EAS 5830: BLOCKCHAINS

Hash Chains

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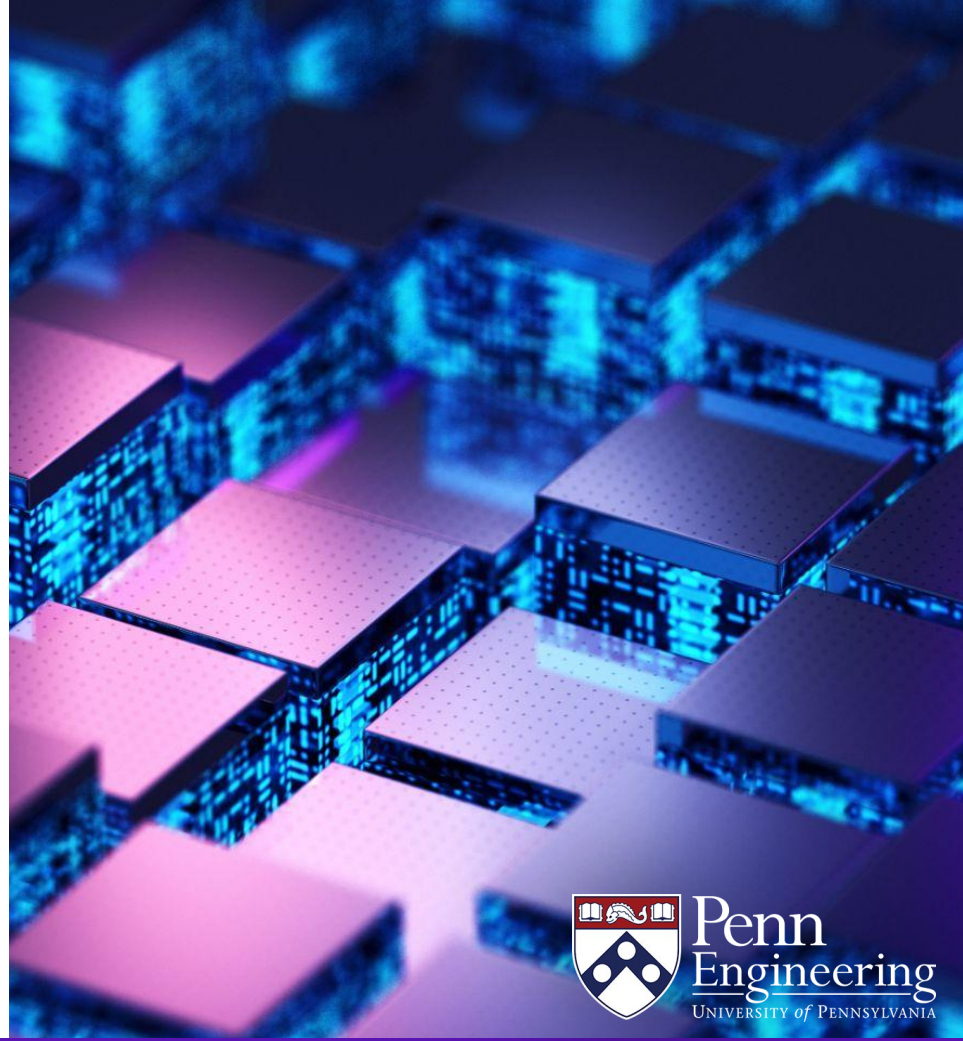
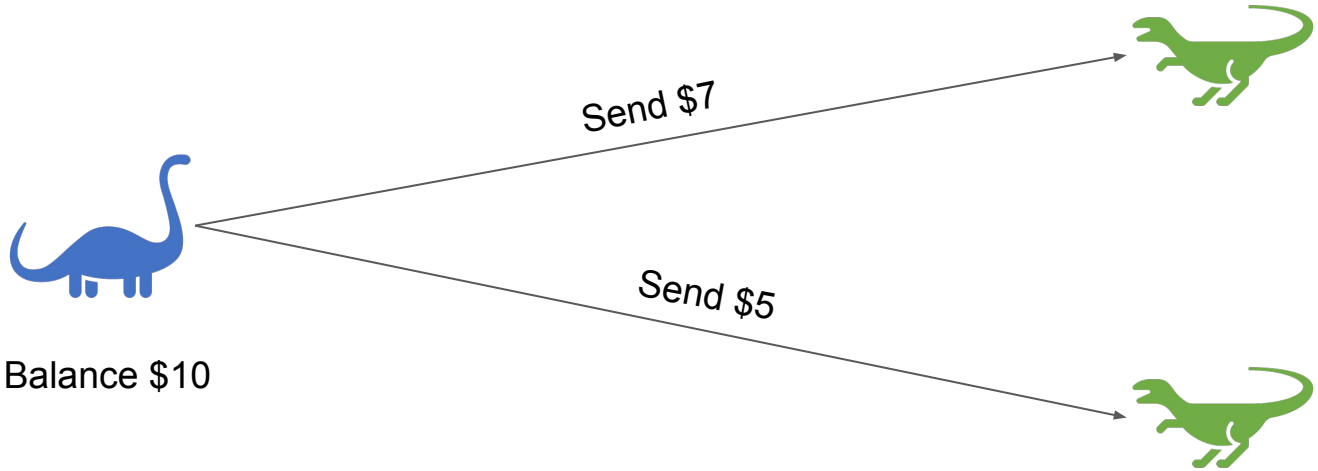


