Shoal: Improving DAG-BFT Latency and Robustness

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1 Context: DAG-based BFT Consensus

BFT Consensus

- N >= 3f+1 validators in total
- At most f validators are faulty

Global agreement on an infinitely growing sequence of some values.

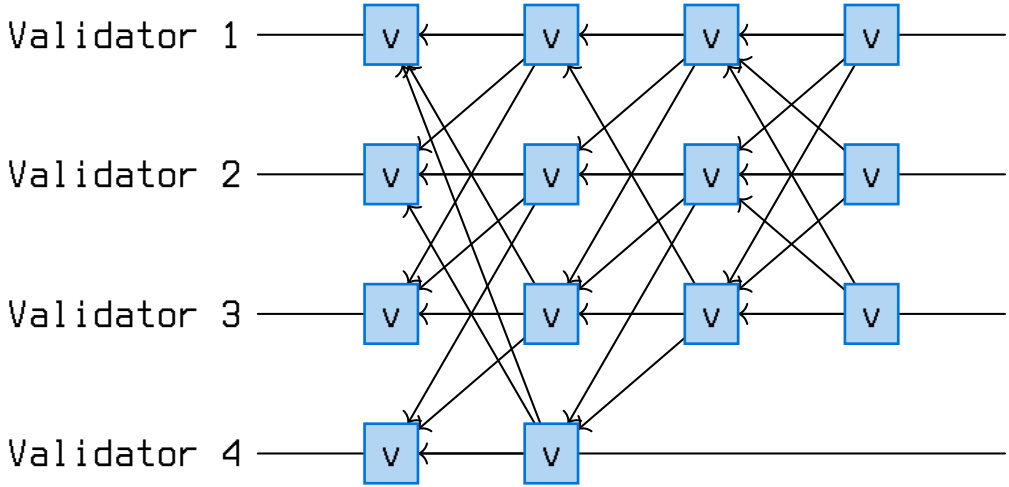
DAG application

Idea

Separate the network communication layer from the consensus logic.

- Each message contains a set of transactions, and a set of references to previous messages.
- Together, all the messages form a DAG that keeps growing - a message is a vertex and its references are edges.

DAG Example



Vertices dissemination

Unifies abstraction

Reliable BFT broadcast (Not all protocols)

Result:

- All honest validators eventually deliver the same vertices and all vertices by honest validators are eventually delivered.
- Causal history of any vertex in both local views is exactly the same.

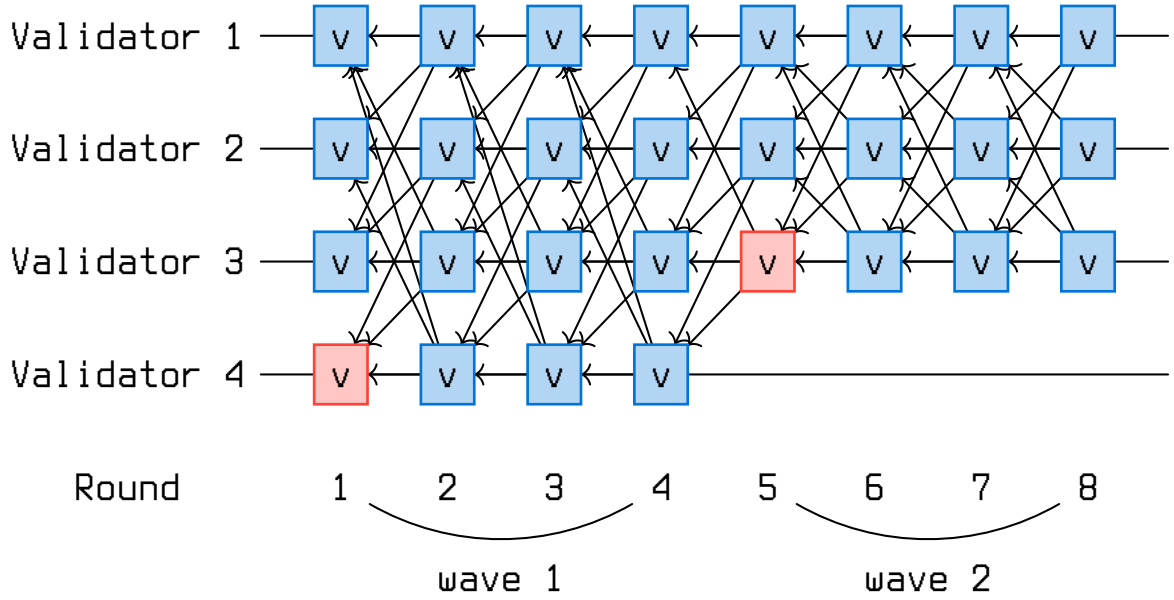
Consensus Mechanism

- Solving locally!!
- No need of any extra communication.

Consensus Structure

- Consensus divided into rounds
- Rounds groups waves
- Each wave contains a leader

DAG Waves example



2 Problem

3 Solution: Pipelining

4 Evaluation