

# Toward a Scalable Public Blockchain Architecture

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04/02/2020

# Problem

## Scalability

Common Problems:

# Problem

## Scalability

### Common Problems:

- P New transactions are always broadcasted to all nodes
- P Each new block is broadcasted to all nodes

# Problem

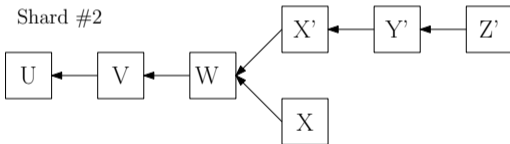
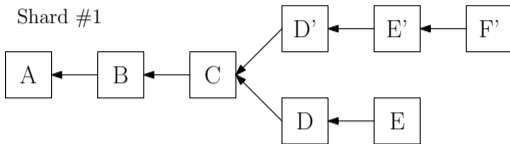
## Scalability

### Common Problems:

- P New transactions are always broadcasted to all nodes
- P Each new block is broadcasted to all nodes
- P All nodes process all transactions that have to be included in the next block

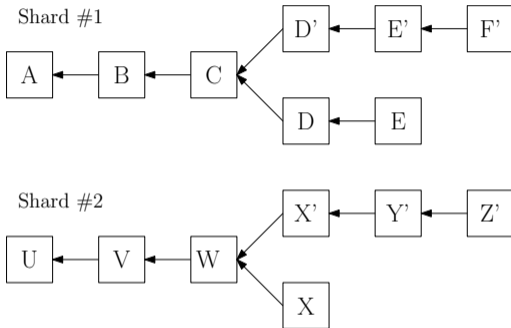
# Problem

State Of the Art



# Problem

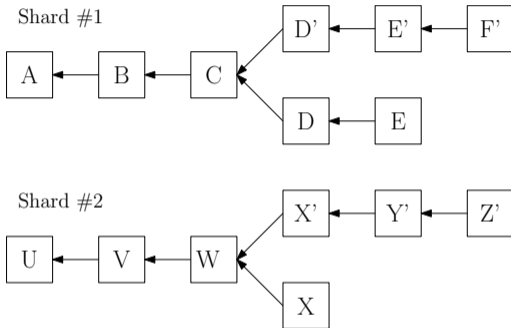
State Of the Art



Problems:

# Problem

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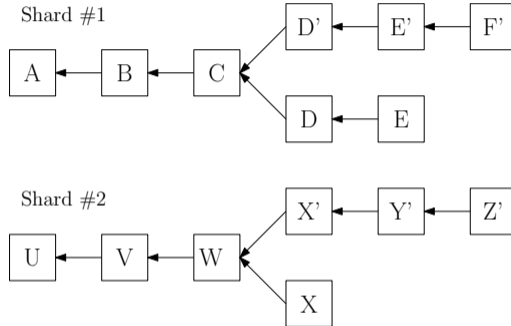


Problems:

**P** Small shard = better scalability, less security

# Problem

State Of the Art



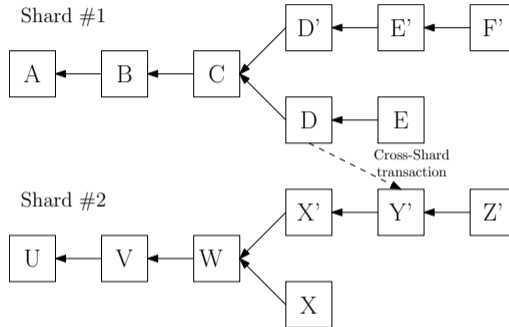
## Problems:

- P Small shard = better scalability, less security
- P Reassignment of the members of shard



# Problem

State Of the Art



## Problems:

- P Small shard = better scalability, less security
- P Reassignment of the members of shard
- P Cross-shard communications

# Our Solution

Transaction  
Creation

Validation and confirmation

Storage DHT (as in [1])

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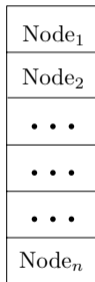
<sup>1</sup>Matteo Bernardini, Diego Pennino, Maurizio Pizzonia:  
**Blockchains Meet Distributed Hash Tables: Decoupling Validation from State Storage.**  
DLT@ITASEC 2019: 43-55

Transaction  
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Validation and confirmation

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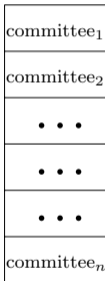
Storage DHT



