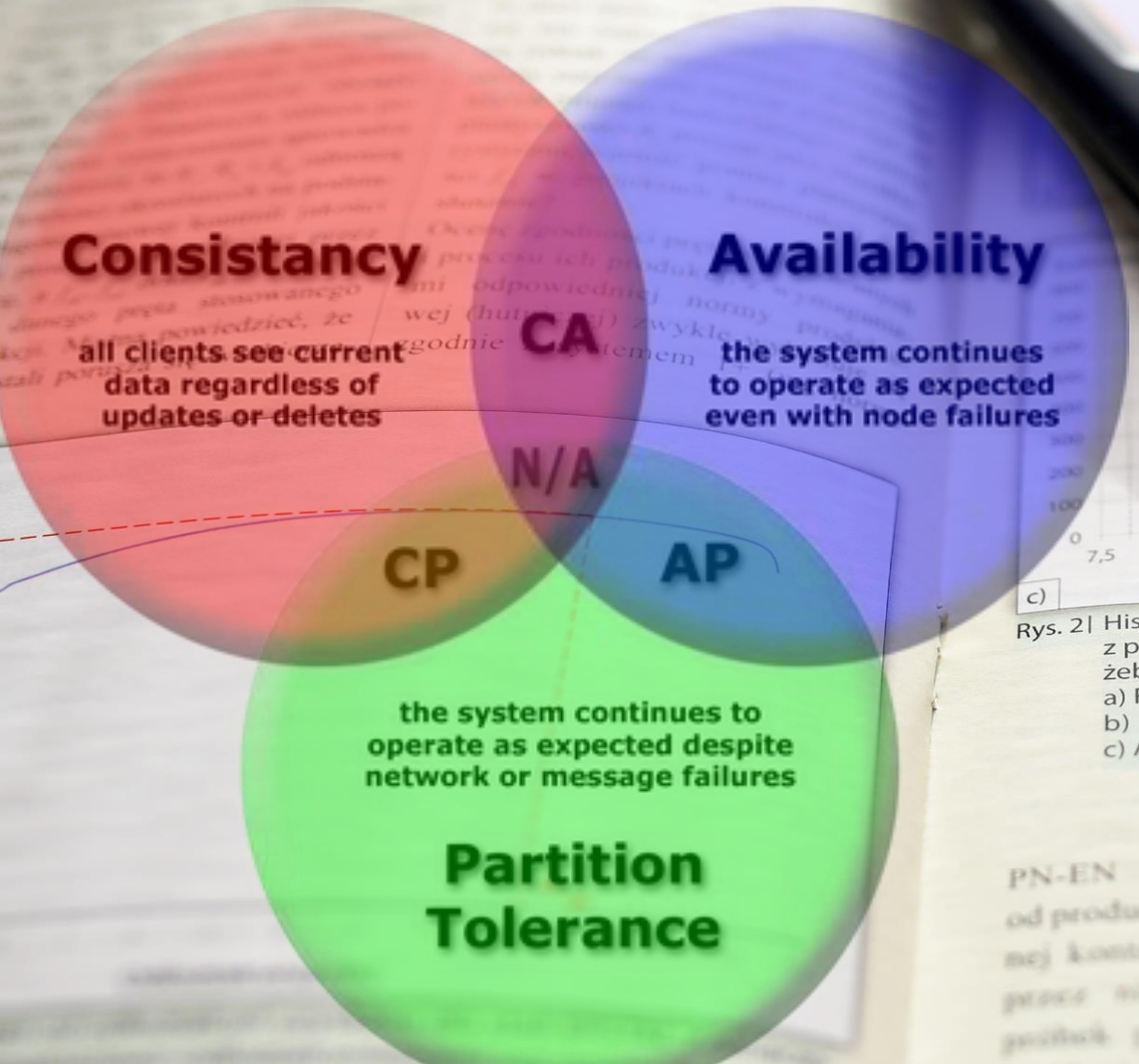
Concurrent applications

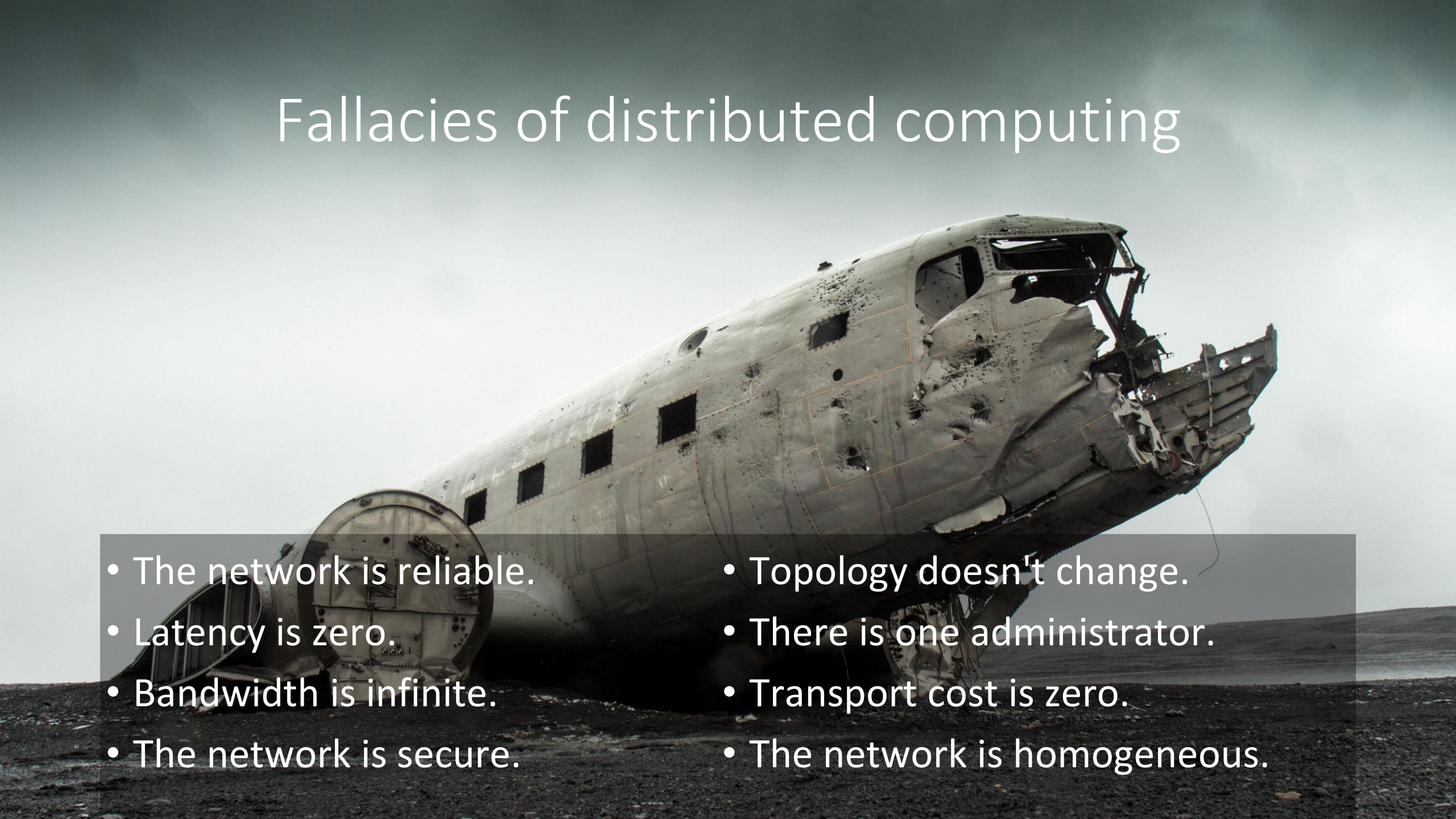
Design crashcourse

Concurrency on global scale

CAP theorem

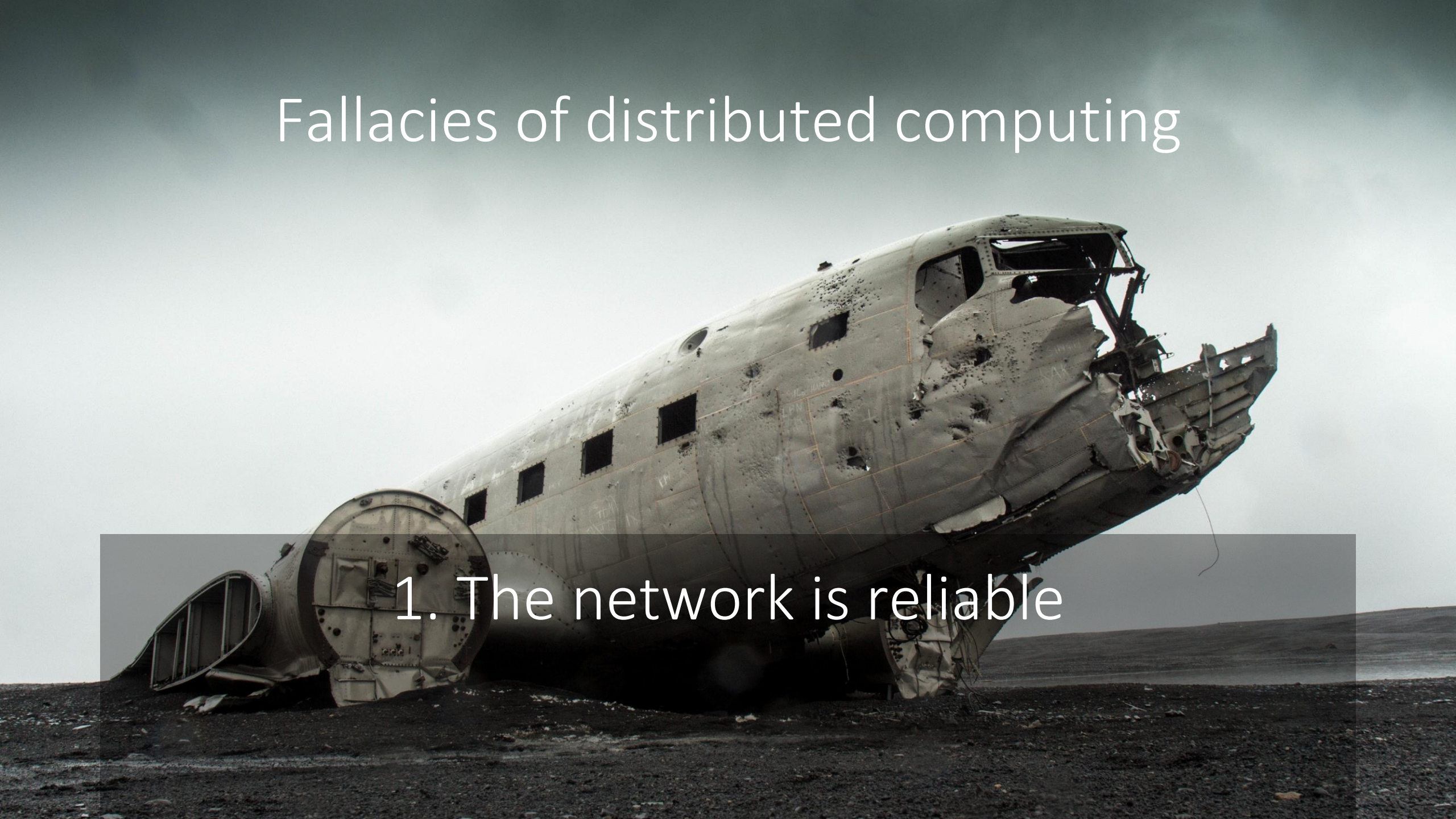

Consistancy
all clients see current data regardless of updates or deletes
Availability
the system continues to operate as expected even with node failures
CA
N/A
CP
AP
