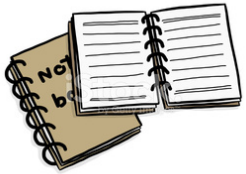
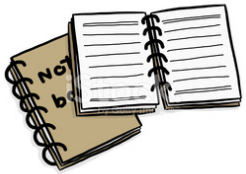
Blockchain as a Platform

Murat Osmanoglu

Blockchain





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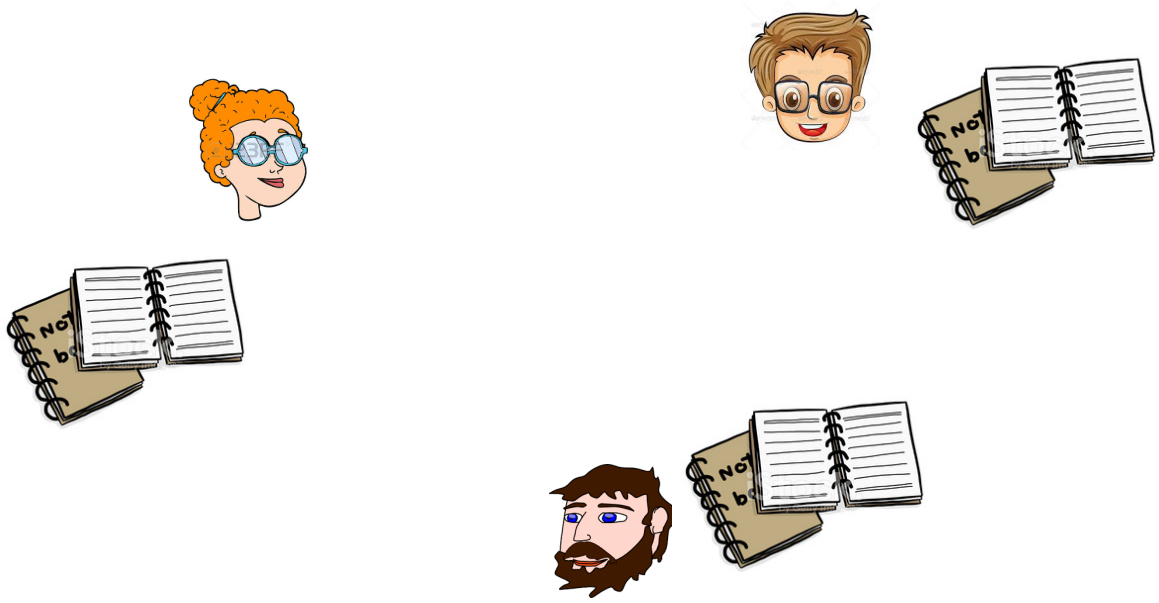

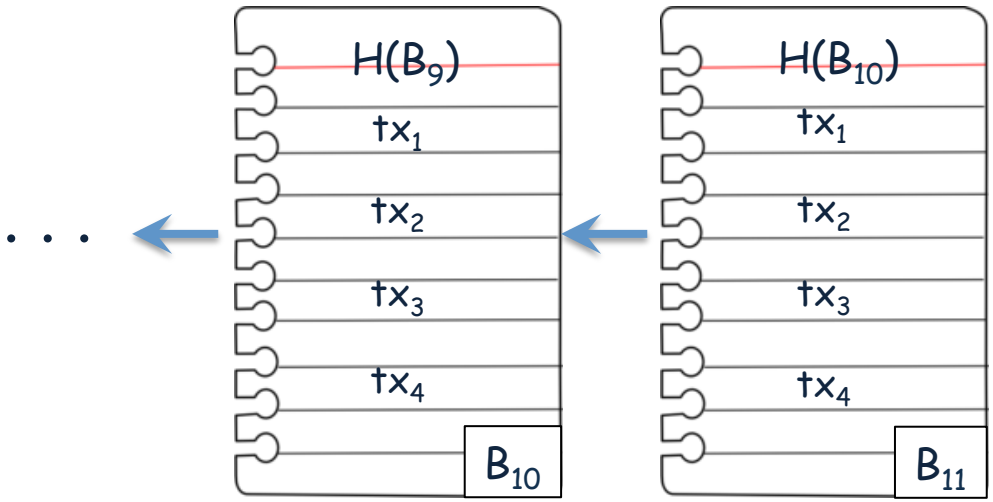

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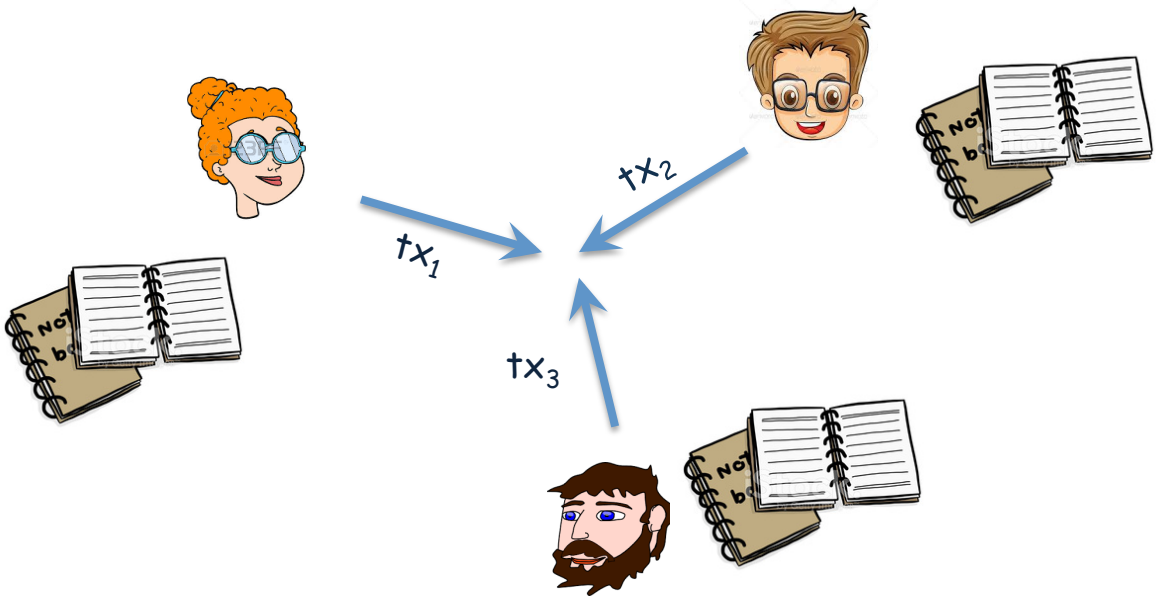

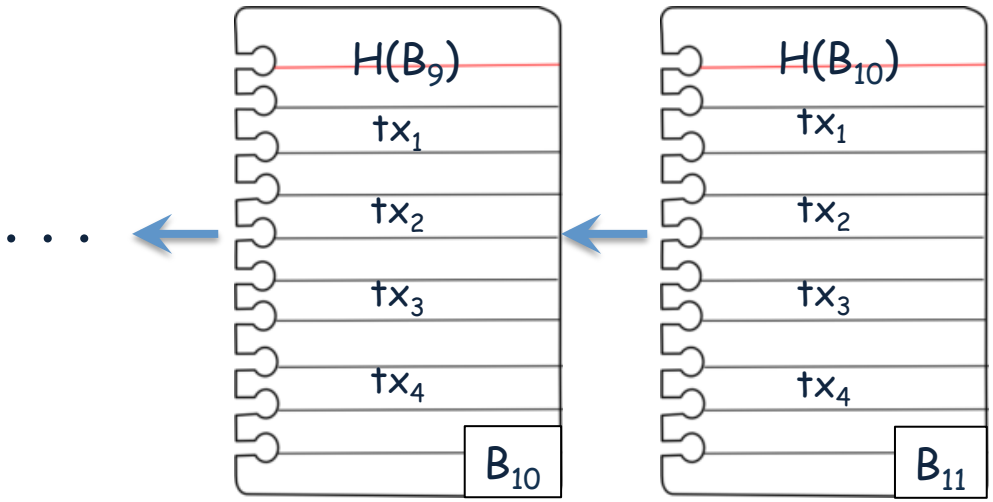

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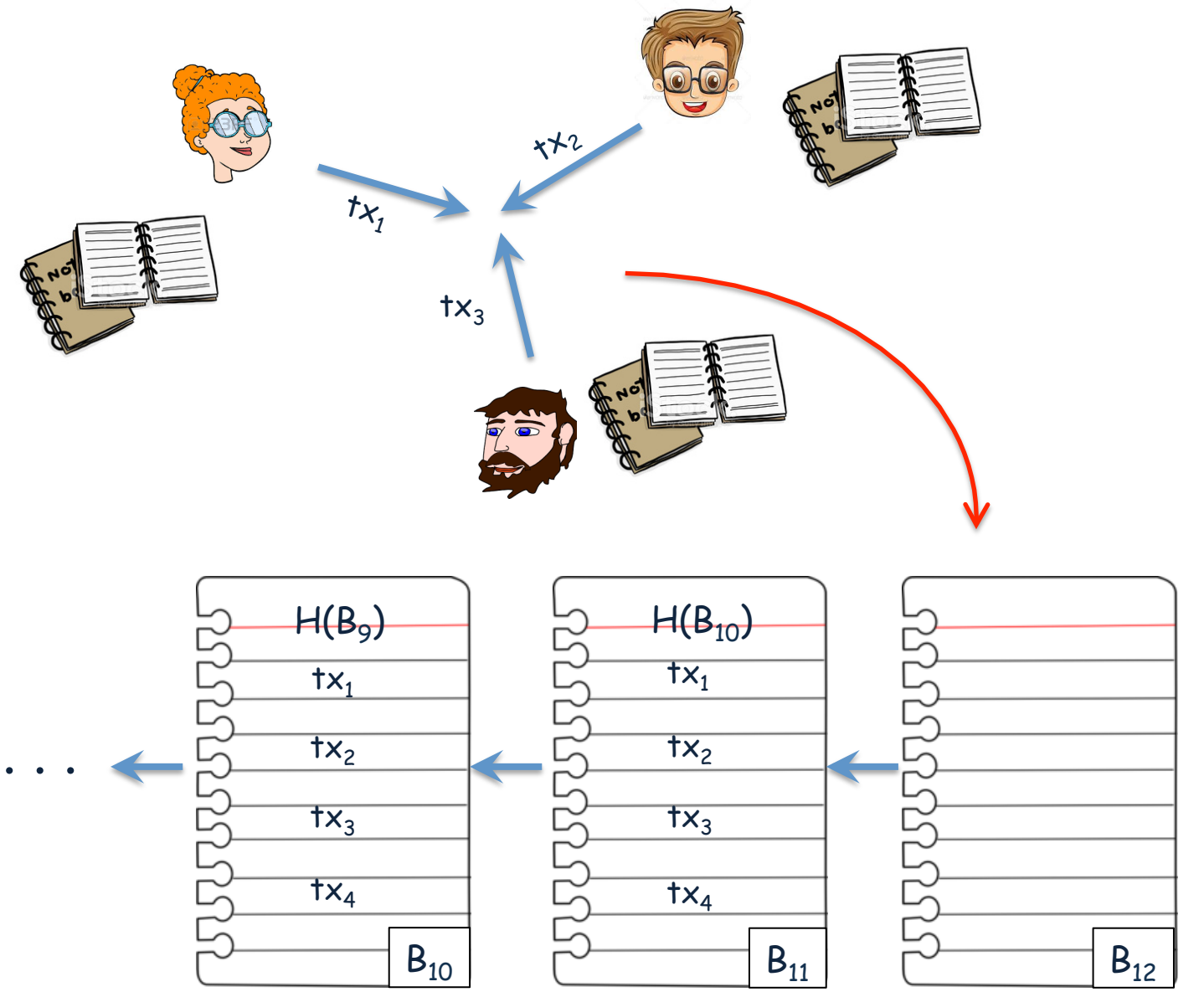

