

# Lab Course: Cloud Data Bases

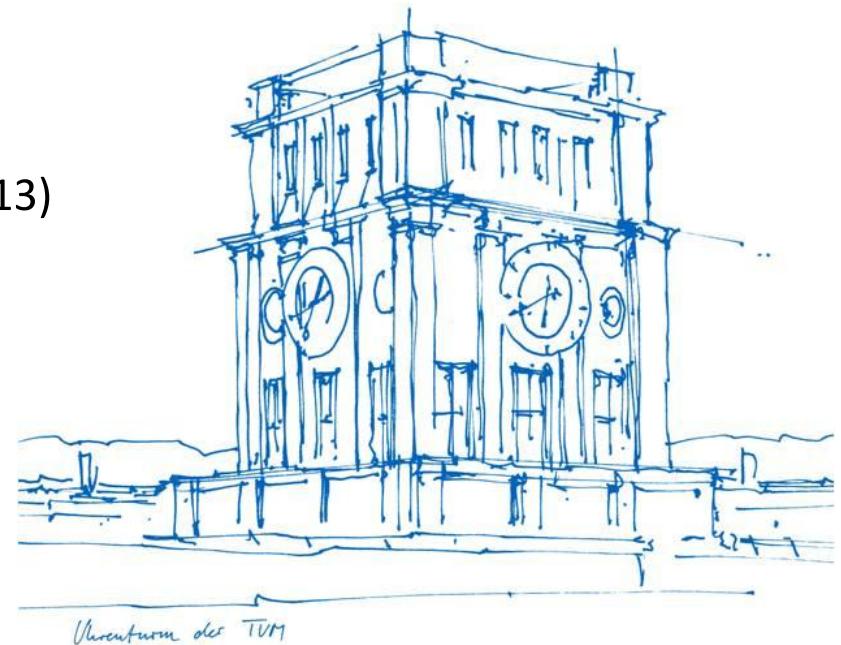
## Group 1 - Final presentation

Technische Universität München

Department of Computer Science

Chair for Application and Middleware Systems (I13)

Garching, Jan. 30, 2018



# Outline

- Data Storage
  - Cache
  - Disk Storage
- Approach to Ports
- Failure Detection
- Database Performance
- Extension

# FIFO Cache: Queue and Hashtable

Hash Map

|   |  |
|---|--|
| A |  |
| D |  |
| B |  |
| E |  |
| C |  |

Queue



# LRU Cache: List and Hashtable

Hash Map

|   |  |
|---|--|
| A |  |
| D |  |
| B |  |
| E |  |
| C |  |

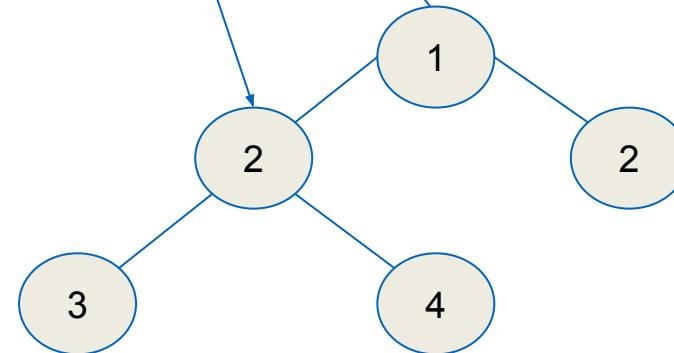
Linked List



# LFU Cache: Min-Heap and Hashtable

Hash Map

|   |  |
|---|--|
| A |  |
| D |  |
| B |  |
| E |  |
| C |  |



Min-Heap

# Disc Storage: Concept

- Index file and storage file
- Storage file: store tuples on a heap
- Index file: fixed-length keys in order

# Indexing

- Perform binary search to find key
- Any key can found in  $O(\log n)$
- Insert and delete: need to shift elements

# Deletion

- Do not physically delete data
- Flag them as deleted instead
- Clean up the storage with a *vacuum* operation

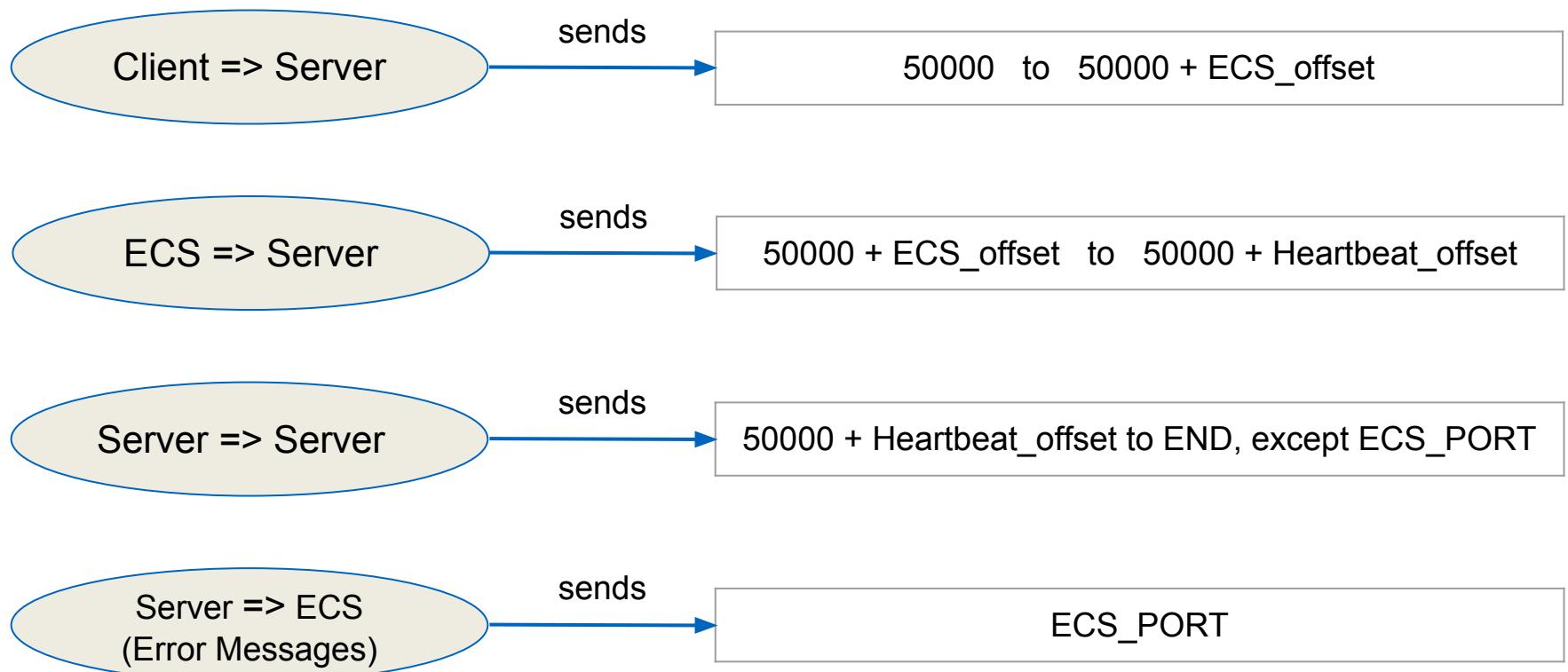
# When to use vacuum?

- Before server start
- During a time with low amount of request
- After moving data between servers

# Outline

- Data Storage
- Approach to Ports
- Failure Detection
- Database Performance
- Extension

# Approach to Ports



# Outline

- Data Storage
- Approach to Ports
- Failure Detection
  - Server Side
  - ECS Side
- Database Performance
- Extension

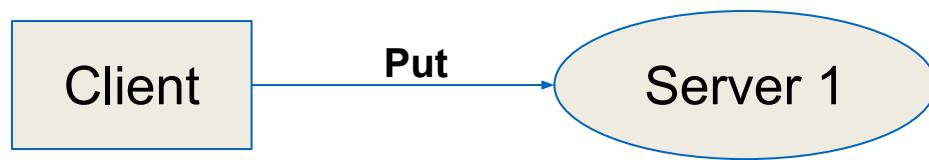
# Failure Detection - Server Side

Two Components:

