



# Reliable Software Systems

Week 10:  
Netflix and YouTube architecture



March 14, 2018  
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# Please fill out the course eval!

<https://uw.iasystem.org/survey/204650>

# Motivating Example: early Netflix

September 2008: Netflix has a streaming service, but ships 2 million DVDs/day.

Netflix had built two data centers next to each other.

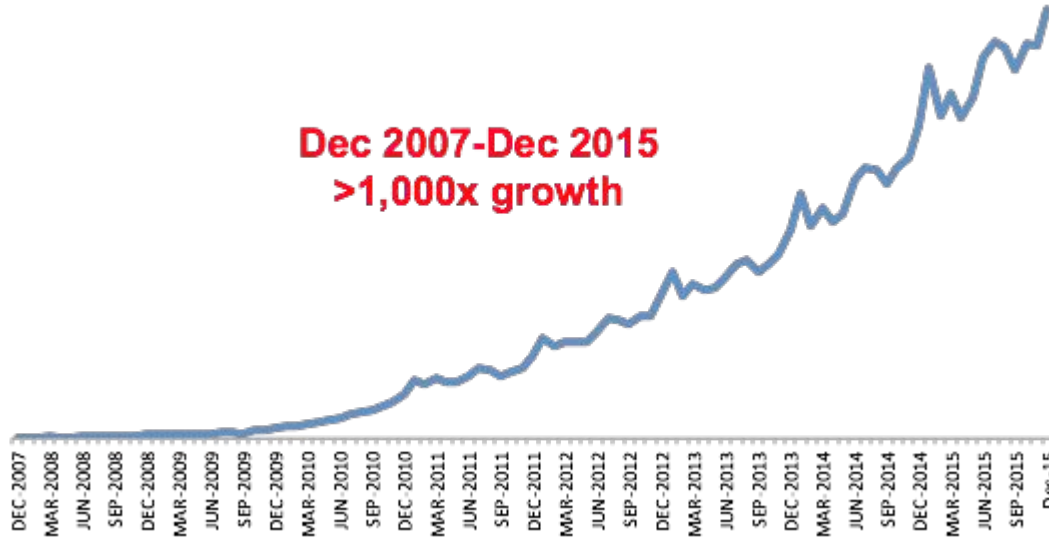
One day they noticed database corruption in their shipping system, due to faulty hardware, which spread to all their other databases.

They had 3 days of a total shipping outage.

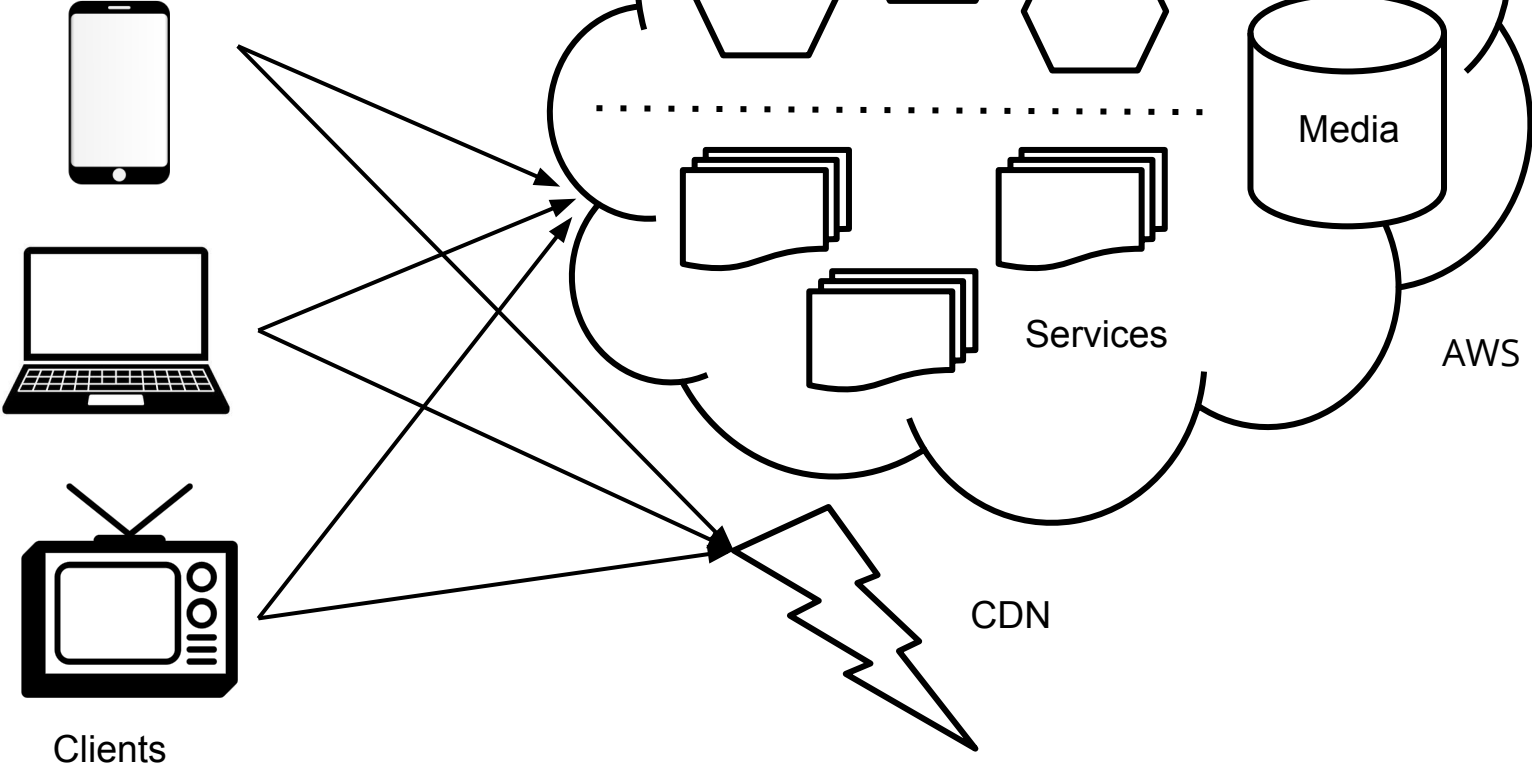
They decided to move away from system that vertically scaled with single points of failure, instead moving to the cloud and a microservices model.