Transaction Creation

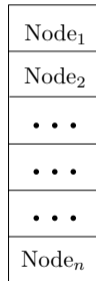
Validation and confirmation

$N$  committees



# Our Solution

Storage DHT

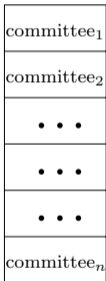


Transaction Creation



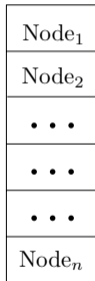
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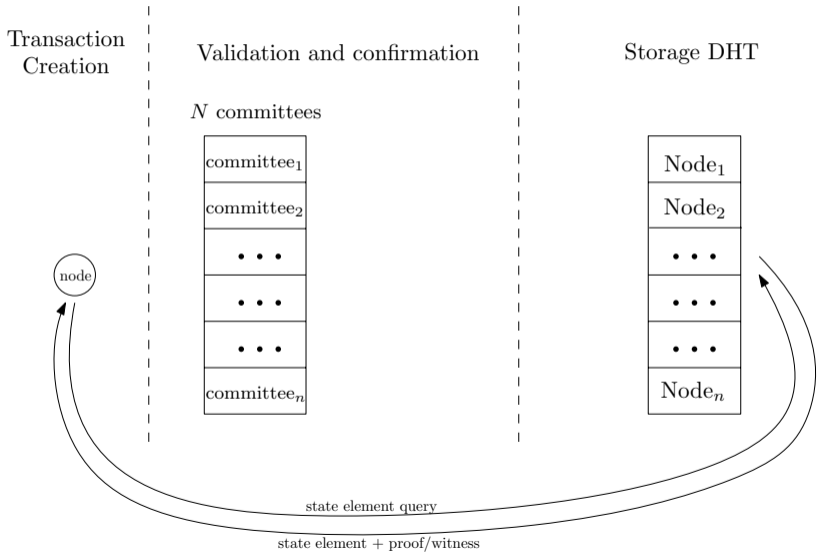


## Our Solution

Storage DHT



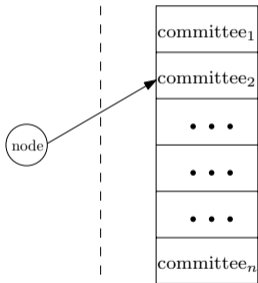
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Transaction Creation

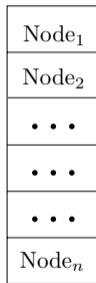
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# Our Solution

Storage DHT

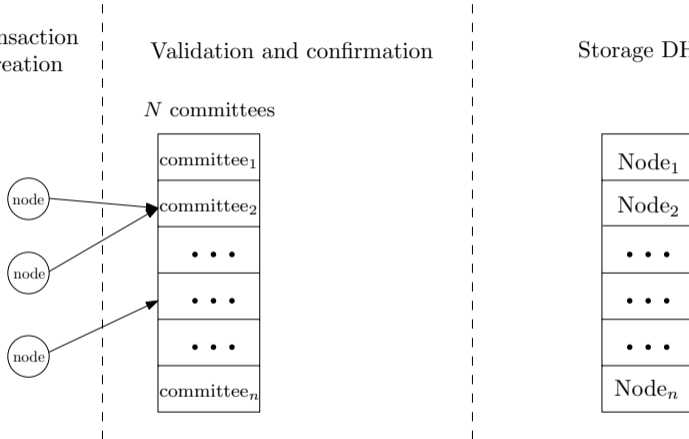


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Transaction Creation

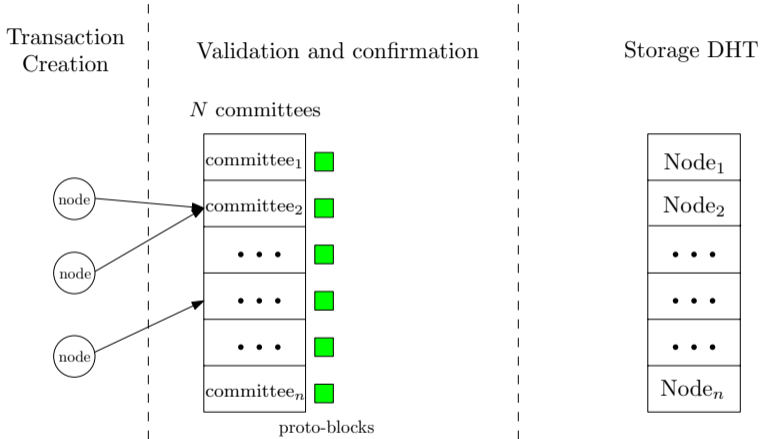
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Storage DHT

