

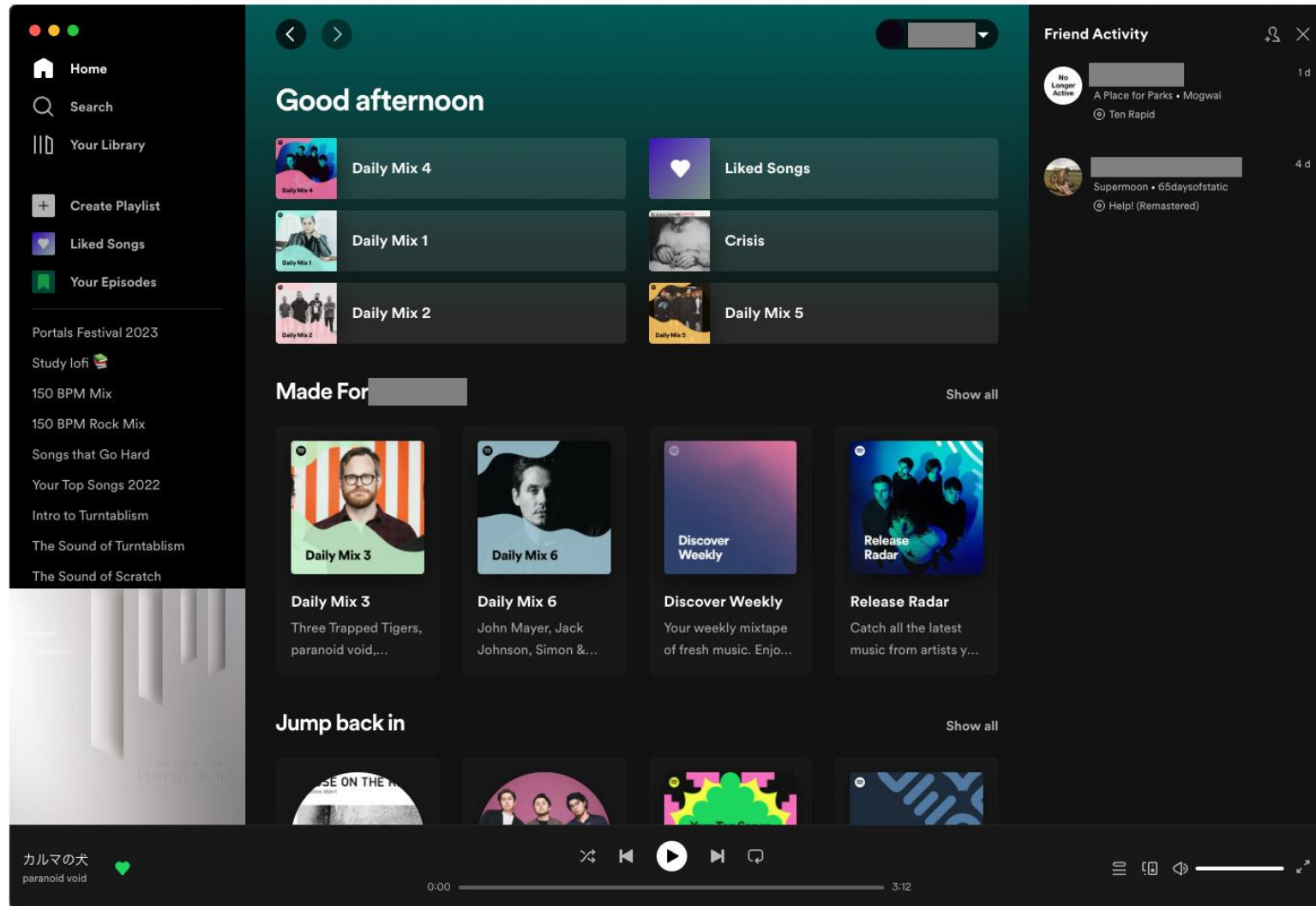
# 17-423/723: Designing Large-scale Software Systems

## **Recitation**

Activity: Design for Scalability

Mar 21, 2025

# Exercise #1: Design Spotify



# Exercise #1: Design Spotify

- Sketch a design of a music streaming application (e.g., Spotify), focusing on two operations: **Searching for songs** and **playing a playlist of songs**
- **Questions to discuss:**
  - What data do we need store for the operations?
  - What data storage model (relational vs. document) for which data?
  - What are major components in the system?
  - What type of scaling (vertical, horizontal, or both) do we apply?
  - How do we distribute data (replication, partitioning, or both)?
  - If replication is used, synchronous vs. asynchronous replication?
  - Which data do we cache? Where is the cache stored?