- Detection on Replication
- Heartbeating

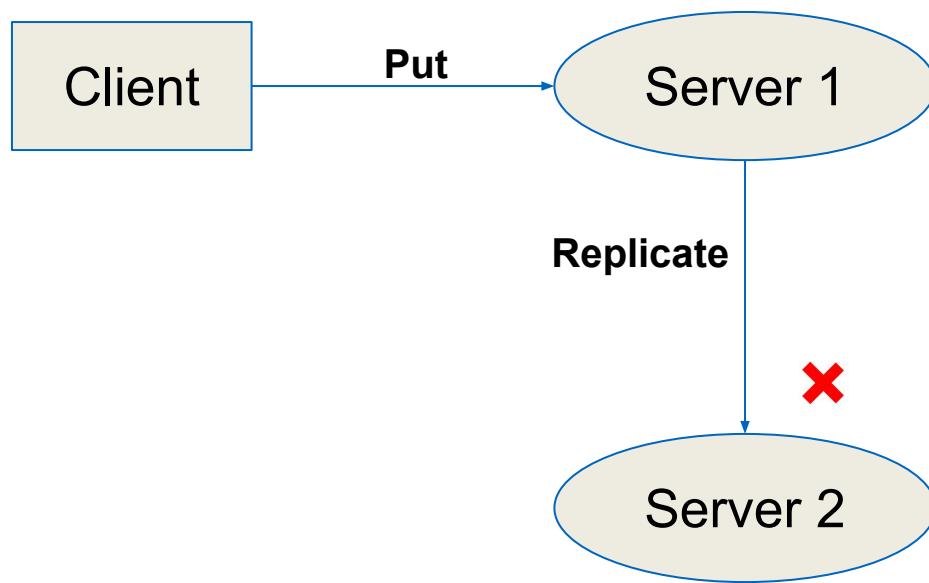
# Failure Detection - Server Side

Detection by Replication



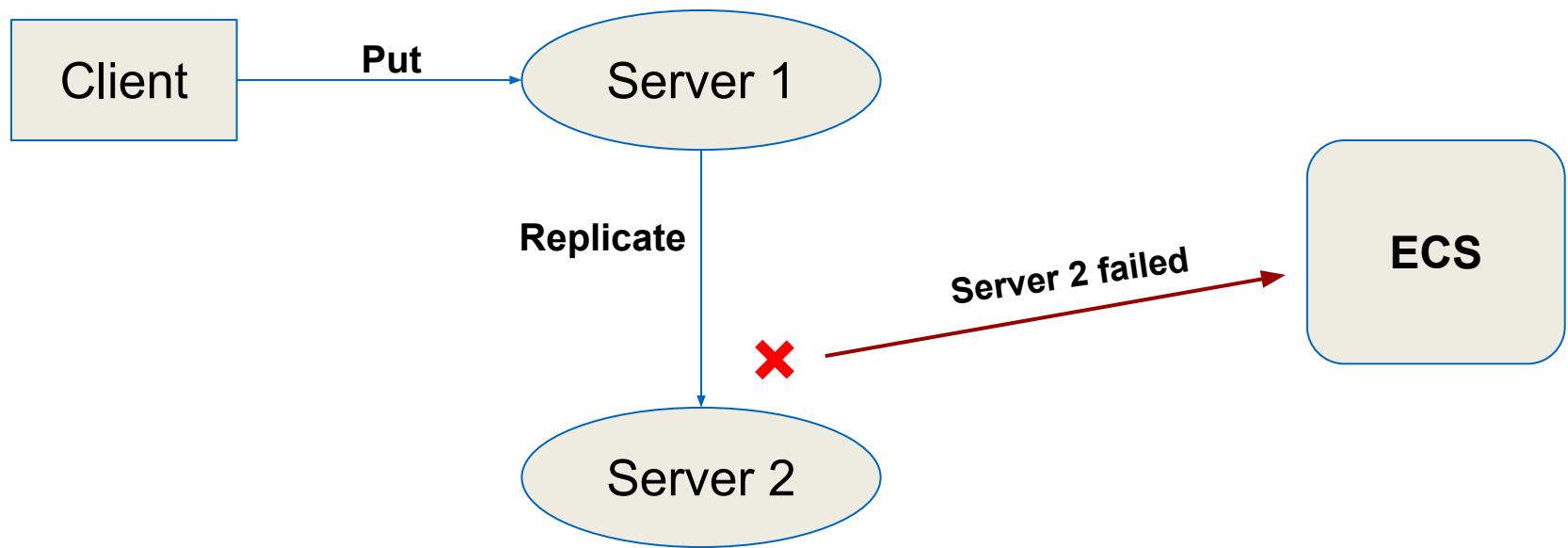
# Failure Detection - Server Side

Detection by Replication



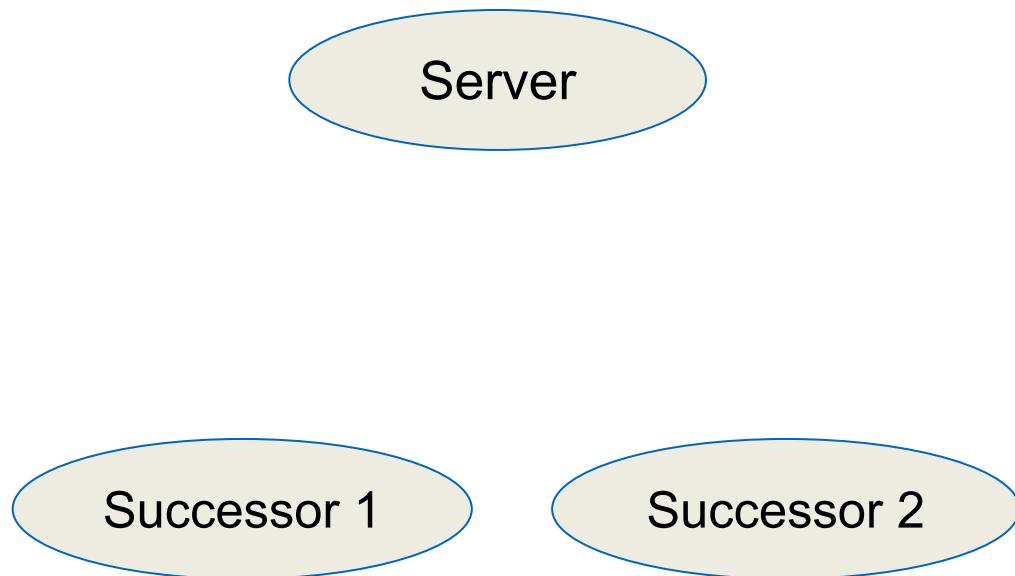
# Failure Detection - Server Side

Detection by Replication



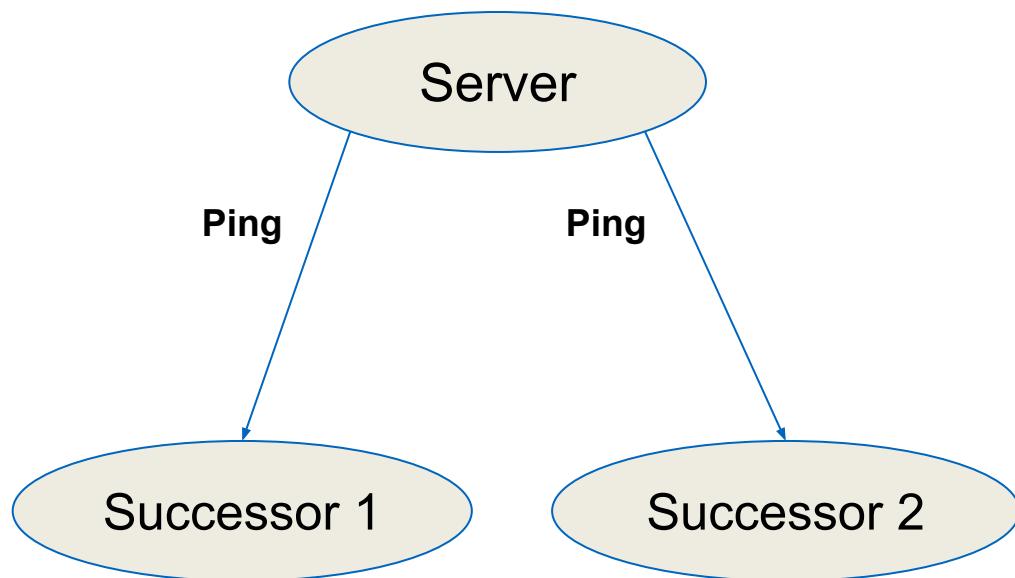
# Failure Detection - Server Side

Heartbeating



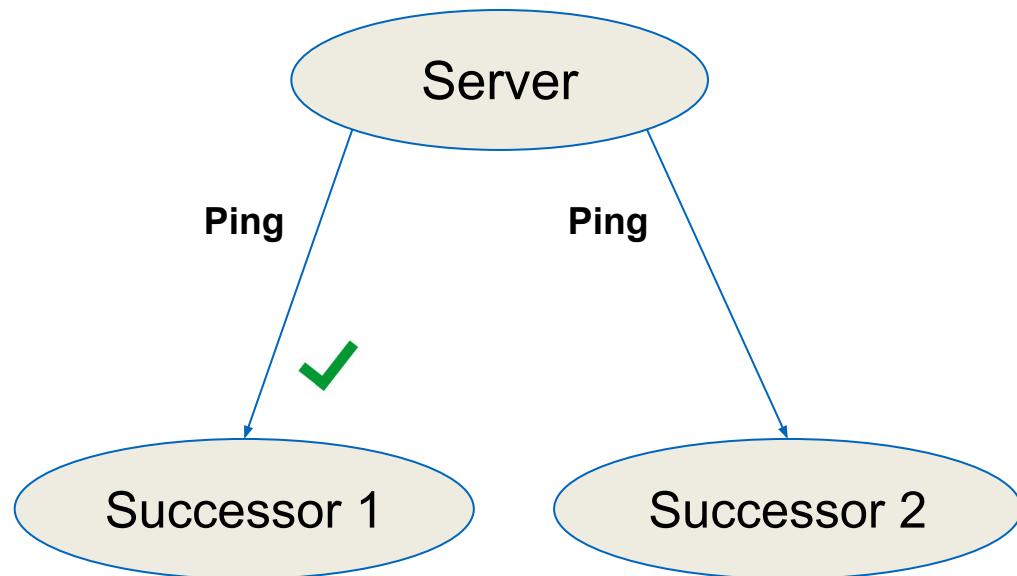
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Heartbeating