the system continues to operate as expected despite network or message failures
Partition Tolerance

Fallacies of distributed computing



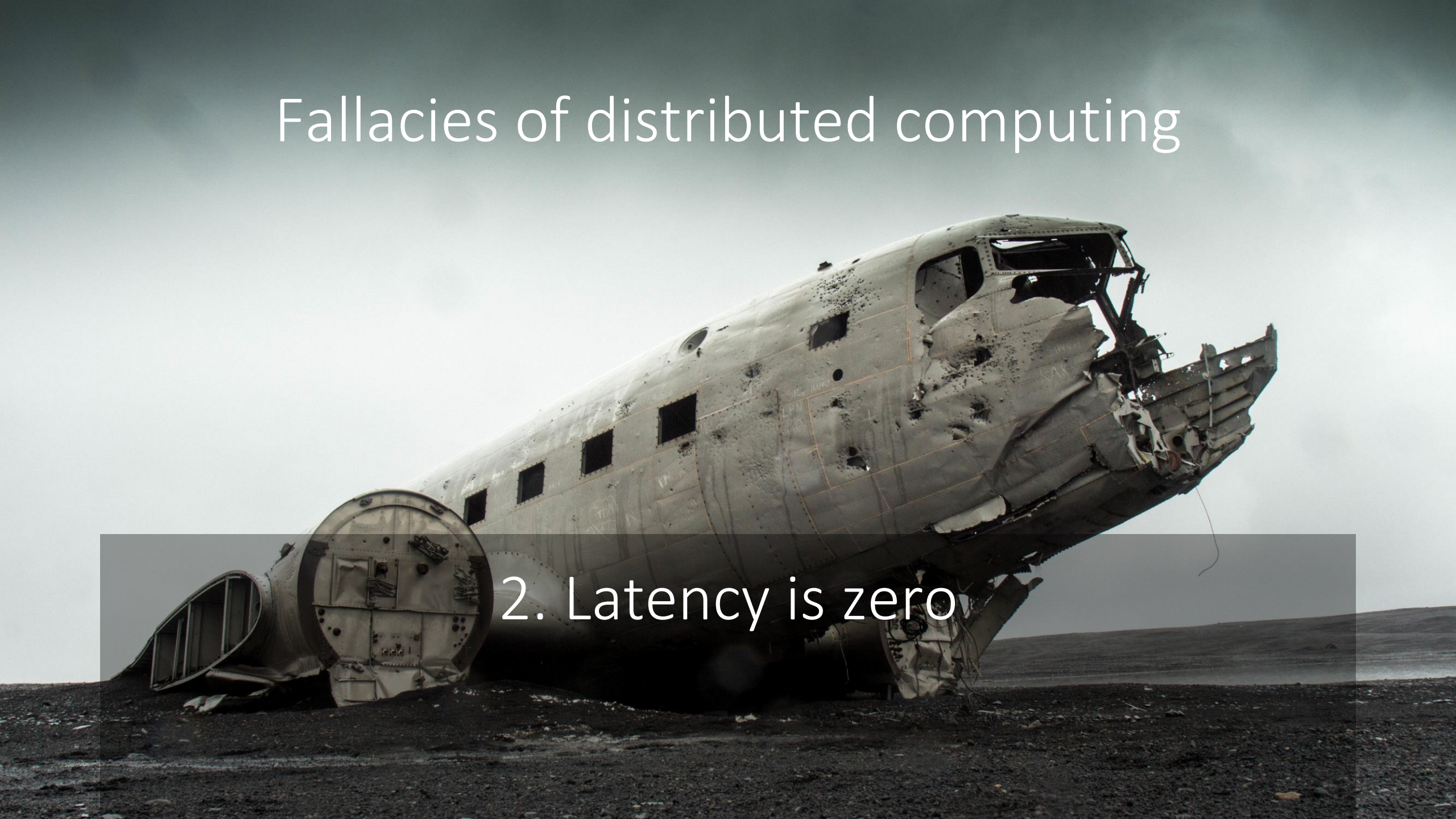
- The network is reliable.
- Latency is zero.
- Bandwidth is infinite.
- The network is secure.
- Topology doesn't change.
- There is one administrator.
- Transport cost is zero.
- The network is homogeneous.