# Exercise #2: Design Slack

The screenshot shows a Slack interface with a dark purple sidebar on the left and a main white content area. The sidebar contains the workspace name 'Acme Sites', a user profile for Victoria Thomas, and a list of channels including #client-proposal, which is currently selected. The main area shows a conversation in the #client-proposal channel. The messages are as follows:

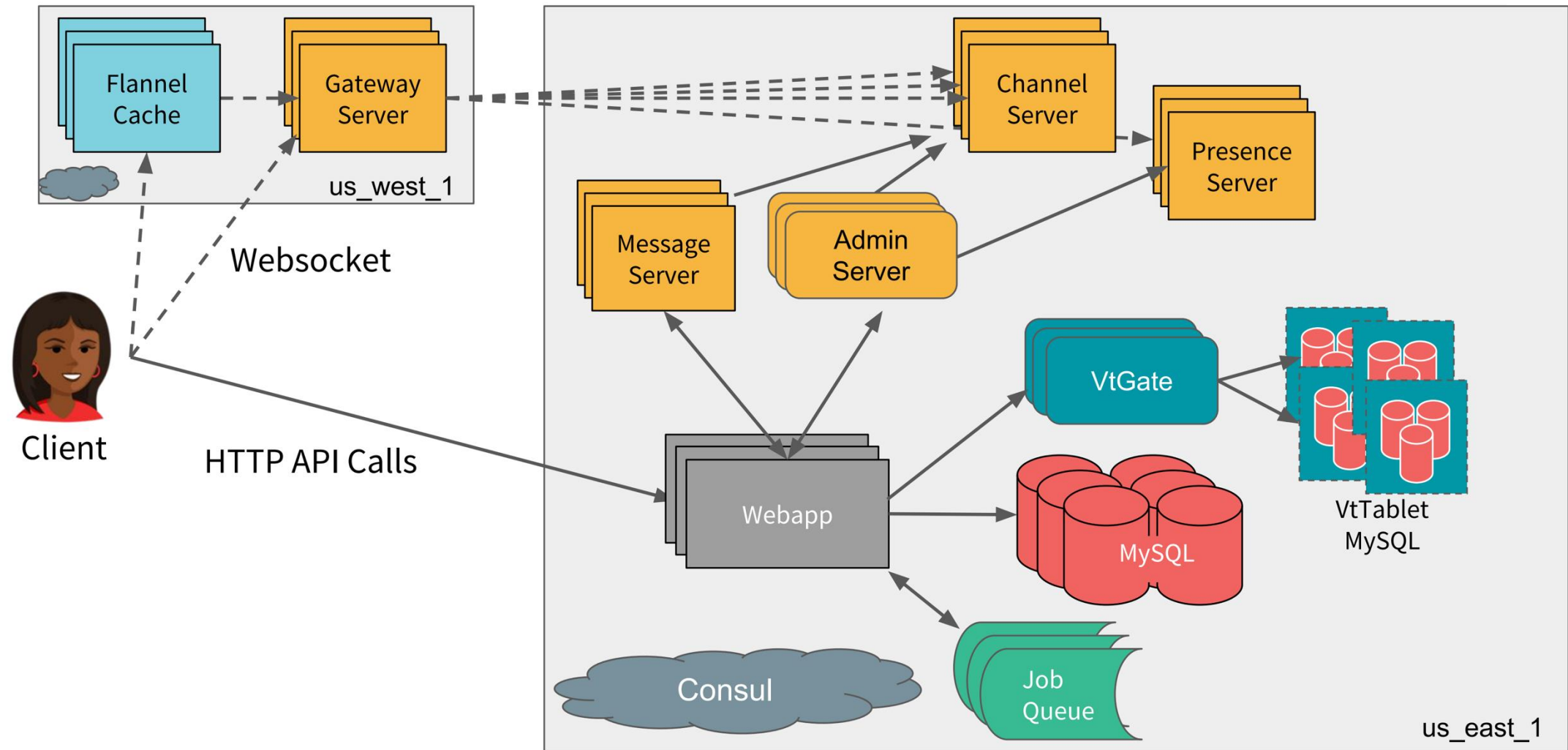
- Victoria Thomas:** Hey team, hoping to have that proposal ready for the Alaska clients by 3pm today, how are we doing? I can chip in wherever needed!
- Carl Benting:** I'm just about finished putting together the estimate portion of it, I could use some feedback. Here's the google doc I'm working on... [docs.google.com/bin/proposal](https://docs.google.com/bin/proposal)
- Attachment:** Q3 OOH – Cost Estimate (Google Drive Document)
- Reaction:** A green checkmark reaction with a count of 1.
- Victoria Thomas:** The numbers look pretty good, I tweaked a few things, but we're good to go!
- Reena Baines:** I'm just wrapping up the sketches, I'll post them here once I'm done!

The right sidebar shows the 'About #client-proposal' panel with options for Channel Details, Pinned Items, 12/19 Members, Shared Files, and Notification Preferences. At the bottom, there is a text input field with a plus icon on the left and a smiley face icon on the right.

# Exercise #2: Design Slack

- Sketch a design of a group communication platform (e.g., Slack), focusing on two operations: **Viewing a channel** and **sending a message to a channel**
- **Questions to discuss:**
  - What data do we need store for the operations?
  - What data storage model (relational vs. document) for which data?
  - What are major components in the system?
  - What type of scaling (vertical, horizontal, or both) do we apply?
  - How do we distribute data (replication, partitioning, or both)?
  - If replication is used, synchronous vs. asynchronous replication?
  - Which data do we cache? Where is the cache stored?

# Slack Design (2018)



Scaling Slack - The Good, the Unexpected, and the Road Ahead (Mike Demmer, 2018)