Tagging Responses for Disaster Recovery

Avinash Kulkarni

CS 6464

Project Demo

Motivation

Enterprise storage requires fault tolerance

- One solution is the Primary-Backup approach
- For better fault tolerance, Primary and Backup are geographically separated
- Primary and Backup are synchronized through replication
- Consistency through replication
- But replication affects performance – there's a trade off to be made
- Can we get good performance without sacrificing consistency?

Replication Strategy

- Synchronous replication
  - Maintains data consistency
  - Poor performance for high latency links
- Asynchronous replication
  - Good performance
  - Danger of data inconsistency

Existing approach

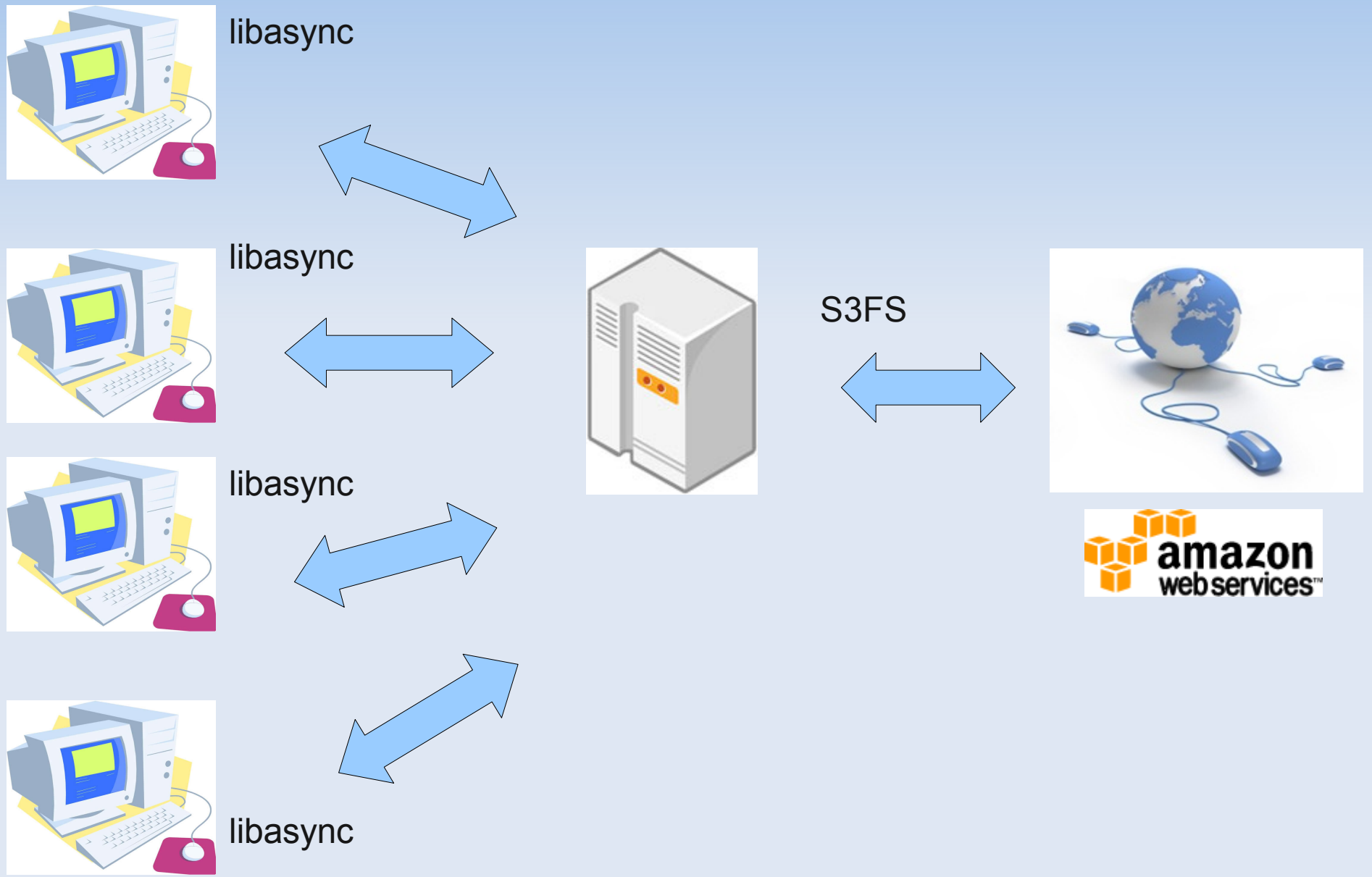
Use of asynchronous replication

- SMFS(Hakim W, Lakshmi G et al)
  - Exploit large network bandwidth delay product
  - Network serves as a data store
  - Risk of packet drops – redundant packets are sent for error recovery
  - Achieves good performance, at the cost of extra bandwidth usage