# Netflix scale

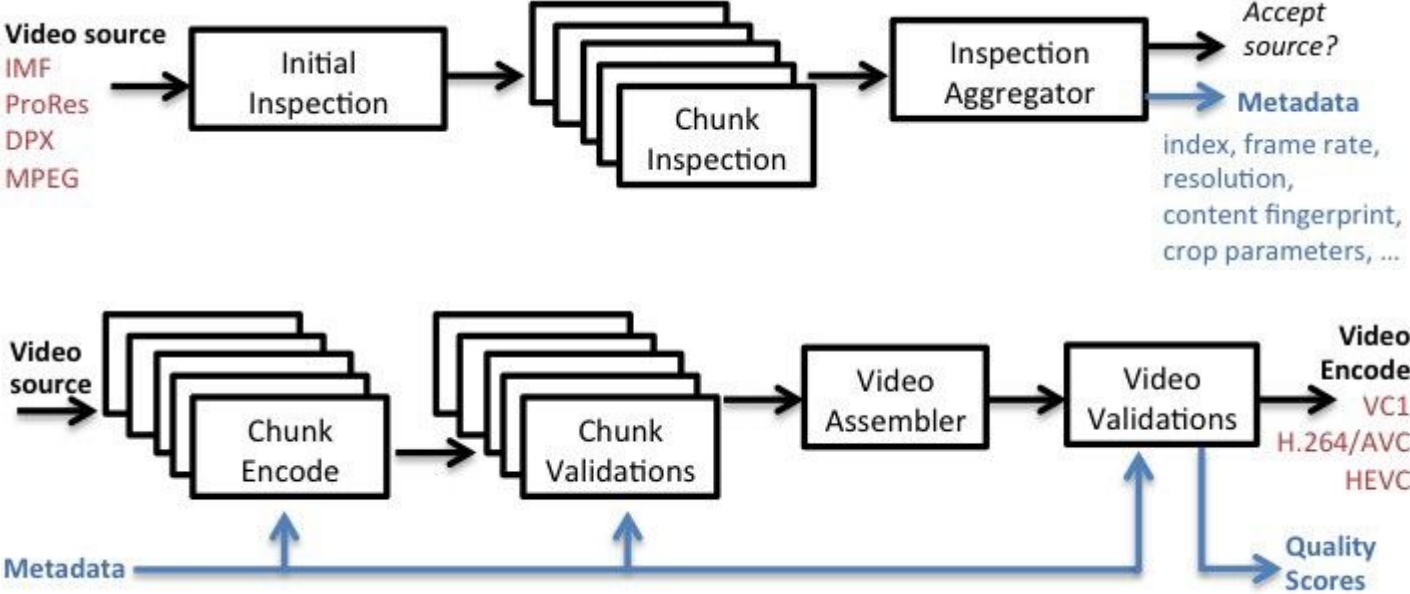
## Monthly Streaming Hours



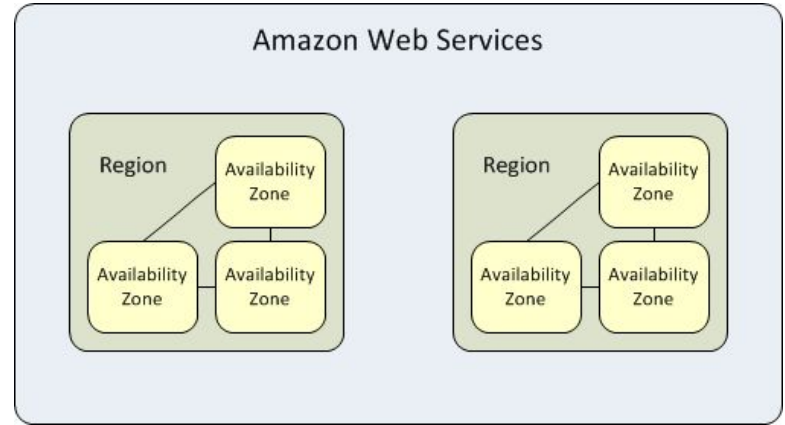
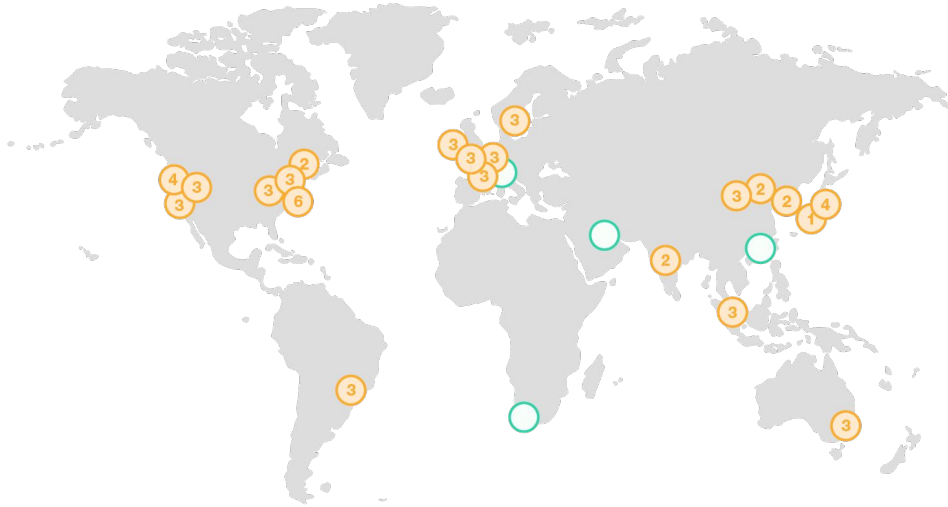
# Netflix architecture



