

A DISTRIBUTED OPERATING SYSTEM FOR  
PERMISSIONED BLOCKCHAINS

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**HYPERLEDGER FABRIC**

# BYZANTINE GENERALS' PROBLEM

- ▶ An agreement problem
- ▶ A group of generals wants to attack a city
- ▶ They must to know when to attack or when to retreat
- ▶ They cannot see or hear each other
- ▶ What do they need? → A PLAN
- ▶ We should build a network (nodes, communication channels, protocols)

## BYZANTINE GENERALS' PROBLEM

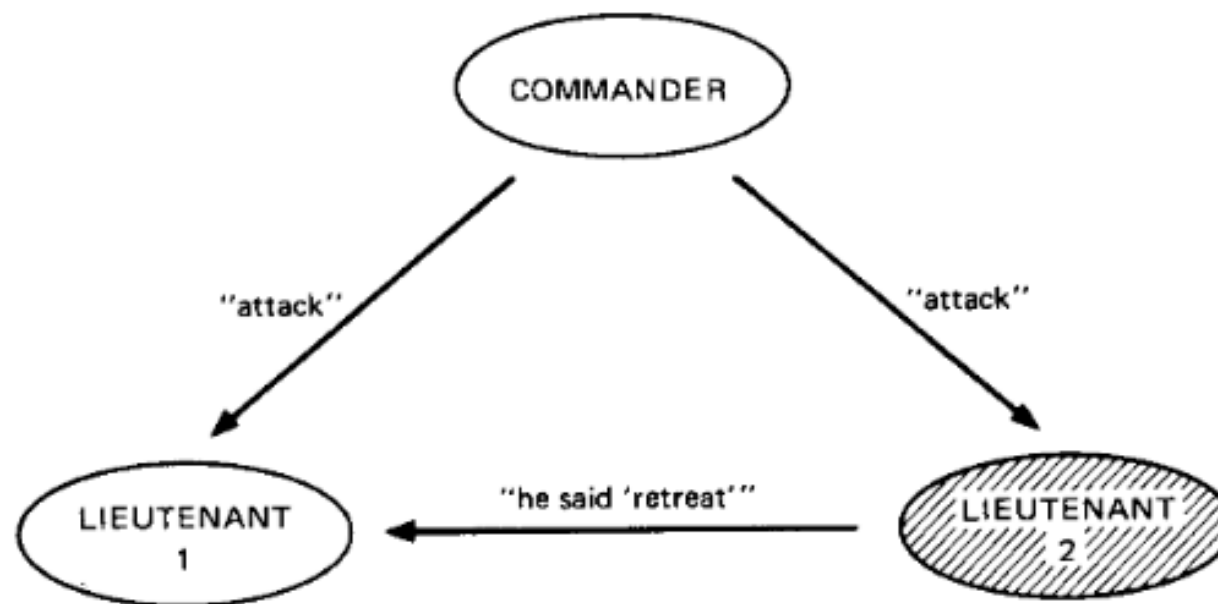


Fig. 1. Lieutenant 2 a traitor.

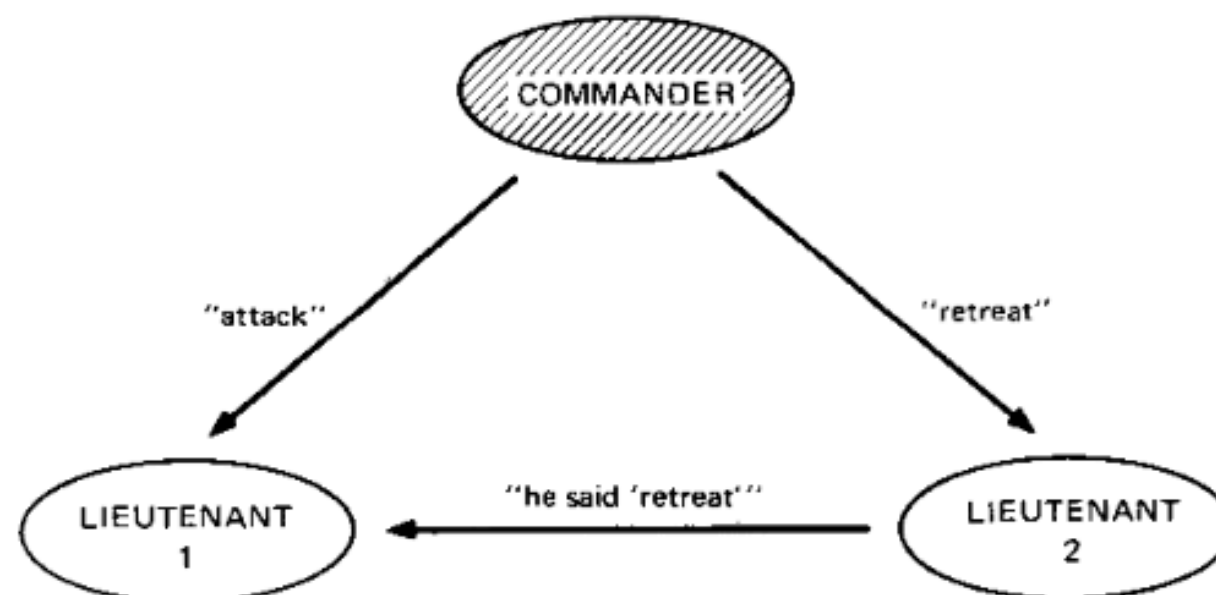


Fig. 2. The commander a traitor.

... take me to your commander!

# BYZANTINE GENERALS' PROBLEM IN PRACTICE

- ▶ Aircraft systems (Boeing 777 and 787 flight control systems)
- ▶ Spacecrafts (SpaceX Dragon flight system)
- ▶ Bitcoin

# BLOCKCHAINS

- ▶ Simply, a blockchain is a huge ledger for recording transactions
- ▶ It is maintained within a distributed network of mutually untrusting peers (the generals)
- ▶ Every peer maintains a copy of the ledger
- ▶ They validate and order the transactions through a consensus protocol