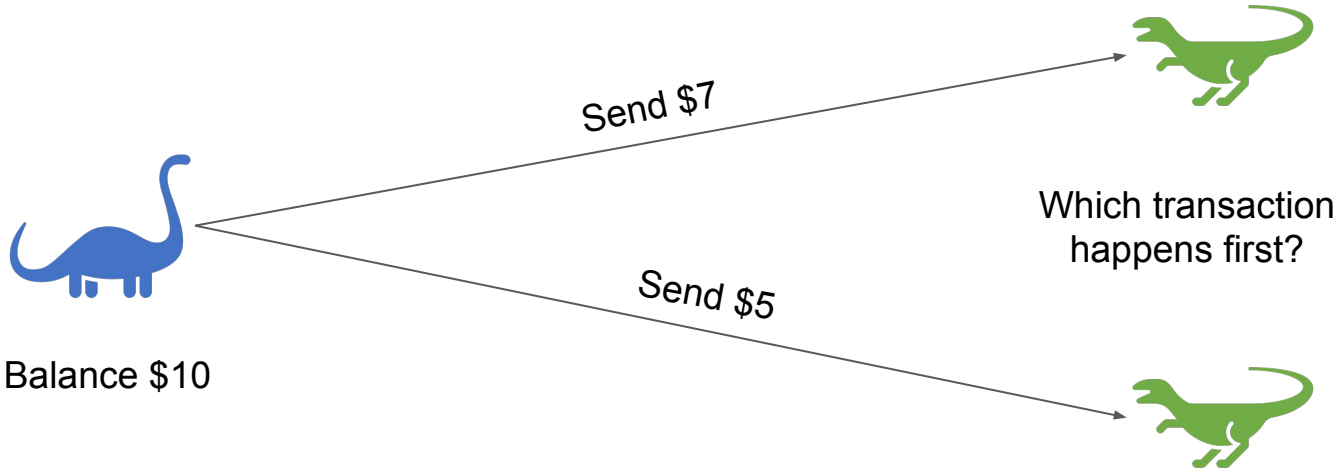
Learning goals

- Hash chains
  - An append-only data structure
- Applications of hash chains

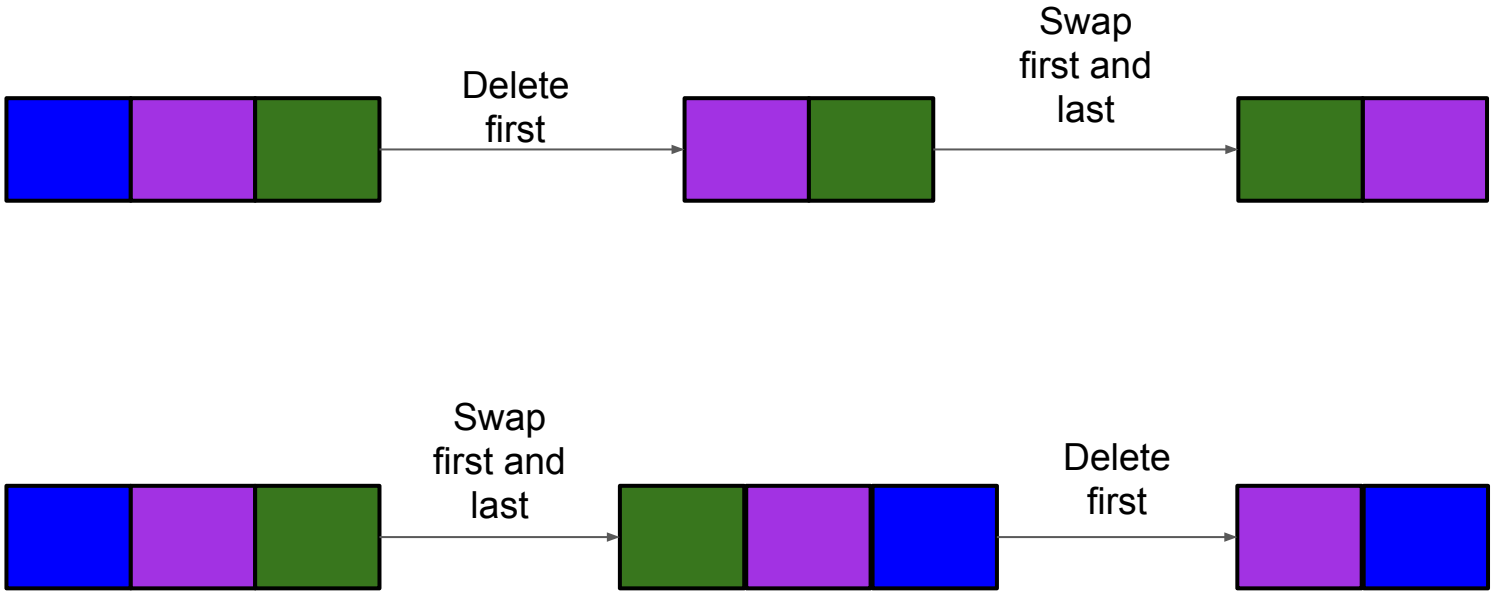
Ordering transactions



Ordering transactions

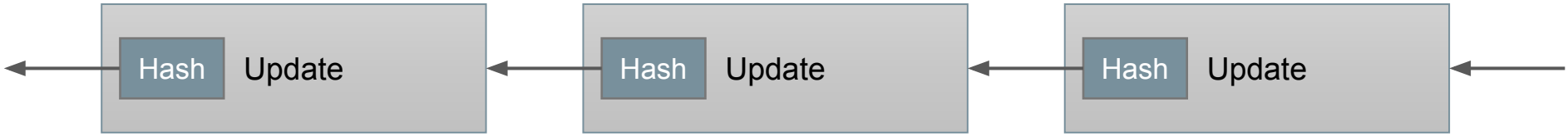