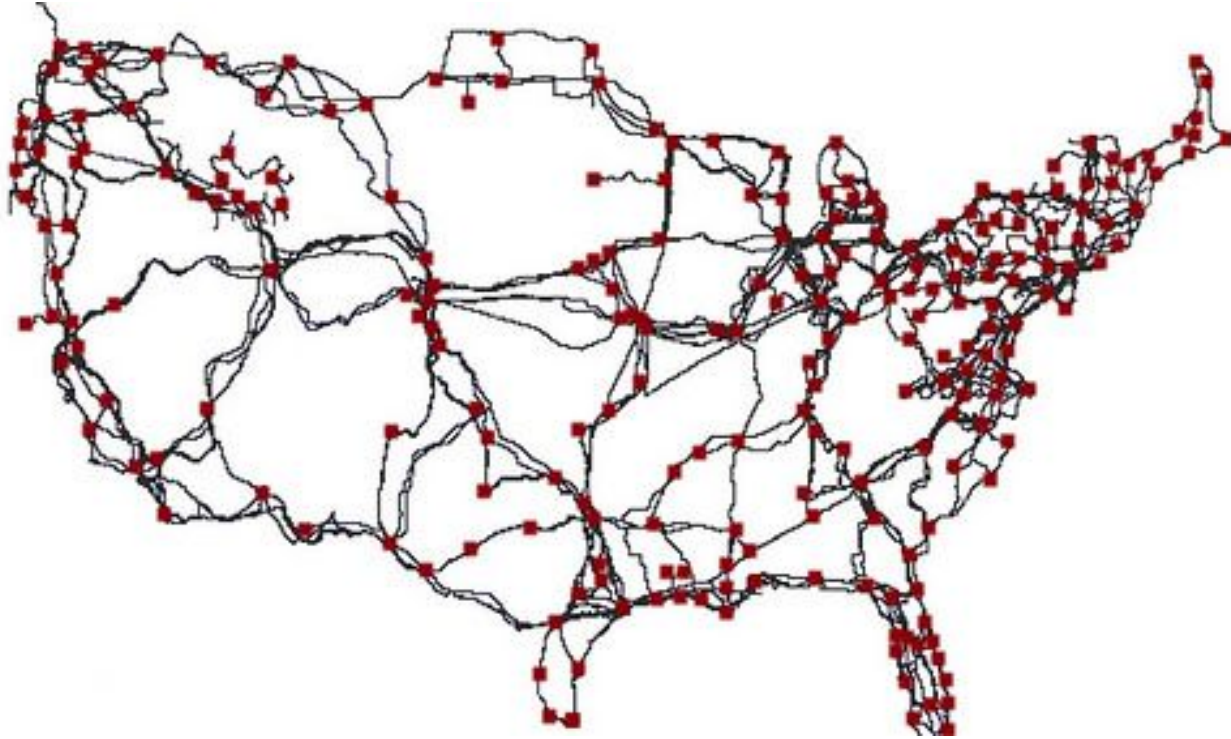
# Netflix - transcoding



# Netflix - serving applications

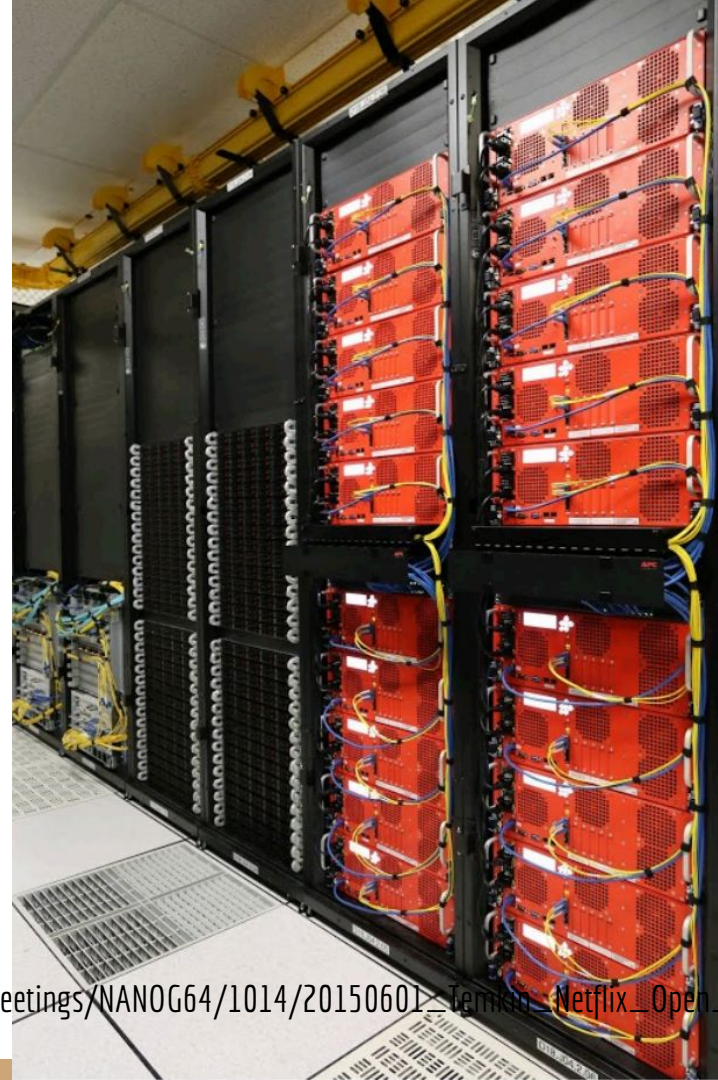


