Algorand: BA*

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In public ledger based cryptocurrencies, the question is:

WHICH BLOCK DO WE ADD NEXT???

Bitcoin

The next block is decided through

MINING

Algorand

The next block is decided through

VOTING

HOW?

BYZANTINE AGREEMENT

+

SCALABLE!

!!!

BYZANTINE AGREEMENT* (BA*)

!!!

FAST!

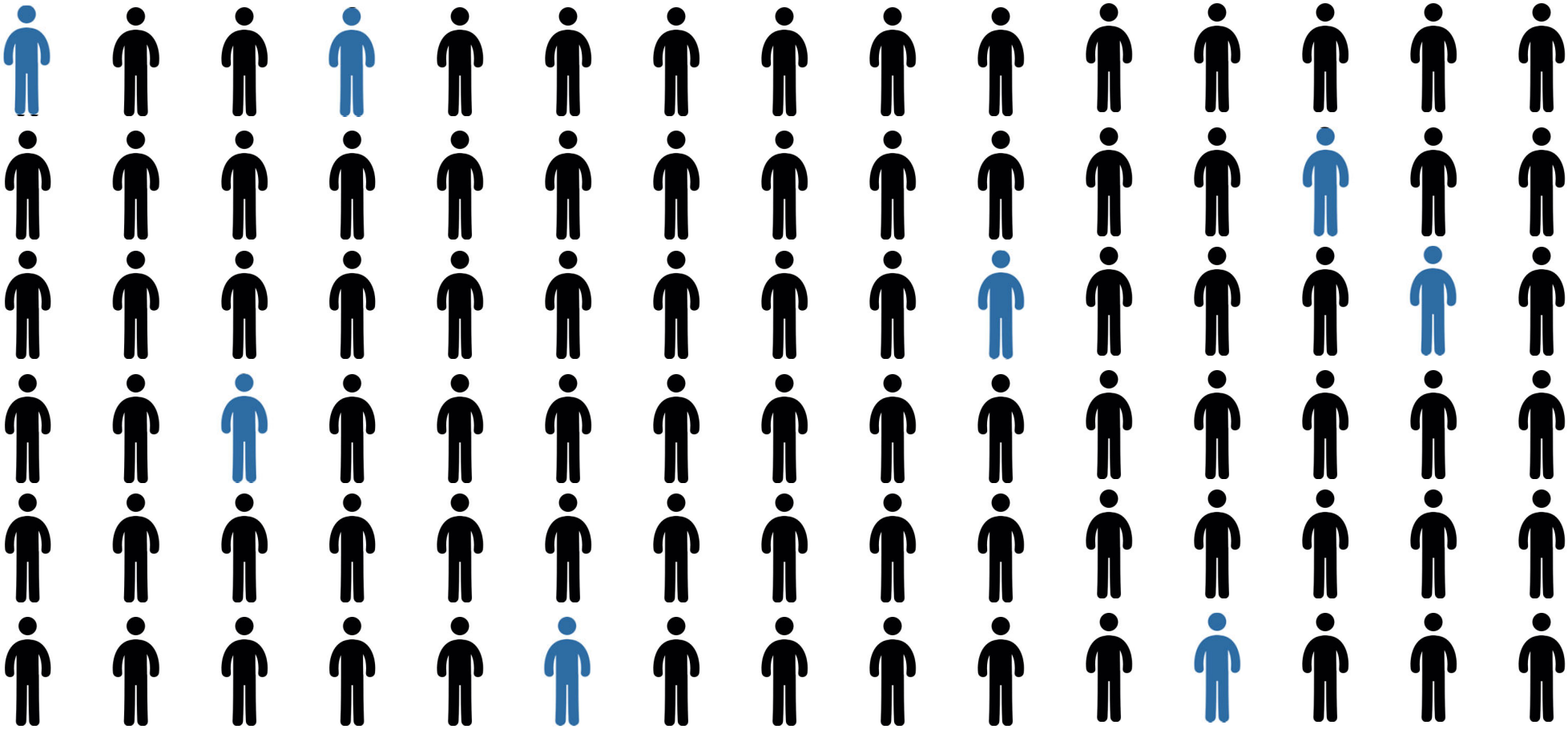
Let’s break it down

Let’s start with the **original Byzantine Agreement Protocol.**

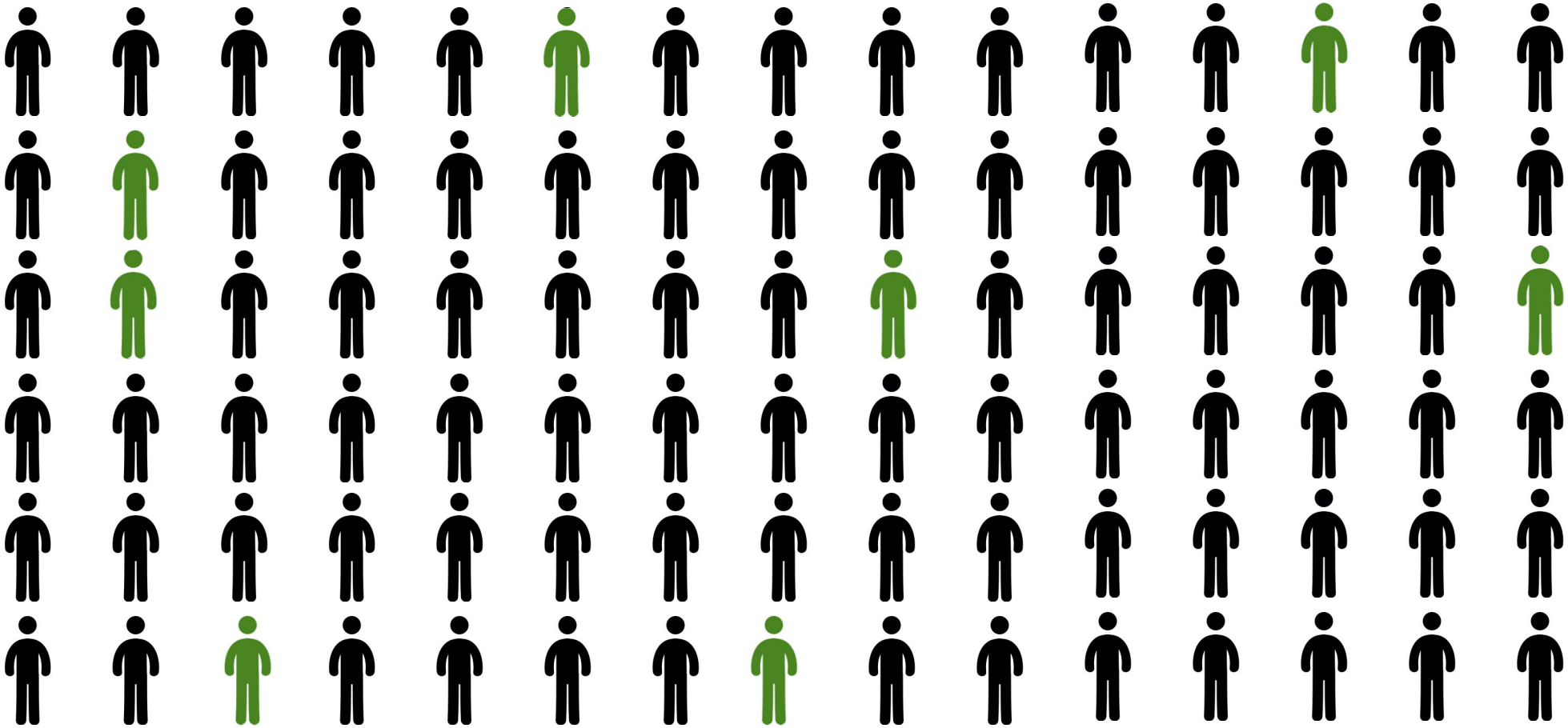
And repeat.