Ordering updates

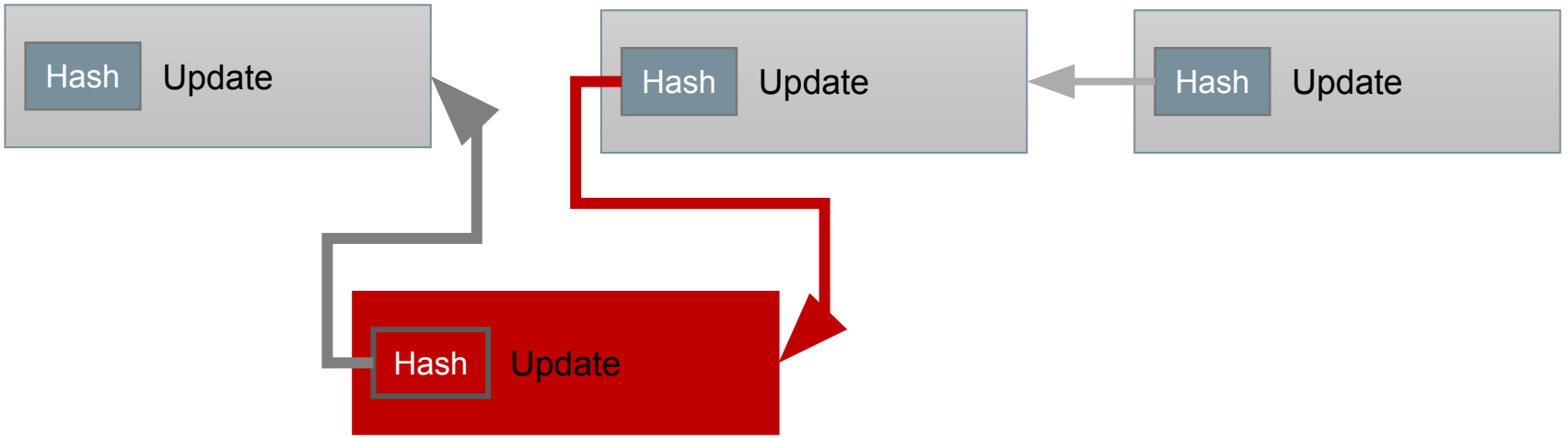


Hash chains

- Chain of “blocks”
- Each block contains data
  - e.g. transactions
- Each block contains a hash of its predecessor
- Collision resistance means that each block determines all its predecessors