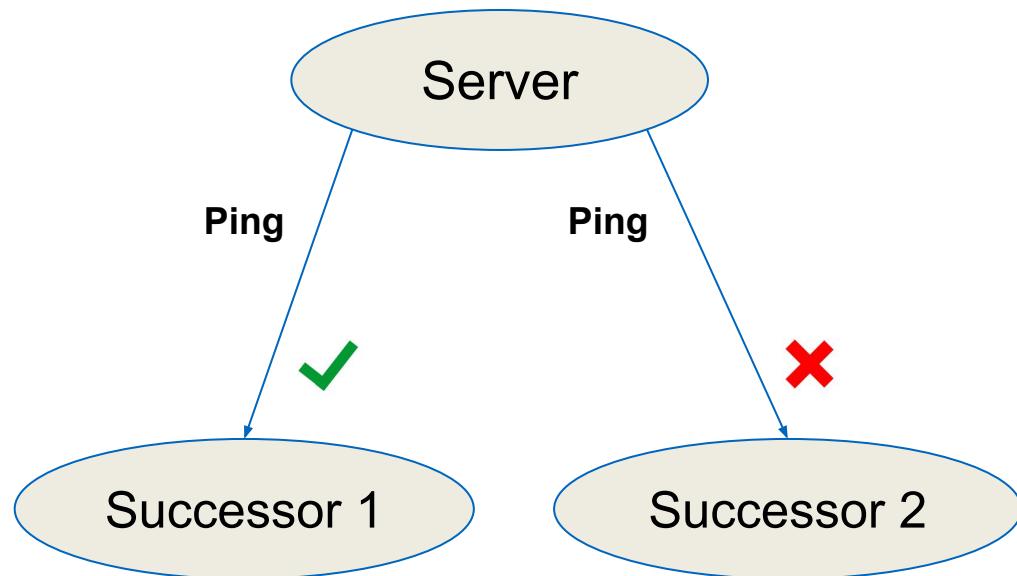
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Heartbeating



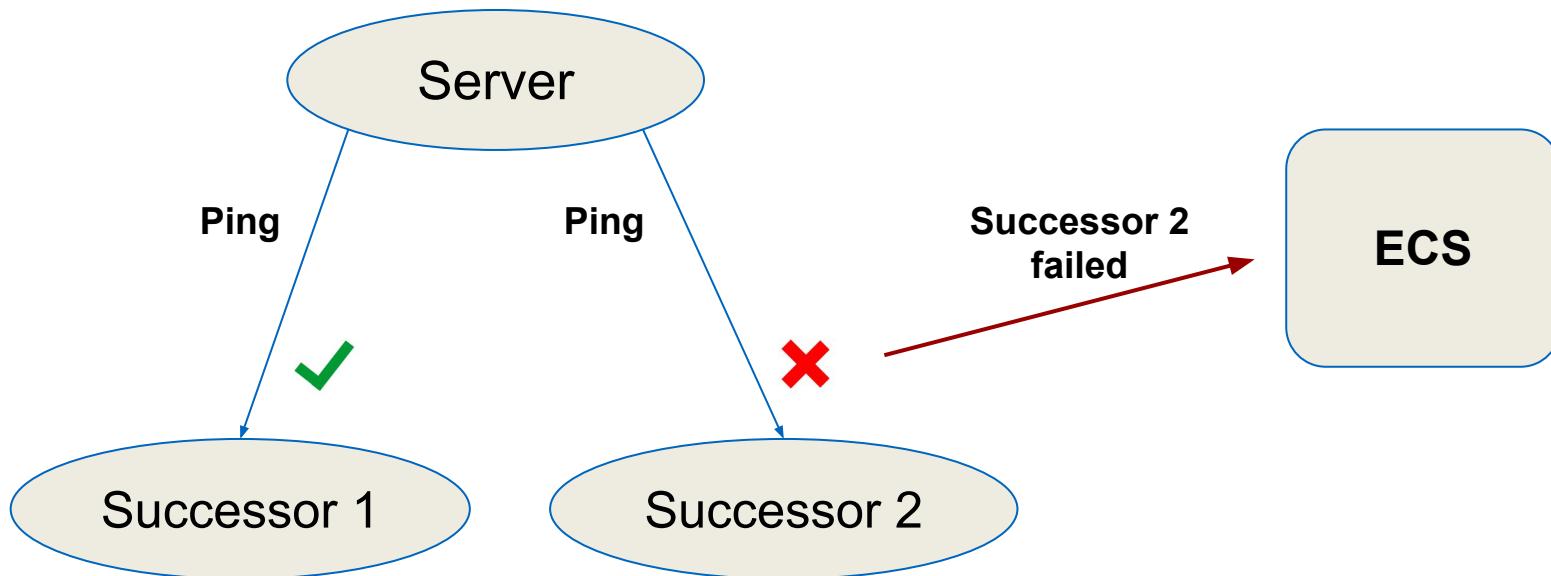
# Failure Detection - Server Side

## Heartbeating



# Failure Detection - Server Side

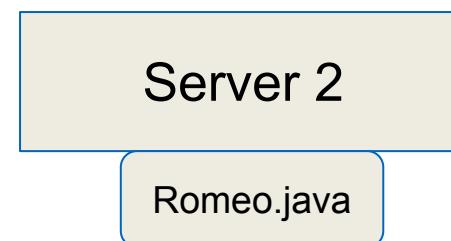
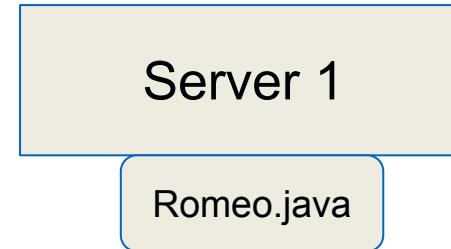
## Heartbeating



# Failure Detection - Server Side

## Heartbeating

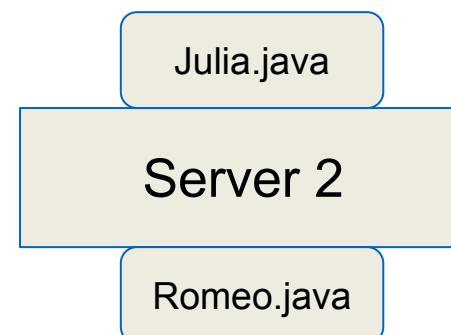
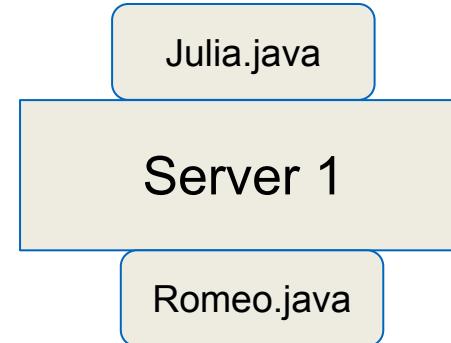
- Our implementation:
  - Ping Sender (Romeo.java)



# Failure Detection - Server Side

## Heartbeating

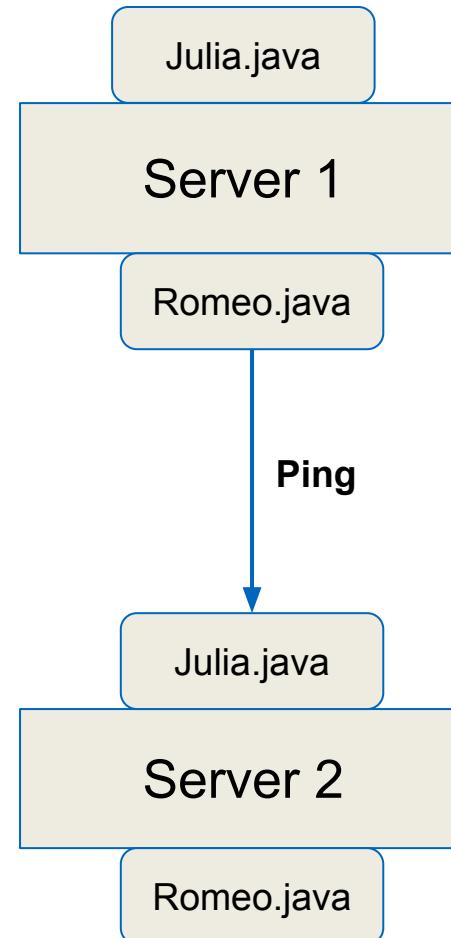
- Our implementation:
  - Ping Sender (Romeo.java)
  - Ping Receiver (Julia.java)



