

# Impacts of widespread Utreexo adoption

**How Utreexo changes incentives for protocols and end users**



<https://github.com/kcalvinalvin/2024-btc-singapore>



# Me!

**Calvin Kim**

- Research & implementation on Utreexo for 5 years
- Bitmex 2020-2023
- HRF 2023-2024





# **What you guys should take away!**

**3 things**

- What is Utreexo

- What is Utreexo
- What are the benefits for end users

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- What are the benefits for end users
- **What are the impacts on the Bitcoin ecosystem**

# What is Utreexo?

**Replace the database used  
for the UTXO set with fancy  
merkle trees**





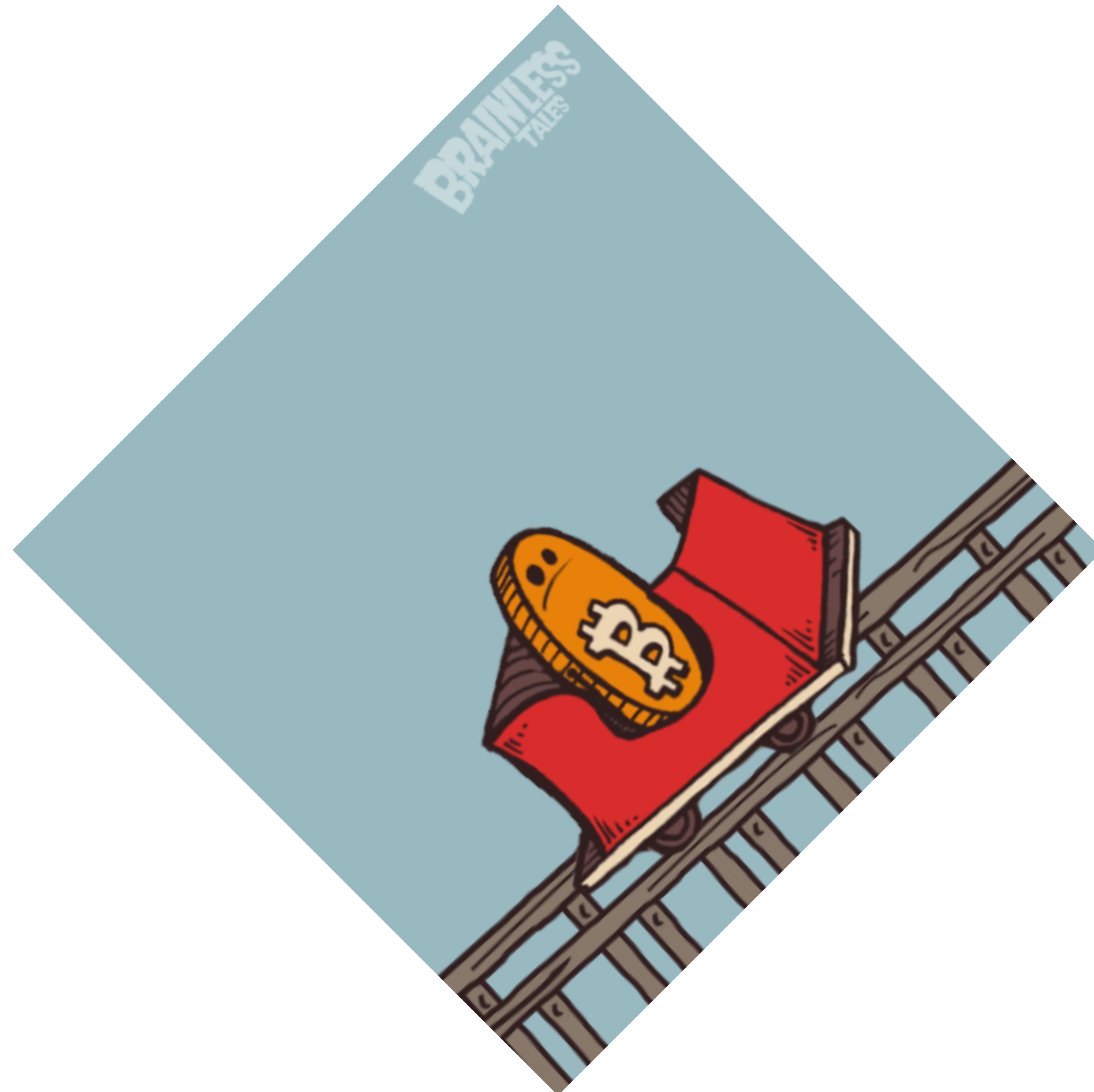
Merkle  
trees



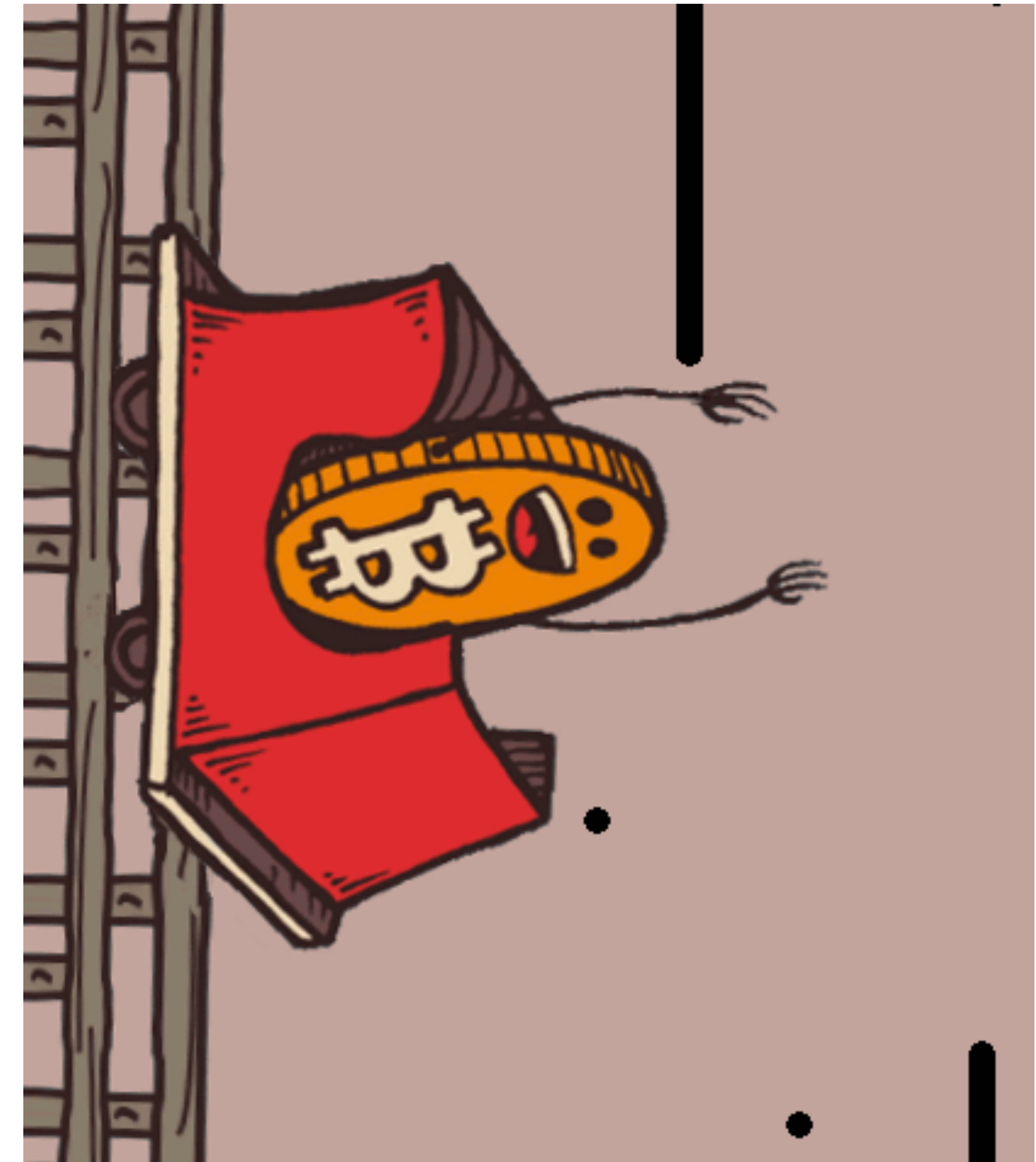
*Utreexo*

**Why?**

Internet usage  
CPU



disk read/write  
disk usage  
RAM usage



# Tradeoffs

- Use slightly more CPU and more internet

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- Use slightly more CPU and more internet
- **Massively save on disk read/write, disk usage, and RAM usage**

# **What are the benefits for end users?**



**Better UX for running fully  
validating nodes**

# Fully Validating Nodes

- Nodes that check all blocks/txs follow Bitcoin consensus rules

# **Why is it important?**

**For an individual**

- Only way to be sovereign

# Why is it important?

For the Bitcoin network

- Miners may cheat if there aren't enough nodes on the network

## **With Utreexo:**

- Web browser full nodes
- Mobile wallet full nodes

**First client side full nodes**



# Features

**Over traditional fully validating nodes**

- Immediate bootstrap

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- Less than 1KB of disk usage vs 10GB

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## Over traditional fully validating nodes

- Immediate bootstrap
- Less than 1KB of disk usage vs 10GB
- Lower device resource usage

