State-Machine Replication
The Problem

Solution: replicate server!
The Solution

1. Make server **deterministic (state machine)**
The Solution

1. Make server deterministic (state machine)
2. Replicate server
The Solution

1. Make server **deterministic** *(state machine)*
2. Replicate server
3. Ensure correct replicas step through the same sequence of state transitions
The Solution

1. Make server deterministic (state machine)
2. Replicate server
3. Ensure correct replicas step through the same sequence of state transitions
4. Vote on replica outputs for fault-tolerance
The Solution

1. Make server deterministic (state machine)
2. Replicate server
3. Ensure correct replicas step through the same sequence of state transitions
4. Vote on replica outputs for fault-tolerance
A: voter and client share fate!