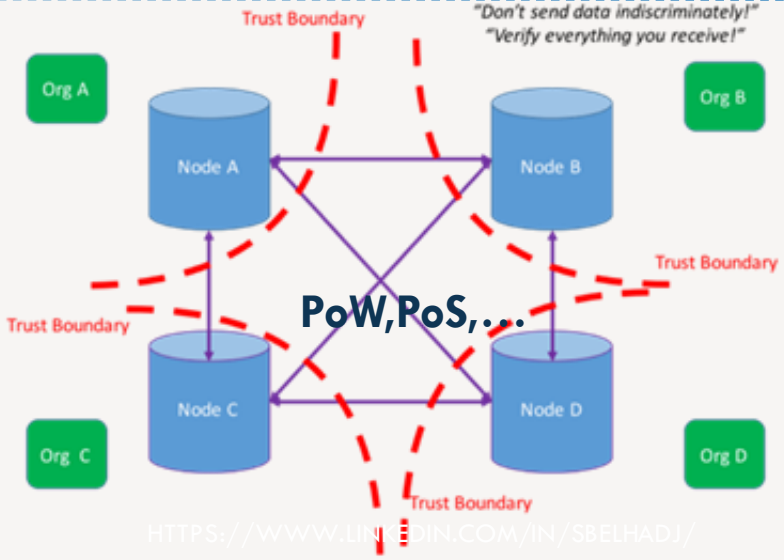
DISTRIBUTED DATABASE VS DISTRIBUTED LEDGER



Distributed Database

Nodes of a distributed database ***trust*** *each other and collaborate with each other to present a consistent, secure truth to the rest of the world.*

It's All About the **Trust Boundary!!!**



Distributed Ledger (Blockchain)

Nodes of a distributed ledger (Blockchain) ***can not trust*** *each other and so must independently* ***verify*** *data they receive from each other and only share data they are happy to be broadly shared.*

BLOCKCHAIN DEFINITION (CONCEPTUAL)

Blockchain is a **paradigm shift** in the way we approach designing economic systems involving **multiple peers** with divergent interests (~zero-sum game) but find it profitable to be part of the same system.

The traits of such systems are :

- ✓ **Decentralized** , governed by rules but without rulers : **Protocols** instead of **Platforms**.
- ✓ **Trust** is derived from the network not from hierarchy (Trustless).
- ✓ Transactions are secured by **Cryptography**.

