

# Blockchain Technology, NFT, WEB3, and Metaverse

*Assoc. Prof. Dr. Cihangir Tezcan*



## MIDDLE EAST TECHNICAL UNIVERSITY

Informatics Institute, Department of Cyber Security  
**MIDDLE EAST TECHNICAL UNIVERSITY, ANKARA, TURKEY**

*16 June 2022*

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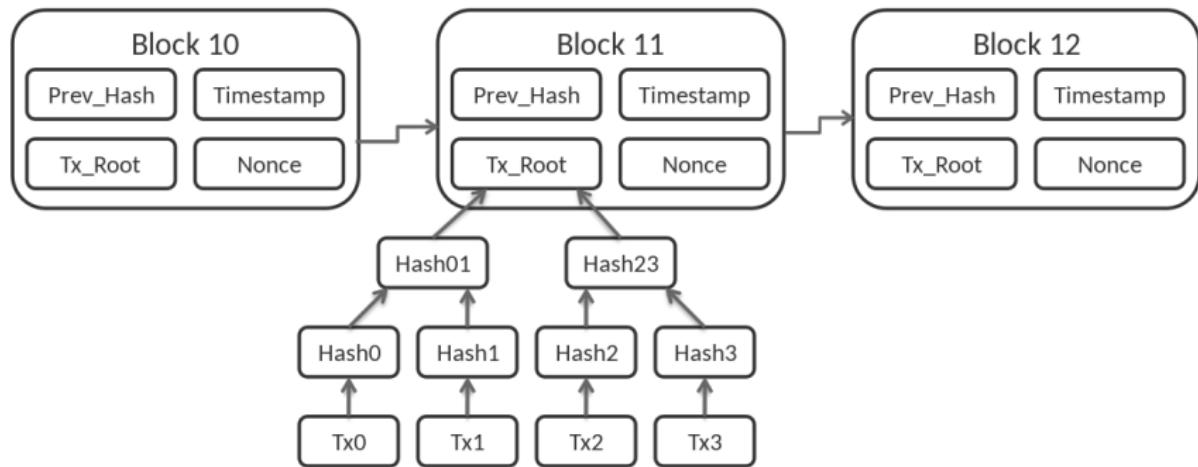
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- Blockchains are stored across a distributed network of servers, each continually exchanging, storing, and updating the ledger
- This allows the information to be decentralized and unable to be corrupted by a single user

# Bitcoin Blockchain Structure



*Bitcoin blockchain structure (Matthäus Wander CC BY-SA 3.0)*

# Annual Electricity Consumption

## Bitcoin Energy Consumption

Click and drag in the plot area to zoom in



Zoom 1m 3m 6m YTD 1y All

Jan 21, 2017 → Jul 3, 2022

● Estimated TWh per Year    ● Minimum TWh per Year

[BitcoinEnergyConsumption.com](https://digiconomist.net/bitcoin-energy-consumption)

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# Annual Electricity Consumption

## Ethereum Energy Consumption

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<https://digiconomist.net/ethereum-energy-consumption>

# Hash Puzzles to Prevent Double Spending

## Proof of Work

Aim is to obtain a hash value less than a target

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# Blockchain Challenges

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- NIST is organizing Post-Quantum Cryptography Competition (2016-2024)

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  - 3 NFT
- Many academic papers that propose blockchain solutions are wrong or redundant

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- 6 Tamper-proof log of all data store writes is wanted

# A Blockchain for Diplomas/Certificates

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A blockchain entry:

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## A Blockchain entry:

- **Name:** Cihangir Tezcan
- **Degree:** B.Sc.
- **Department:** Mathematics
- **Year:** 2007
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**SHA256** of the above entry:

ad06774b333255822225c80b73d3a94669076ccb611dd36893c94c3884d7e316

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- 1** Fungible tokens are identical and interchangeable (ERC-20)
- 2** Non-fungible tokens are unique and each token represents someone's ownership of a specific digital asset (ERC-721)

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- In Bitcoin like blockchains, this generally requires 2 transactions

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- ERC-721 standard does NOT record the hash of the file!!!