Fallacies of distributed computing



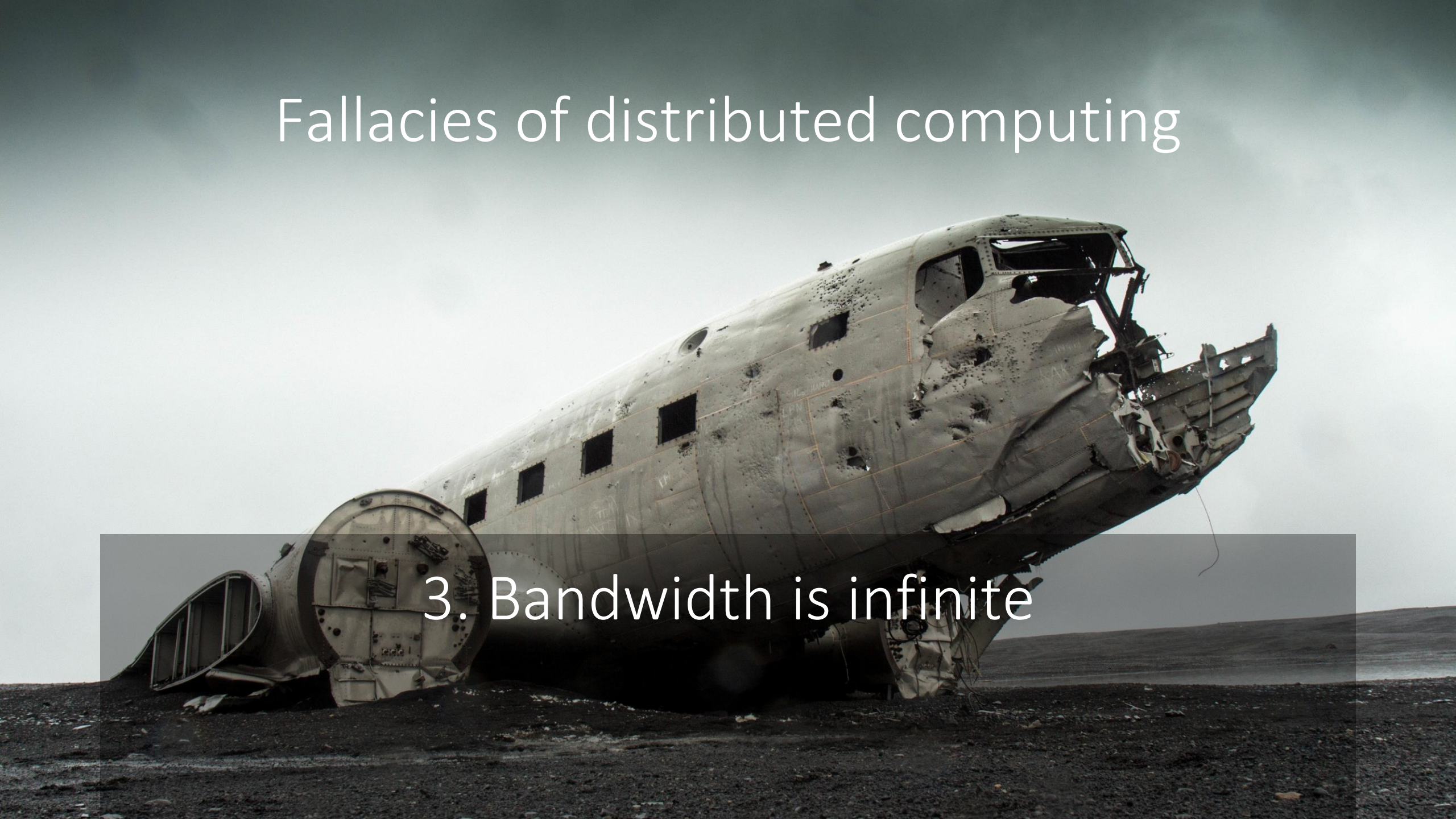
1. The network is reliable

Fallacies of distributed computing



2. Latency is zero

Fallacies of distributed computing



3. Bandwidth is infinite

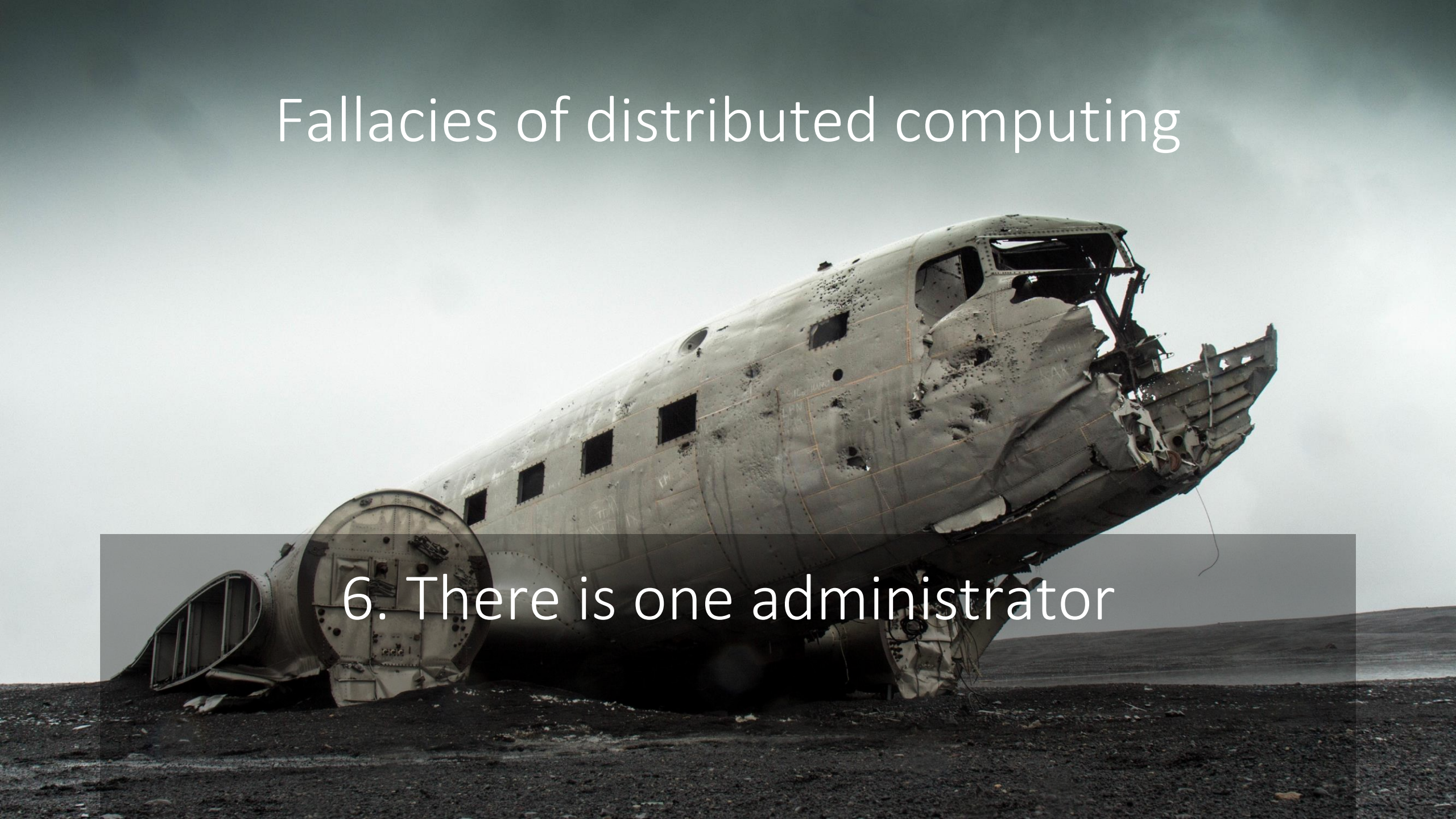
Fallacies of distributed computing

4. The network is secure

Fallacies of distributed computing