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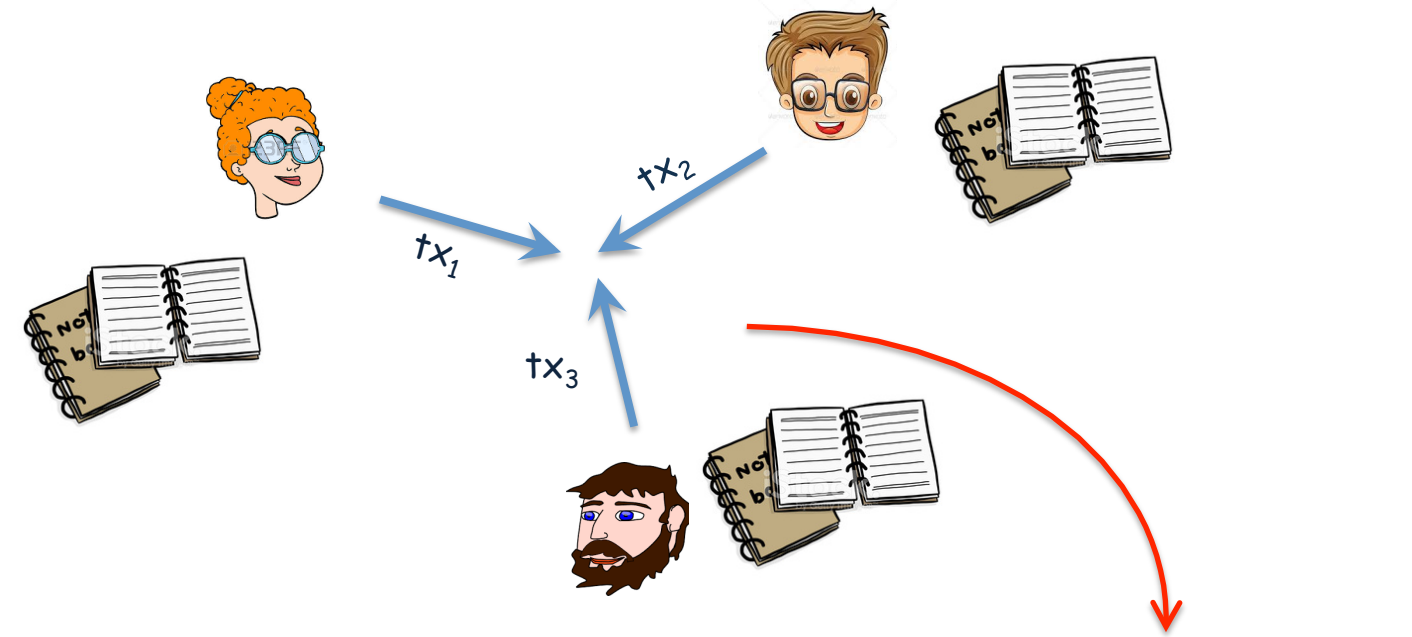
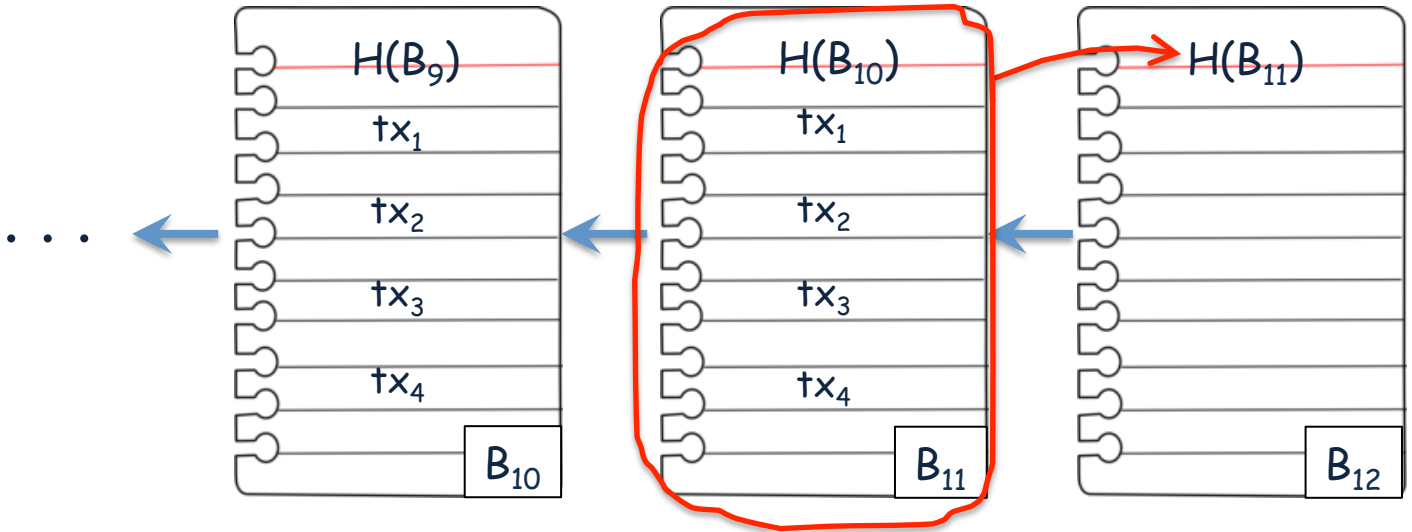
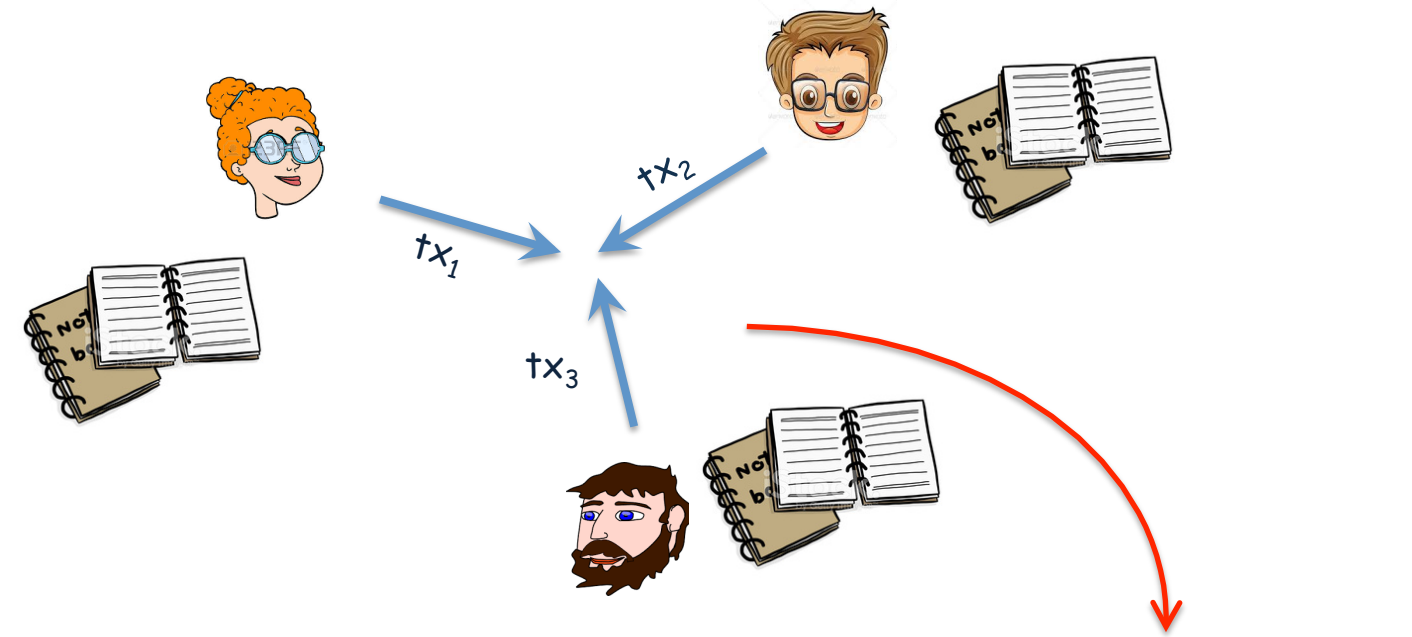
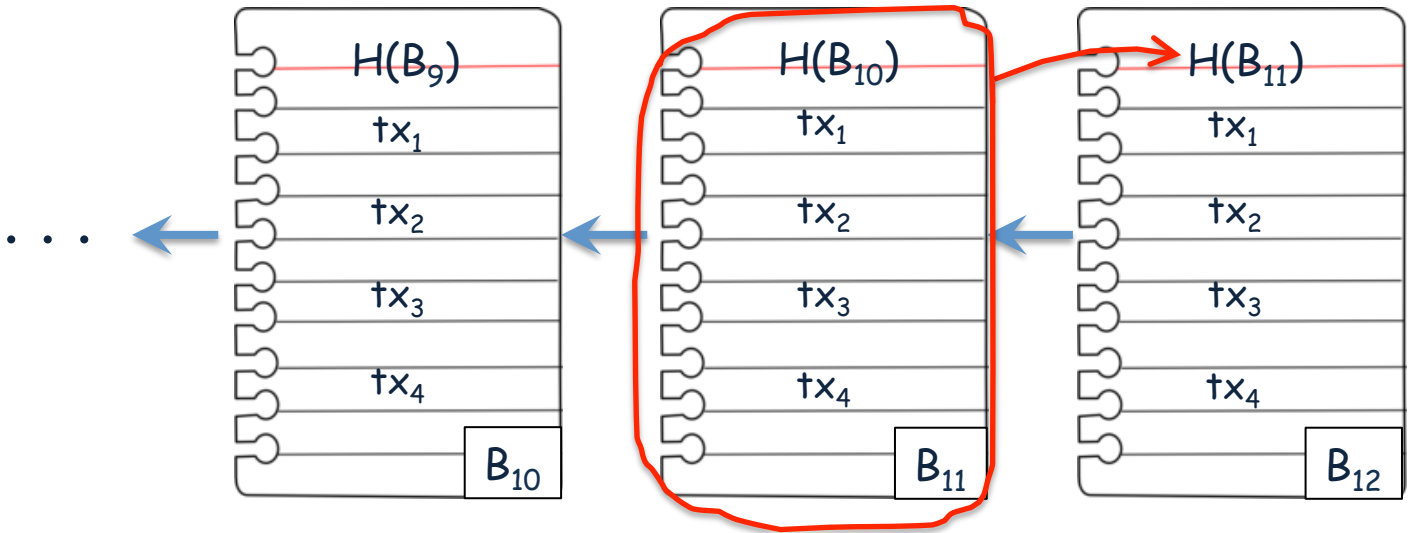

tx1
tx2
tx3


H(B9)
tx1
tx2
tx3
tx4
B10
H(B10)
tx1
tx2
tx3
tx4
B11
H(B11)
B12

Blockchain


tx_1
tx_2
tx_3


. . .
$H(B_9)$
tx_1
tx_2
tx_3
tx_4
B_{10}
$H(B_{10})$
tx_1
tx_2
tx_3
tx_4
B_{11}
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B_{12}

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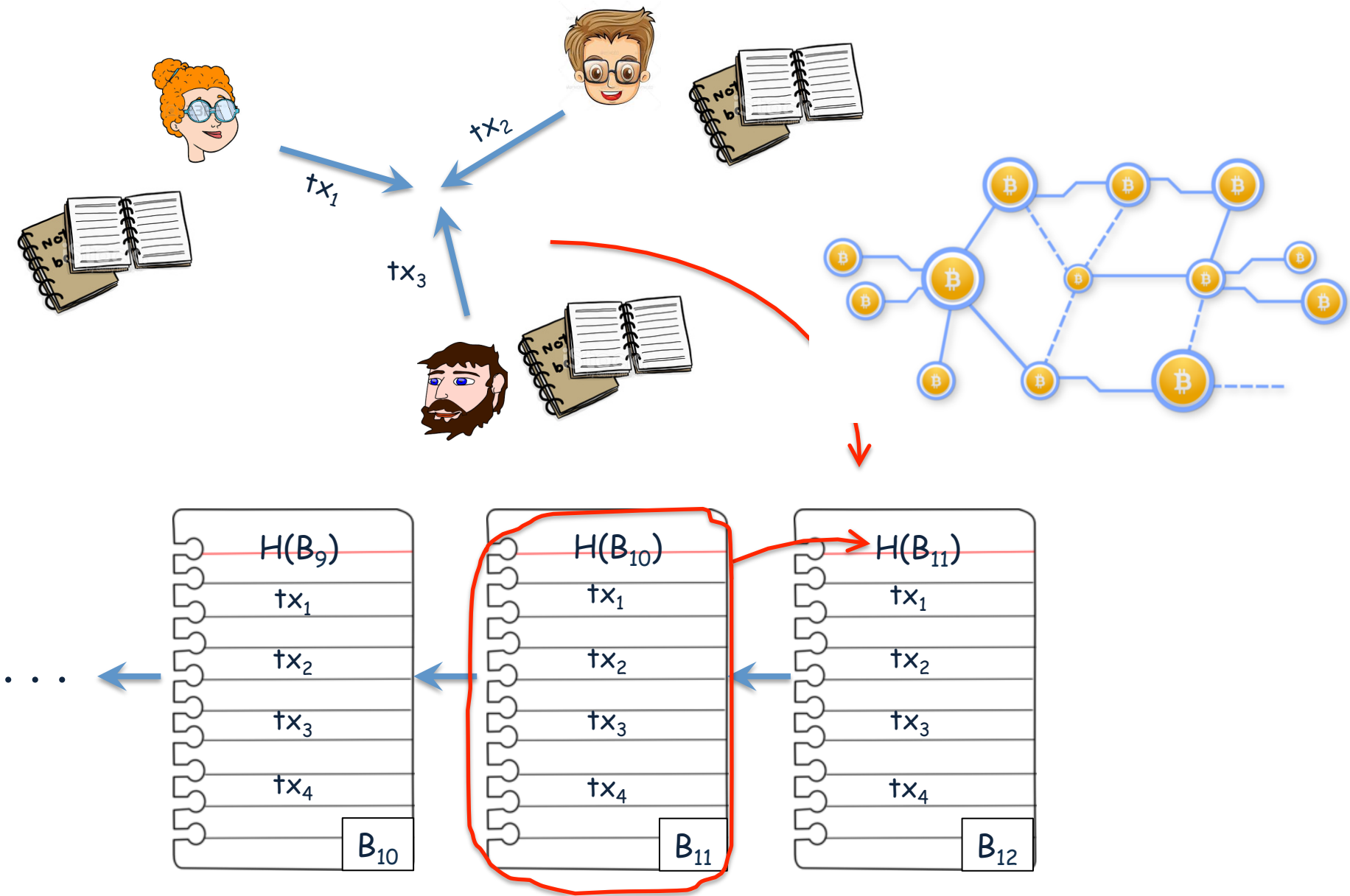
tx_1
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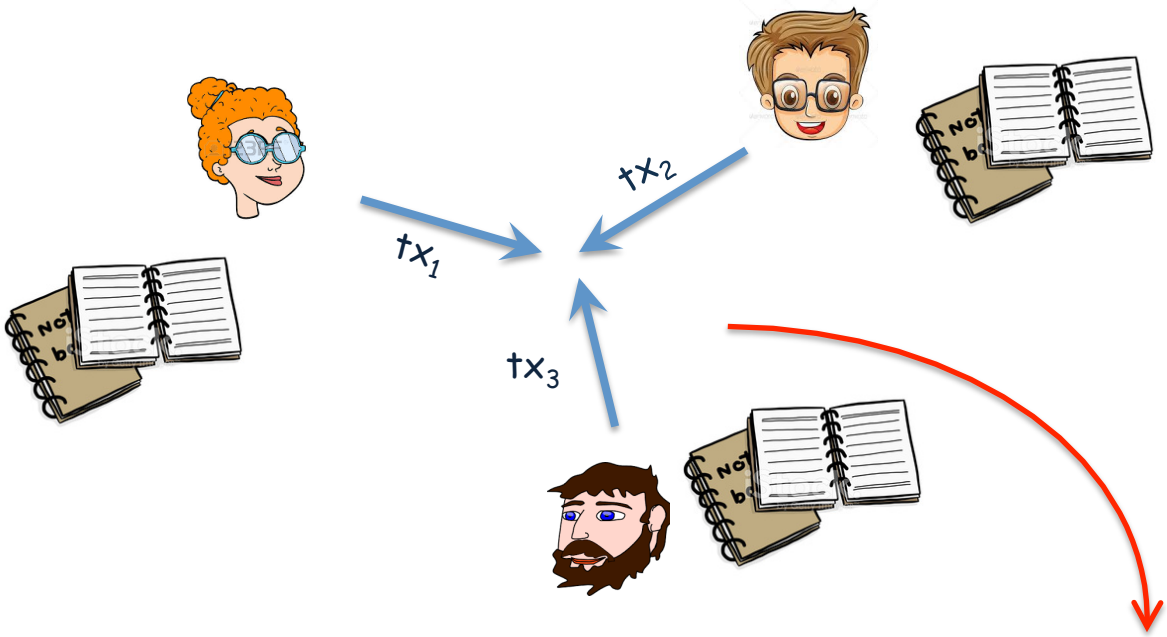
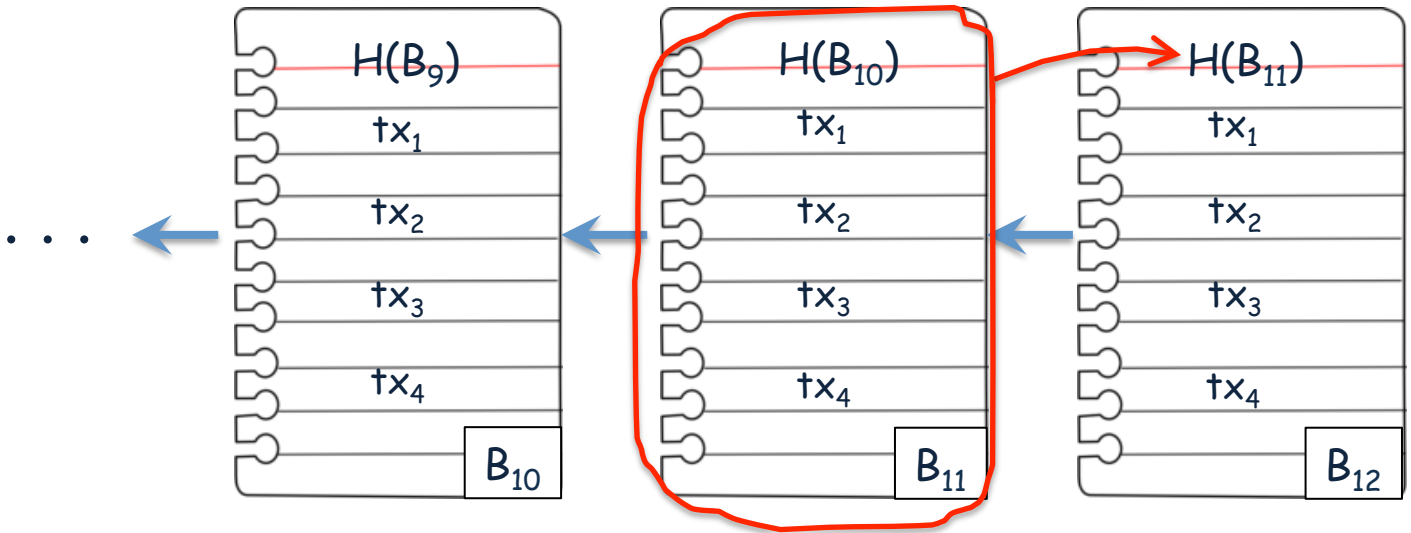