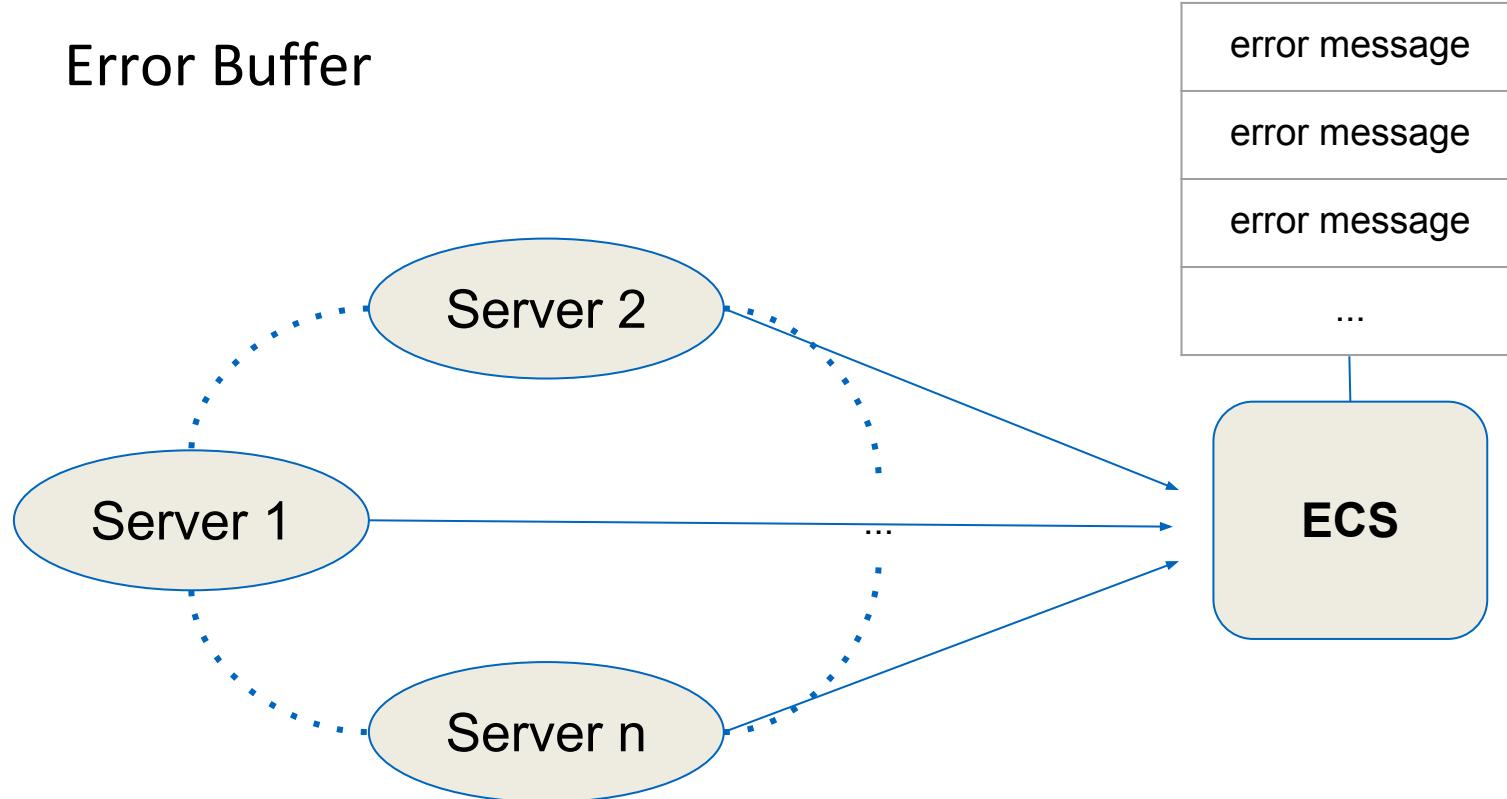
# Failure Detection - Server Side

## Heartbeating

- Our implementation:
  - Ping Sender (Romeo.java)
  - Ping Receiver (Julia.java)

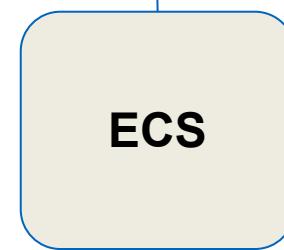
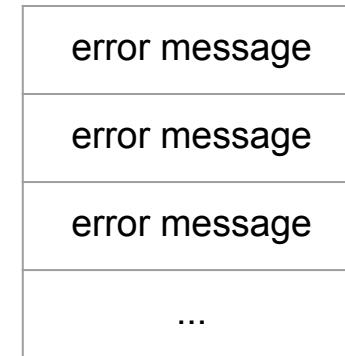