5. Topology doesn’t change

Fallacies of distributed computing

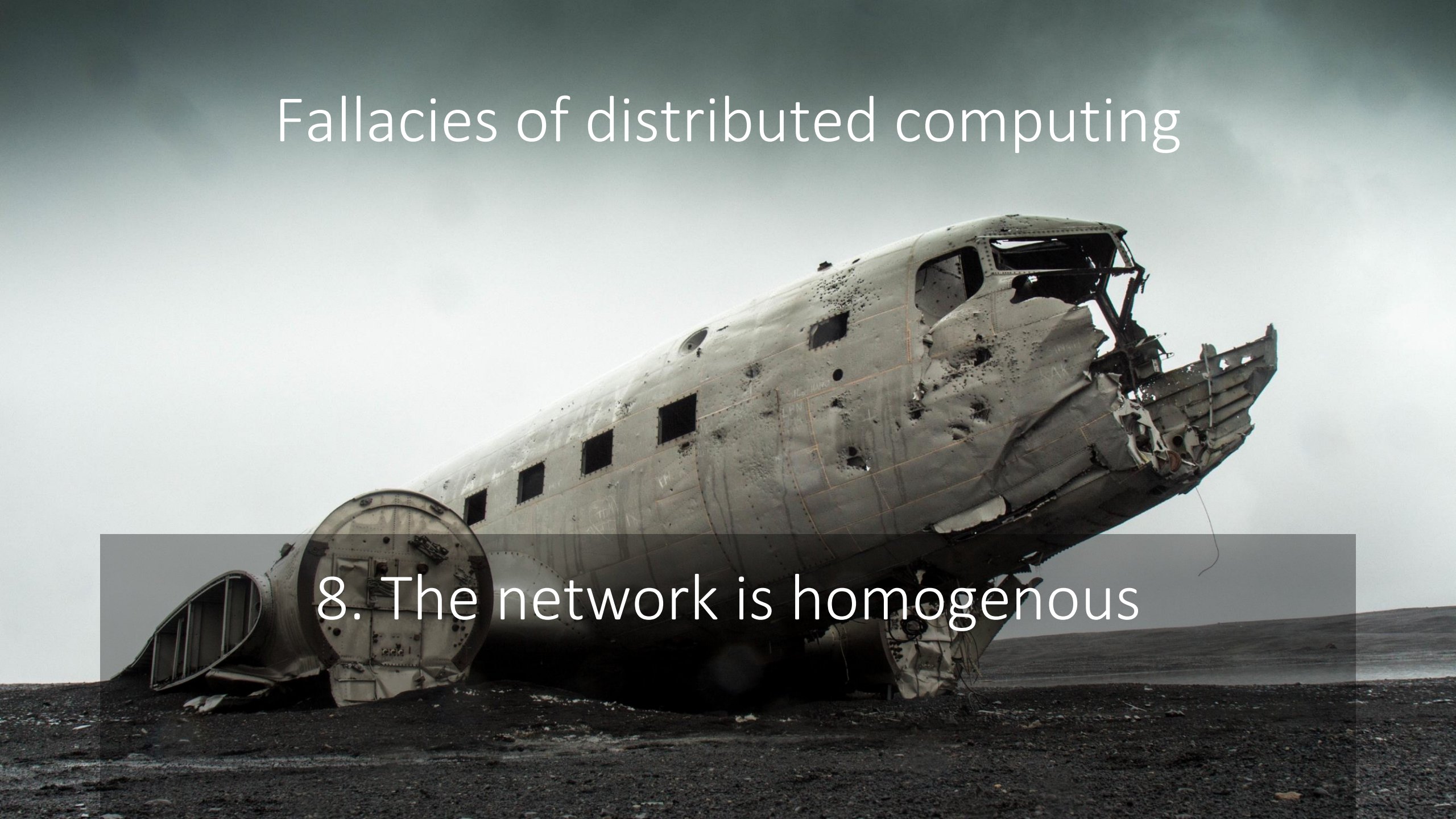


6. There is one administrator

Fallacies of distributed computing

7. Transport cost is zero

Fallacies of distributed computing



8. The network is homogenous

Fallacies of distributed computing

9. Location is irrelevant

Data consistency