BIG SHIFT IN BUSINESS MODELS DESIGNS

Business models are increasingly based on the reduction of intermediaries

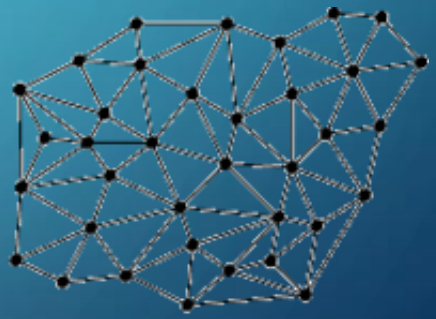
Platform Economy

PayPal salesforce

Sharing Economy

Funding Circle airbnb UBER KICKSTARTER

P2P Economy

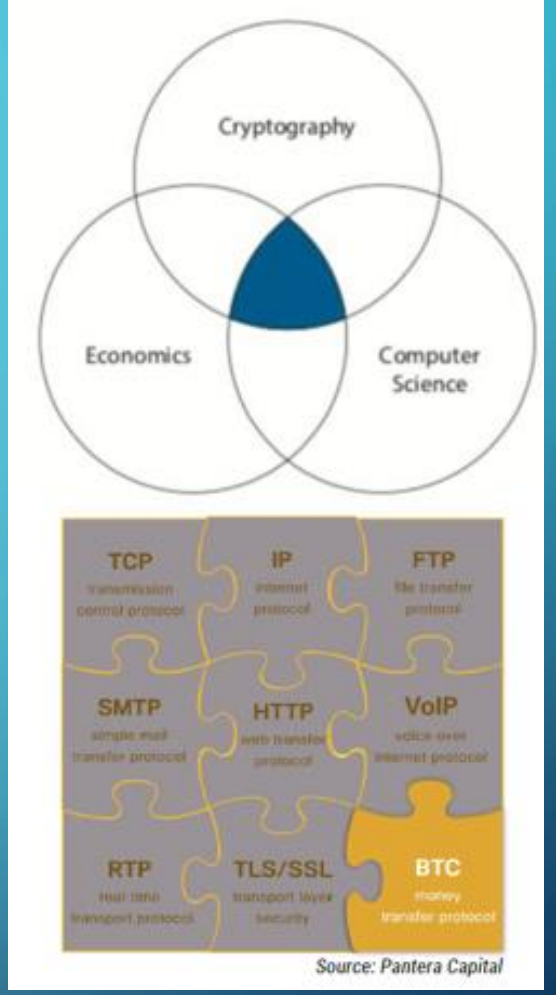


ethereum

2010 2015

BLOCKCHAIN & INTERNET OF VALUE

THE INTERNET Innovation in Information Transfer	THE BLOCKCHAIN Innovation in Value Transfer
Application Universe: *Streaming video and music, data sharing, cloud computing*	***Application Universe:*** *Smart contracts, distributed computing, tokenization*
Killer App: Email	**Killer App:** Bitcoin
Network: ISPs, Routers	**Network:** Miners, Nodes, Staking, etc.
Protocols: TCP/IP, HTTP, DNS, FTP	**Protocols:** Bitcoin, Ethereum, IPFS, Blockstack



- Blockchain is the last Brick in the Internet protocol that allowed Internet to move **Value** between peers

EMBEDDED SECURITY IN BLOCKCHAIN DESIGN

- Internet was designed without security as a priority ➔ Only a resilient network!!
- Blockchain protocol was designed with security EMBEDDED in its CORE (BFT in practice, identification , encrypted transactions,)

- Internet security was implemented at the Application protocol Level.
- Blockchain security is implemented at the low level protocol layer.

DAPPS SECURITY REQUIREMENTS

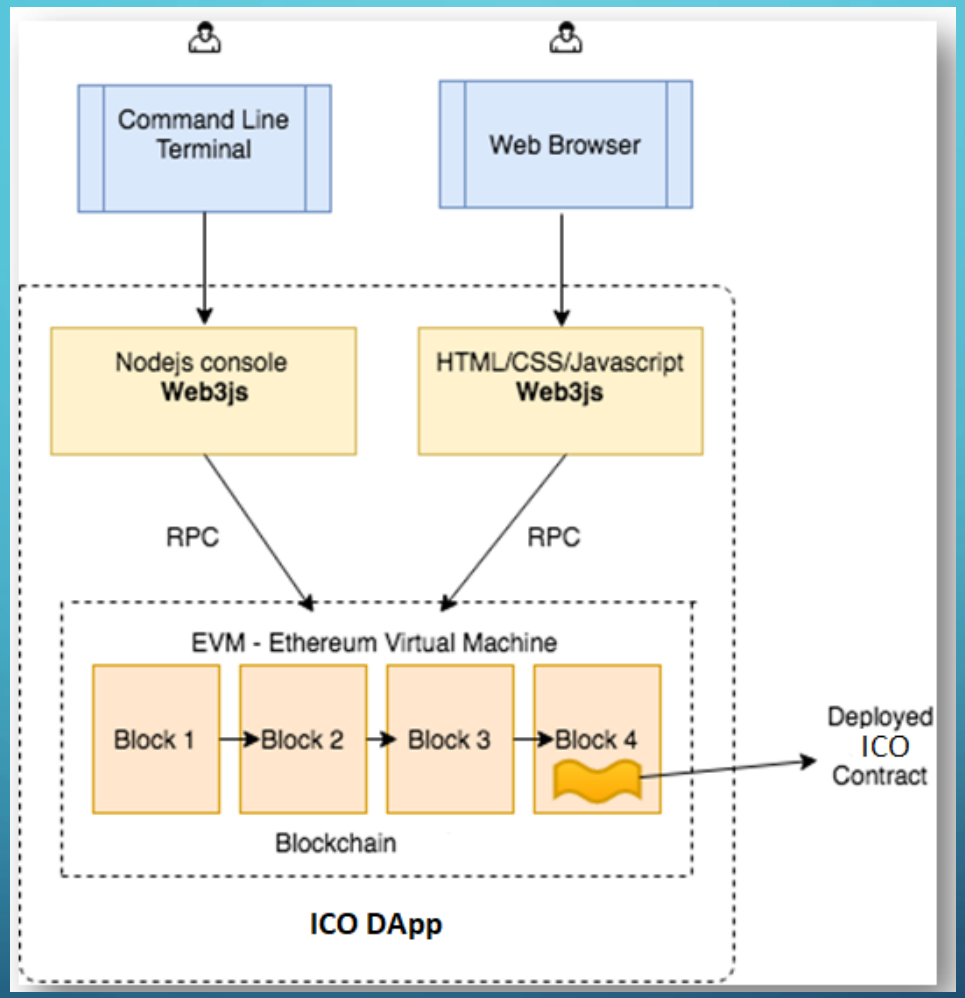
- **Identification & Authentication** → Cryptographic identity
- **Data Integrity** → Encrypted transactions coupled to Common Consensus mechanism
- **Data Confidentiality** → Zero-knowledge proof / Homomorphic encryption
- **Data Ownership/Control** → Distribution of Data

BLOCKCHAIN SECURITY FOR IOT

- The Distributed character of IOT networks makes it a good candidate for Blockchain technology
- **Blockchain**, which is most familiar for **bitcoin** and Ethereum, offers an intriguing solution for **IoT security**. **Blockchain** contains strong protections against data tampering, locking access to Internet of Things devices, and allowing compromised devices in an **IoT** network to be shut down.