- Pseudonymous
- Democratic desicions through consensus protocols in a wild enviroment
- Immutable history of transactions
- Distibuted (not suffering signle point of failure)
- Uncensorable
- Transparent



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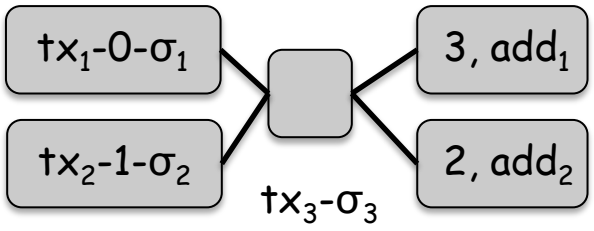

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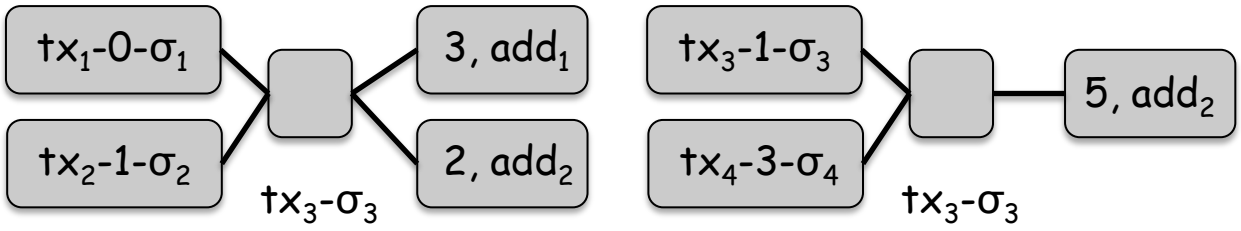

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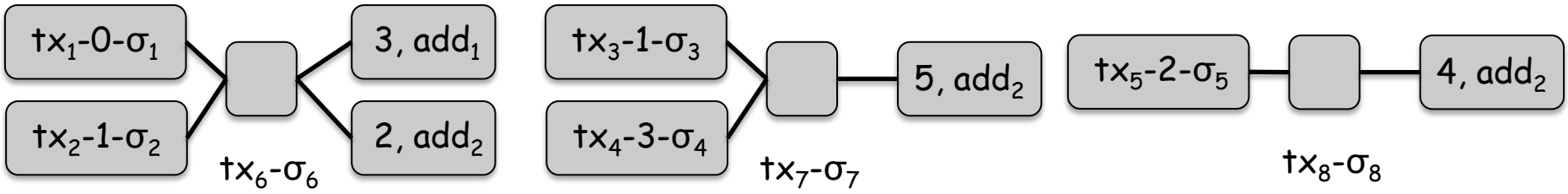

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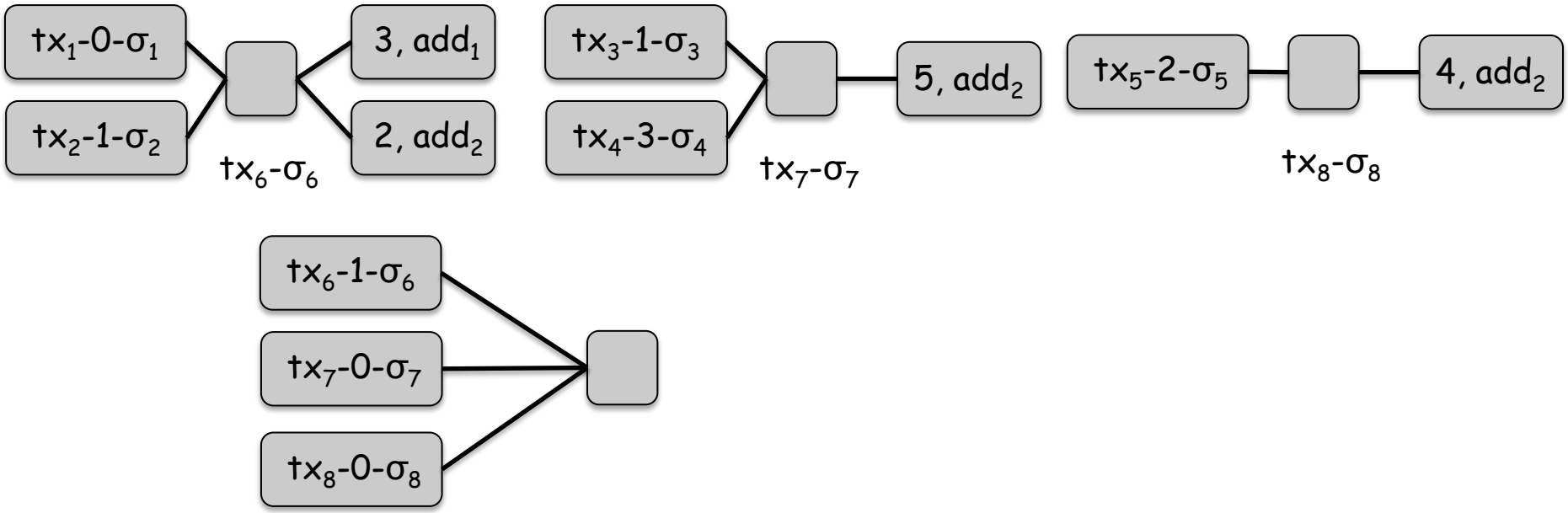

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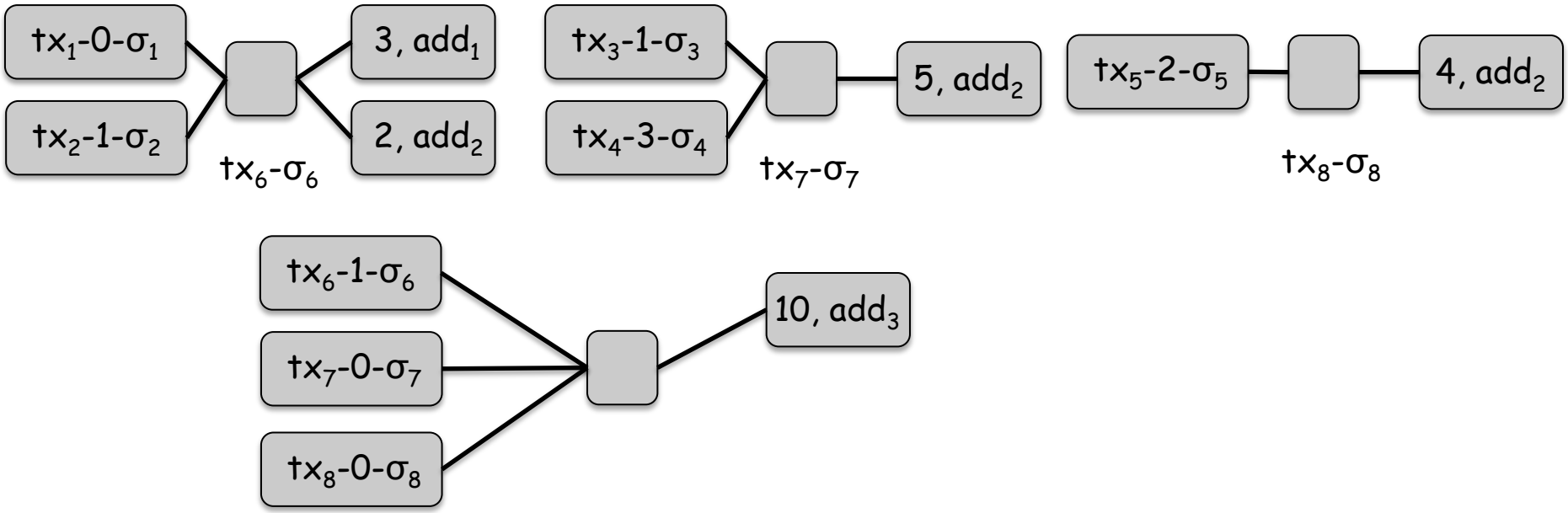

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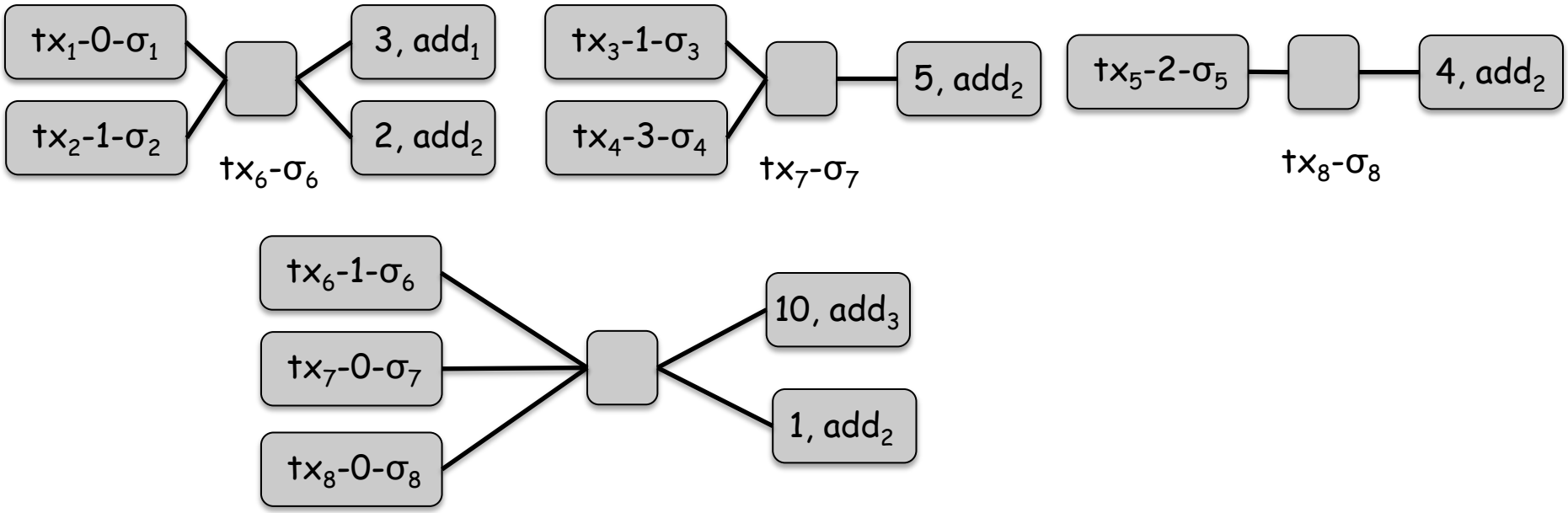