But what if you have

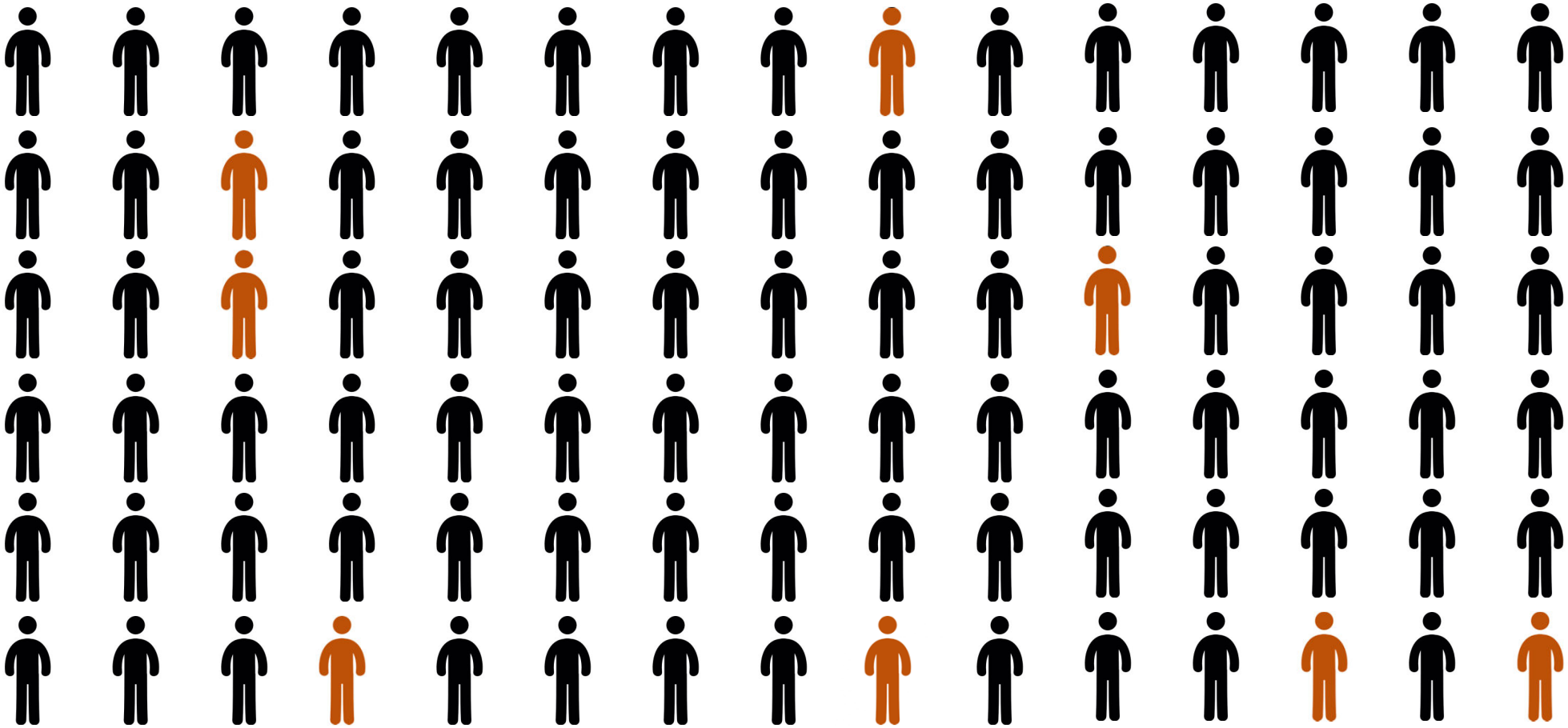
1 MILLION USERS??



But can’t the those **committee members** get **targeted**?