# Impacts on the Bitcoin Ecosystem

# Current full nodes

- Everyone stores the entire UTXO set

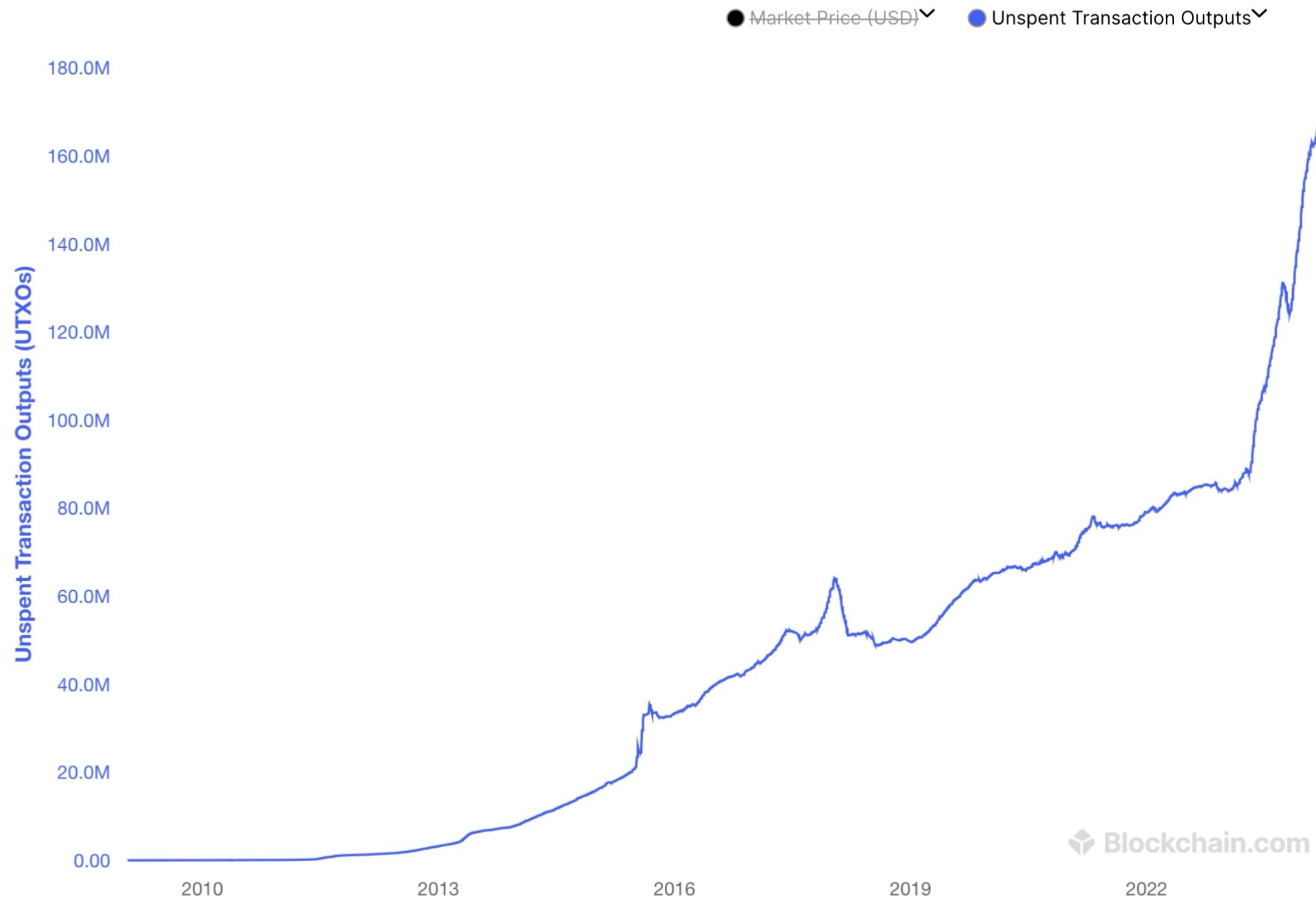