What is data consistency

Data consistency

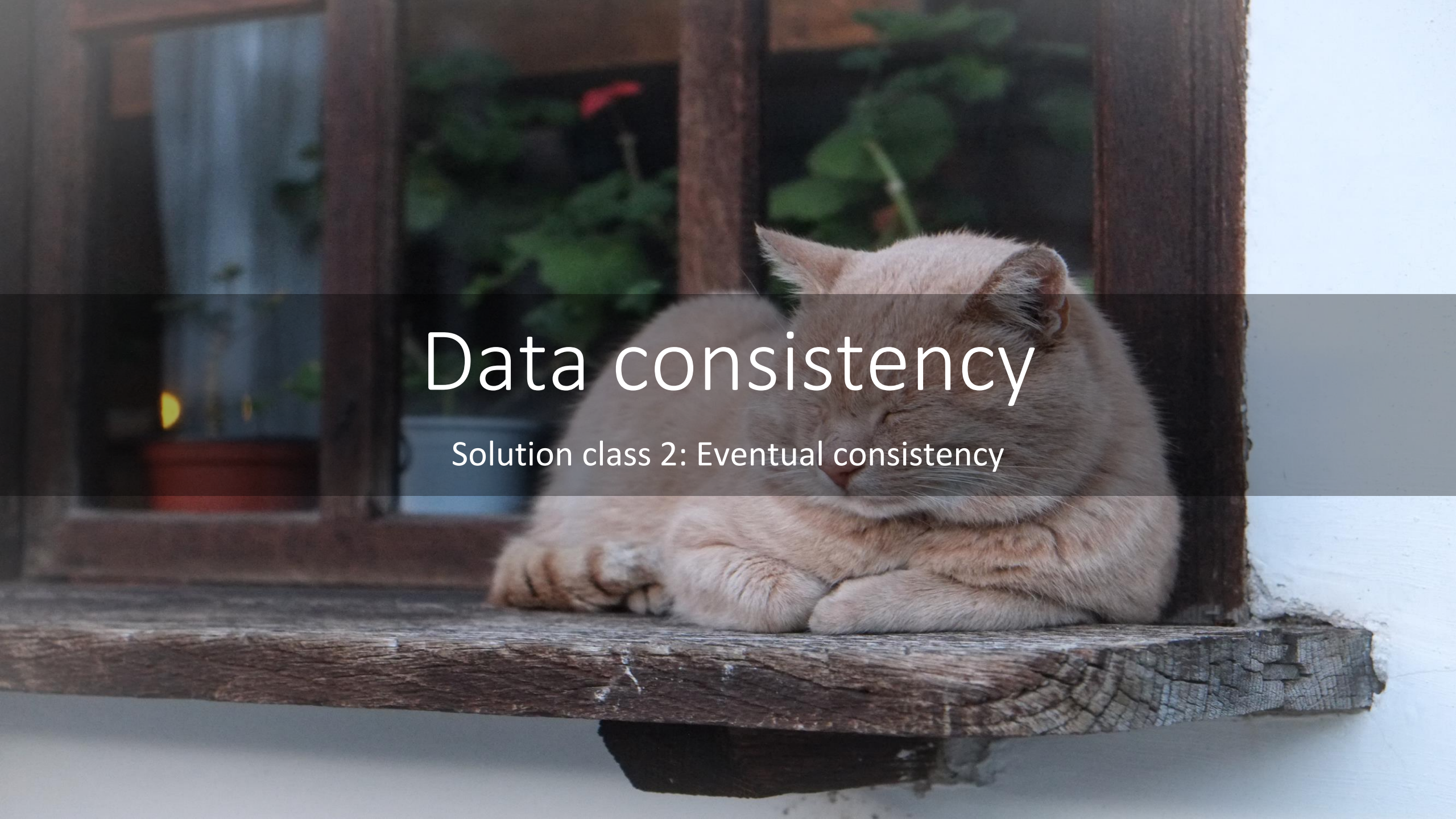
Problems

Data consistency

Solution class 1: Optimistic locking

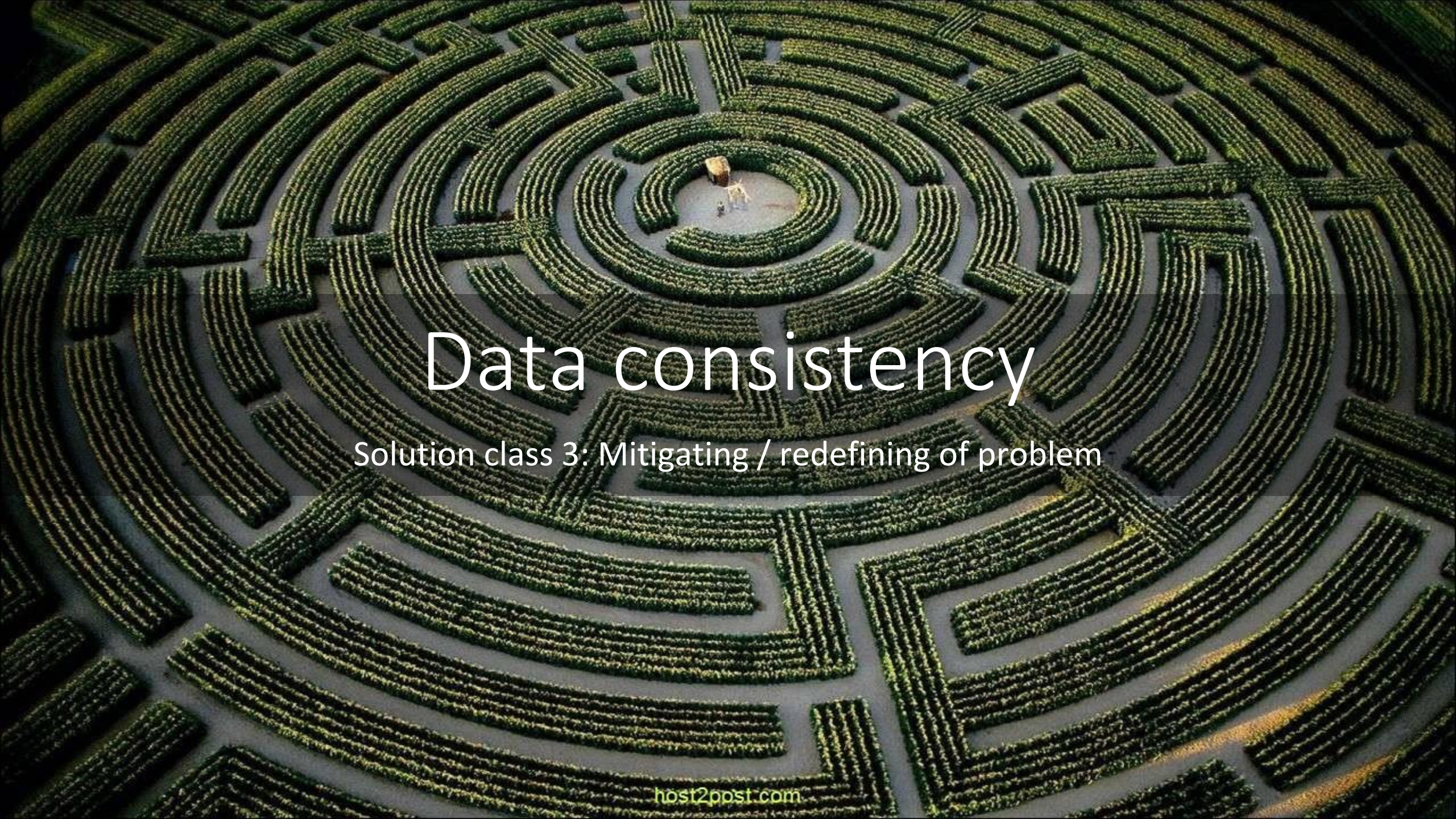
Data consistency

Optimistic locking



Data consistency

Solution class 2: Eventual consistency



Data consistency

Solution class 3: Mitigating / redefining of problem