# Failure Detection - ECS Side

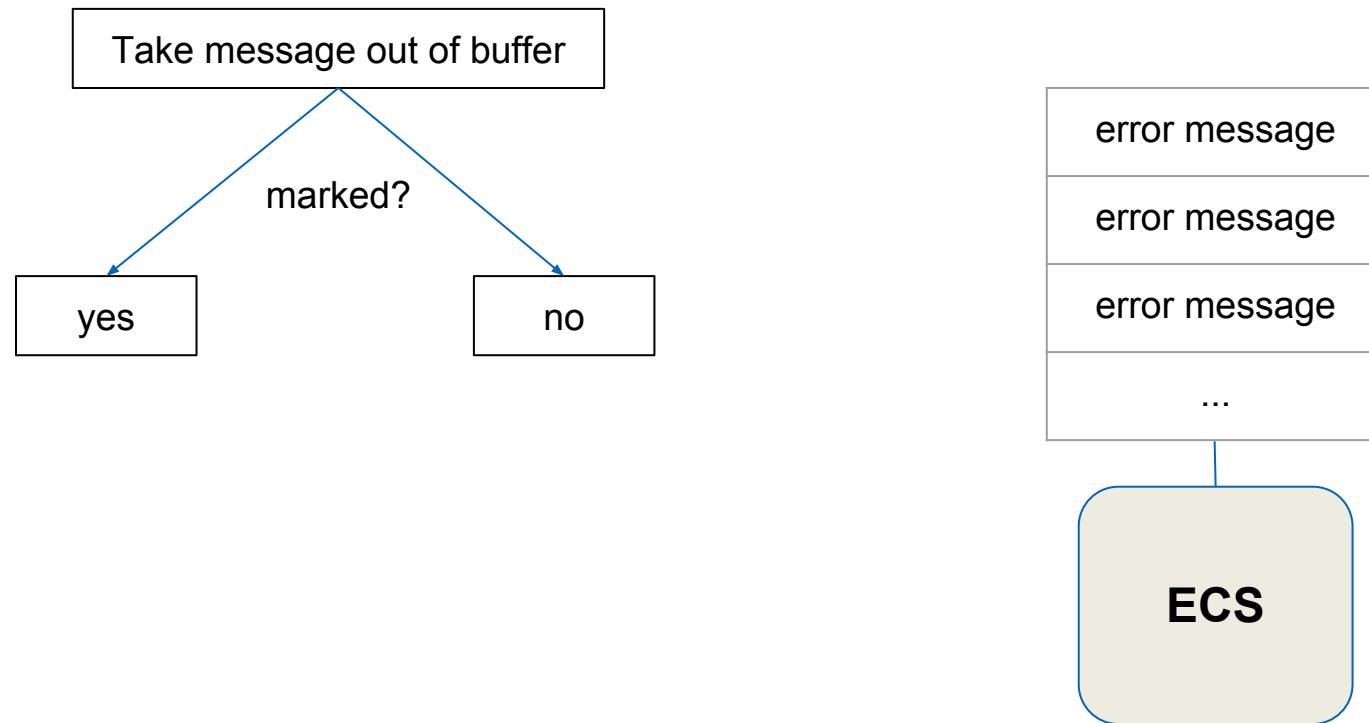


# Failure Detection - ECS Side

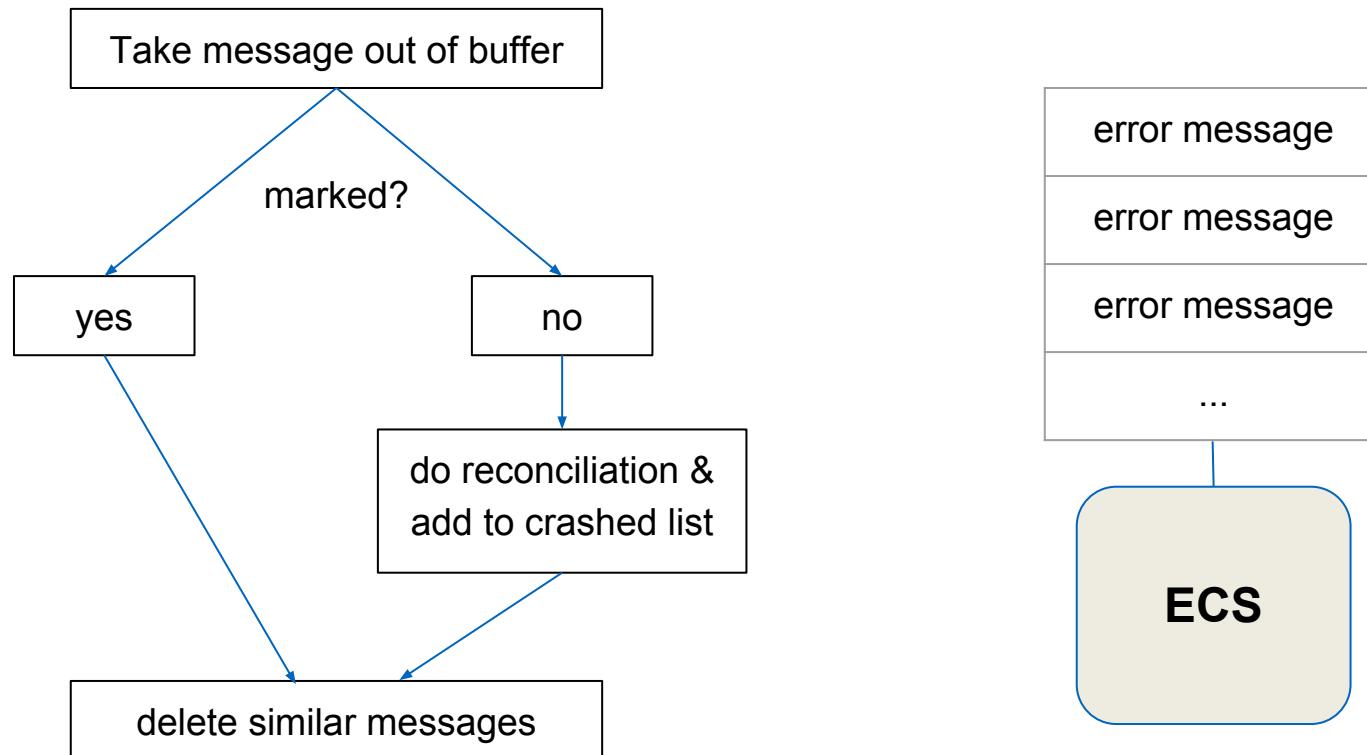
Take message out of buffer



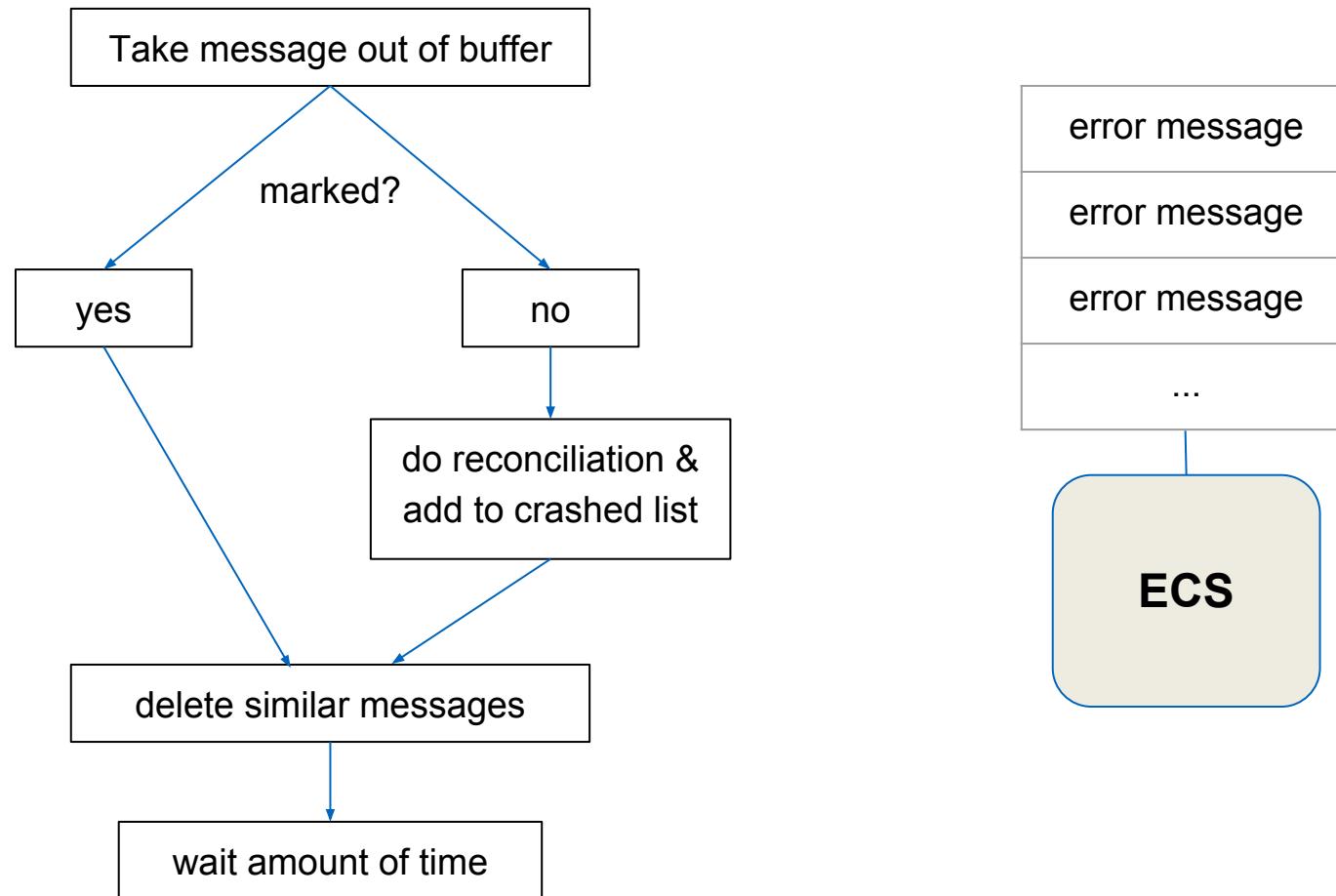
# Failure Detection - ECS Side



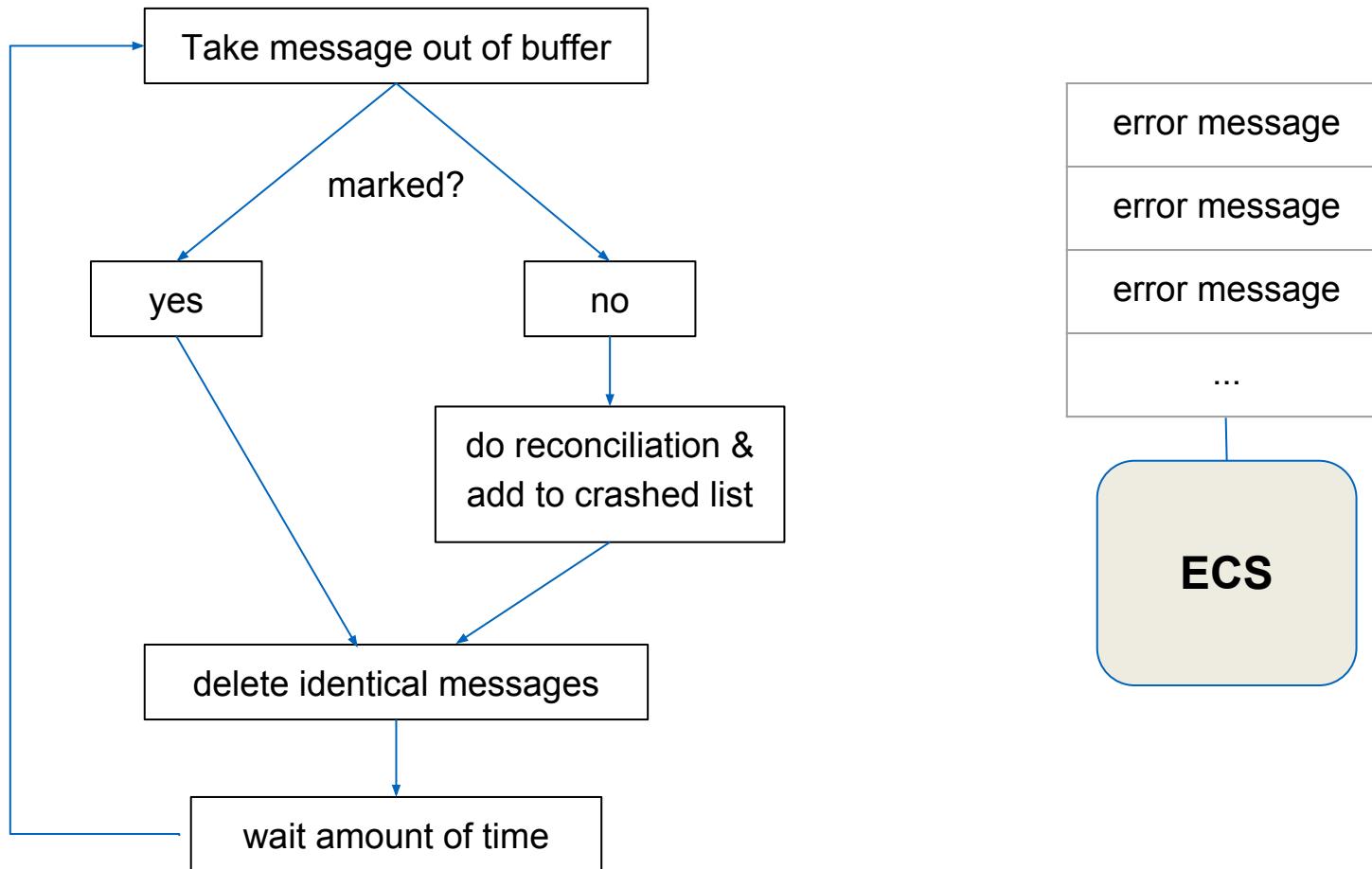