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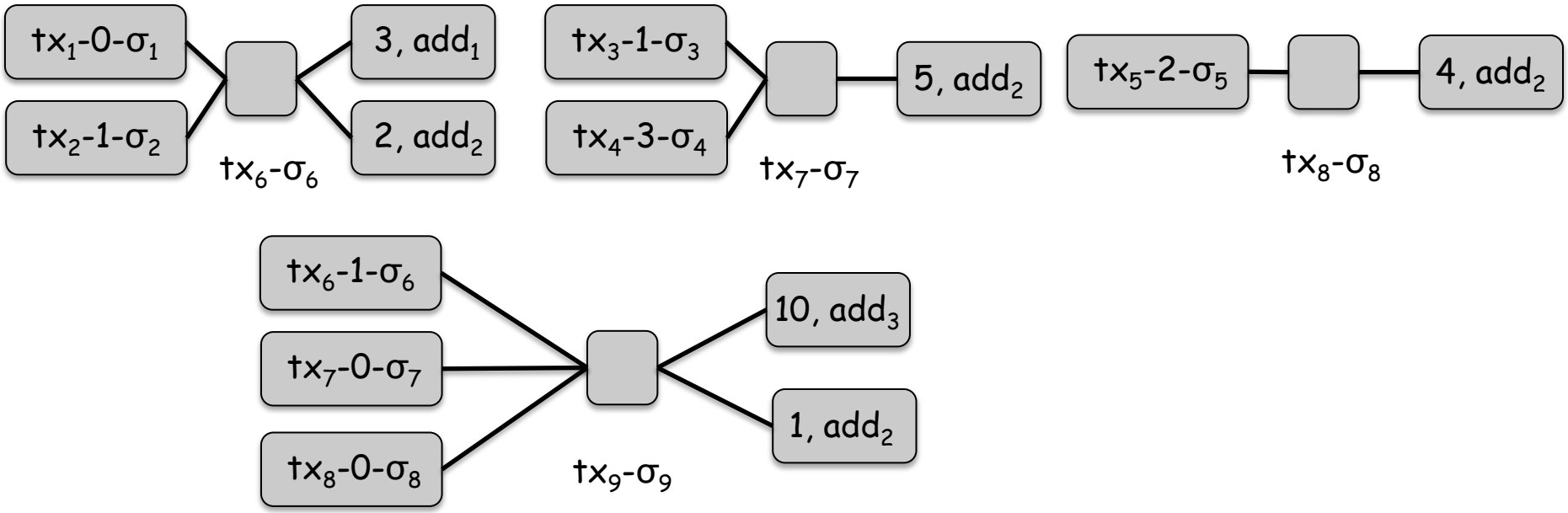

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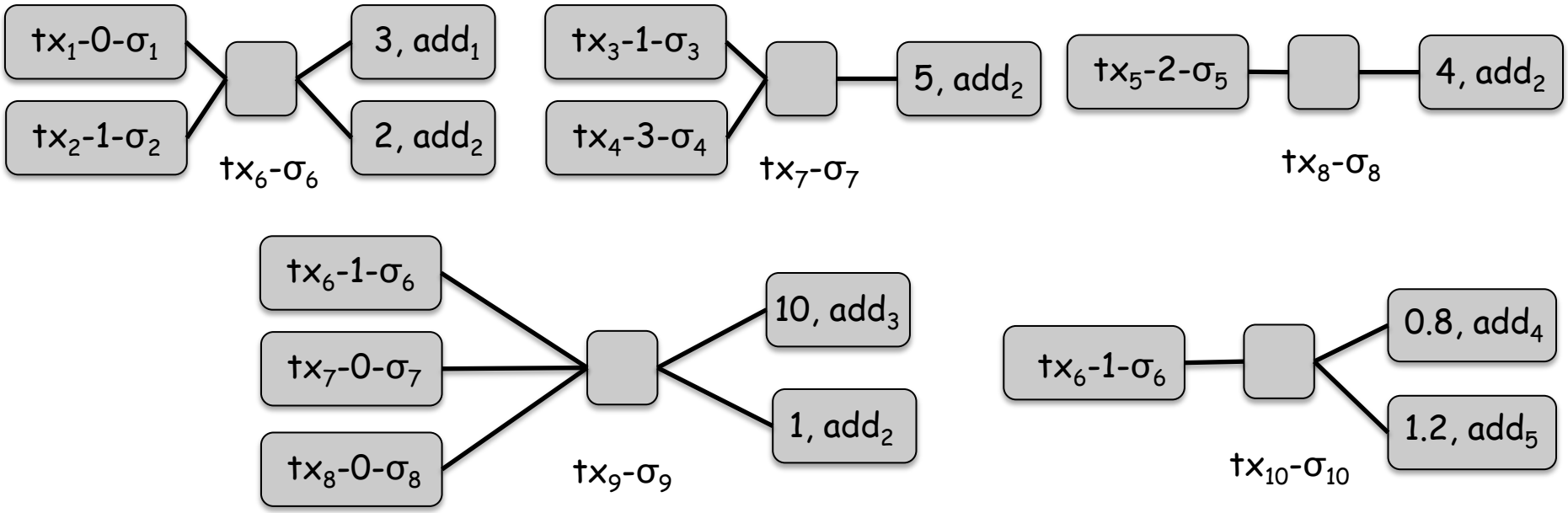

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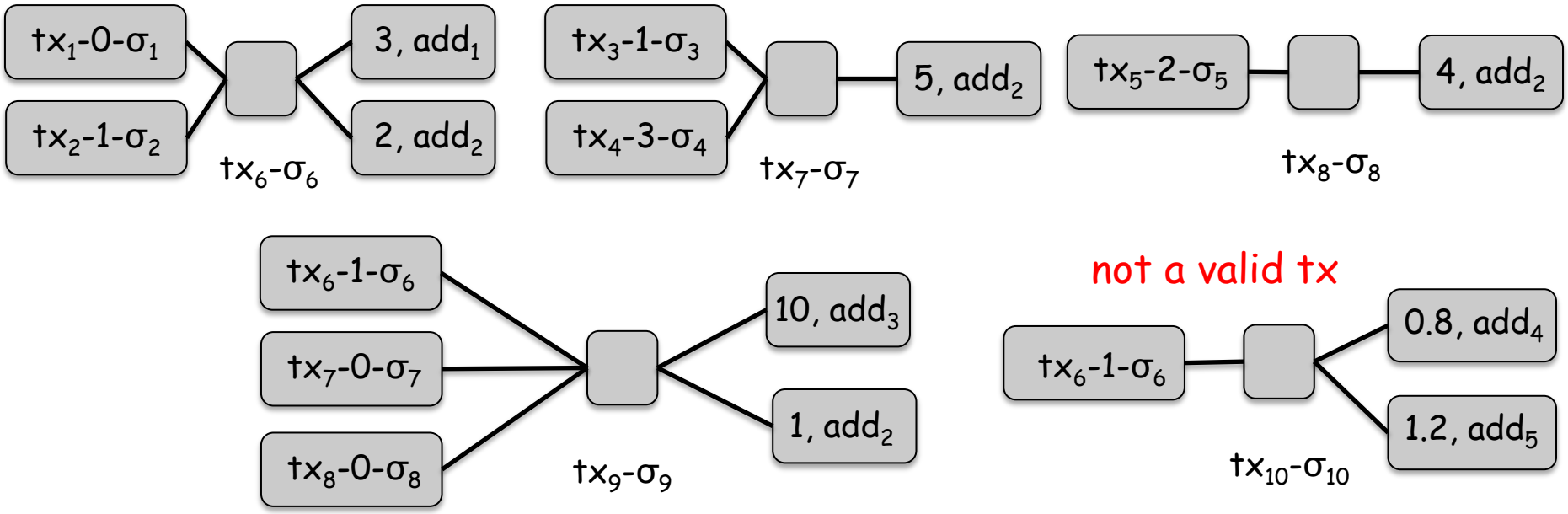

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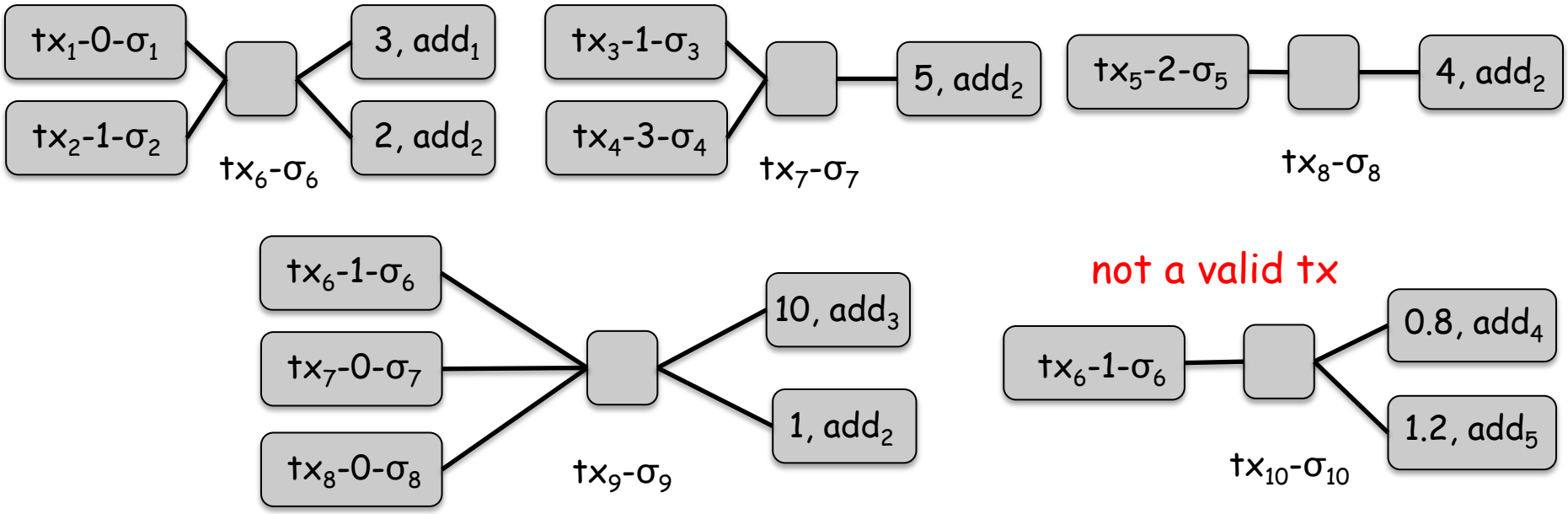

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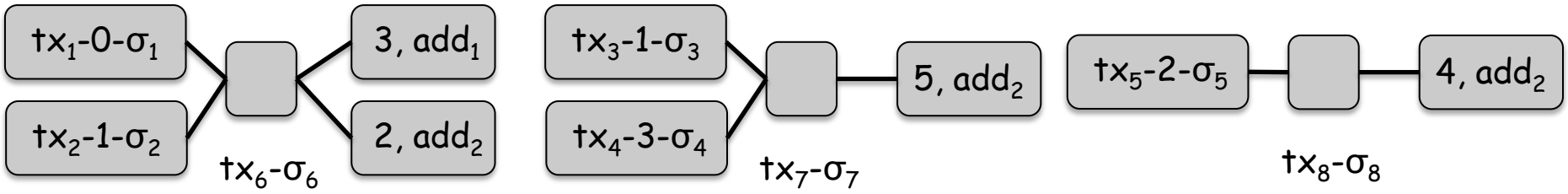
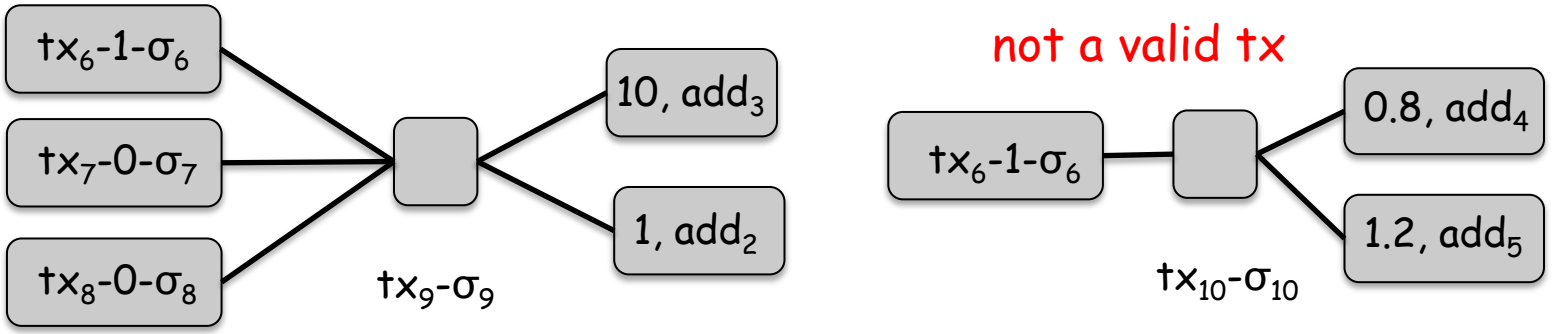
- Account-based transaction model





Ethereum

- transaction-based deterministic replicated state machine
  - a virtual machine that applies changes to global state

