Chapter 5

CONTRACT AND SMART CONTRACT

TP. HCM 2022

OVERVIEW

- Contract
- Smart Contracts
- Blockchain Design with Smart Contracts
- Brieft explanation of Dapps, Token, NFT
- Legal Issues

CONTRACT

promise or **performance**
given in exchange for
promise or **performance**

SMART CONTRACT

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

pragma solidity >=0.7.0 <0.9.0;

/**
 * @title Ballot
 * @dev Implements voting process along with vote delegation
 */
contract Ballot {

    struct Voter {
        uint weight; // weight is accumulated by delegation
        bool voted;  // if true, that person already voted
        address delegate; // person delegated to
        uint vote;   // index of the voted proposal
    }

    struct Proposal {
        // If you can limit the length to a certain number of bytes,
        // always use one of bytes1 to bytes32 because they are much cheaper
        bytes32 name;   // short name (up to 32 bytes)
        uint voteCount; // number of accumulated votes
    }

    address public chairperson;

    mapping(address => Voter) public voters;

    Proposal[] public proposals;

```

Code is law

SMART CONTRACT

"A set of promises, specified in digital form, including protocols within which the parties perform on these promises."

Nick Szabo, 1996

However…

- Smart Contracts may not be "**Smart**"
- Smart Contracts may not be "**Contracts**"

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SMART CONTRACT

- Replaces traditional contracts in blockchain context