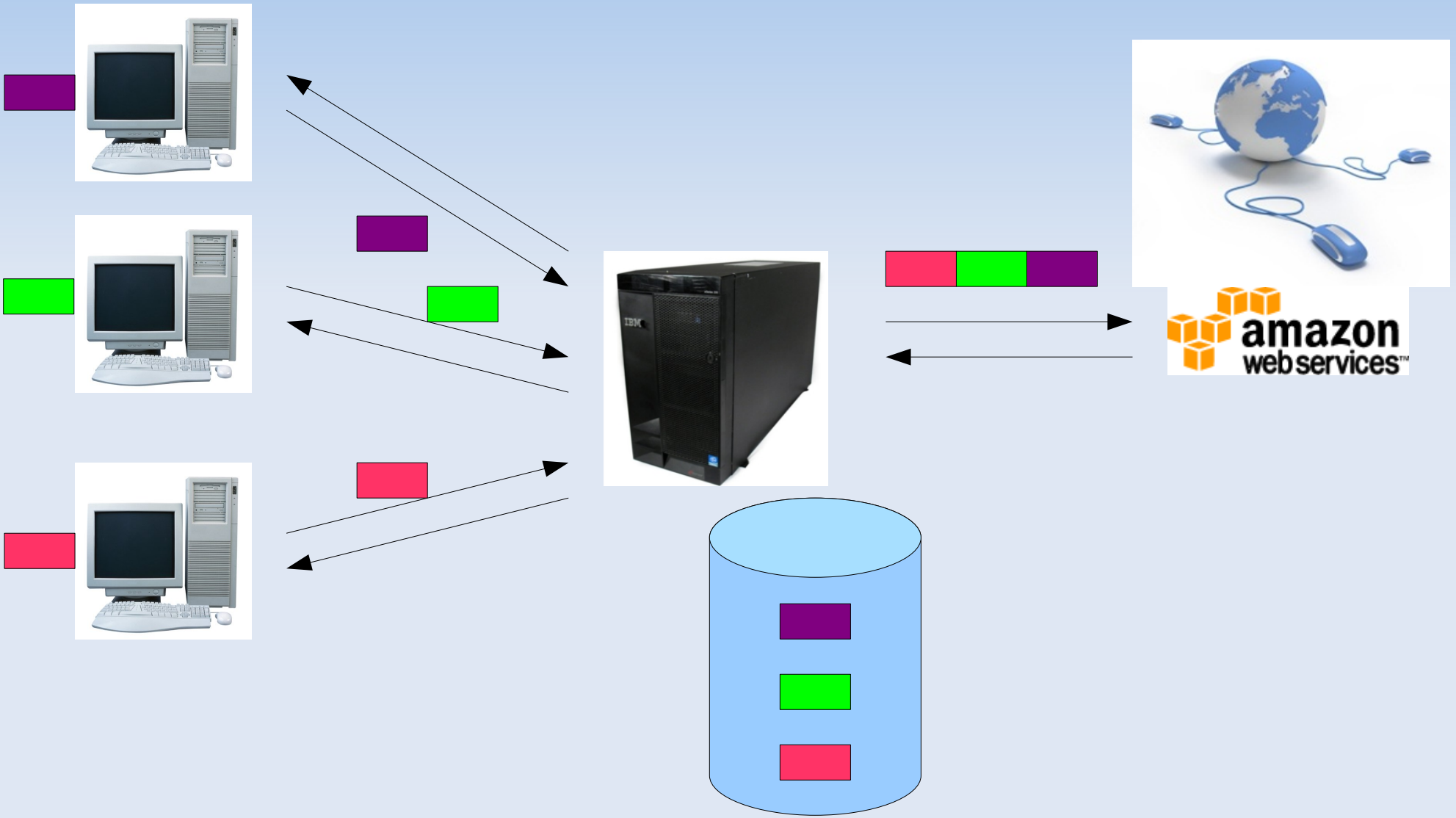
Tagging responses

- Exploit client caches for recovering from disasters
- Tag responses to writes from clients, directing them to cache data
- Data in client caches is the delta between primary-backup
- We gain the performance benefits of asynchronous
  - Without sacrificing consistency