# Failure Detection - ECS Side



# Failure Detection - ECS Side



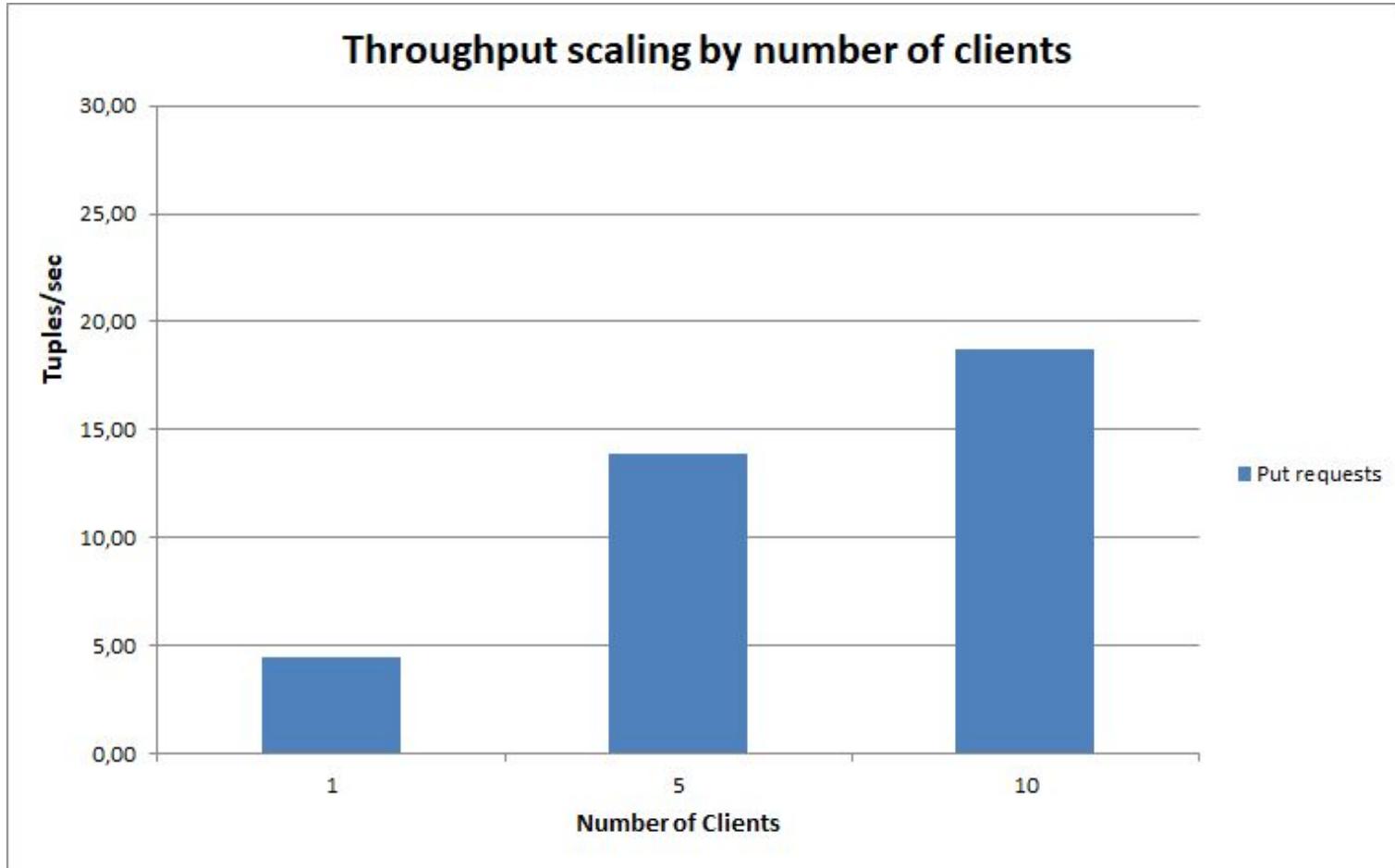
# Failure Detection - ECS Side



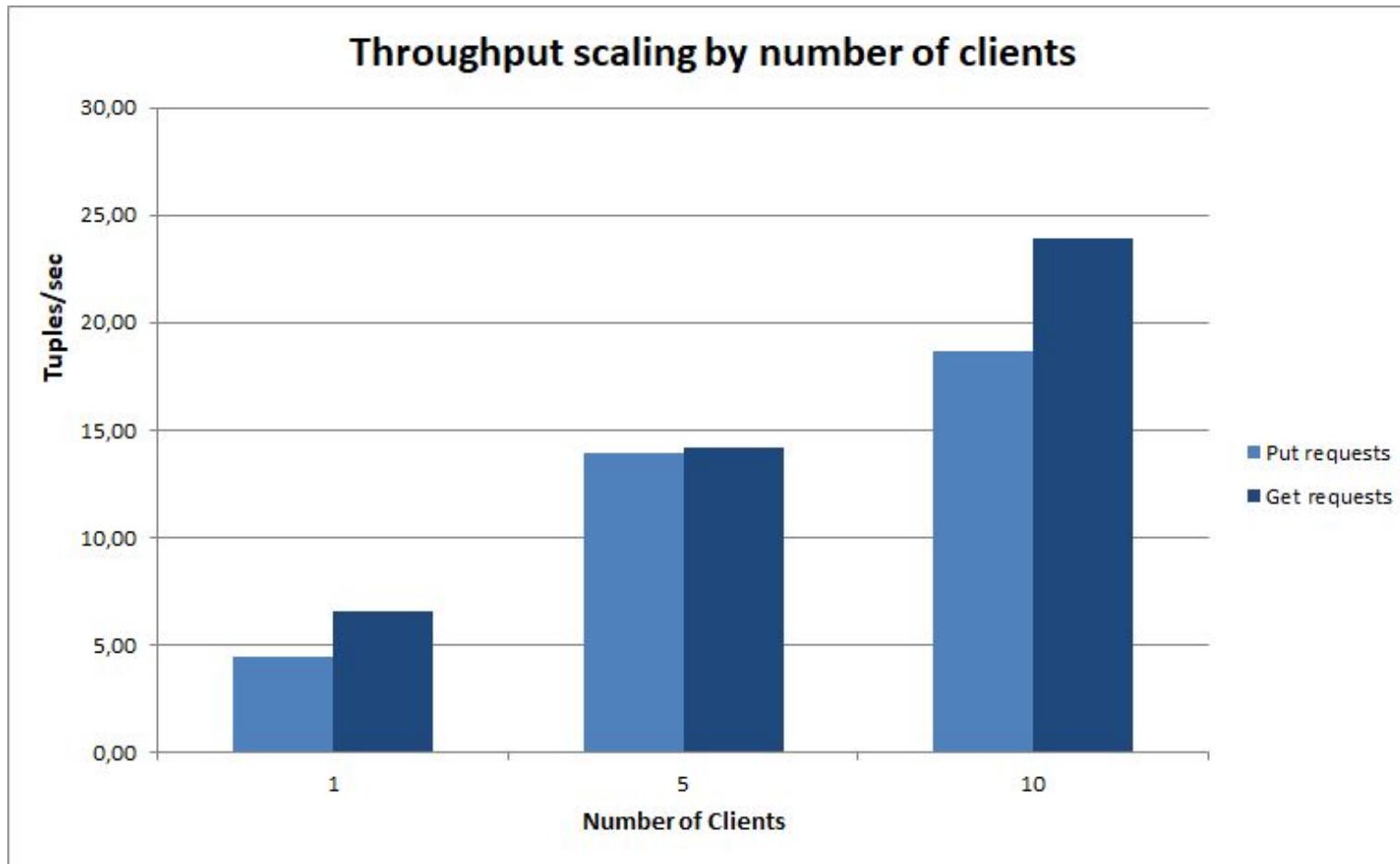
# Outline

- Storage Implementation
- Approach to Ports
- Failure Detection & Handling
- **Database Performance**
- Extension

