

# IN5020 - Distributed Systems Group Session

## Topic 2 – System Models

Praveensankar Manimaran

Praveema@ifi.uio.no

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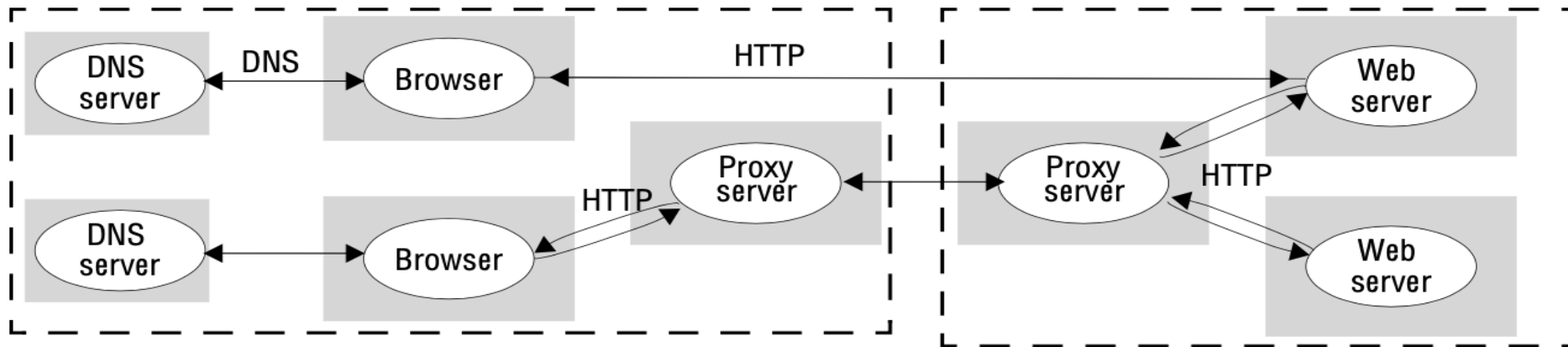
# Literatures reading for these exercises

- Lecture slides – System Models for Distributed Systems
- Coulouris et al p49-51, p64-65, p67-71