And again…



Cryptographic Sortition & Verifiable Random Function (VRF)

IN A SINGLE STEP…

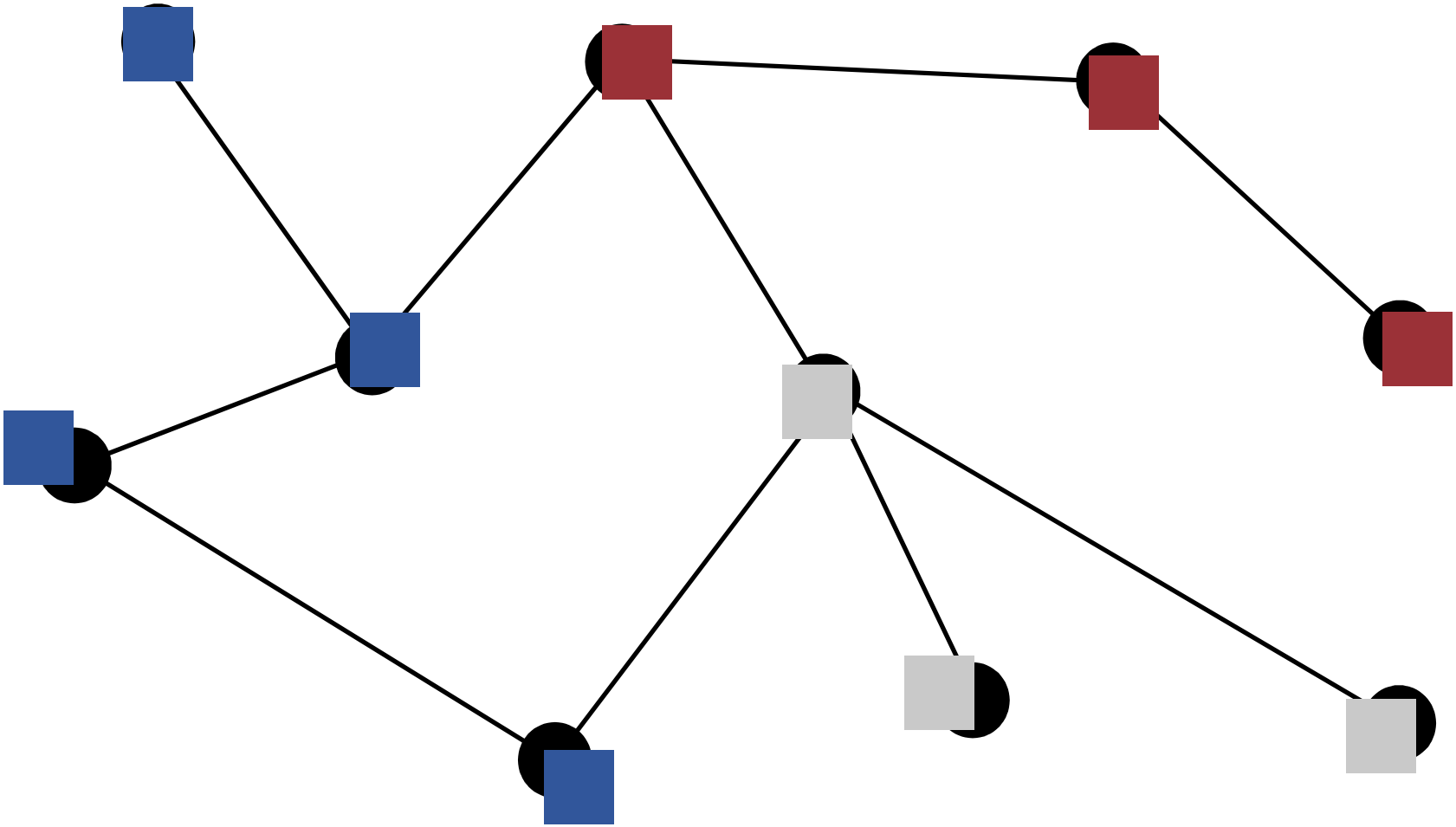
1. Set up a COMMITTEE & VOTE
2. COUNT the VOTES