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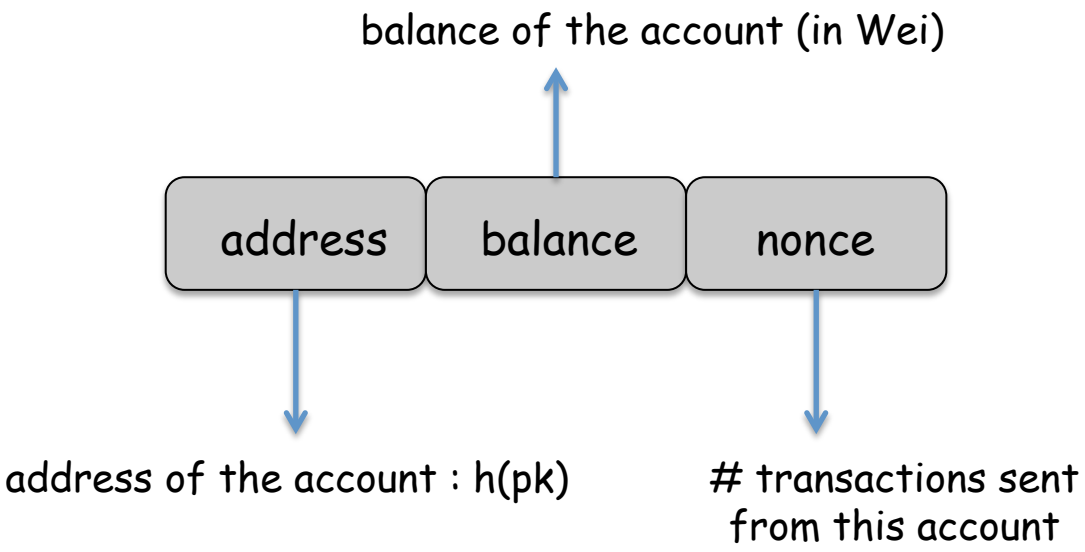

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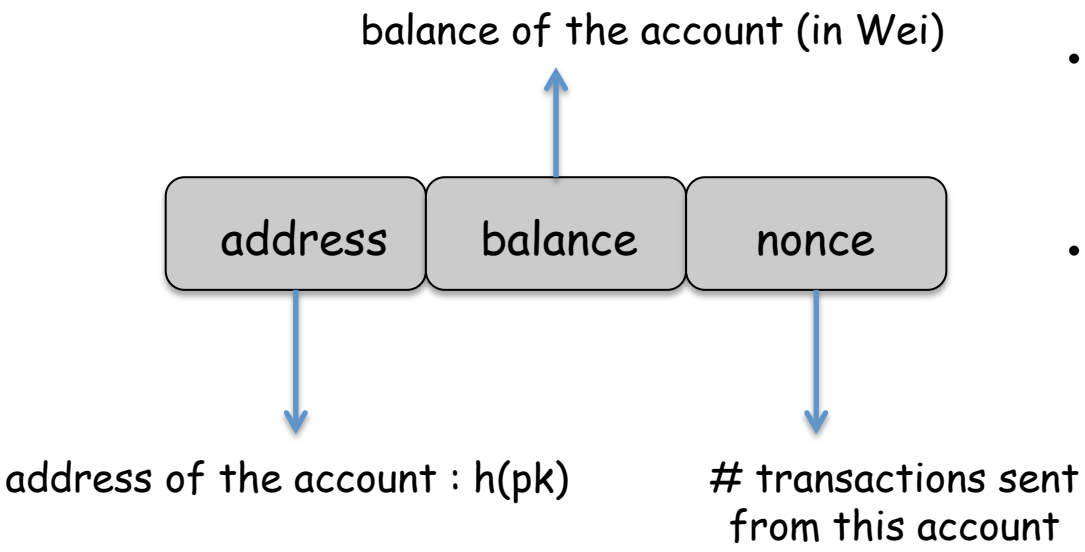

- Wei : the smallest denomination used in Ethereum network
- 1 ether = 10^{18} Wei

Ethereum

- personel accounts

- contract accounts

Ethereum

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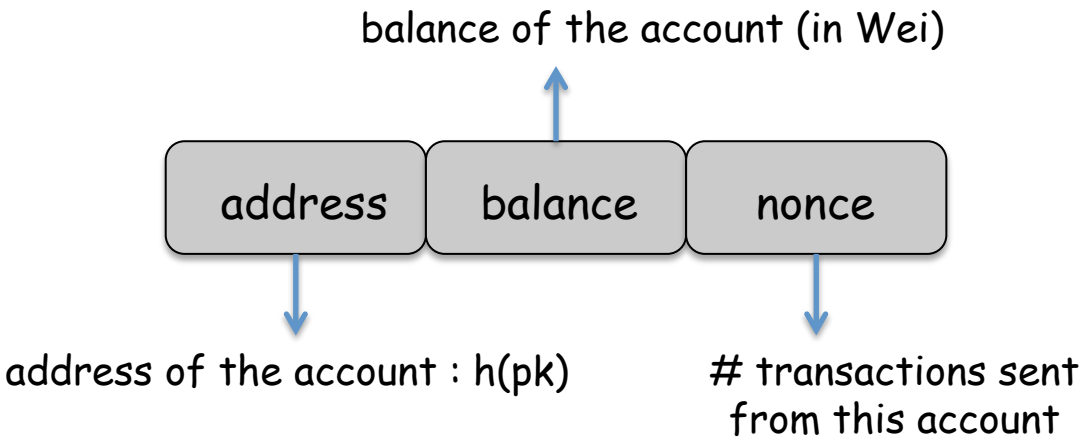

- contract accounts

Ethereum

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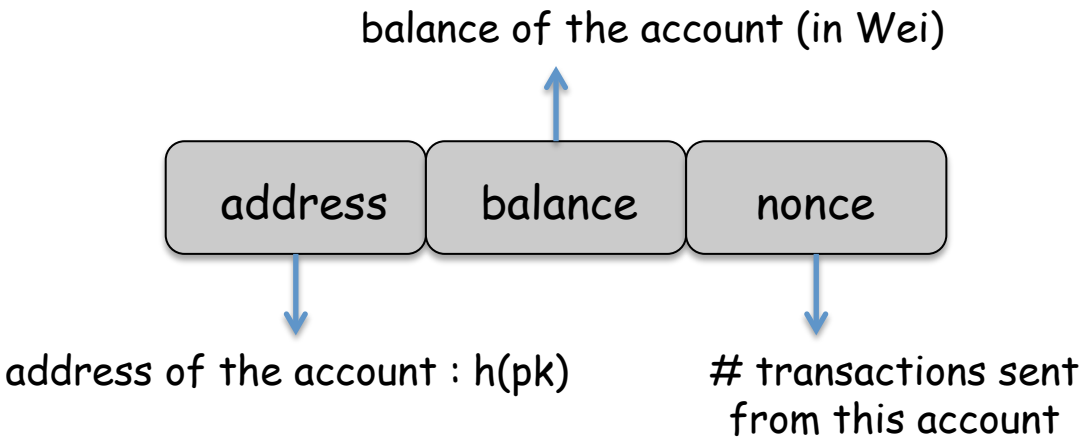

- contract accounts

smart contract : a piece of codes that autonomously execute the terms of a contract

they are trigged by addressing a transaction to them

they are executed independently and authonomously in a prescribed manner on every node in the network

Ethereum

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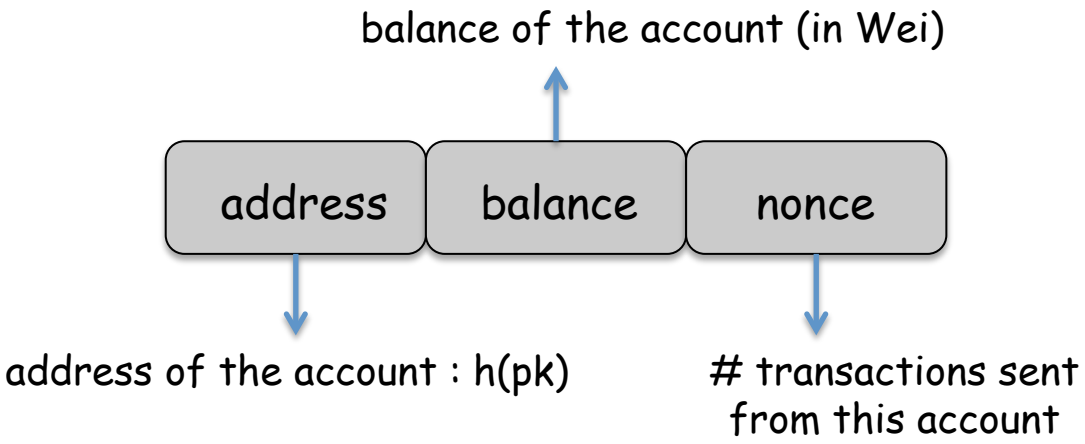

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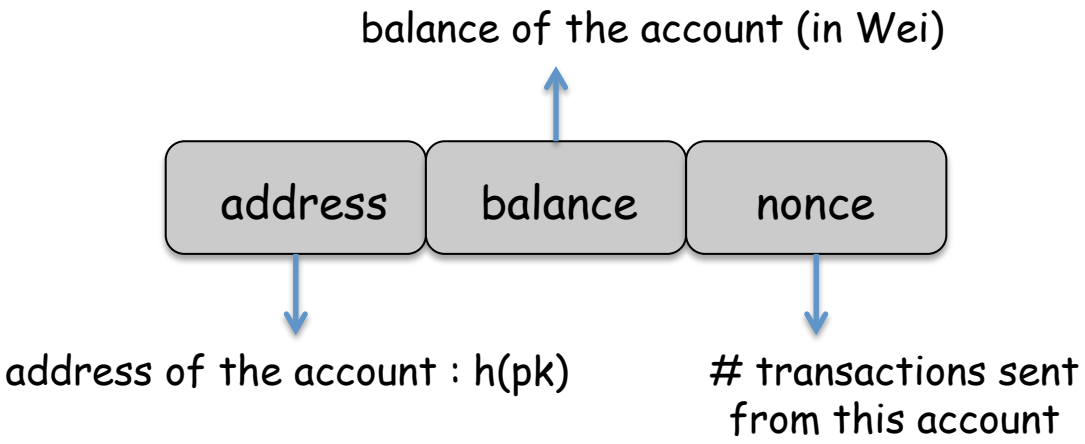

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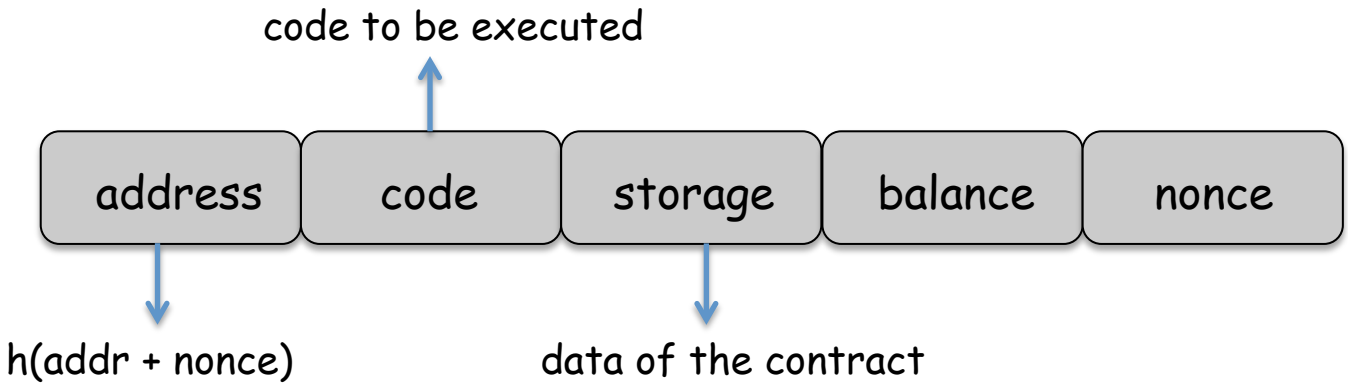

Ethereum

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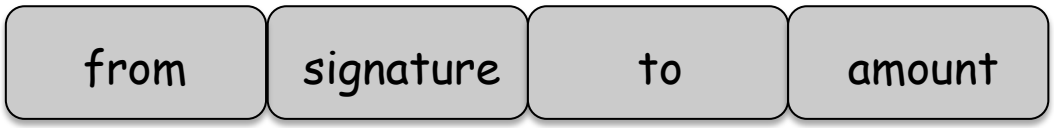

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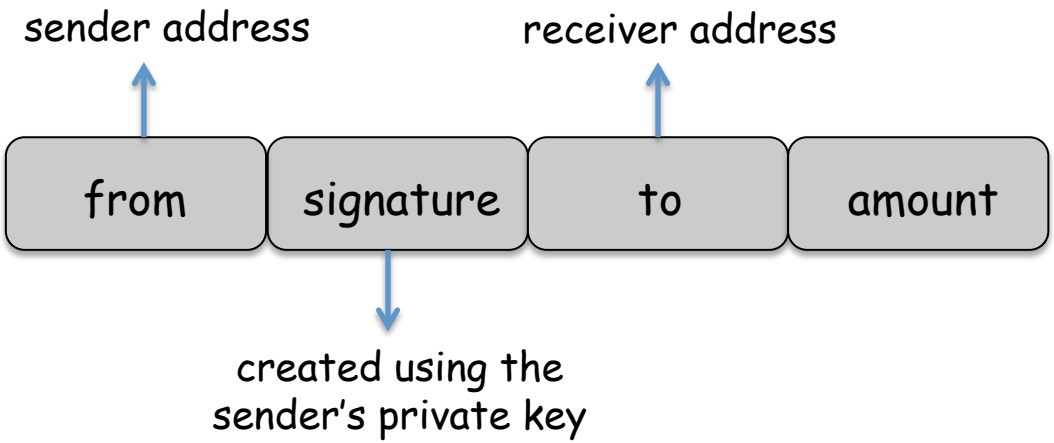