ICO DAPP DEMO

DApp reference Architecture



Steps

Step 1 : Setting up the environment

Step 2 : Writing the Smart Contracts

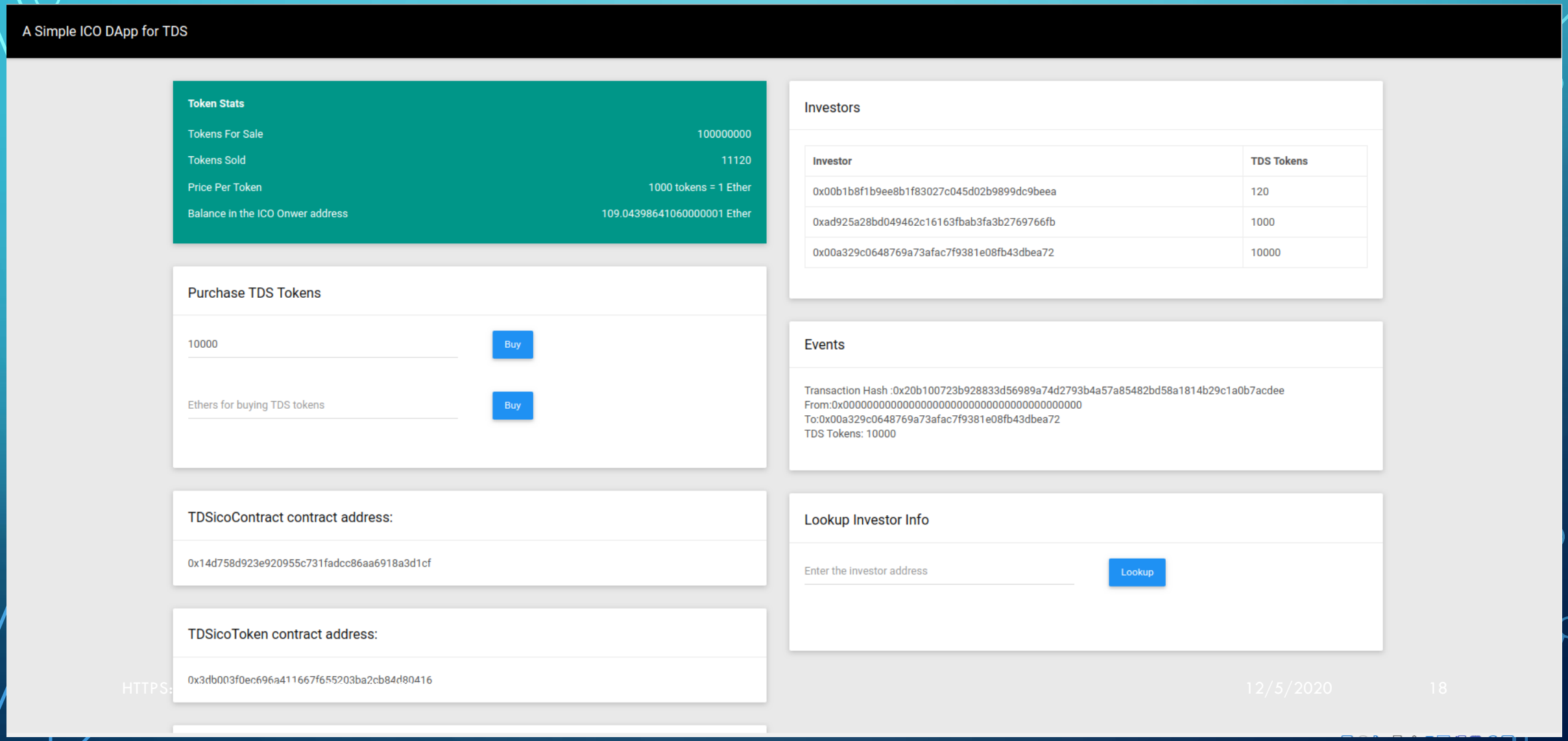
Step 3 : Compiling and deploying(migrating) the Smart Contracts

Step 4 : Testing the Smart Contracts

Step 5 : Creating the Front-end

Step 6: Using the DApp

Creating the Front-end



Step 6 : Interacting with the DApp