# Database Performance



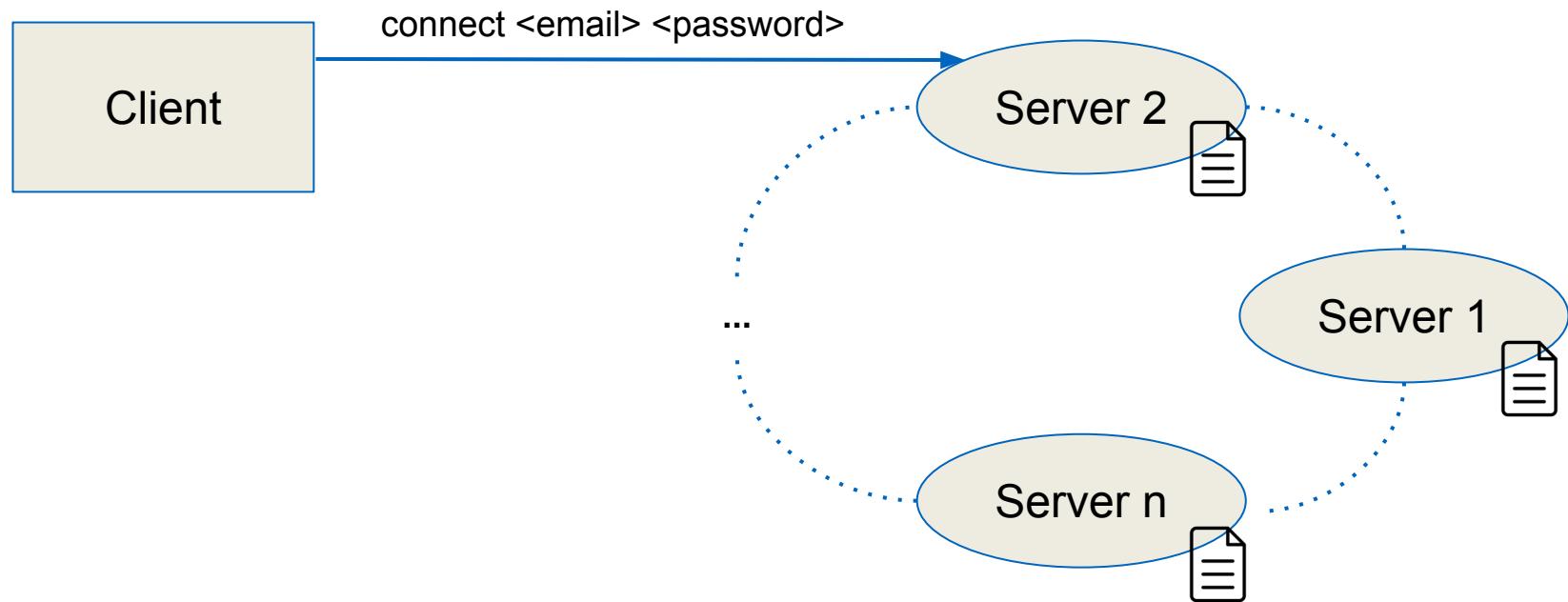
# Database Performance



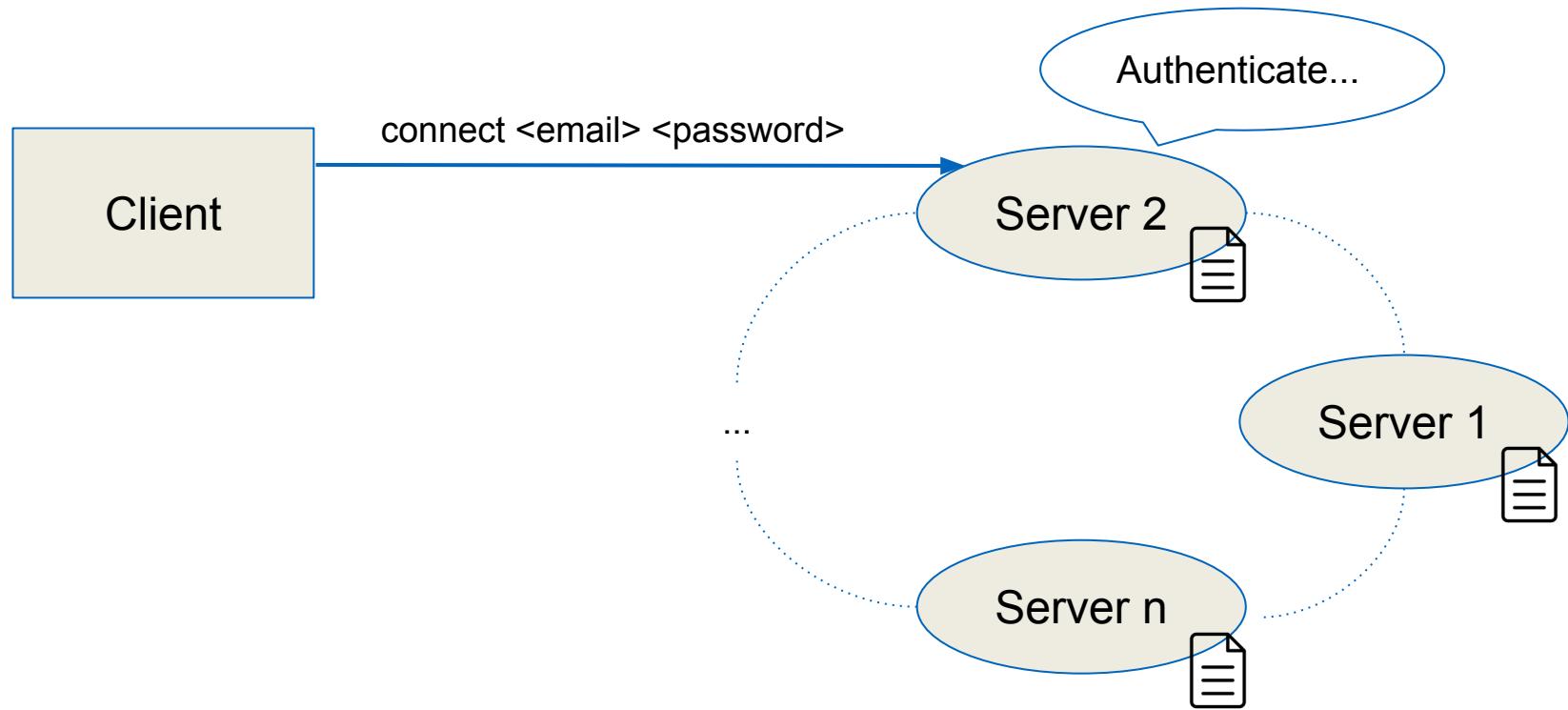
# Outline

- Project Overview
- Storage Implementation
- Approach to Ports
- Failure Detection & Handling
- Database Performance
- Extension
  - Authentication
  - Subscription Service

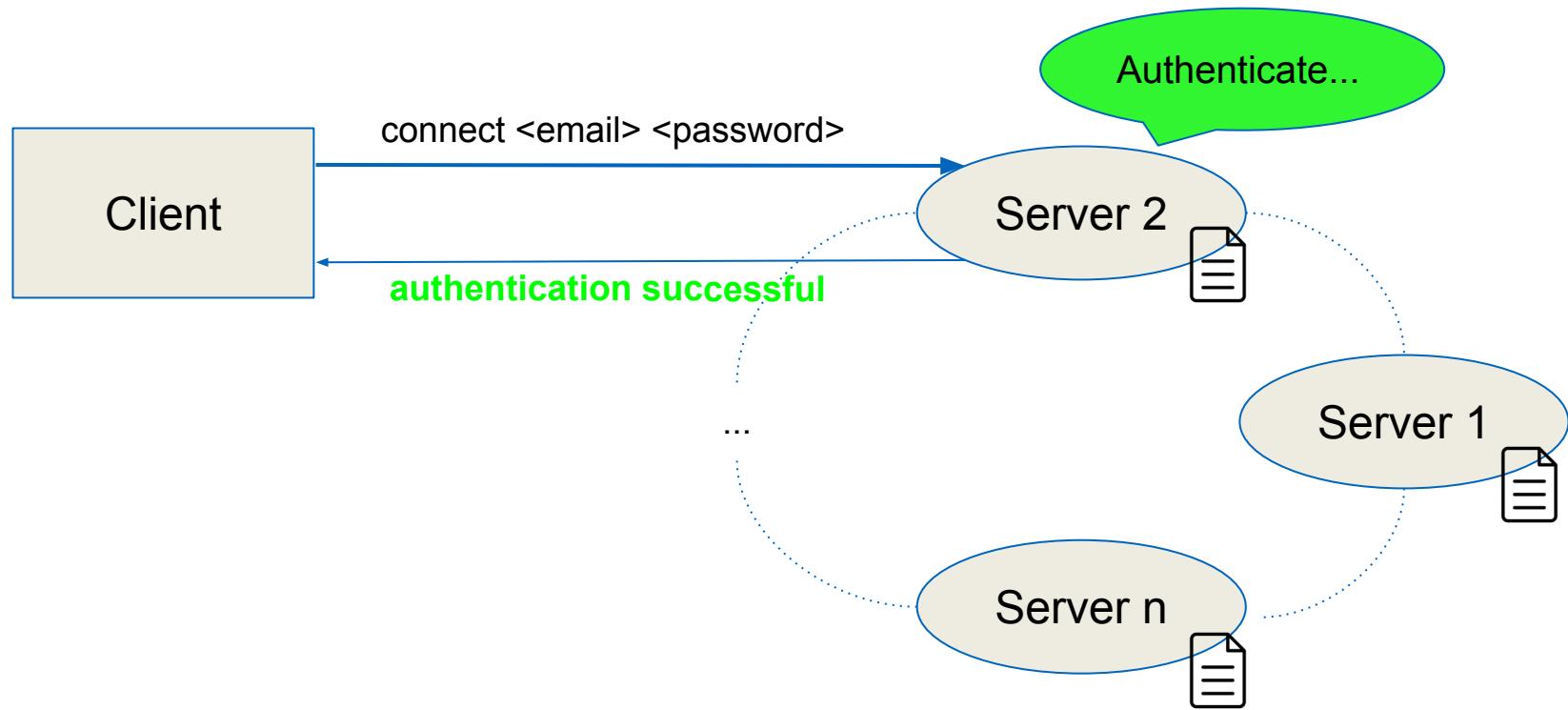
# Extension - Authentication



# Extension - Authentication



# Extension - Authentication



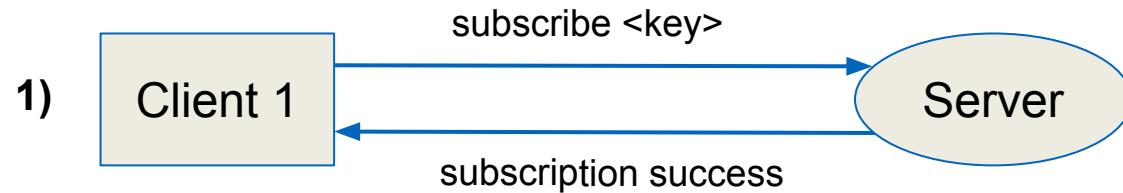
# Extension - Authentication

- Authentication valid for 1 session
- User list available to servers only
- Passwords not in cleartext,  
but as hash values