Data consistency

Solution class 4: Leader election

Data consistency

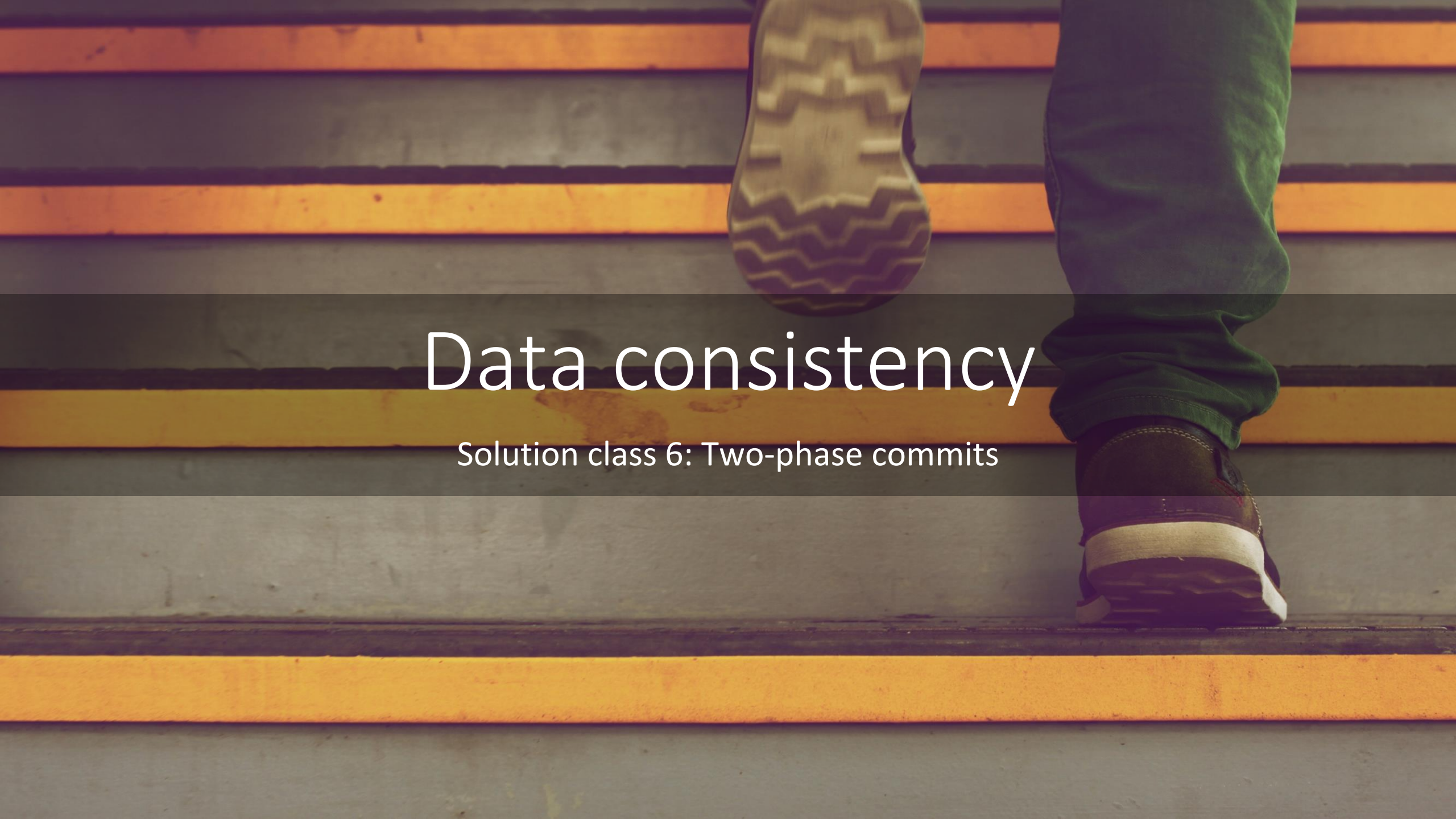
Solution class 5: Idempotent requests

Data consistency

Idempotent requests

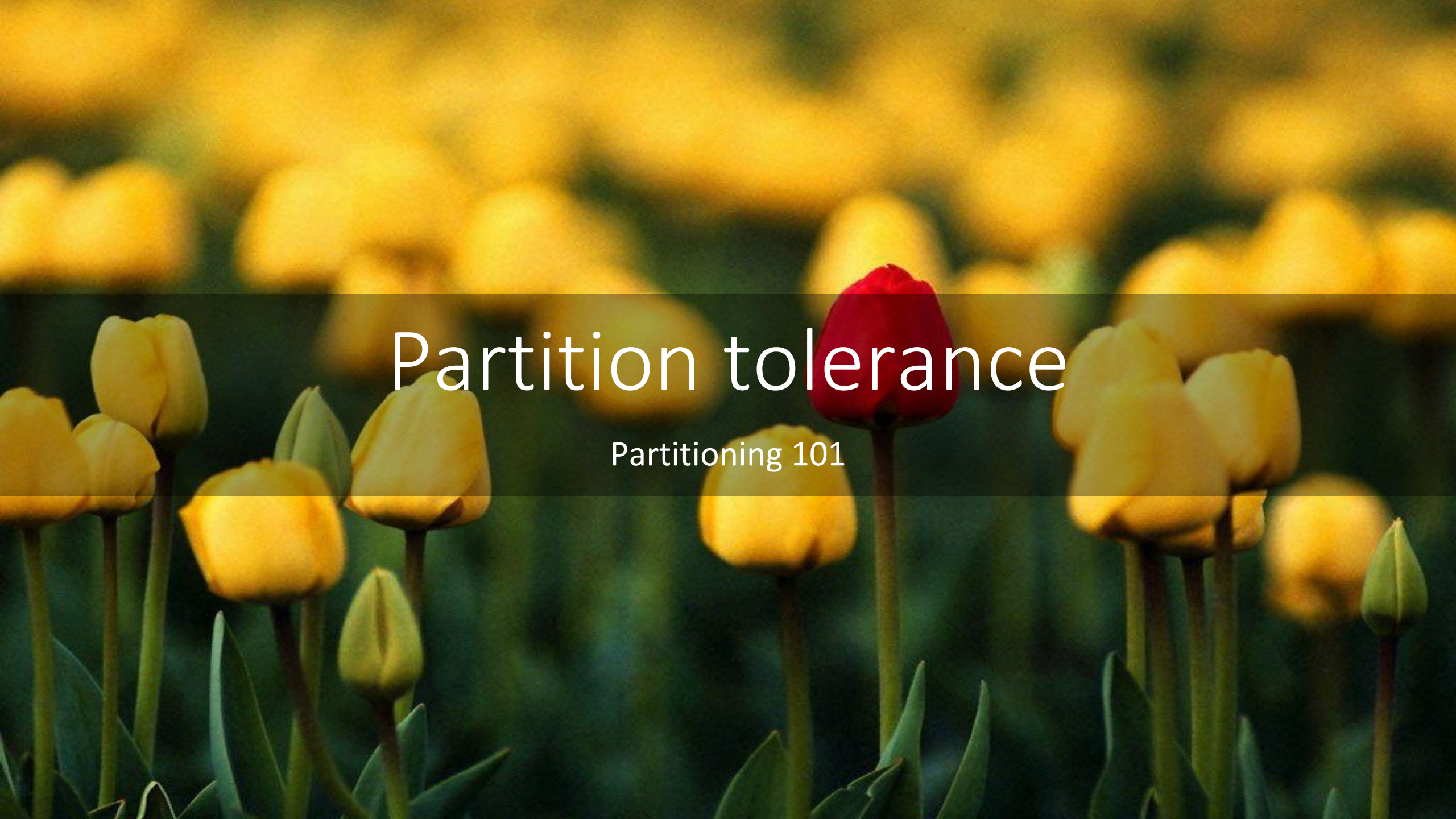
Data consistency

Idempotent requests



Data consistency

Solution class 6: Two-phase commits



Partition tolerance

Partitioning 101