# Networking interlude

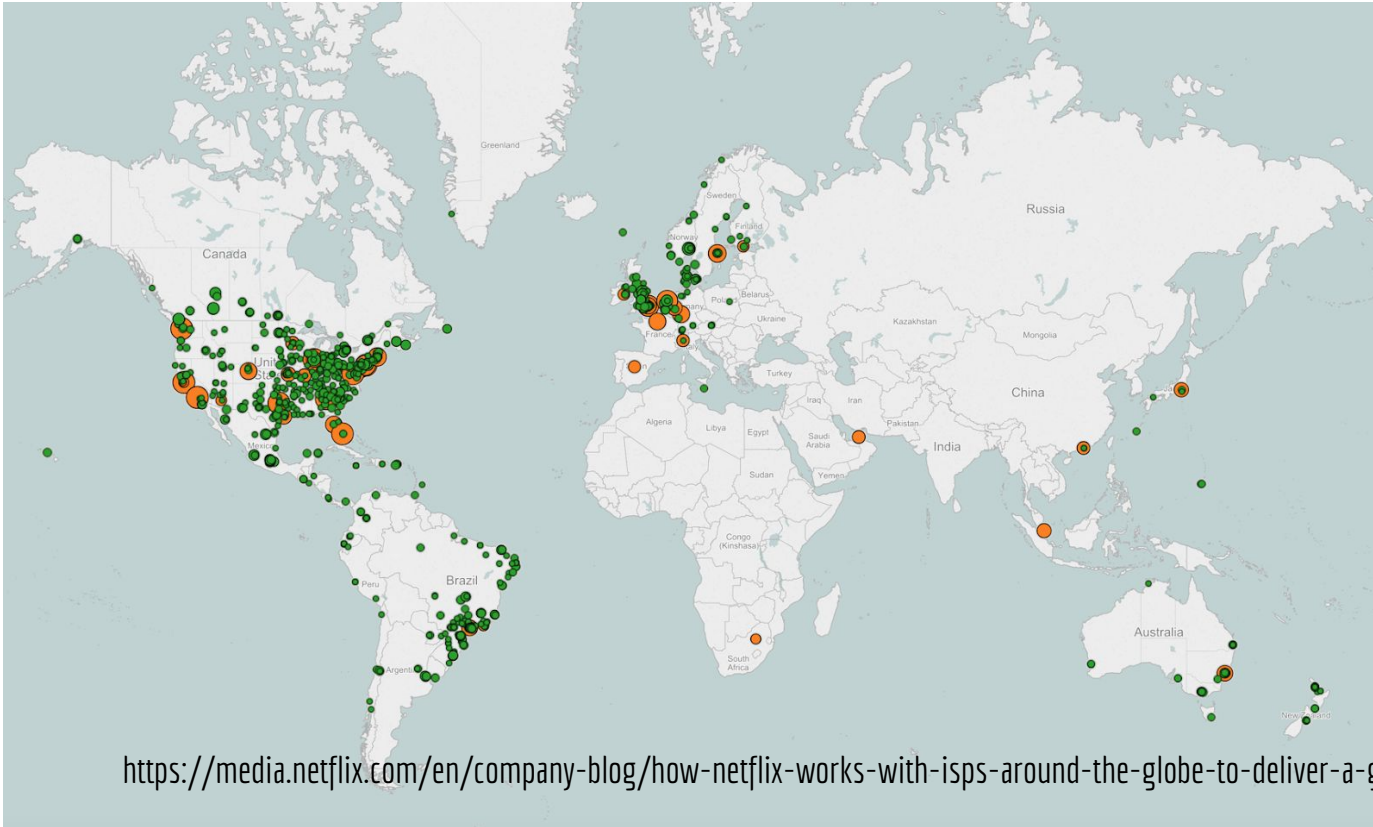




# Open Connect

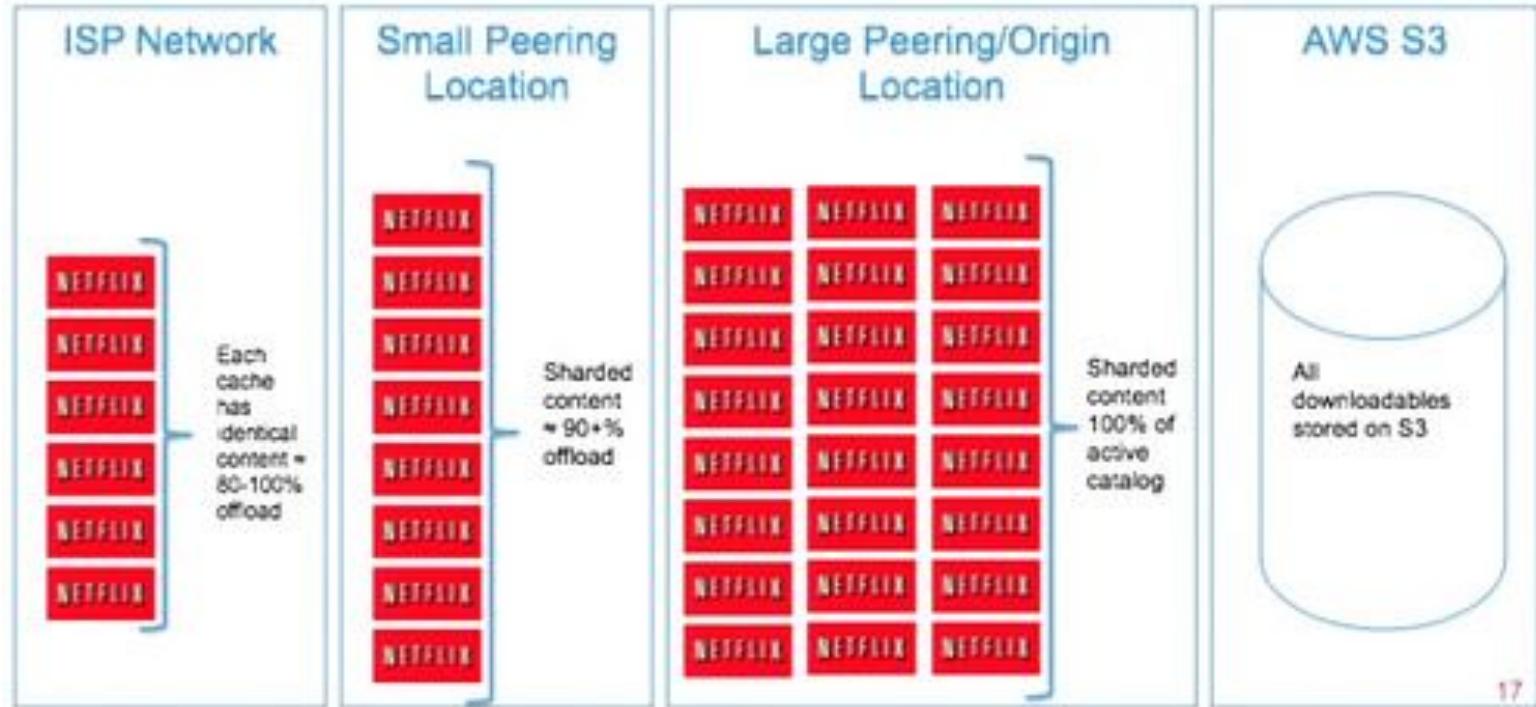


# Open Connect