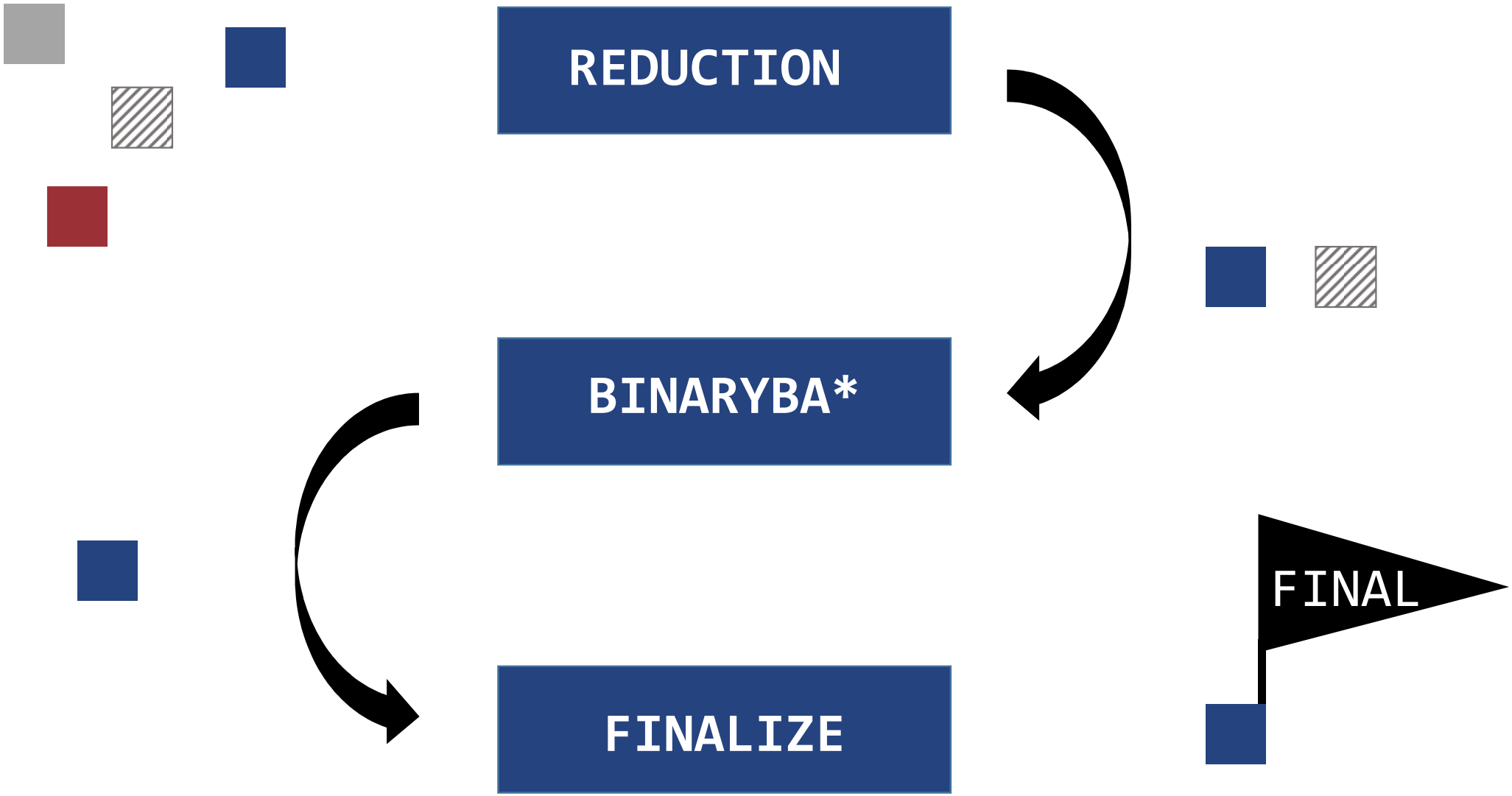
COUNTING THE VOTES

1. MESSAGE IS PROCESSED + VERIFIED
2. TALLIED UP

Otherwise,
TIMEOUT