Partitioning

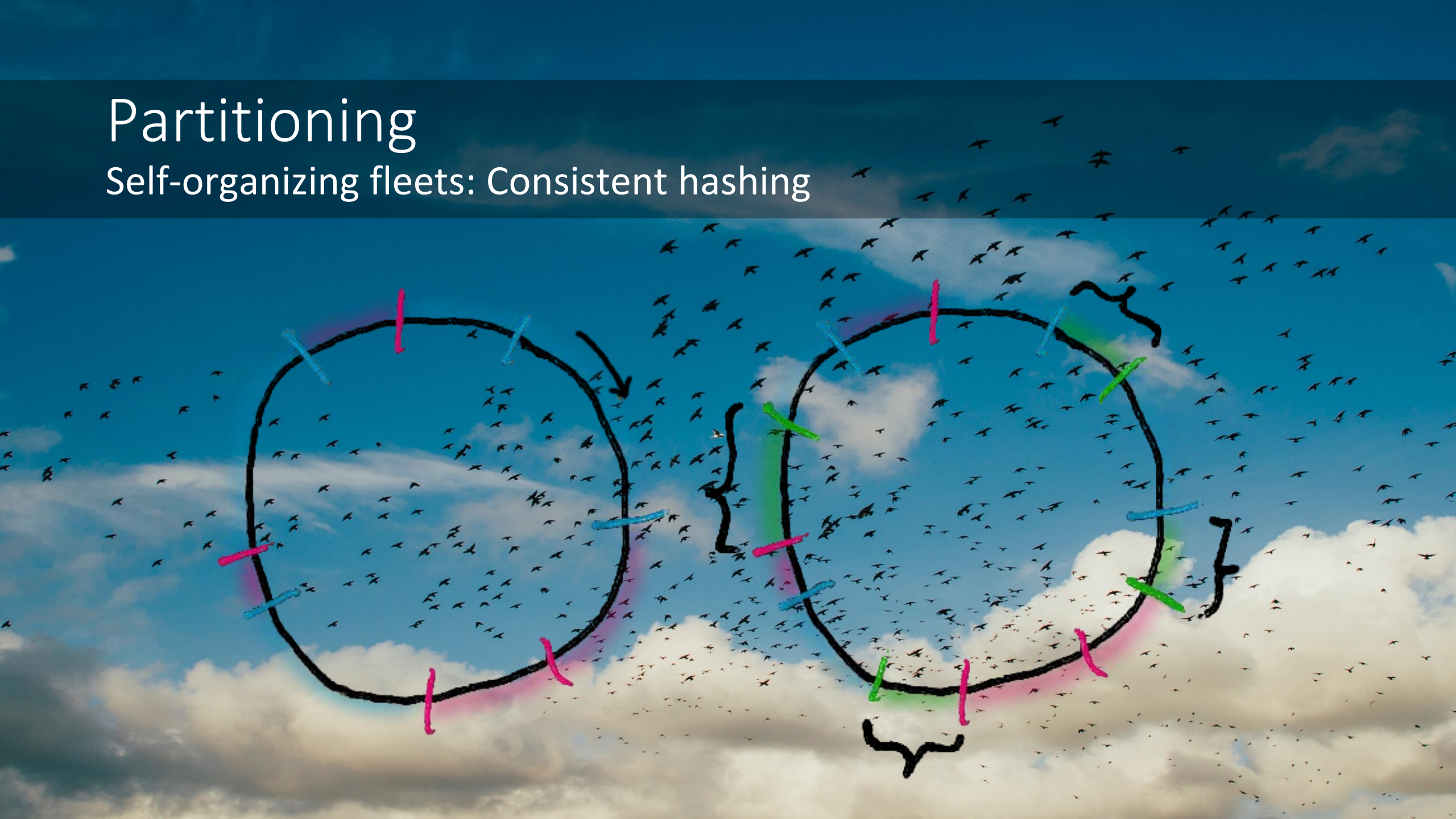
Solution class 1: Cache

Partitioning

Solution class 2: Self-organizing fleet

Partitioning

Self-organizing fleets: Consistent hashing



Partitioning

Self-organizing fleets: sharding

Partitioning

Solution class 3: Circuit breakers

Partitioning

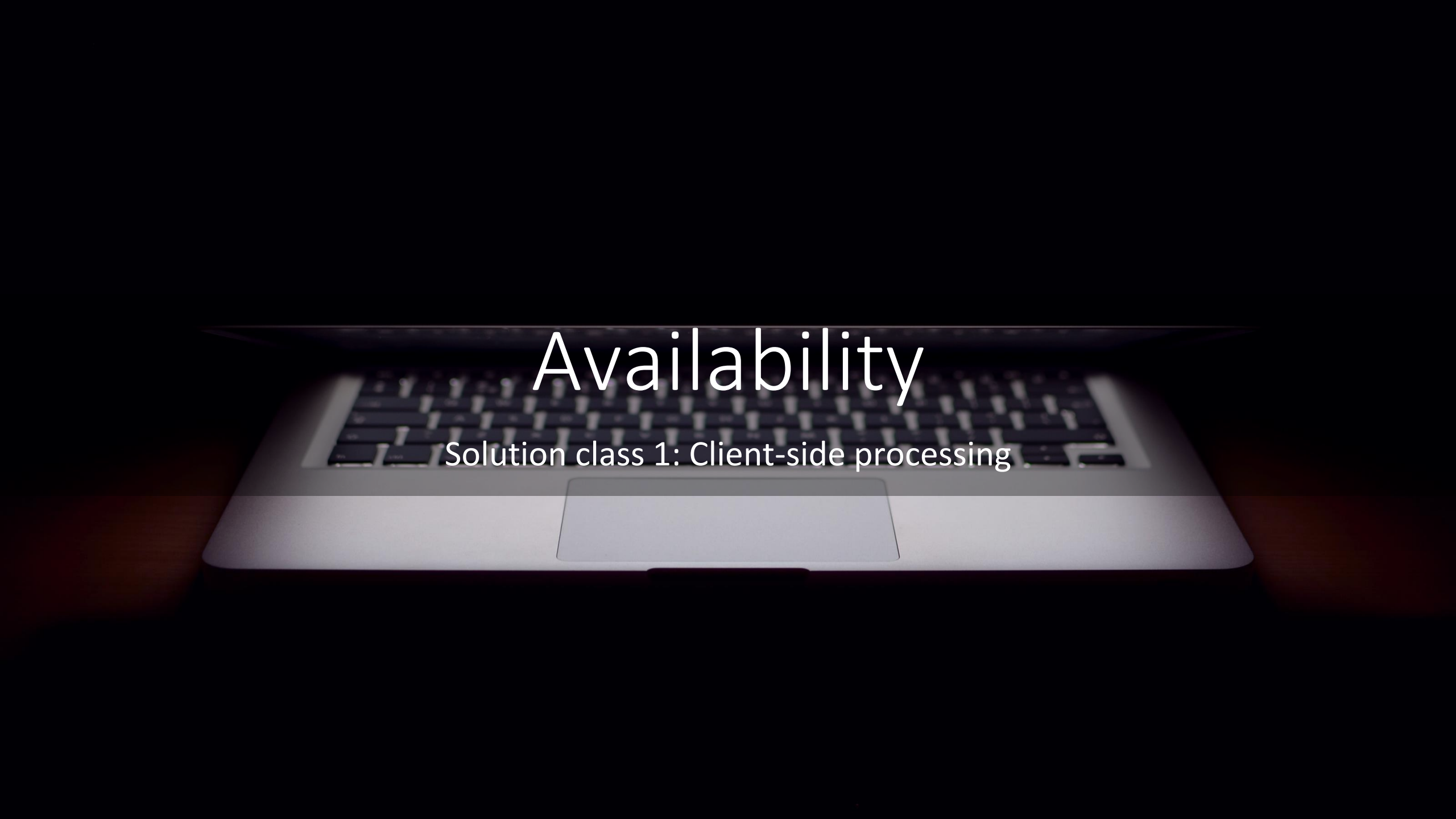