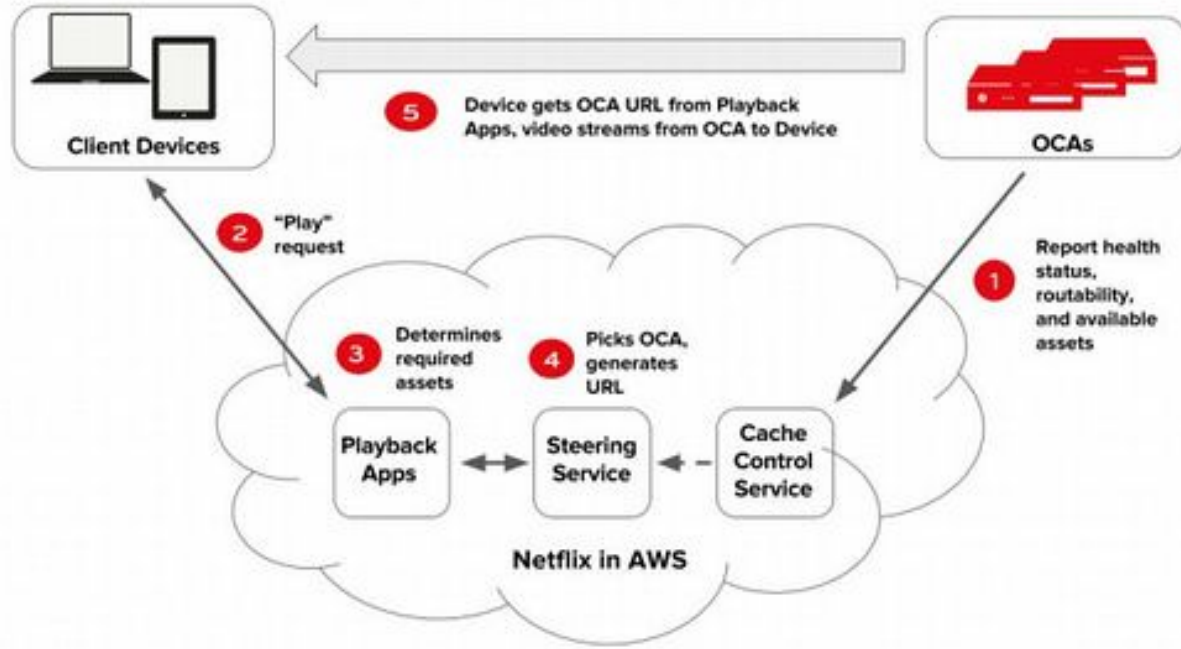


<https://media.netflix.com/en/company-blog/how-netflix-works-with-isps-around-the-globe-to-deliver-a-great-viewing-experience>