## Question 1 -

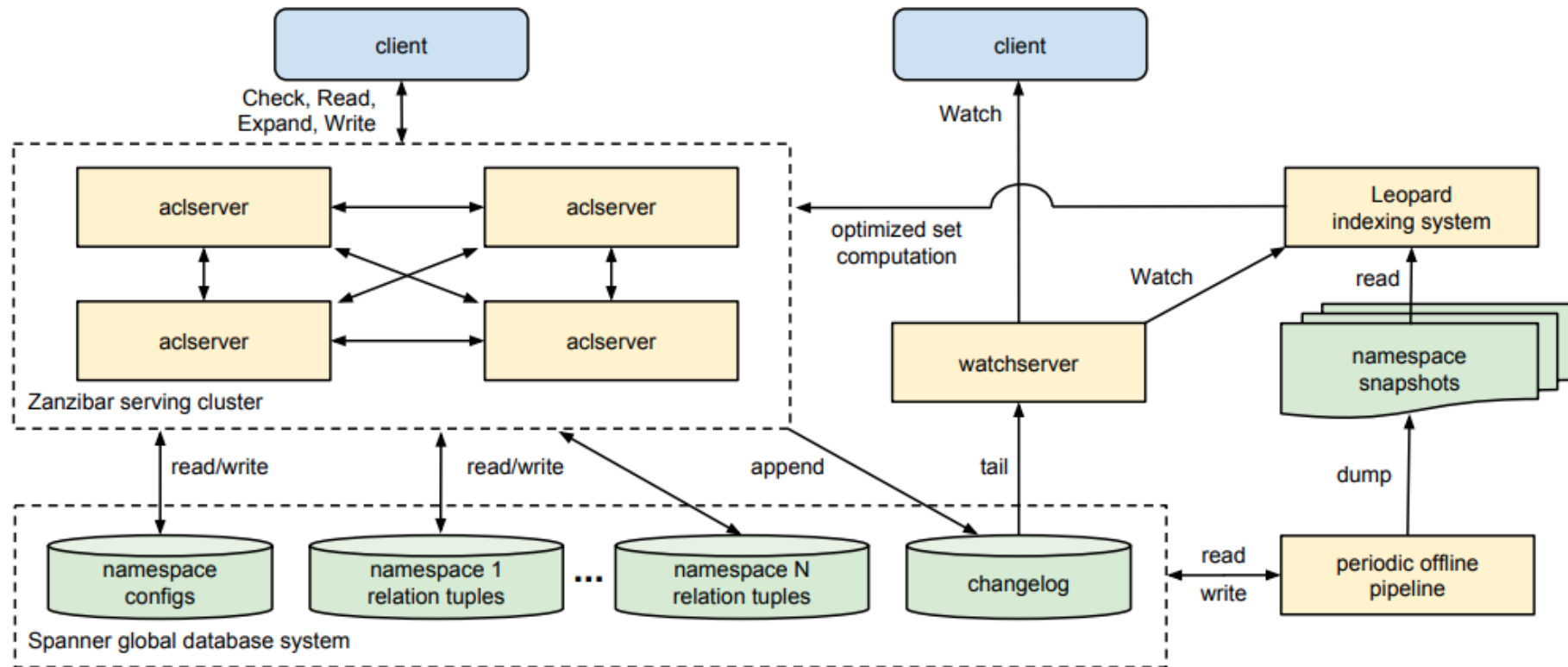
Describe and illustrate the client-server architecture of one or more major Internet applications (for example, the web, email, etc.)

# Web



- Browsers are clients of both DNS Servers and Proxy Servers
- Proxy Servers – reduce the delay and traffic at the client side, could perform caching at both sides, balances load at the server side

# Zanzibar – Google's Authorization System



- a global system for storing and evaluating access control lists
- provides a uniform data model and configuration language for expressing a wide range of access control policies

## Question 2 -

What are the two variants of the Interaction model in distributed systems?

# Synchronous vs Asynchronous distributed systems

	<b>Synchronous</b>	<b>Asynchronous</b>
Execution time	Known upper and lower bound	Arbitrary execution time
Message transmission delay	Known bounds	arbitrary
Clock drift rate	Known bounds	arbitrary

## Question 3 -

Distinguish between buffering and caching

Coulouris ch 2 ex 2.9



# Buffering

- technique for storing data transmitted from a sending process to a receiving process in local memory or secondary (disk) storage until the receiving process is ready to consume it.
- For example, when reading data from a file or transmitting messages through a network, it is beneficial to handle it in large blocks. The blocks are held in buffer storage in the receiving process' memory space. The buffer is released when the data has been consumed by the process.

# Caching

- a technique for optimizing access to remote data objects by holding a copy of them in local memory or secondary (disk) storage.
- Accesses to parts of the remote object are translated into accesses to the corresponding parts of the local copy.
- Unlike buffering, the local copy may be retained as long as there is local memory available to hold it.
- A cache management algorithm and a release strategy are needed to manage the use of the memory allocated to the cache.

## Question 4 -

How is caching useful in placement strategies? What are its disadvantages?

# Usefulness of Caching

## **Advantages of caching:**

Increase availability: reduce load on the server

Performance: reduce latency

## **Challenges in caching:**

**Stale data** - if cache is not updated properly.

## Question 5 -

Why do we use logical clocks in distributed systems?

# Reason for using logical clocks

- Physical clocks are unreliable in distributed systems
- Communication delays are common between 2 nodes
- Ordering messages across systems is very essential for many applications (such as bank transactions, etc.)

## **Logical clocks:**

- Captures the logical ordering of events by using the happened-before principle



Thank You