# Current full nodes

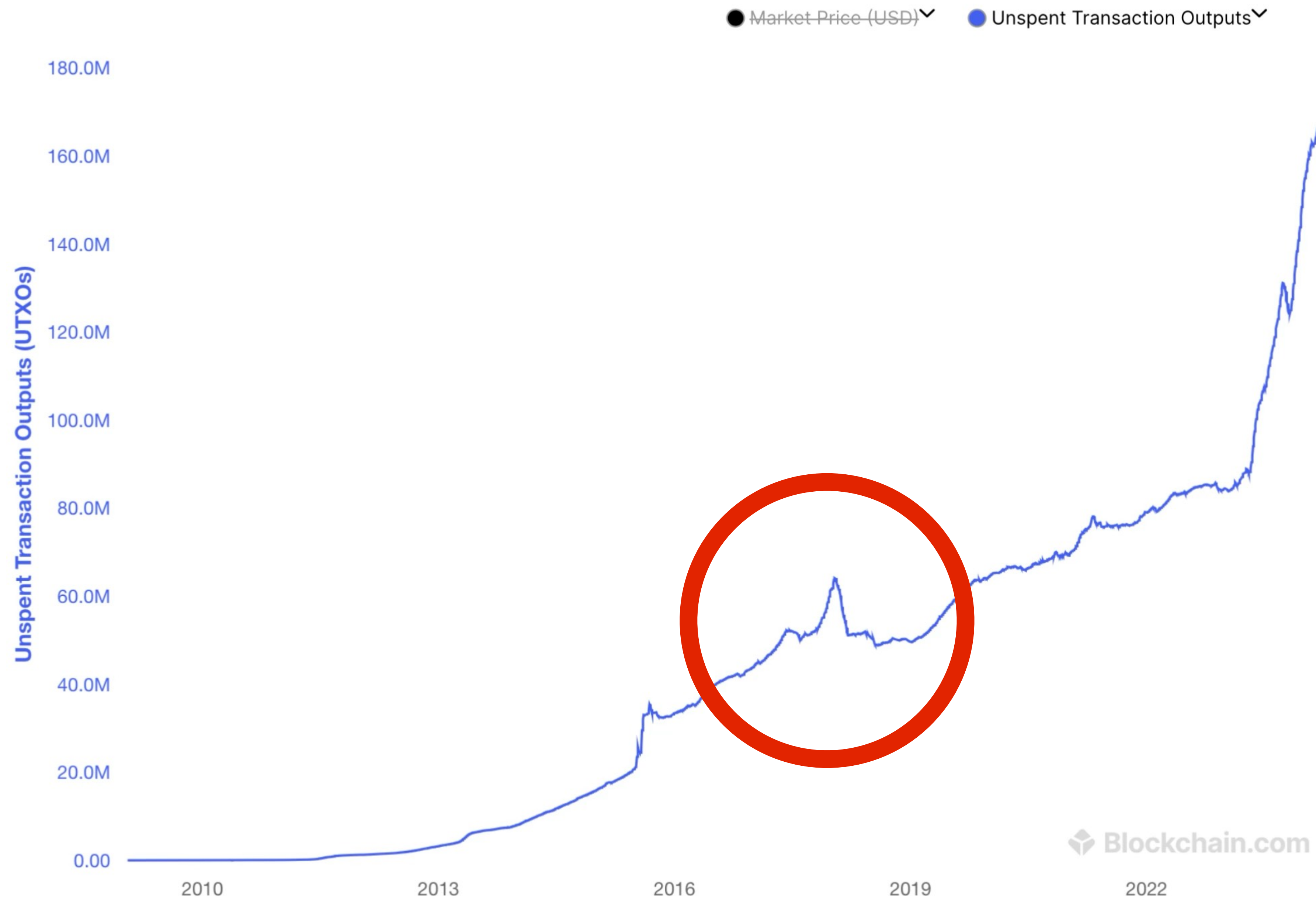
- Everyone stores the entire UTXO set
- I have the burden of storage if someone else creates a lot of UTXOs