- Authority-less autonomous program, that directly controls numeric securities (digital assets), based on mutually agreed terms
- Looks like “if-then” instructions that automatically evaluate predefined conditions and do transactions
- Has an owner and a life cycle, and is executed on Ethereum Virtual Machine (EVM)

SMART CONTRACT

Pros

- Immutability characteristic
- Autonomy and automaticity characteristics

Cons

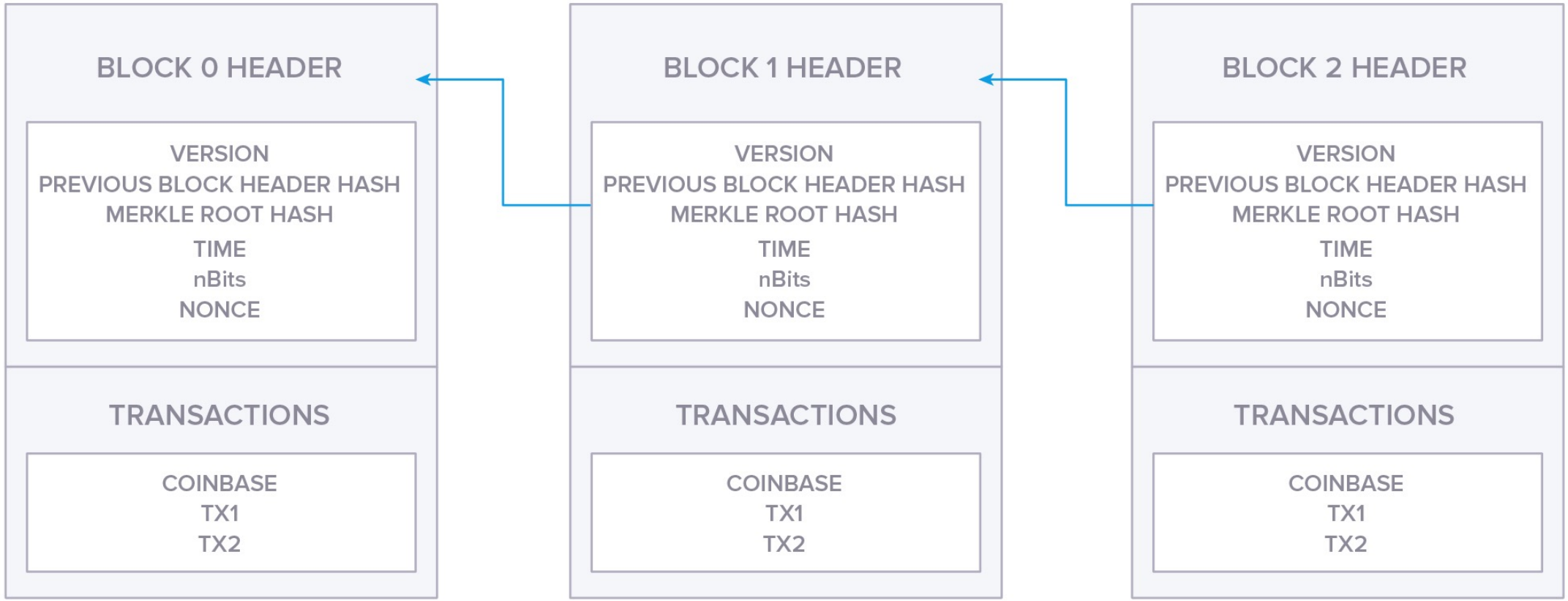
- Not suitable for all kinds of contracts
- Simple and only include “if a, then b” patterns

BUGS???

INTERACTING WITH A SMART CONTRACT

- Smart contract is not self-executable
- It requires an external call to be executed. Otherwise, it is pending till one calls one of its implemented functions
- Once it is executed, transactions resulting from the execution are transcribed on the blockchain and eventually smart contract's meta data are updated

BLOCKCHAIN DESIGN WITH SMART CONTRACTS



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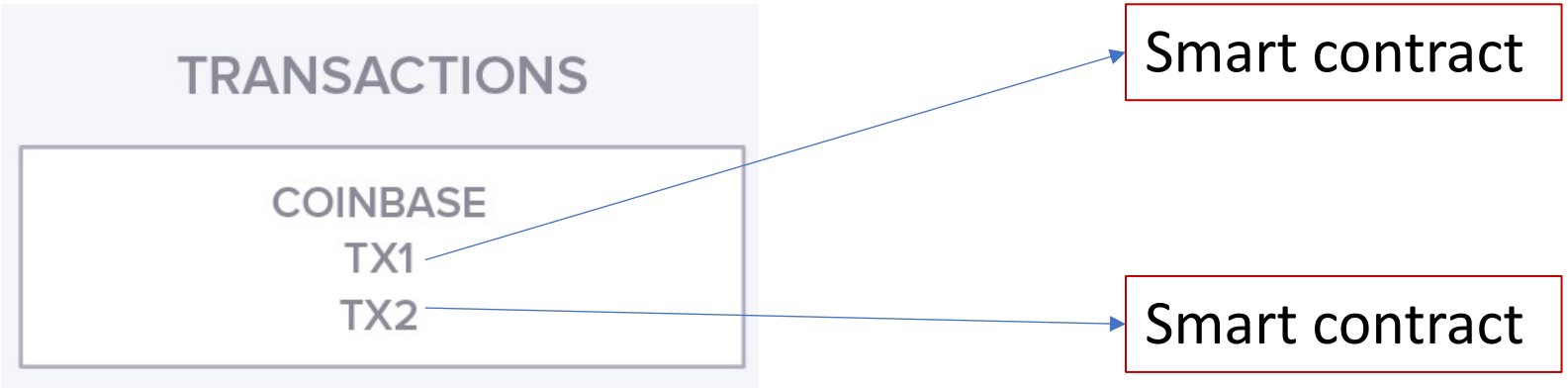


Smart contract execution may or may not change blockchain state

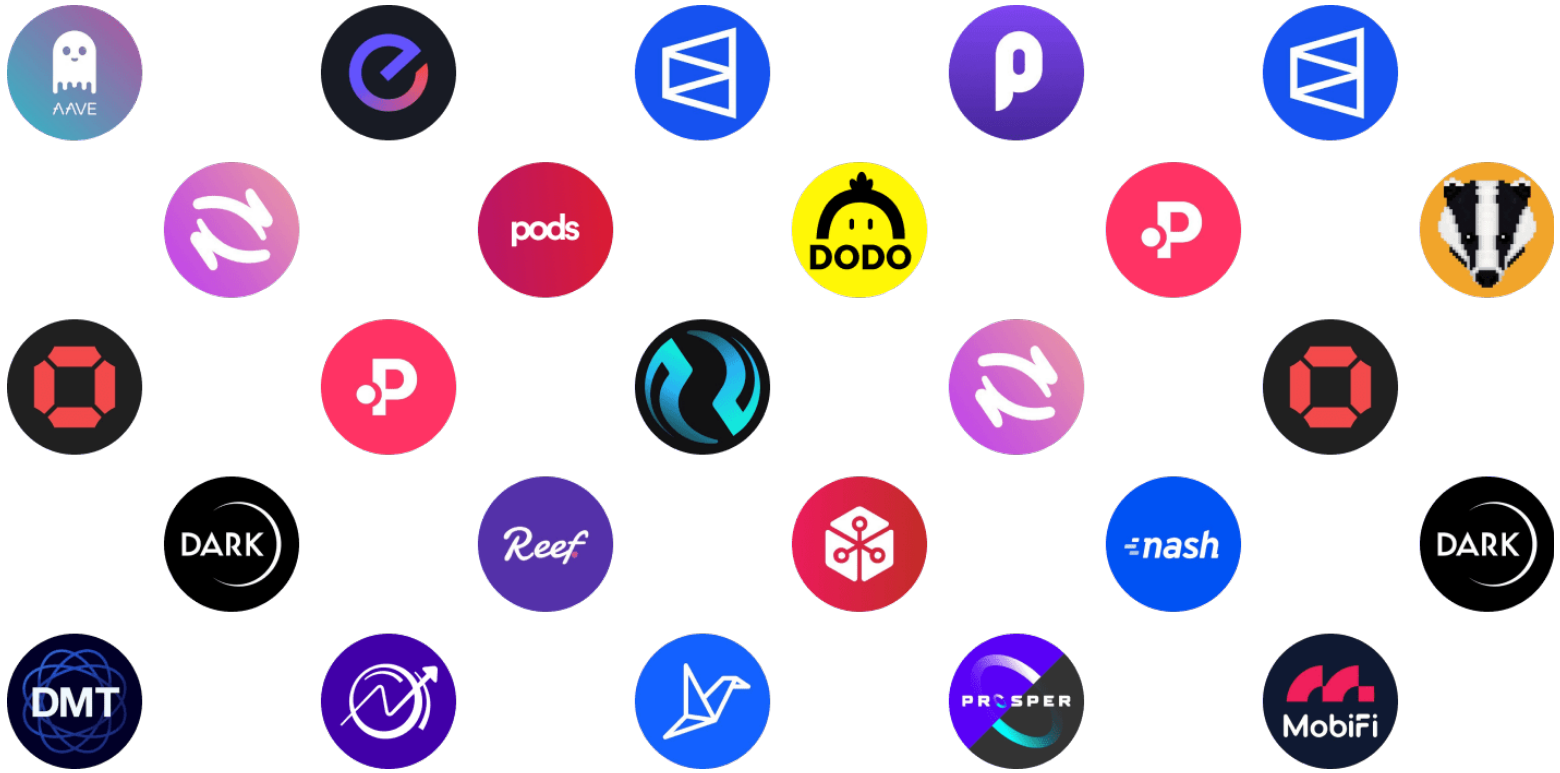
USE CASES

- Lending & borrowing
- Security
- Mortgage
- Supply chain
- Trade finance
- …

DAPPS & TOKEN

Dapps

- Applications run on a Decentralized Blockchain Network
- They generally have a Native Token & Run as a Smart Contract



https://dappradar.com/

NFTs

- NFTs (non-fungible tokens) are unique cryptographic tokens that exist on a blockchain and cannot be replicated.