Solution class 4: Leader-based

Partitioning

Solution class 5: Paxos protocols

Availability

Definiton



Availability

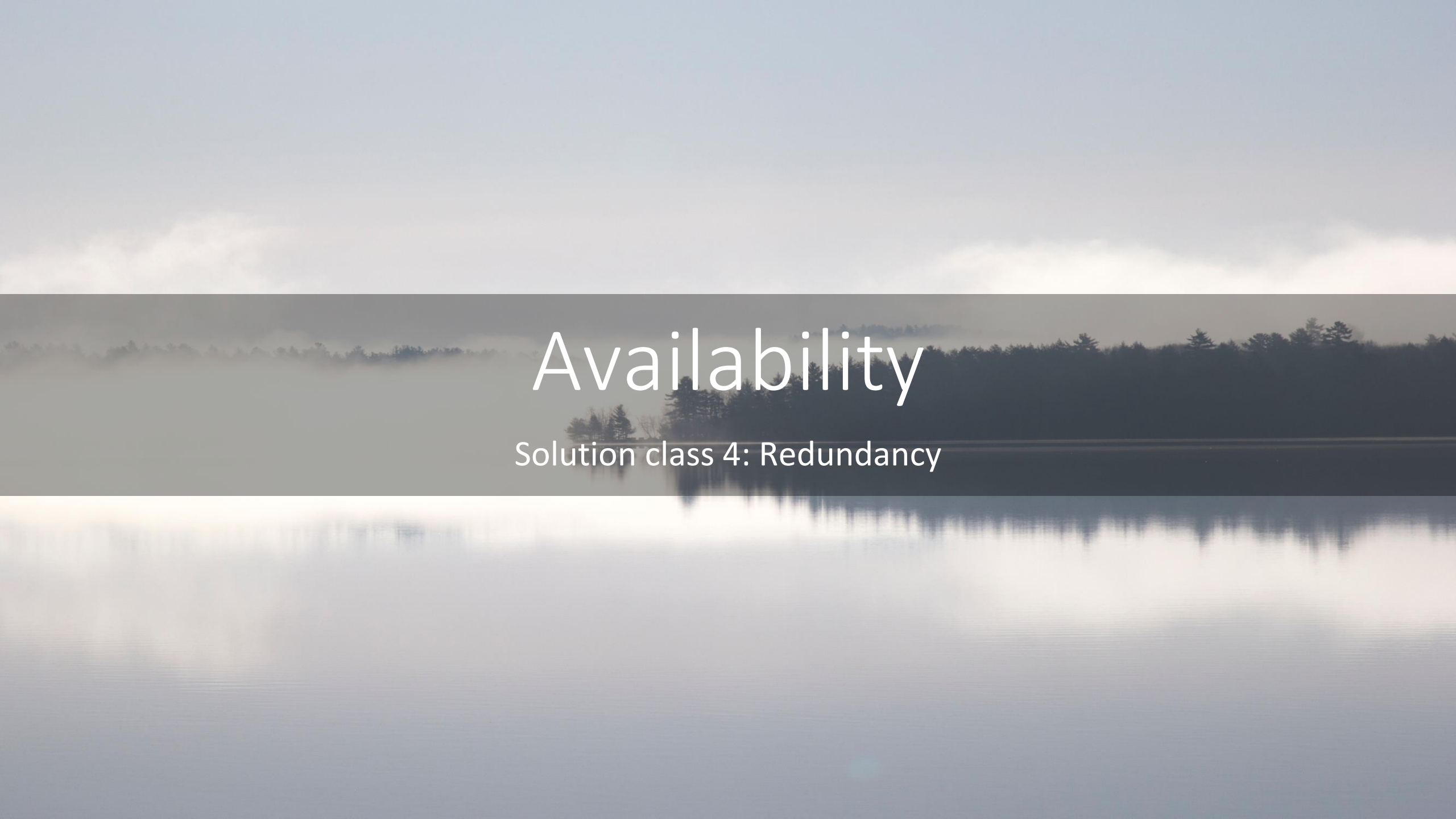
Solution class 1: Client-side processing

Availability

Solution class 2: Service degradation

Availability

Solution class 3: Availability zones



Availability

Solution class 4: Redundancy

Summary

Q&A