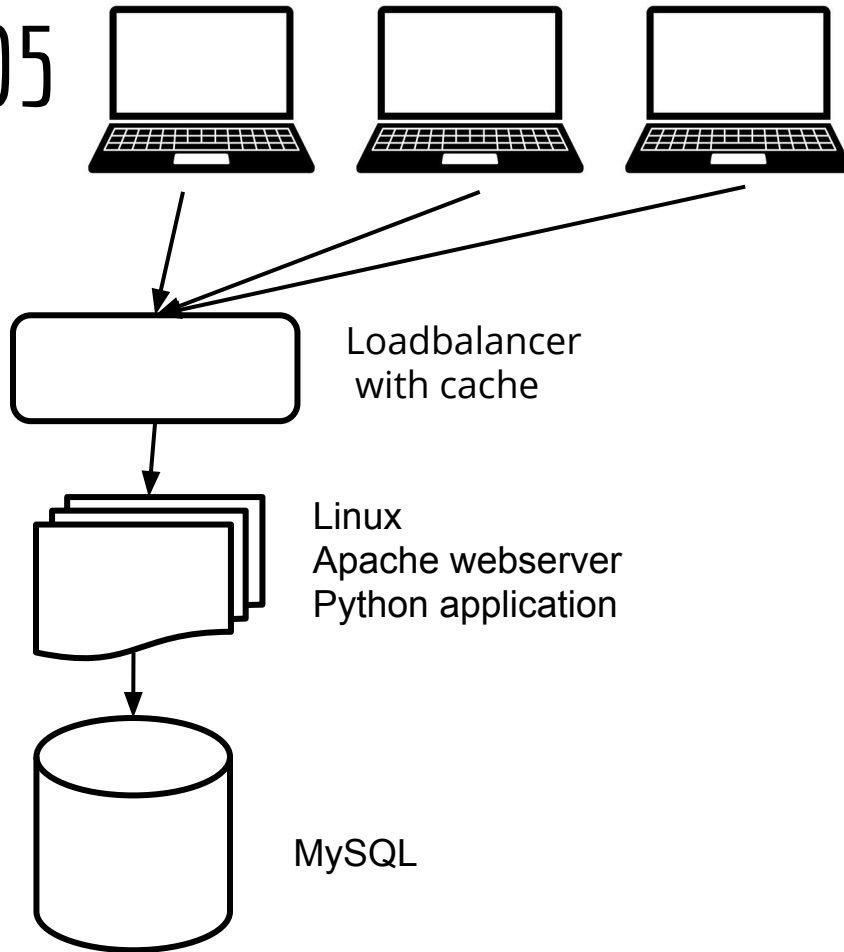
# Netflix - tiered caching



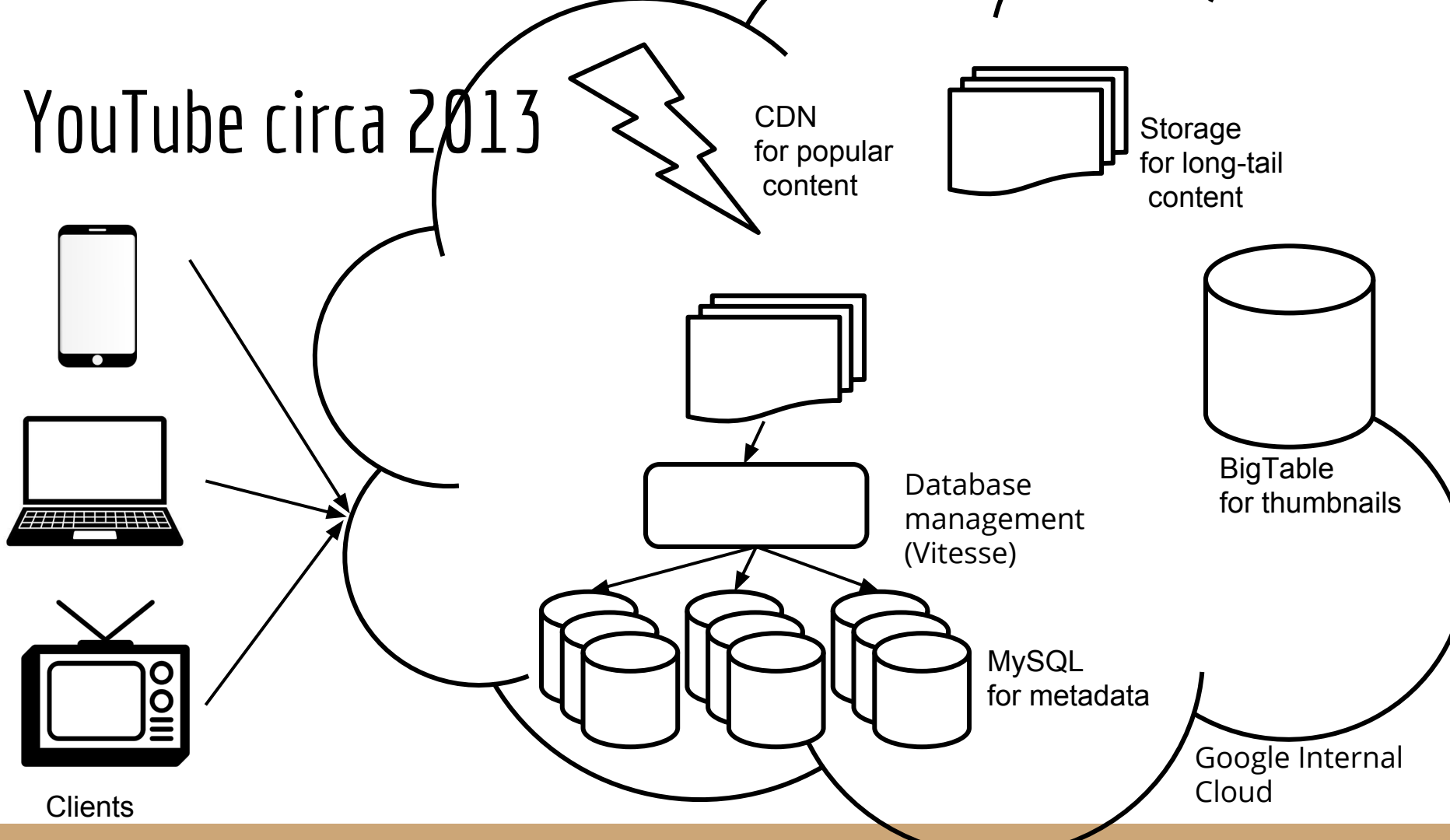
# Netflix - client playback



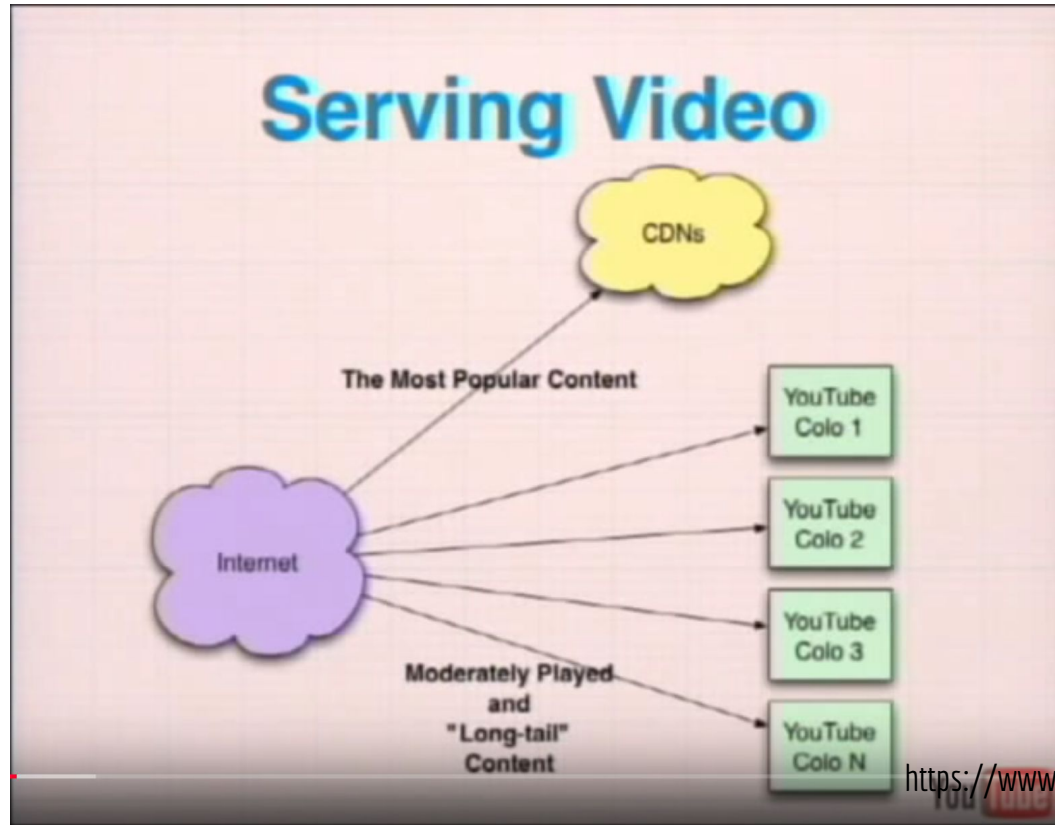
# YouTube circa 2005



# YouTube circa 2013

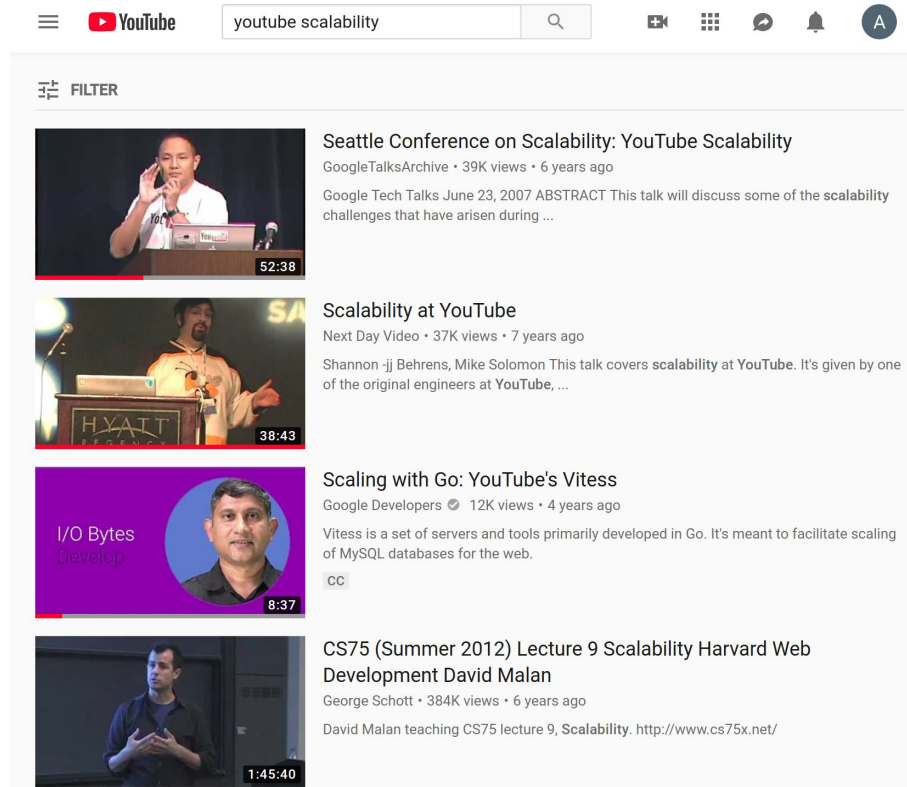


# YouTube - serving video



<https://www.youtube.com/watch?v=w5WVu624fY8>


# YouTube - serving thumbnails





The screenshot shows the YouTube search interface. At the top, there is a search bar containing the text 'youtube scalability'. To the right of the search bar are icons for video camera, grid, share, notification, and a user profile icon with the letter 'A'. Below the search bar, there is a 