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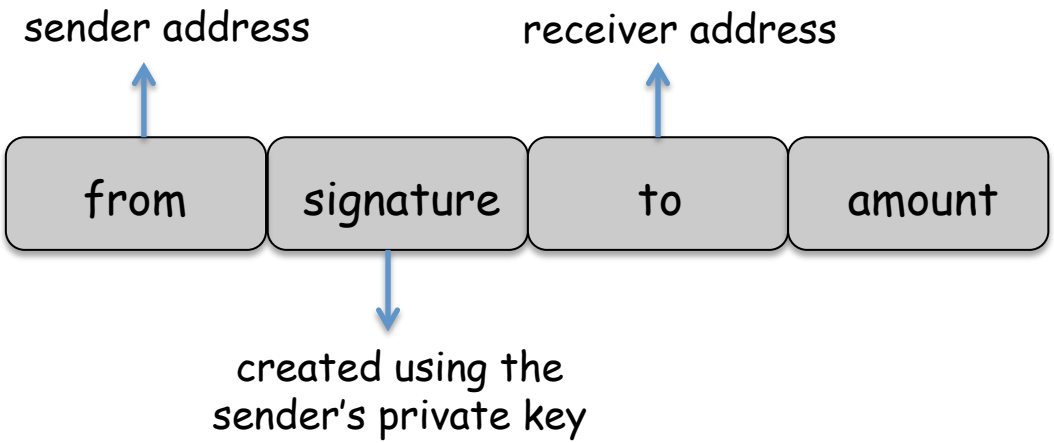

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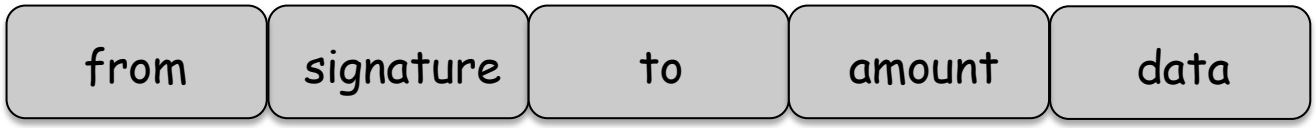

Ethereum

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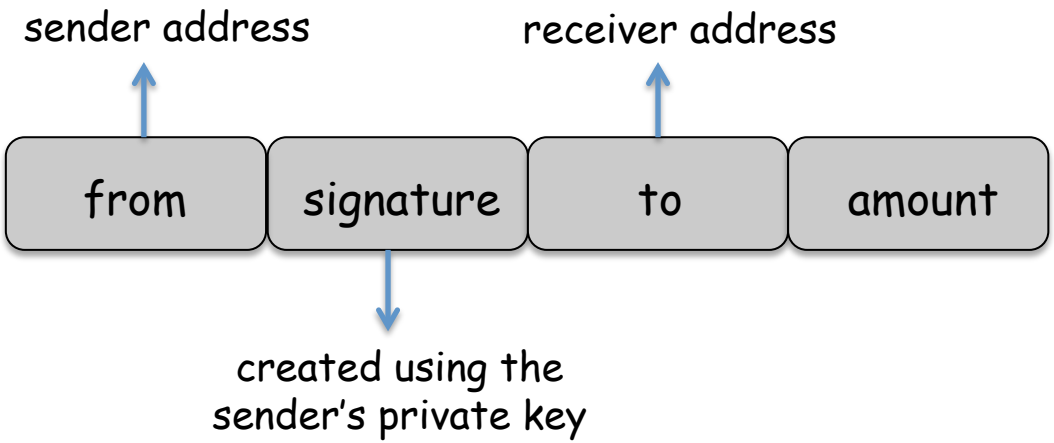

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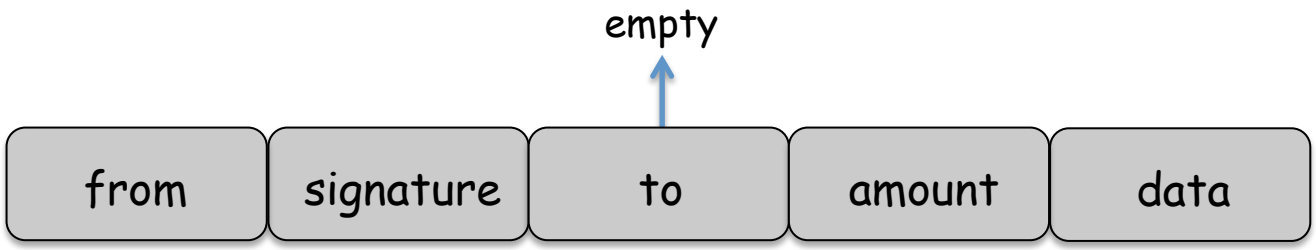

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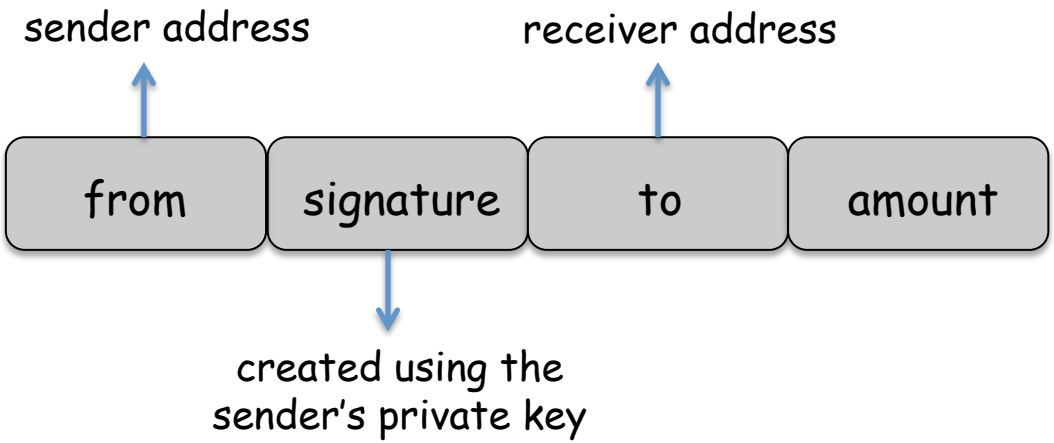

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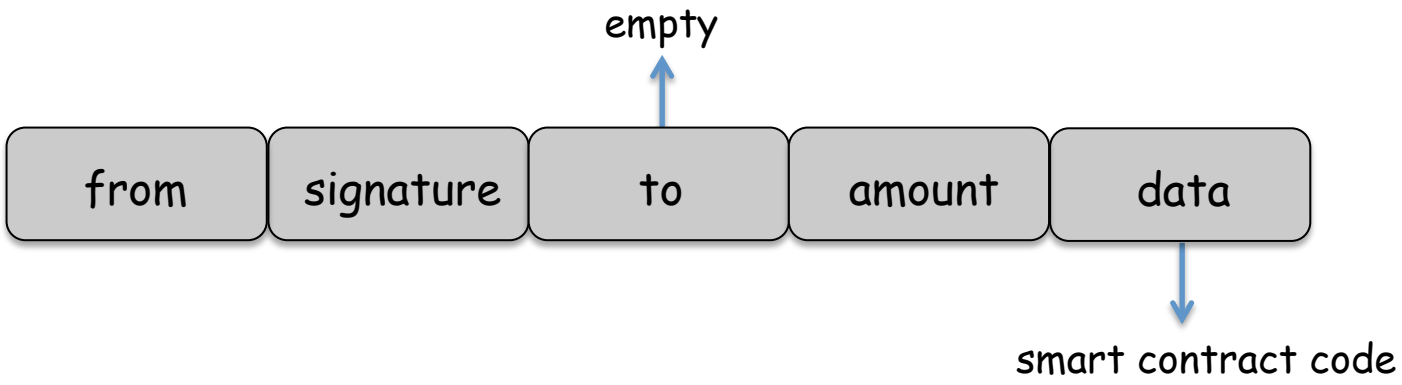
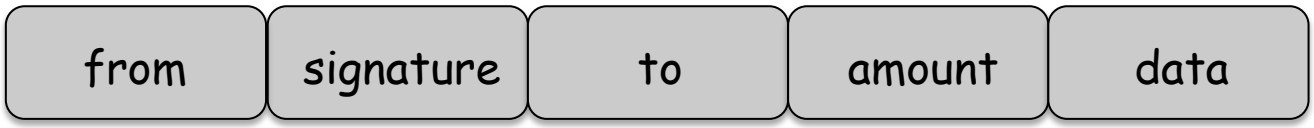


Ethereum

- contract interaction



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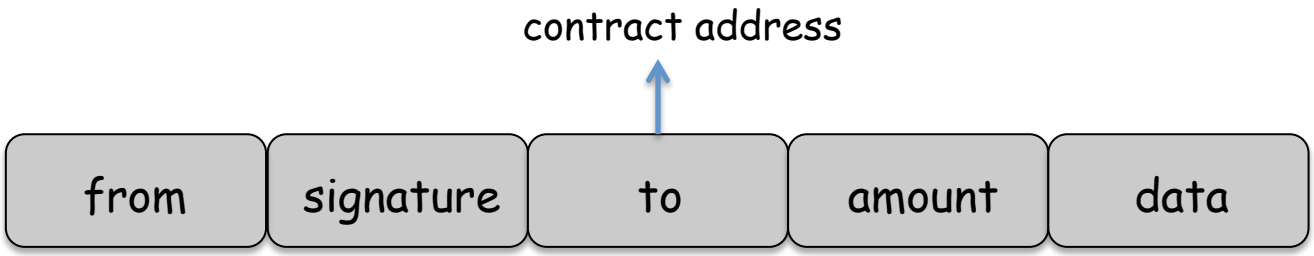
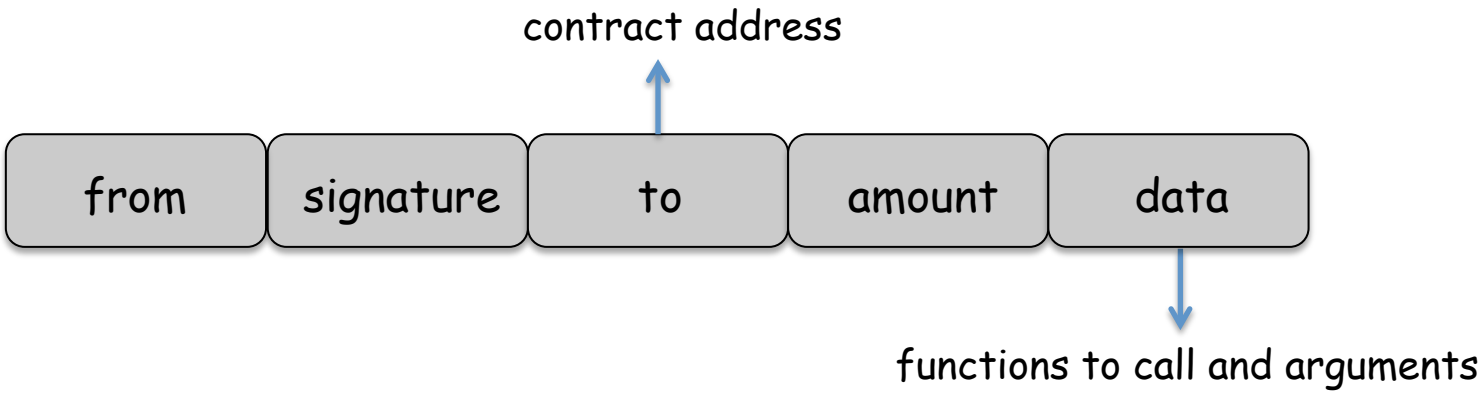


Ethereum

- contract interaction



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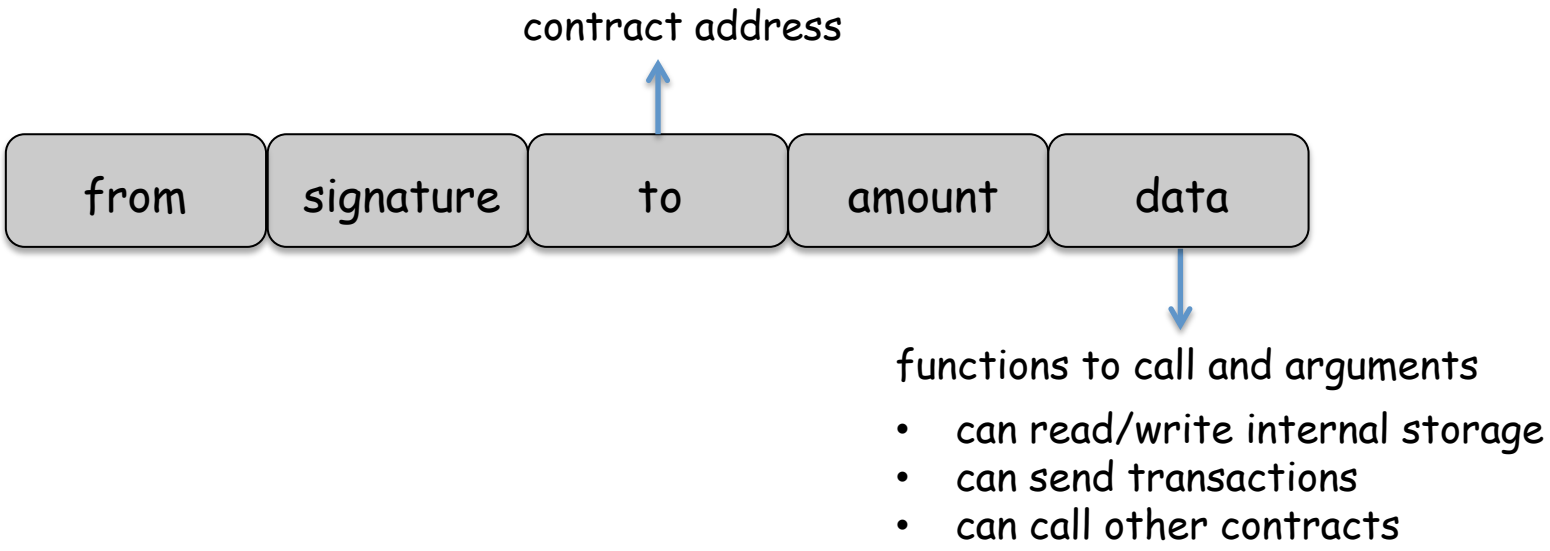

