

# 313-Recitation 7: Architectural Assessment and Decisions

**Goals:** In this recitation, students will learn how to:

1. Read and understand architectural description,
2. Evaluate and compare architectures based on quality attributes,
3. Change an architecture to improve along a quality dimension, and
4. Analyze the tradeoffs of your change.

**Context:** You will develop a video hosting website, similar to YouTube. The website should allow users to search, view, and upload videos. It is expected that at any time 99% of users are viewing videos and 1% are uploading them. The nominal load is 100 simultaneous users.

The following qualities are important for the video hosting website:

- **Performance:** Under nominal load, all webpages should load within 5 seconds, and 240p video should have no more than 2 seconds of loading delay per minute of streaming.
- **Scalability:** Incremental increases in load by 100 simultaneous users should degrade the performance by no more than 10%.
- **Availability:** Between 8 a.m. and 10 p.m., the website should be available 99.9% of the time for viewing and 99% of the time for uploading.
- **Security:** The private user data is not disclosed to third parties. The access permissions (users can only edit their own videos and view public videos) are not violated. If a security breach does happen, the attacker steps can be reconstructed from the system logs.

In this recitation, we will use the following architectural abstractions (a.k.a. legend):



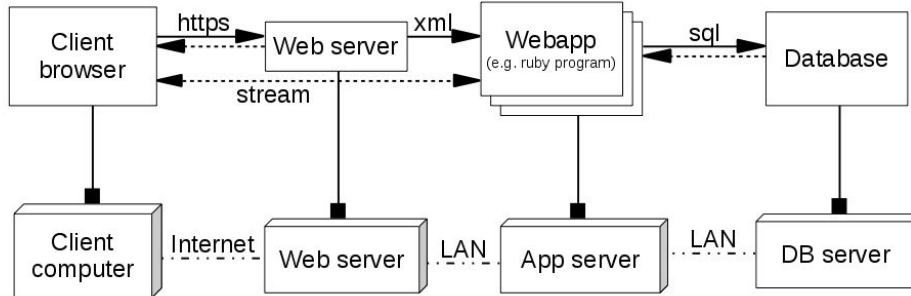
## Part 1: Comparing Architectures (15 min.)

In the architectural views below, we capture OS processes that interact via different request-response protocols. We also capture machines connected to each other with wires. Finally, the mapping between processes and machines is specified using the “deployed on” relation.

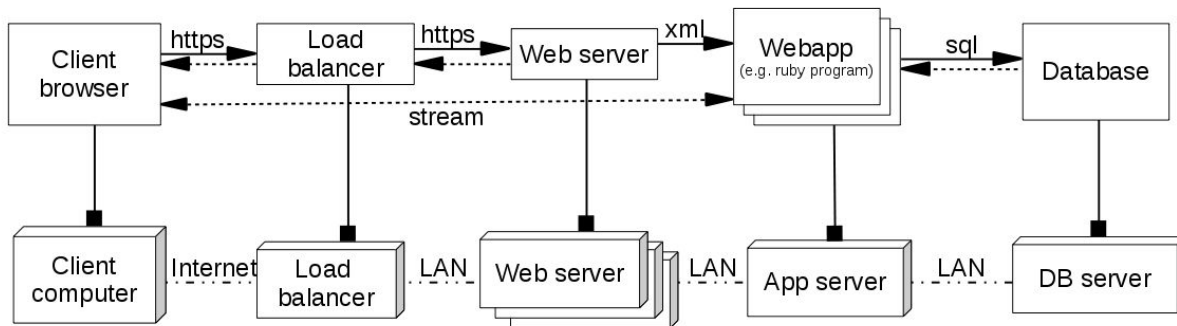
Form teams of three (3) people, examine the two preliminary drafts of the architecture and discuss the following questions:

- What types of views are shown below?
- For each quality attribute, which architecture supports the quality better? Why?
- Which architecture would be easier to implement? Why?
- Which architecture would be cheaper to deploy and maintain? Why?
- Are there any other advantages or limitations for each architecture version?

**Version 1.** The client browser connects to a web server via HTTPS. The webserver provides the static content: HTML and images. The web application is created after each client request handled by the webserver and starts streaming to (or from, in case of upload) the client. While streaming, the web application collects (or stores) video fragments from the database.



**Version 2.** This system has several web servers. A load balancer distributes the requests to the least loaded web server. There is still one application server, running multiple web apps in separate threads.



## Part 2: Architectural Decision (15 min.)

Come up with one (1) change to either architecture that would improve it in at least one of the mentioned quality attributes. Understand how your change affects the operation of the system and draft an architectural diagram.

- What did you change? Why?
- What quality of the system did you improve?
- What qualities or aspects were traded off? Why?