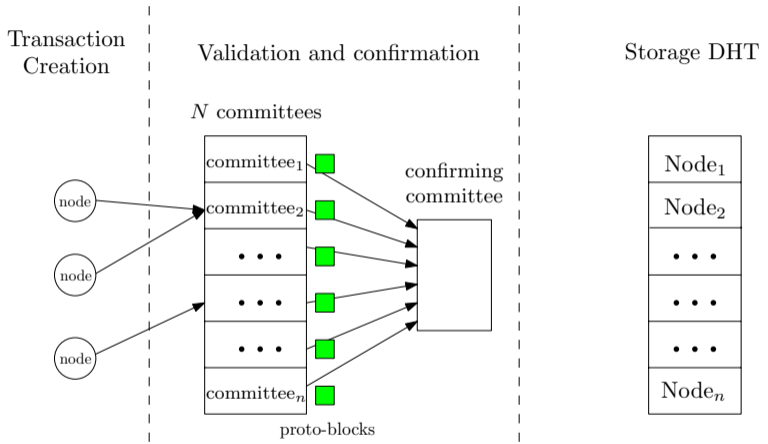




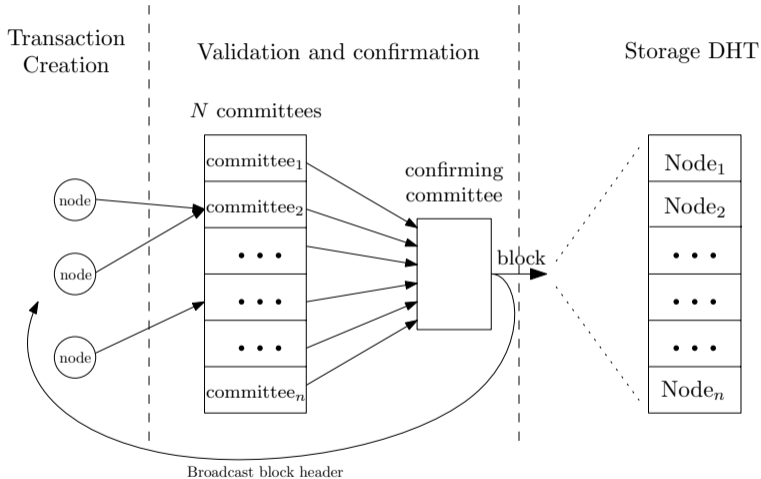
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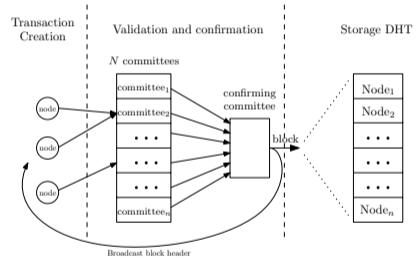
# Our Solution



# Conclusion

## Architecture:

- Only one blockchain
- No heavy broadcast
- Workload is balanced among all nodes

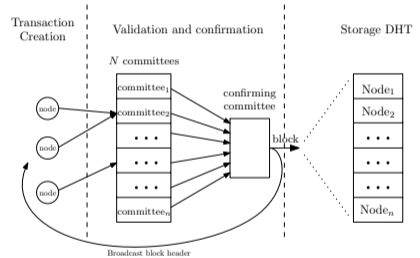


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## Open problems:



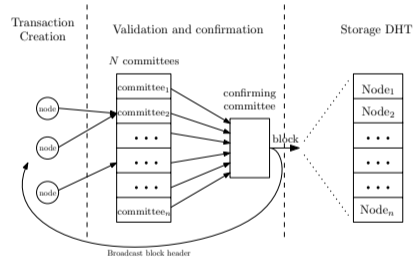
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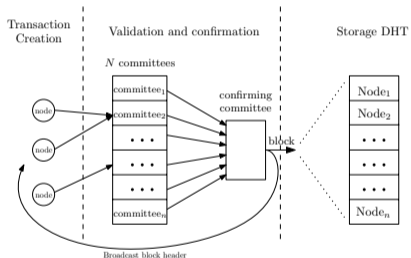
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## Open problems:

- × bottleneck Confirming committee
- × multicast details



# Thanks for your attention!

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