**One time fee and free forever**

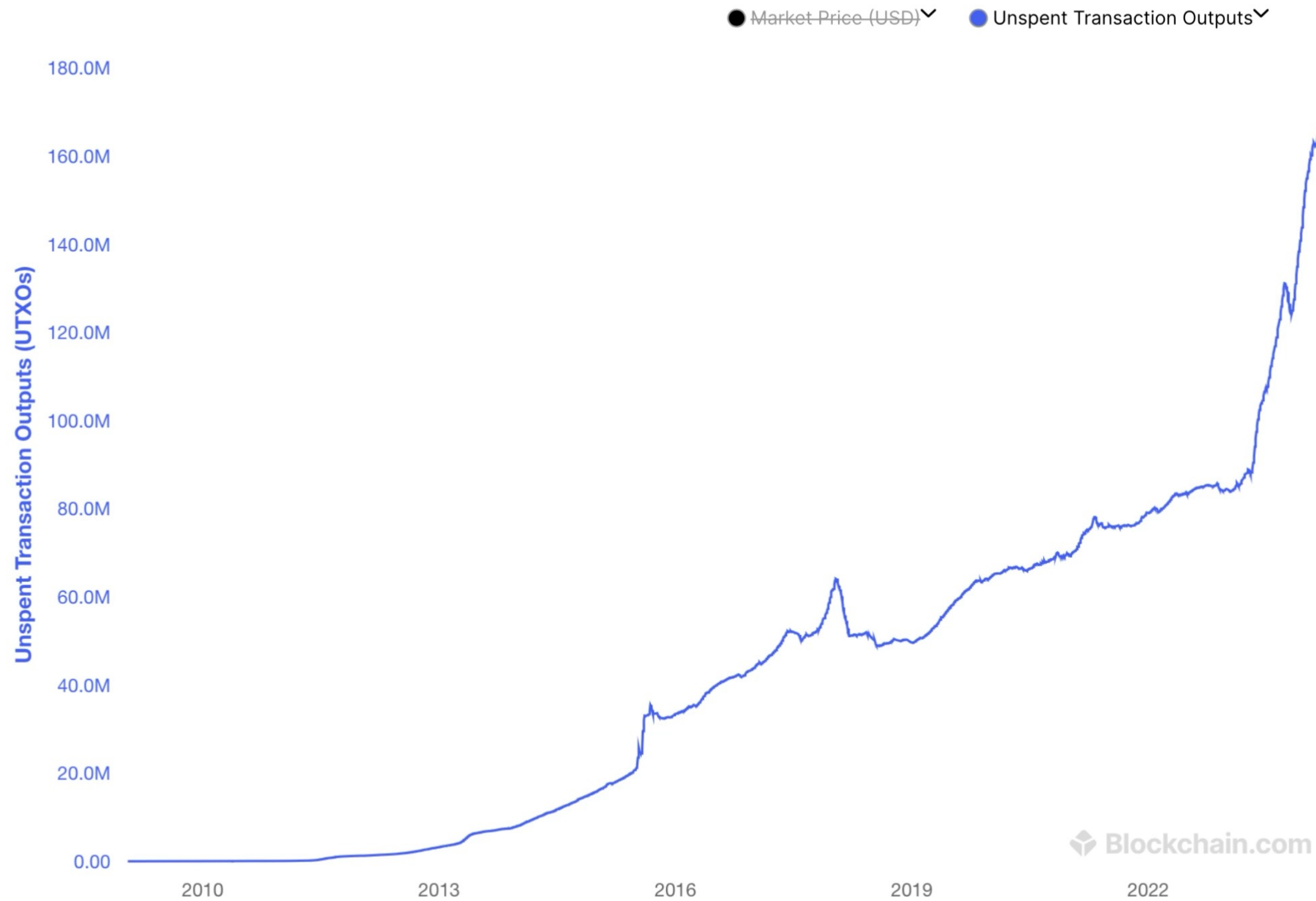
coinbase



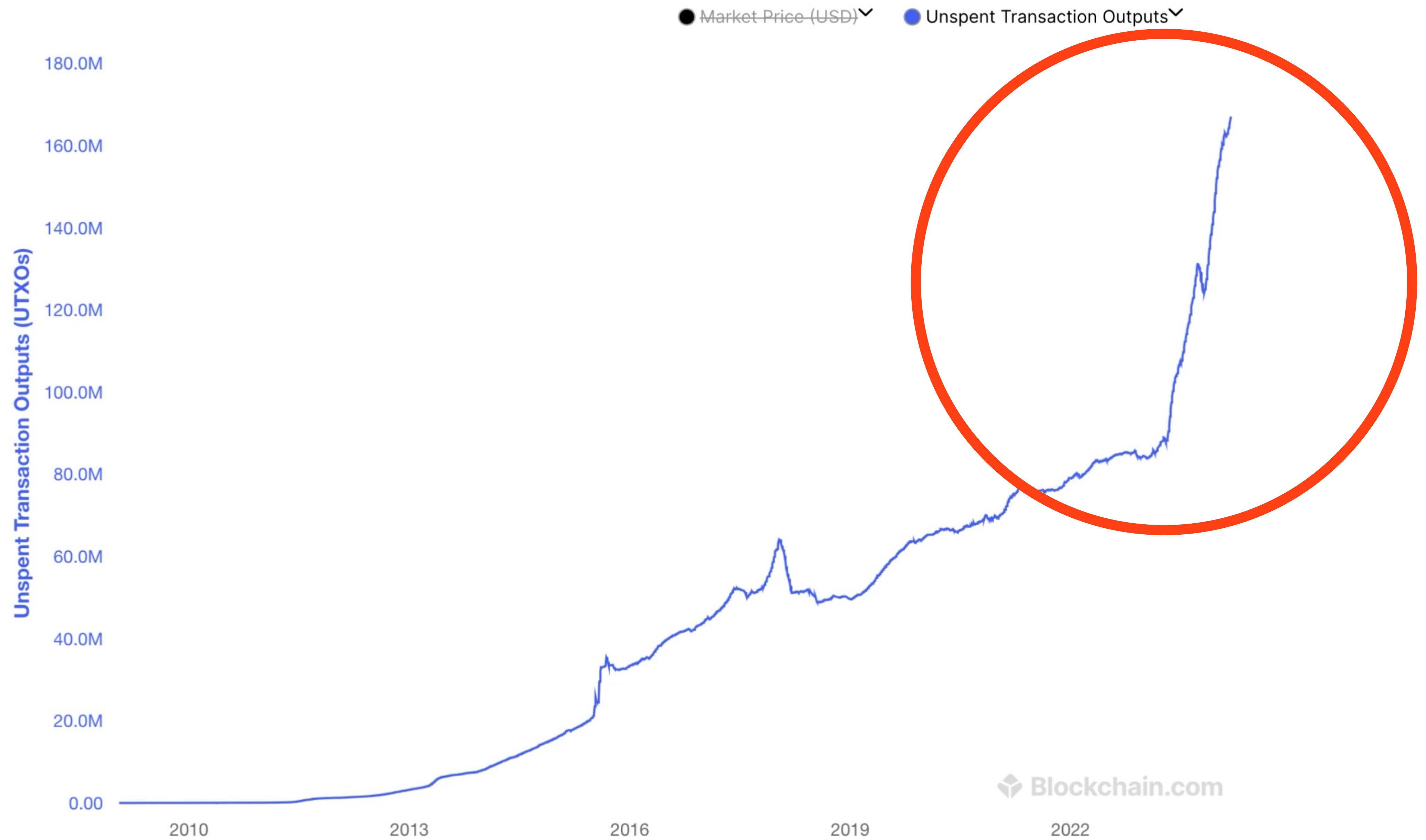


coinbase

Ordinals







# coinbase

## Ordinals

**BITCOIN STAMPS**

*Unprunable UTXO Art, Because Sats Don't Exist.*

# **Why is the UTXO set growth bad?**

- **Increases storage requirements**

# Why is the UTXO set growth bad?

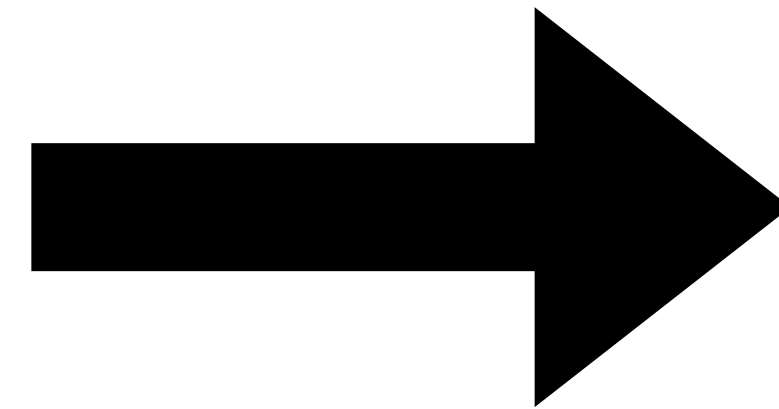
- Increases storage requirements
- Increased cost for block/tx validation as the UTXO set gets bigger

## **With Utreexo**

- Burden of storage on the entity creating the UTXO

# Burden of Storage

Everyone



Owner of  
the UTXO

# No more free storage

- Current incentive structure doesn't account for the data storage overhead

# No more free storage

- Current incentive structure doesn't account for the data storage overhead
- Utreexo solves this problem by making the creator store the UTXO



- Fancy Merkle trees for the UTXO set

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- **Web browser full nodes**

- Fancy Merkle trees for the UTXO set
- Web browser full nodes
- **Burden of storage shifts to the individual not everyone**

**Alpha release imminent!**

# Resources

- [github.com/utreeexo/utreeexod](https://github.com/utreeexo/utreeexod)
- <https://github.com/Davidson-Souza/Floresta>

# Me

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