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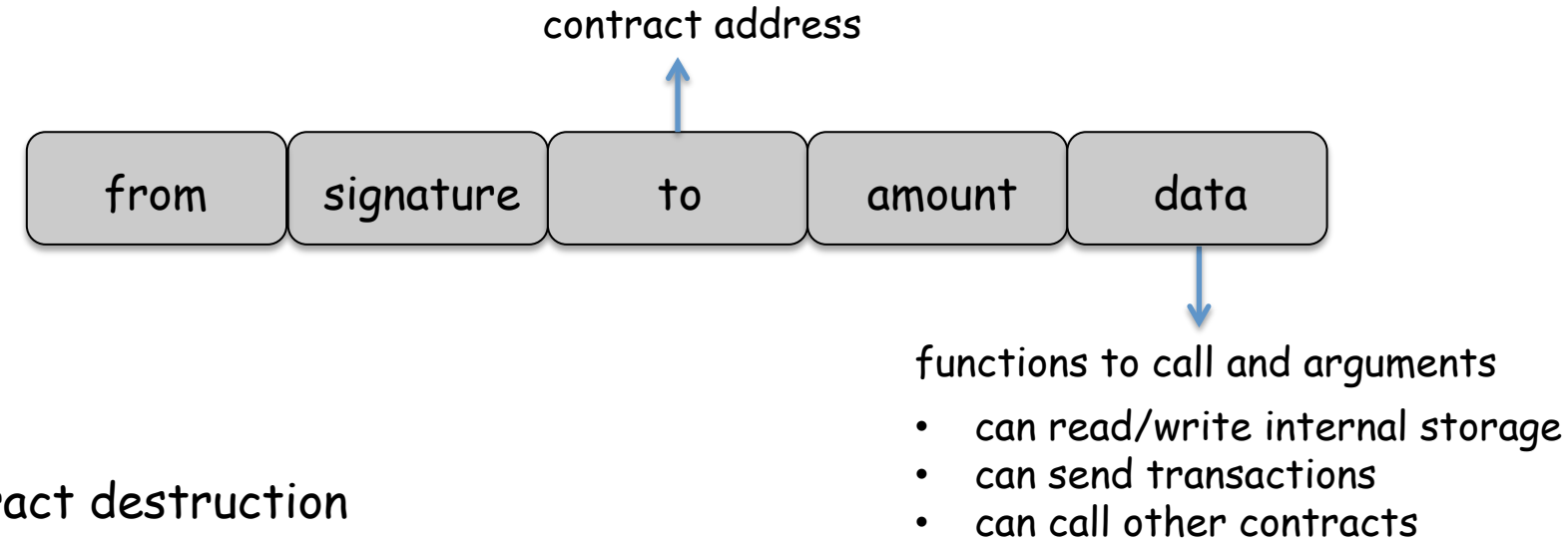

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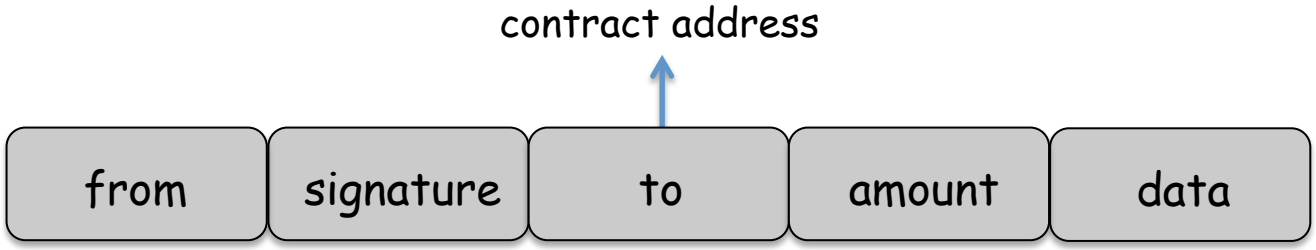

Ethereum

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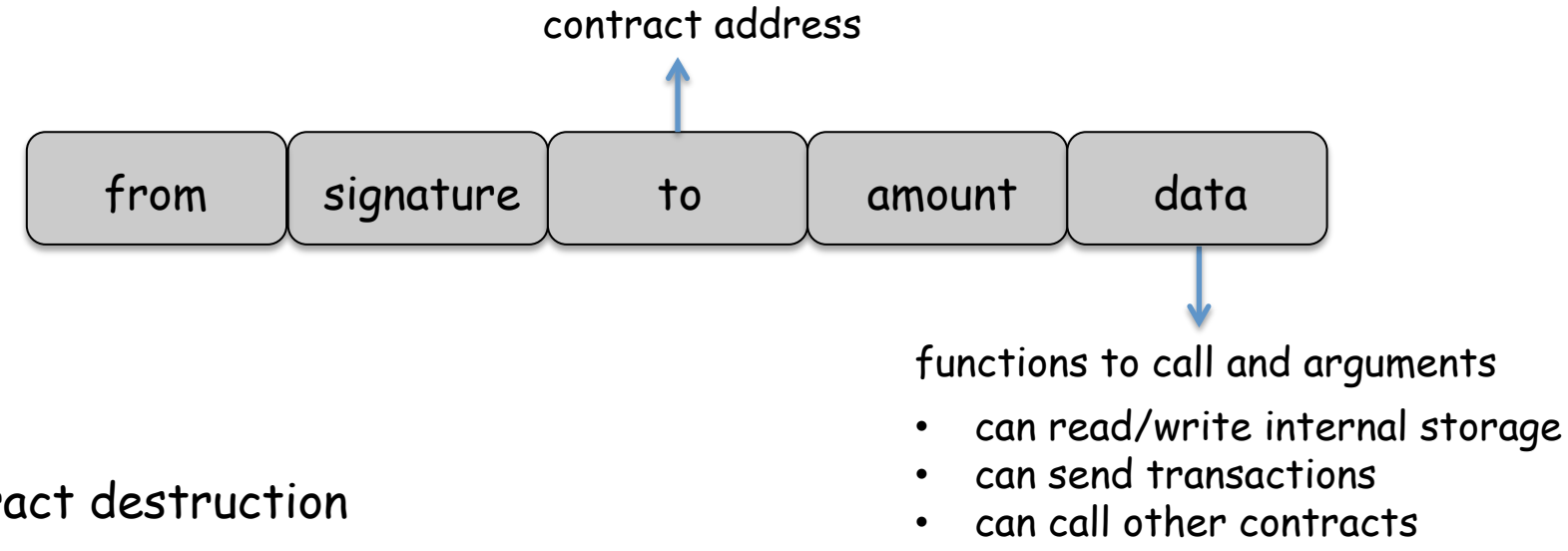

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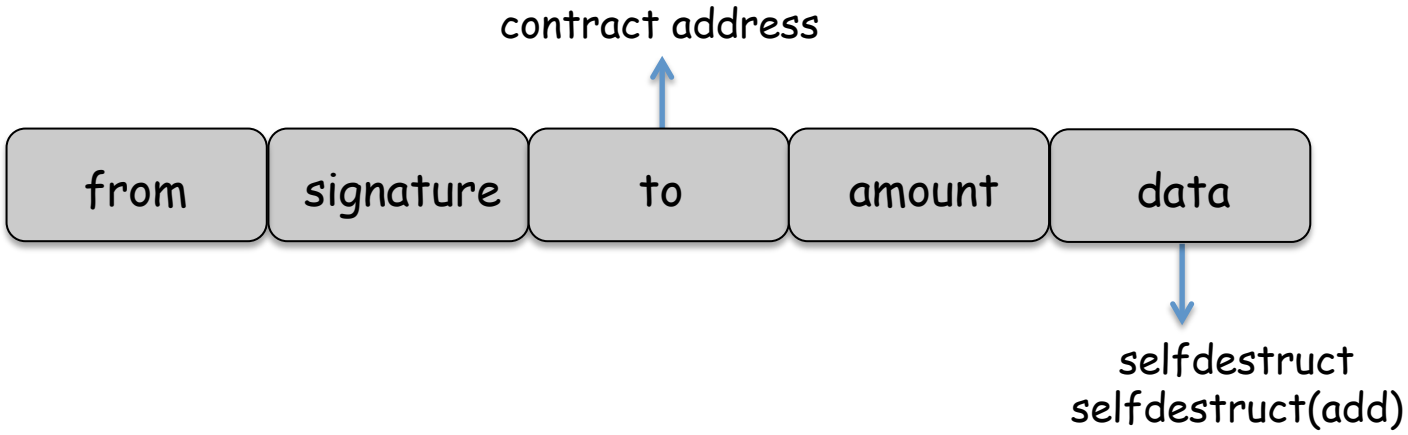

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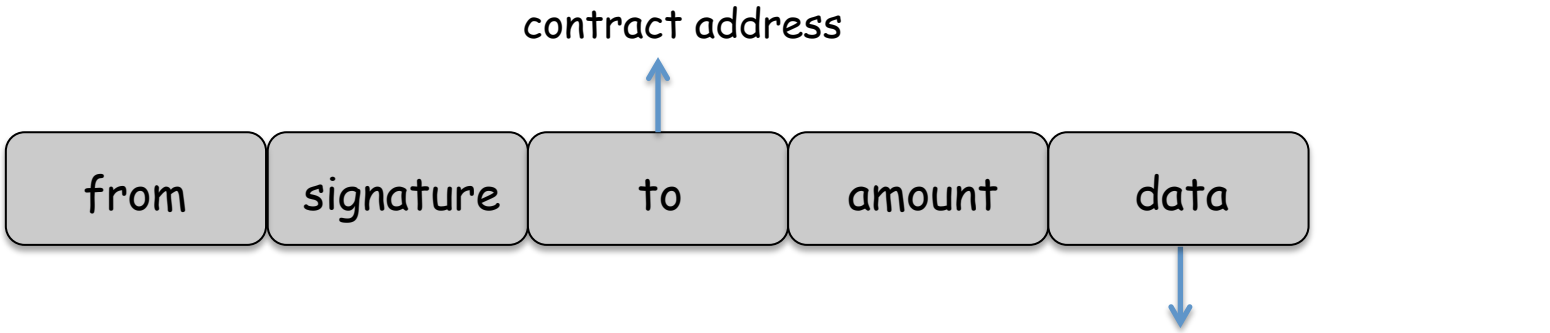

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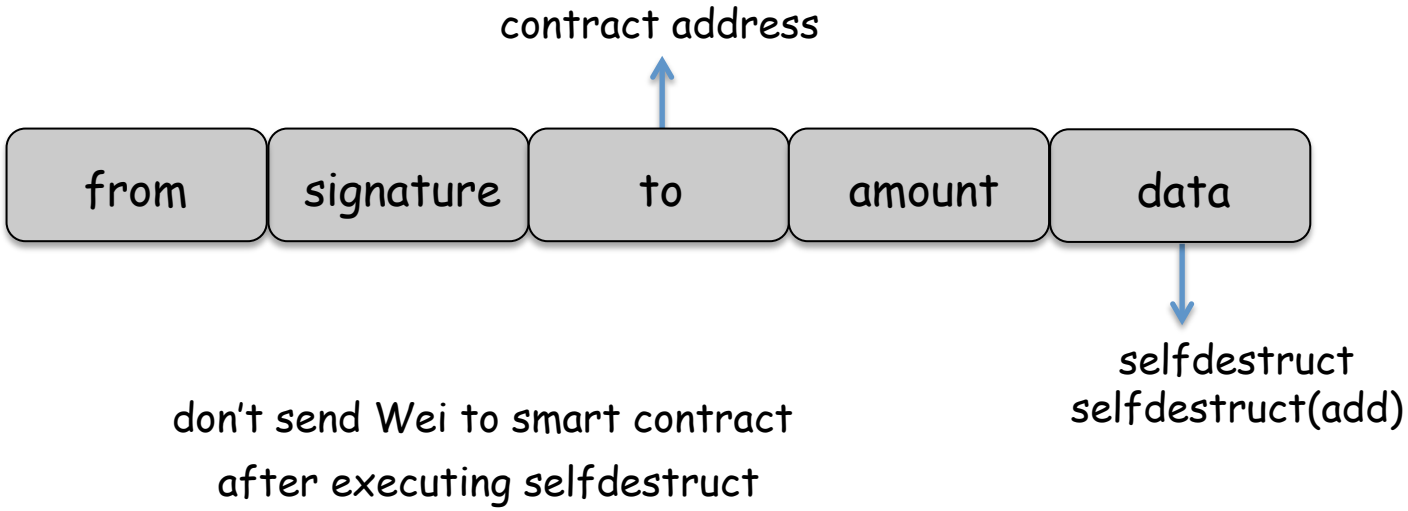

Ethereum

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- uses proof-of-work for consensus with a different hash function (planned to change with proof-of-stake)
- reward 2ETH + fees
  - every computation step has a fee paid in gas
  - gas is a unit used to measure computations