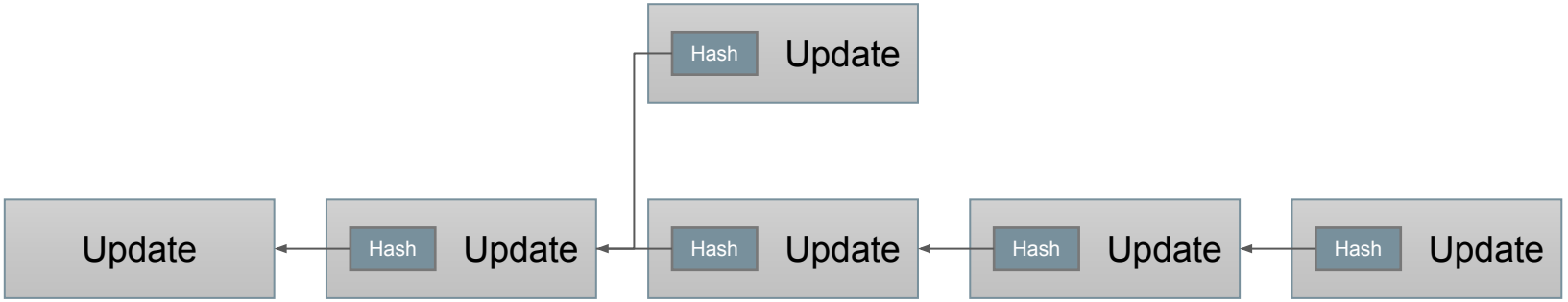


Hash chains prevent insertions



Appending is easy

- There's no well-defined notion of the "end" of the chain
- You can append onto any block



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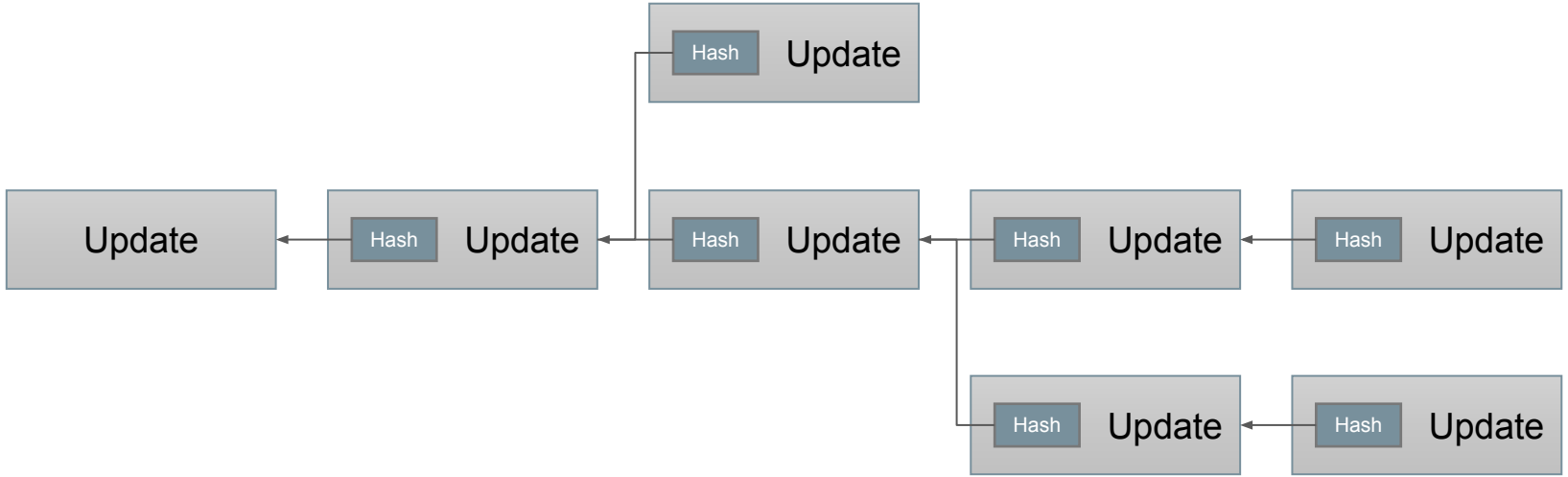