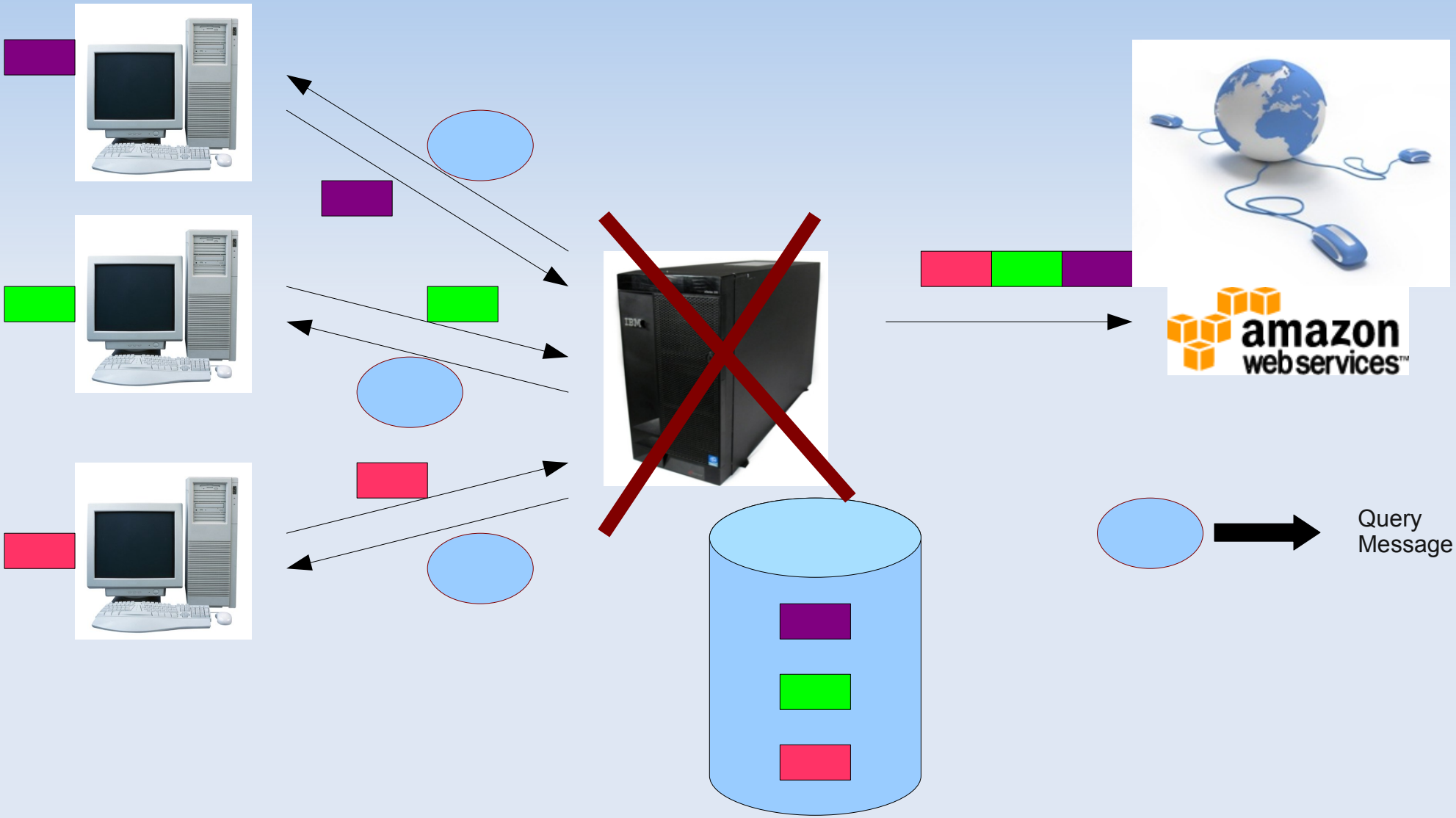
Design


libasync
libasync
libasync
libasync
S3FS
amazon
web services

Steady State



Disaster Recovery



Possible issues

- Unbounded log growth
  - Checkpointing: Primary requests clients to flush logs after synchronizing with backup
- Requires clients to be modified!
- Susceptible to client crashes
  - Solution: Send a random combination of data as response to client
- Clients need to discover primary after crash

Questions?