Ethereum

- transactions

Ethereum

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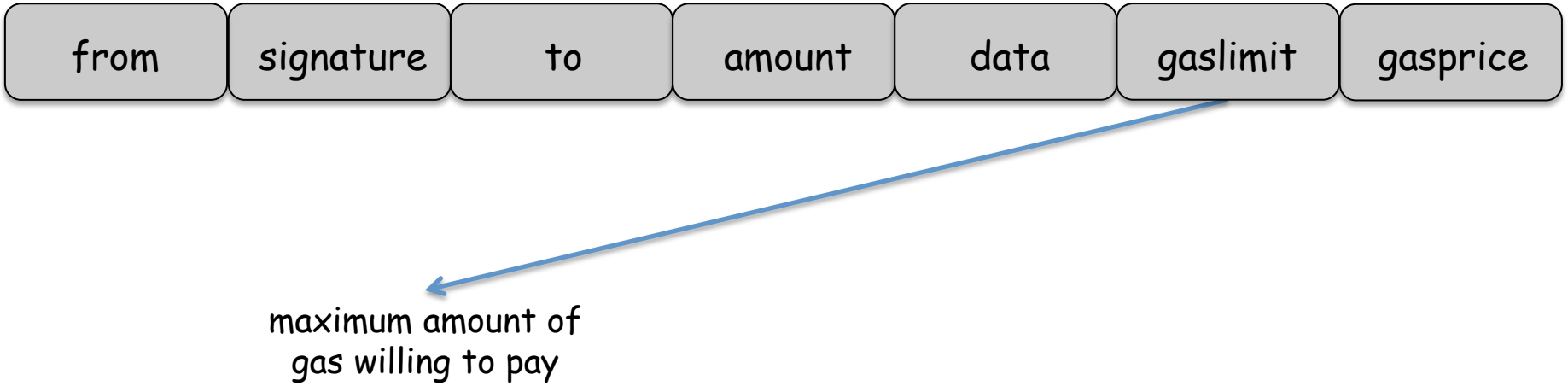
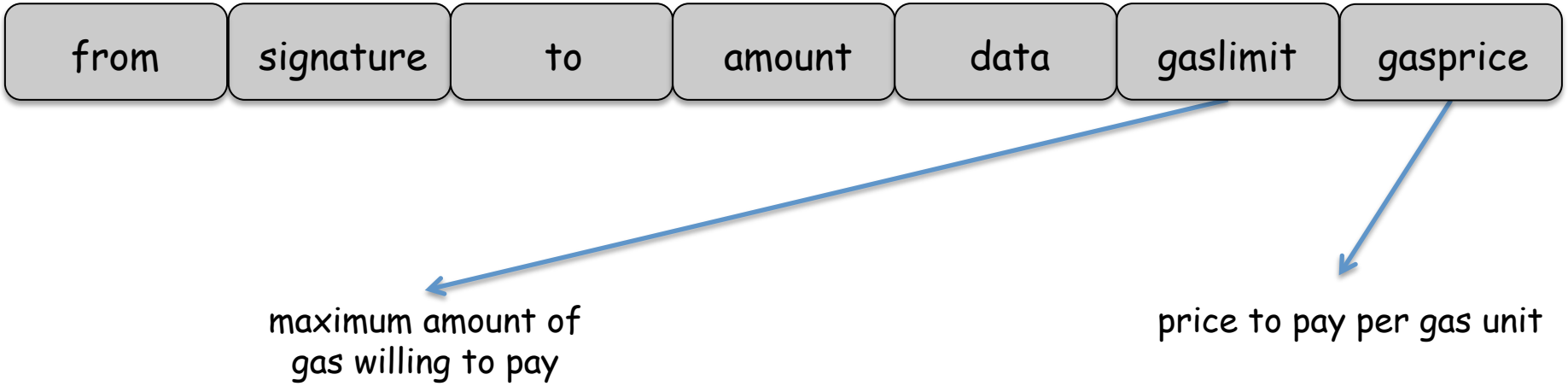


Ethereum

- transactions



Ethereum

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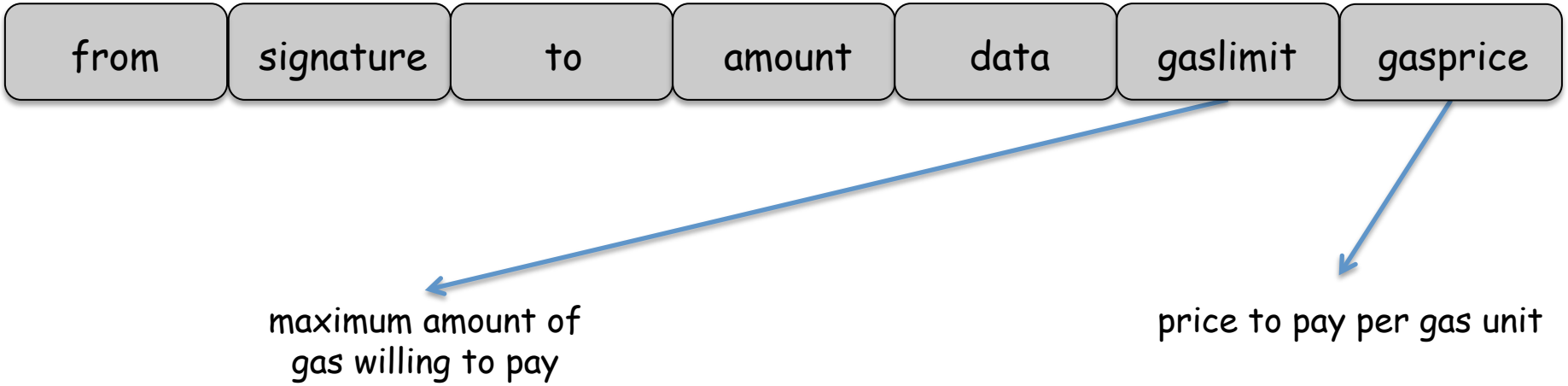

- all unused gas is refunded at the end of transaction

Ethereum

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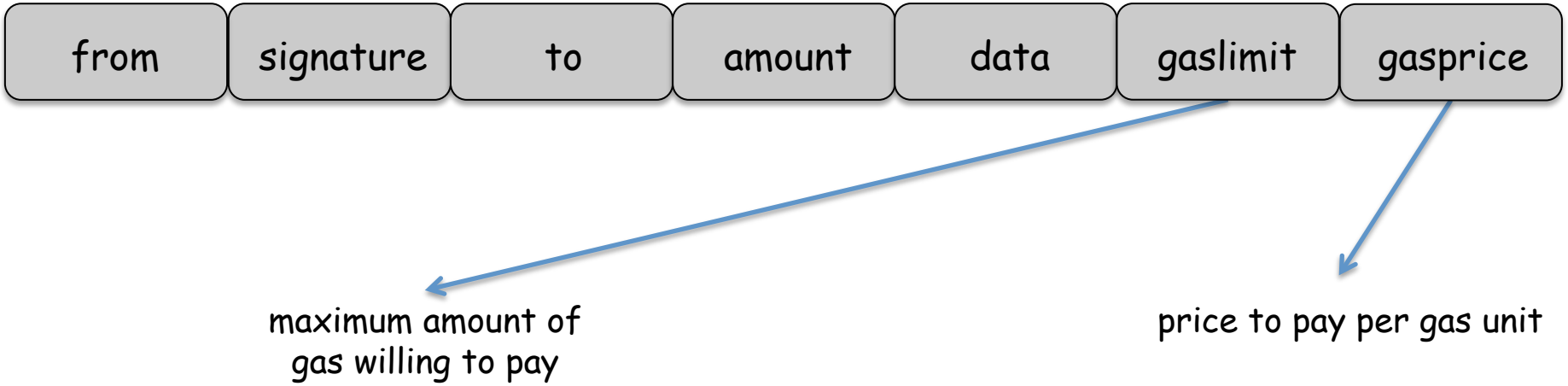

- all unused gas is refunded at the end of transaction
- Blocks have gas limit

Ethereum

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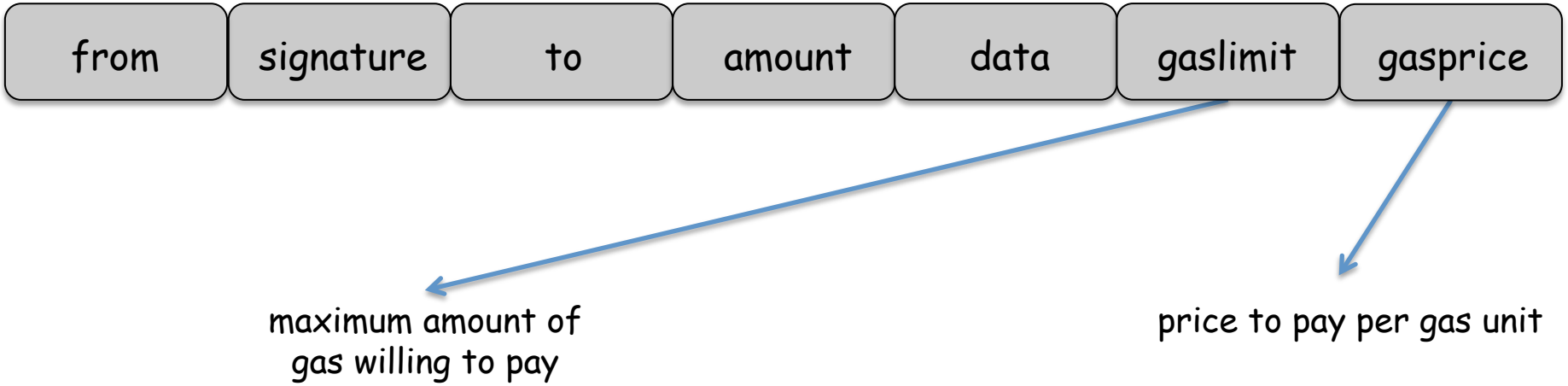

- specifies how quickly a transaction will be confirmed

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Ethereum

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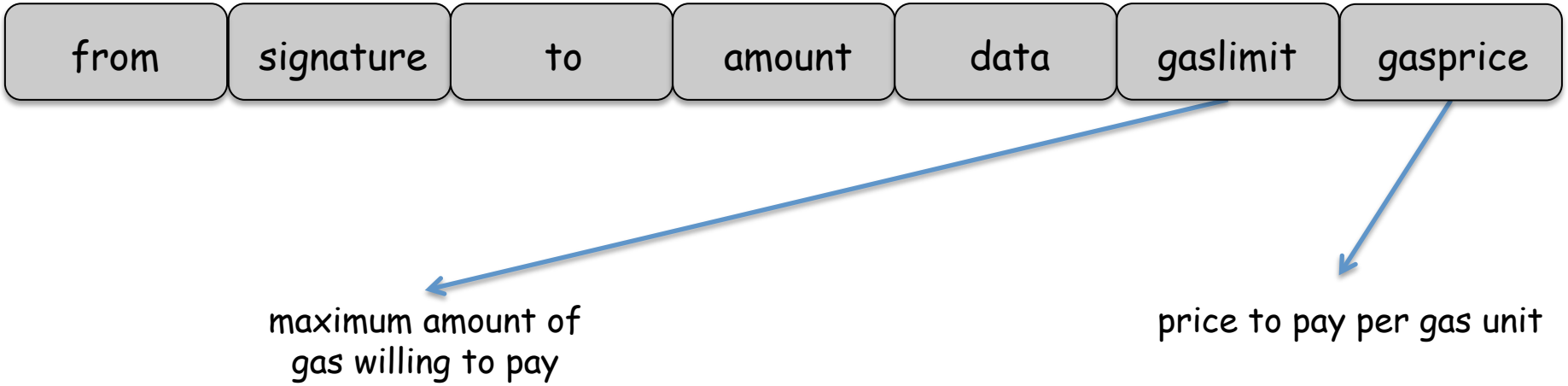

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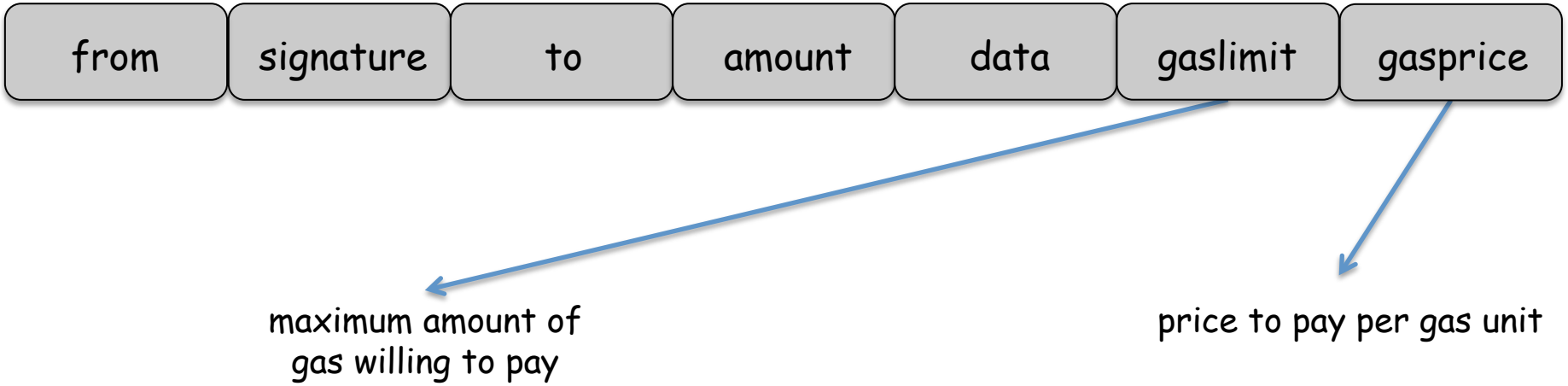
- Blocks have gas limit

- specifies how quickly a transaction will be confirmed
- gas limit x gas price = transaction fee

Ethereum

- transactions



- all unused gas is refunded at the end of transaction
- Blocks have gas limit

- specifies how quickly a transaction will be confirmed
- gas limit x gas price = transaction fee
- 50000 x 20 Gwei = 0.001 ETH (max)

Ethereum

- transactions

- if the signature is valid and the receiver has enough Wei in his balance to pay the required gas, than the transaction considered as valid transaction

Account - based	UXTO - based
conceptually simple	higher privacy
transactions smaller in size	simpler parallelization of transactions
executing transactions in parallel relatively hard	

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- assume someone sends some ether to a receiver by signing the transaction (replay attack)

  receiver can copy the signed transaction and keep broadcasting it till the sender loses all his money

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- add the sender's nonce value to each transaction to avoid such cases