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- 3 NFT files may be lost or changed in the future

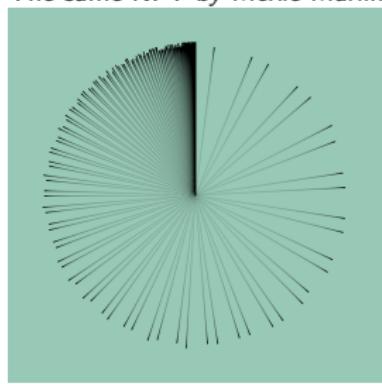
Blockchain  
oooooooooooo

NFT  
oooo●ooooo

WEB3  
oooo

Metaverse  
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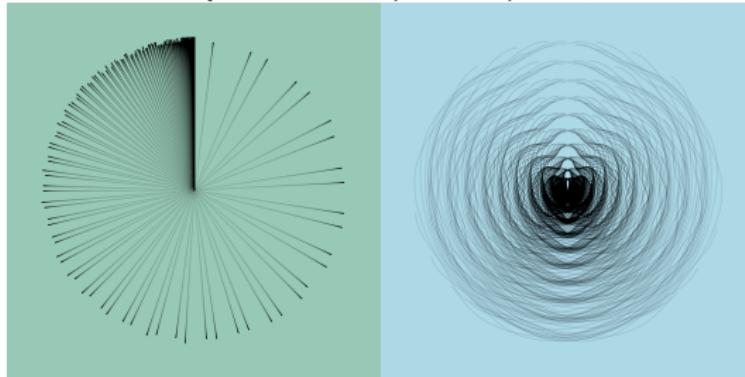
# NFT Example 1



*The same NFT by Moxie Marlinspike on Opensea, Rarible, and Metamask, respectively*

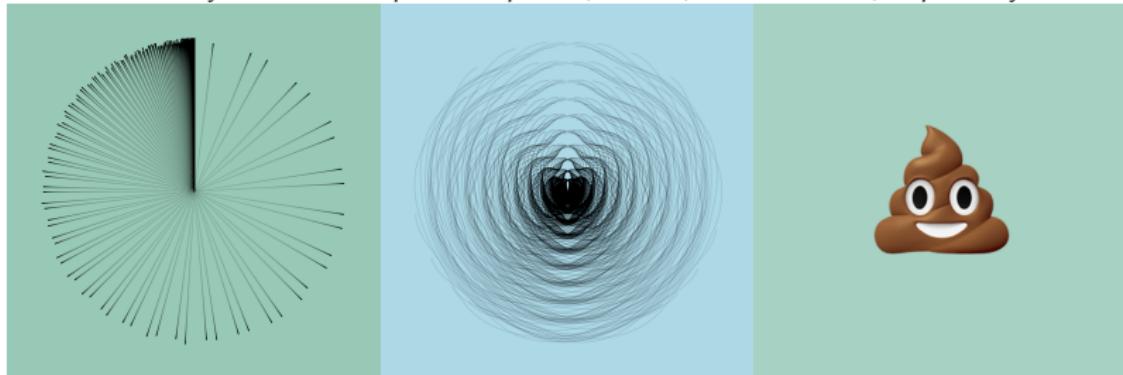
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Storing an NFT at a regular webpage (HTTP) is NOT a good idea