Hash chains simplify consensus

If we can agree on the first block and the last block of the chain, then we agree on the whole chain

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Easy to agree on first block - set it to 0

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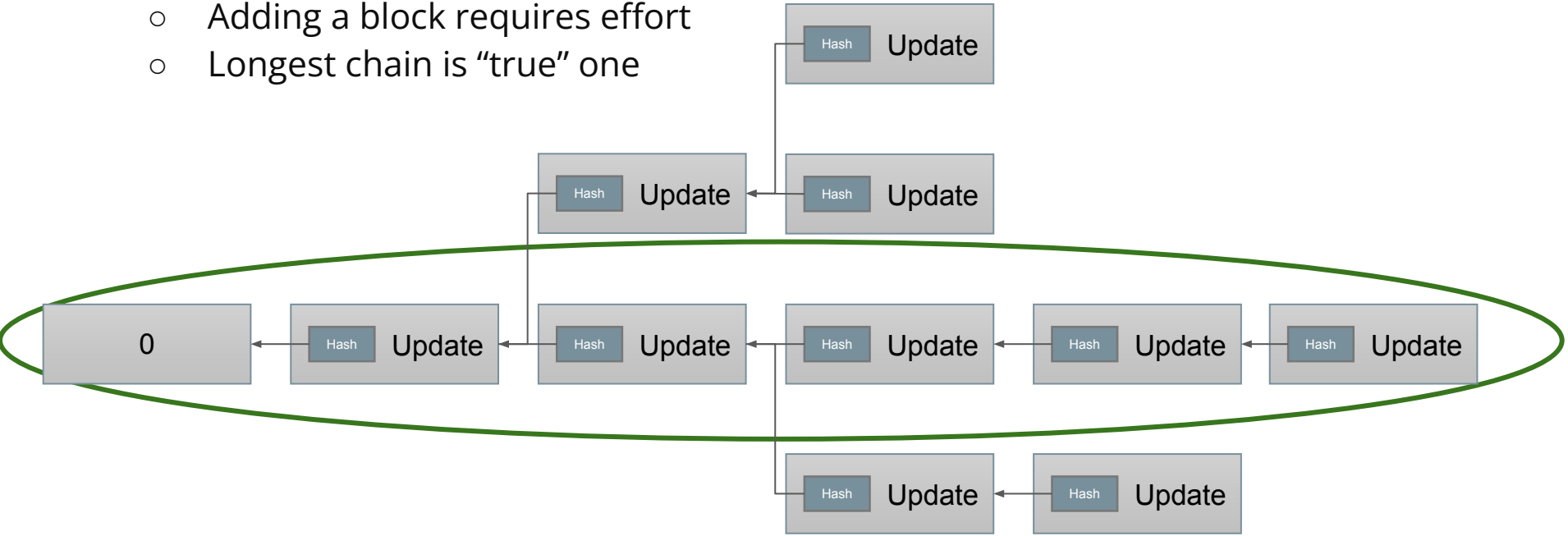
How do you agree on last block?

Agreeing on last block

- Satoshi's idea
  - Adding a block requires effort
  - Longest chain is "true" one



Git

- There isn't always one "true" history
- Each node uniquely defines a state