- NFTs can represent real-world items like artwork and real estate.
- "Tokenizing" these real-world tangible assets makes buying, selling, and trading them more efficient while reducing the probability of fraud.
- NFTs can also function to represent individuals' identities, property rights, and more.

INITIAL COIN OFFERING (ICO)

- Proceeds used to build networks
- Tokens usually issued prior to being functional
- Development, while open source, is largely centralized
- Promoters allocate themselves ‘premined’ tokens
- Tokens are fungible & transferable
- Scarcity is fostered with preset ‘Monetary policy’
- Purchasers anticipate profits through appreciation

INITIAL COIN OFFERING (ICO)

Advantage:

- Young enterprises do not have to wait for months before having the "go" of an investment fund

Disadvantages:

- Difficult to verify the relevance and quality of a project that does not exist yet
- Absence of control authority to regulate the market "anyone can issue a digital title, so there are mechanically a lot of scams of all kinds"
- Volatility of cryptocurrency can quickly raise or lower the amount raised depending on the technical developments of the platform and of other exceptional events

DISCUSSION

READINGS

- Enterprises building Blockchain Confront Early Tech Limitations
- Technical difference between Ethereum, Hyperledger fabric and R3 Corda
- ‘What is Corda?
- A Blockchain Plaform for the Enterprise, Introduction
- What is Digital Asset? / Distributed Ledgers for Financial Institution