Blockchain  
oooooooooooo

NFT  
ooooo●oooo

WEB3  
oooo

Metaverse  
oooo

## NFT Example 2

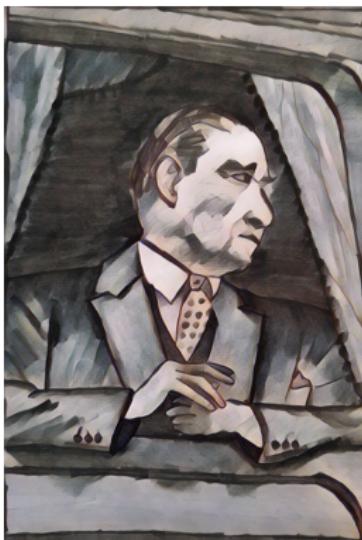


# NFT Example 2

```
name: "Mustafa Kemal Atatürk"
▼ description: "Mustafa Kemal Atatürk\n\nI drew this on National Sovereignty and
Children's Day, 23 April 2021. He is the only leader in the world that
gifted a holiday to children.\n\n\"Little ladies, little gentlemen! You
are all a rose, star and light of prosperity of the future. You are the
ones who will drown the country in real light.\"\\n\\n\"Children are the
future of our nation and a source of joy and merriness. It is our duty to
raise children with the awareness that today's children are the future's
adults.\""
▼ image: "ipfs://QmSvssb4WFfrstBmy9CHKPY5BZvNMc5bSqaQbuQ4w5aHpv/nft.jpg"
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ipfs://QmbGNG3wes9tk7ori7Gu6mRcV9fwWvrzyJutqVQ3sCje99/metadata.json

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IPFS link:

<ipfs://QmSvssb4WFfrstBmy9CHKPY5BZvNMc5bSqaQbuQ4w5aHpv/nft.jpg>

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<ipfs://QmSvssb4WFfrstBmy9CHKPY5BZvNMc5bSqaQbuQ4w5aHpv/nft.jpg>  
9772F58B3EA7BD44DB28A93DED464D6A46027B602B8C298F597FE7A9CC5B594B

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  - Around 9% of OPENSEA royalty fees were modified after the 1st sale

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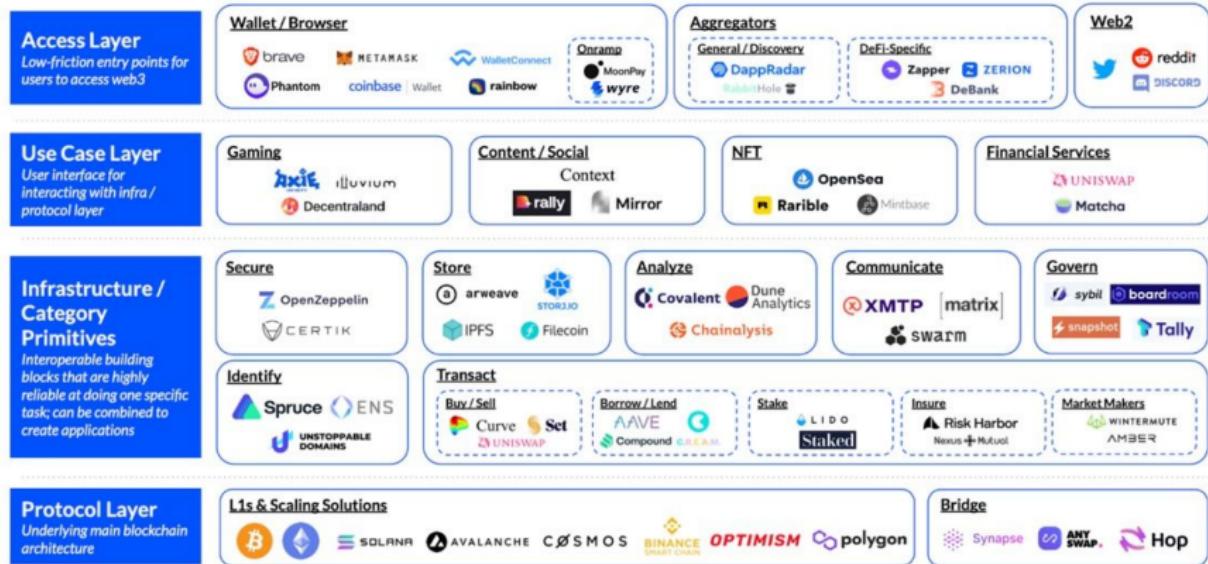