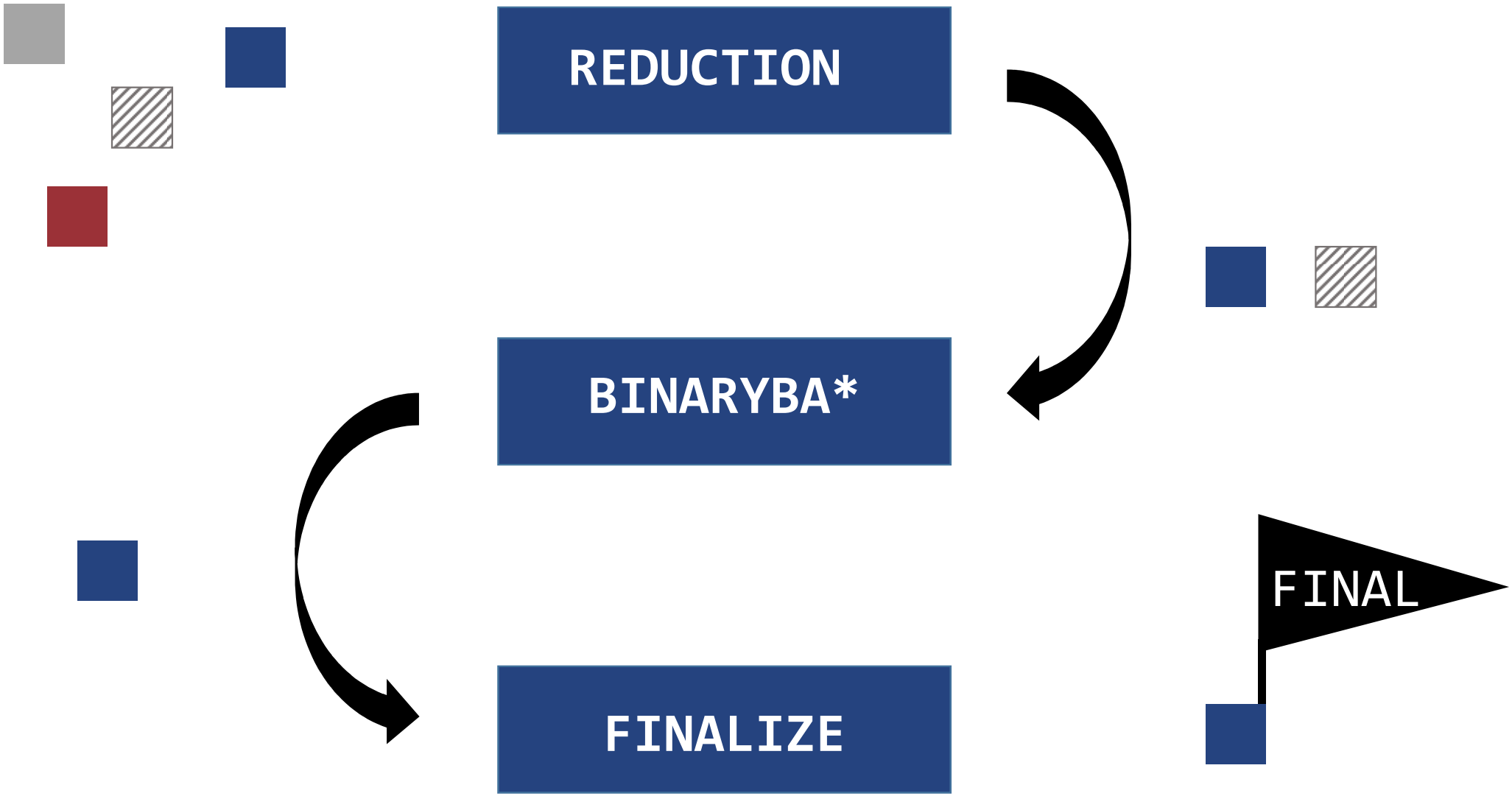
How does BA* work in **ALGORAND**?




REDUCTION
BINARYBA*
FINALIZE
FINAL

What if we get stuck in binaryba?