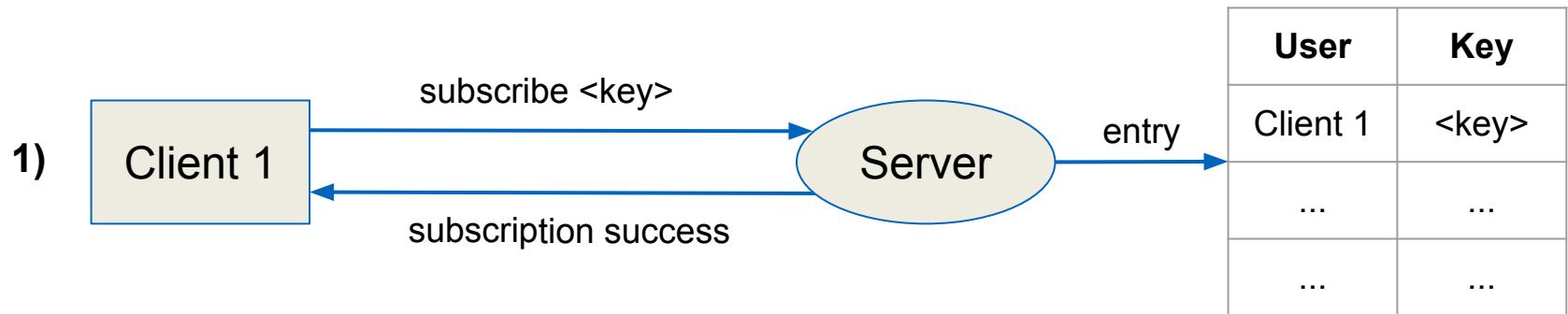
| User        | Password      |
|-------------|---------------|
| alex@tum.de | 24_52_-53...  |
| tim@tum.de  | -54_39_-54... |
| andi@tum.de | -107_86_76... |
| ...         | ...           |



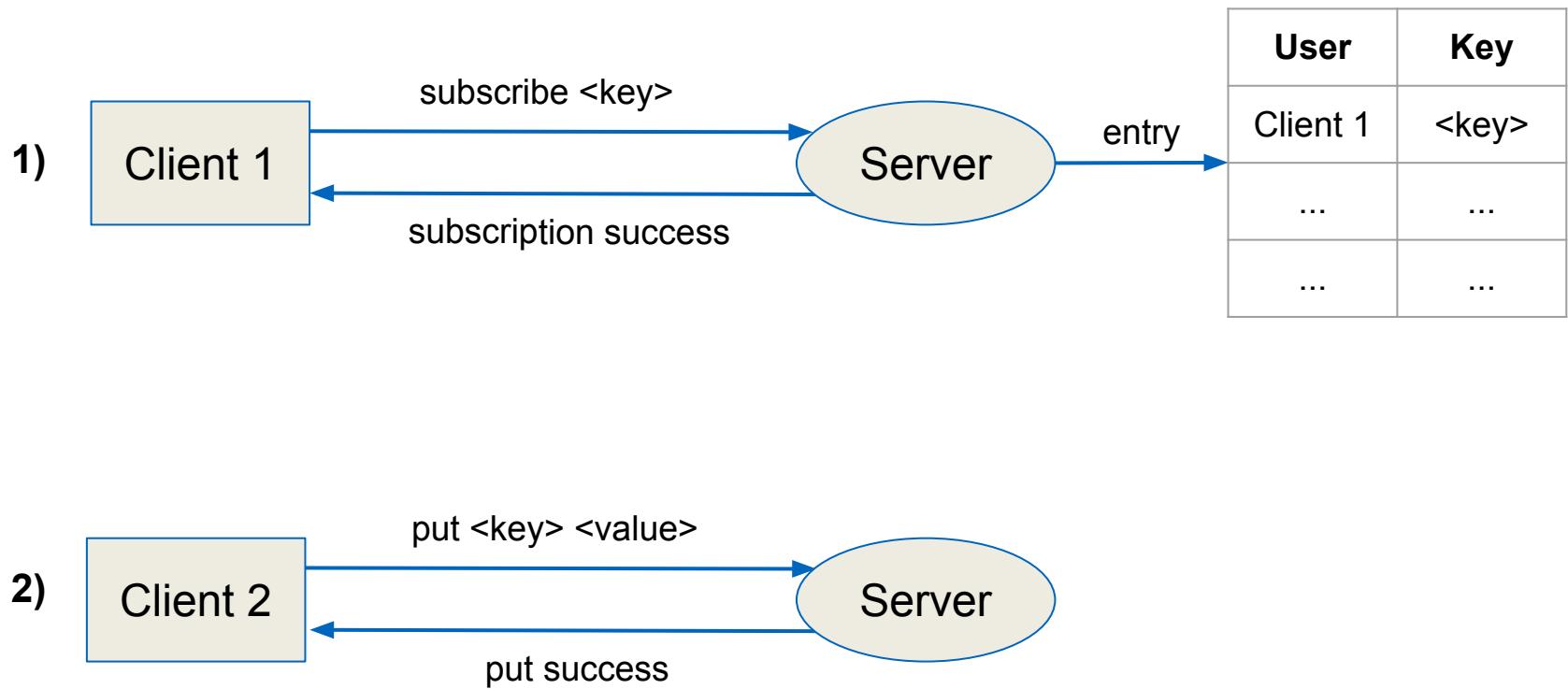
# Extension - Subscription Service



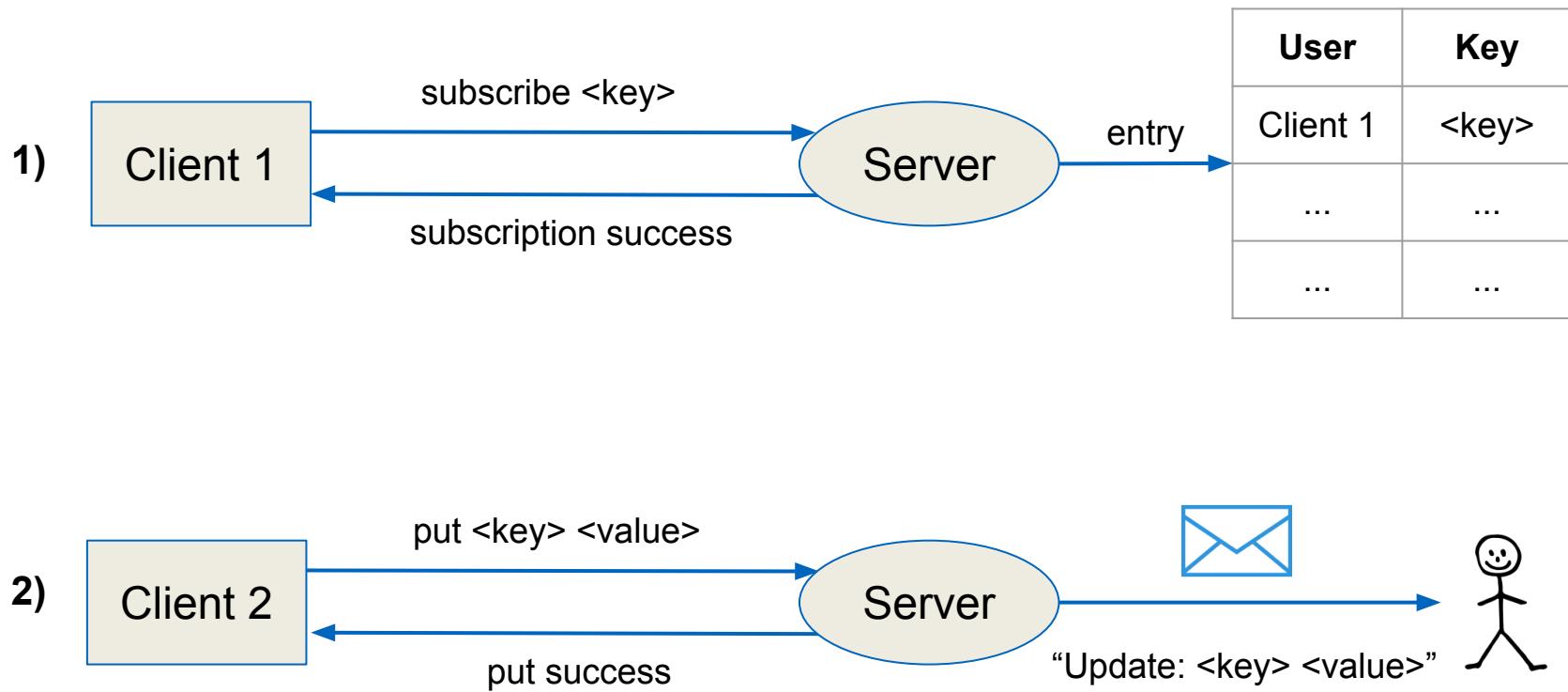
# Extension - Subscription Service



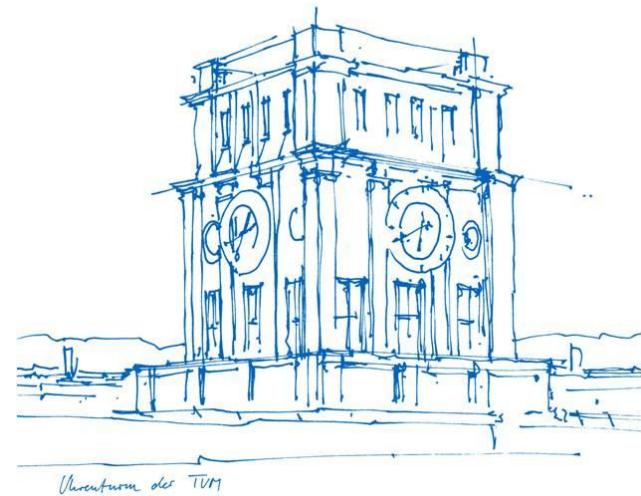
# Extension - Subscription Service



# Extension - Subscription Service



# Thank you!



Urbanscenen der TUM

# Questions?