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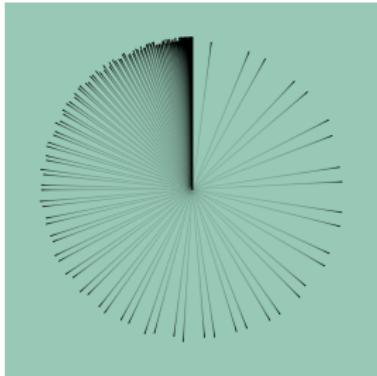
# WEB3

## The Web 3 stack



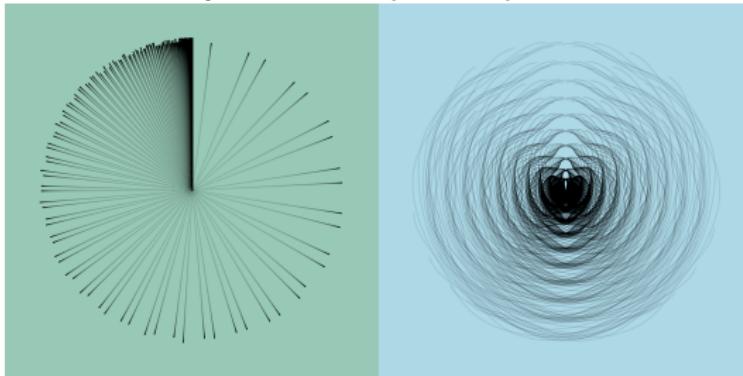
# Back to NFT Example

*The same NFT by Moxie Marlinspike on OpenSea, Rarible, and Metamask, respectively*



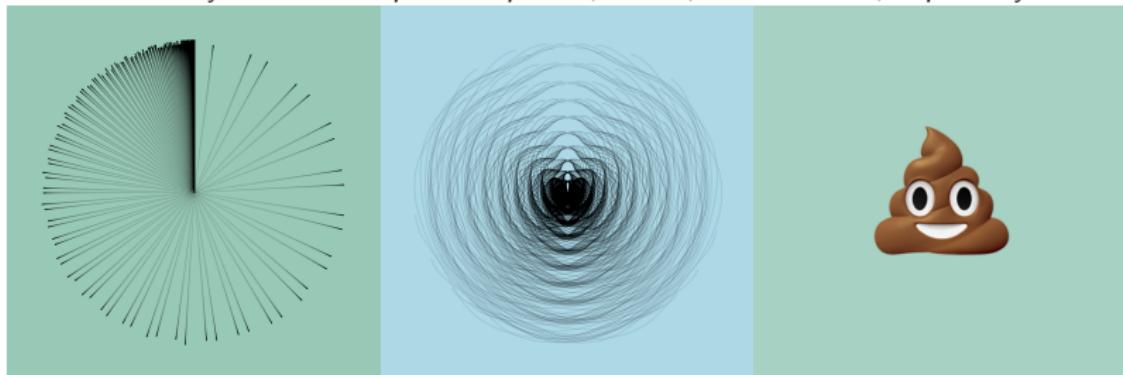
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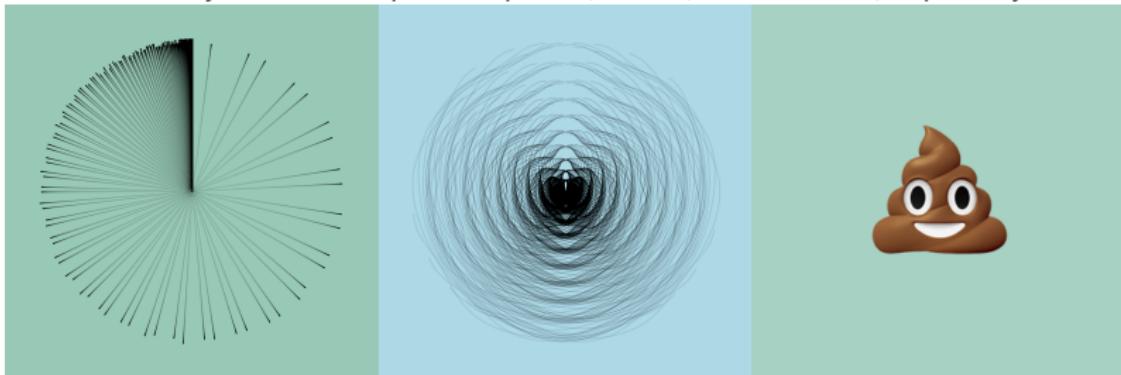
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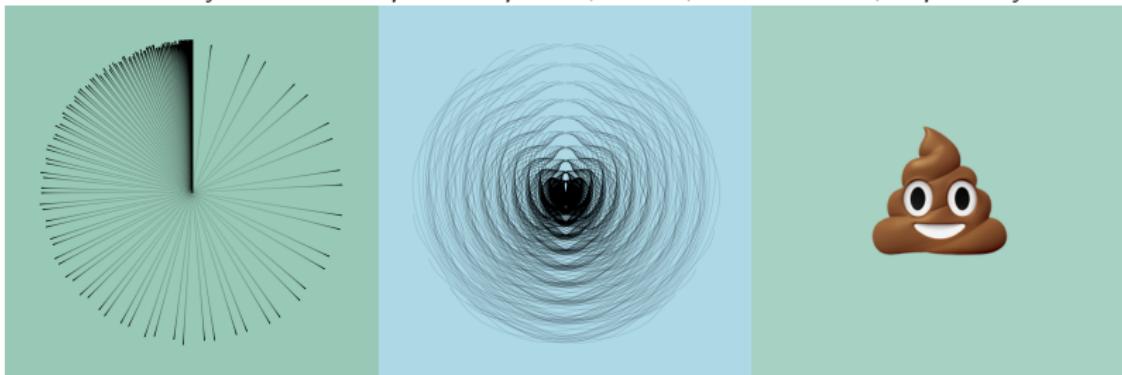
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- For a short time OpenSea removed this NFT from their webpage
- This made NFT to disappear also from Metamask
- Instead of looking at the blockchain, using a library/API of others result in centralized systems

# WEB3 Challenges

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- 1 People do NOT like managing their own servers
- 2 Decentralized apps turn into centralized apps when they share the same library/API
- 3 Considering that hundreds of cryptocurrencies died in the last 10 years, assuming that a blockchain will live forever might be a huge assumption

# Metaverse

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- 4 Metaverse does NOT mean VR/AR

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- 1 Software development takes too much time
- 2 Legal system is not ready for Metaverse
- 3 Services that do not provide convenience will not be preferred
- 4 Some technologies emerge untimely and leave the scene

Thanks

*Thank You for Your Attention*