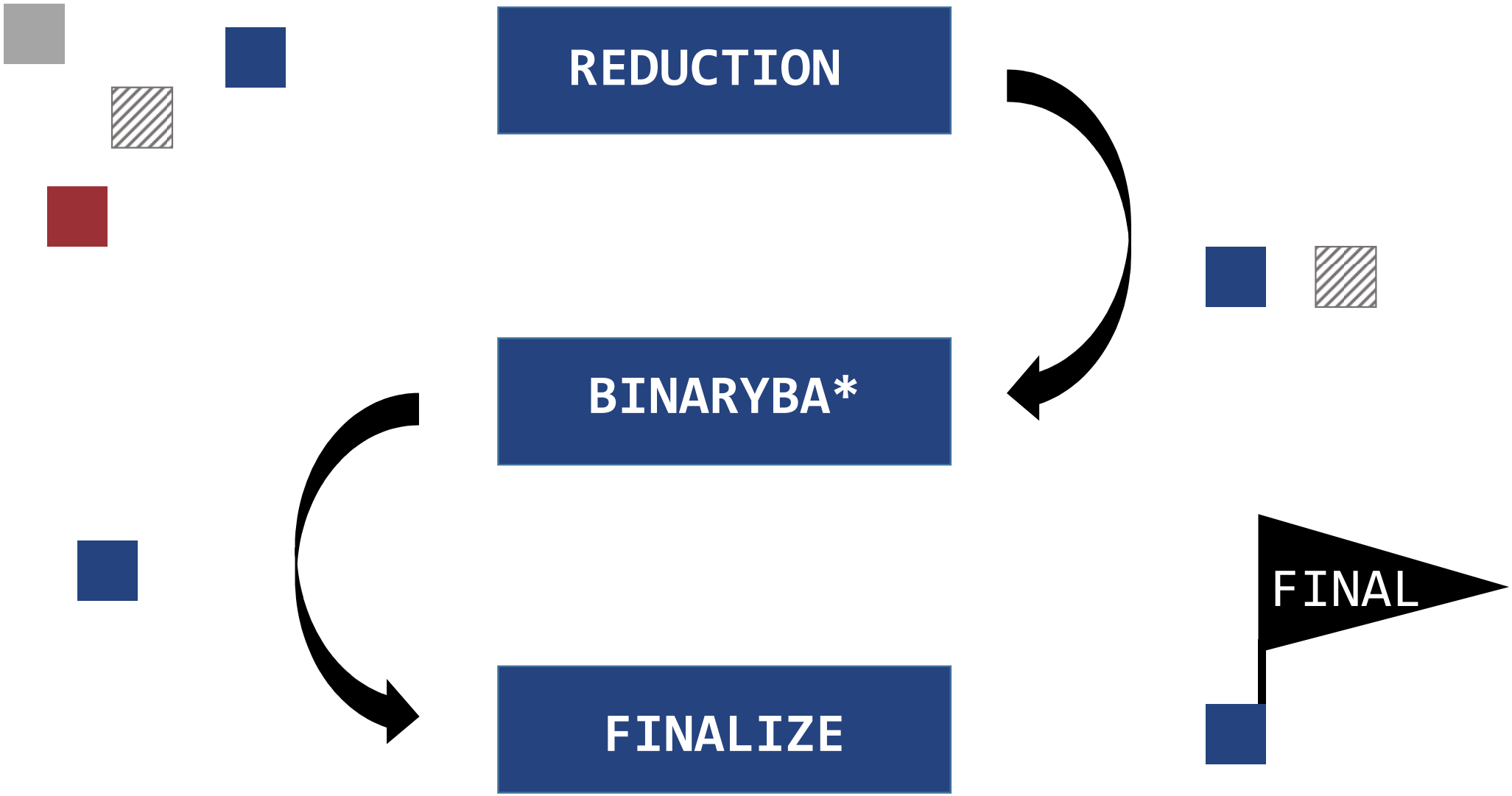
The Common Coin


REDUCTION
BINARYBA*
FINALIZE
FINAL

FINAL v. TENTATIVE

FINAL: BA*() will not reach consensus on any other block for that round

TENTATIVE: BA*() was unable to guarantee safety due to network asynchrony or malicious users


REDUCTION
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FINALIZE
FINAL

Committee Size

Tradeoff between **bandwidth** and **protection against adversary**

DISCUSSION

"In a **Sybil** attack, the attacker **subverts** the reputation system of a peer-to-peer network **by creating a large number of pseudonymous identities**, using them to gain a disproportionately large influence.” - Wikipedia

HOW DOES ALGORAND PREVENT SYBIL ATTACKS?

WHY IS BA* SCALABLE?

What can happen when a weighted fraction (greater than 1/3) of users are malicious?

The end.