'FILTER' button. The search results are listed below, each with a video thumbnail, title, channel name, view count, and upload time. The first result is 'Seattle Conference on Scalability: YouTube Scalability' by GoogleTalksArchive, with 39K views and uploaded 6 years ago. The second is 'Scalability at YouTube' by Next Day Video, with 37K views and uploaded 7 years ago. The third is 'Scaling with Go: YouTube's Vitess' by Google Developers, with 12K views and uploaded 4 years ago. The fourth is 'CS75 (Summer 2012) Lecture 9 Scalability Harvard Web Development David Malan' by George Schott, with 384K views and uploaded 6 years ago.


☰ YouTube youtube scalability 🔍

🔍 FILTER

 **Seattle Conference on Scalability: YouTube Scalability**  
GoogleTalksArchive • 39K views • 6 years ago  
Google Tech Talks June 23, 2007 ABSTRACT This talk will discuss some of the scalability challenges that have arisen during ...

 **Scalability at YouTube**  
Next Day Video • 37K views • 7 years ago  
Shannon -jj Behrens, Mike Solomon This talk covers scalability at YouTube. It's given by one of the original engineers at YouTube, ...

 **Scaling with Go: YouTube's Vitess**  
Google Developers ✓ 12K views • 4 years ago  
Vitess is a set of servers and tools primarily developed in Go. It's meant to facilitate scaling of MySQL databases for the web.  
[CC](#)

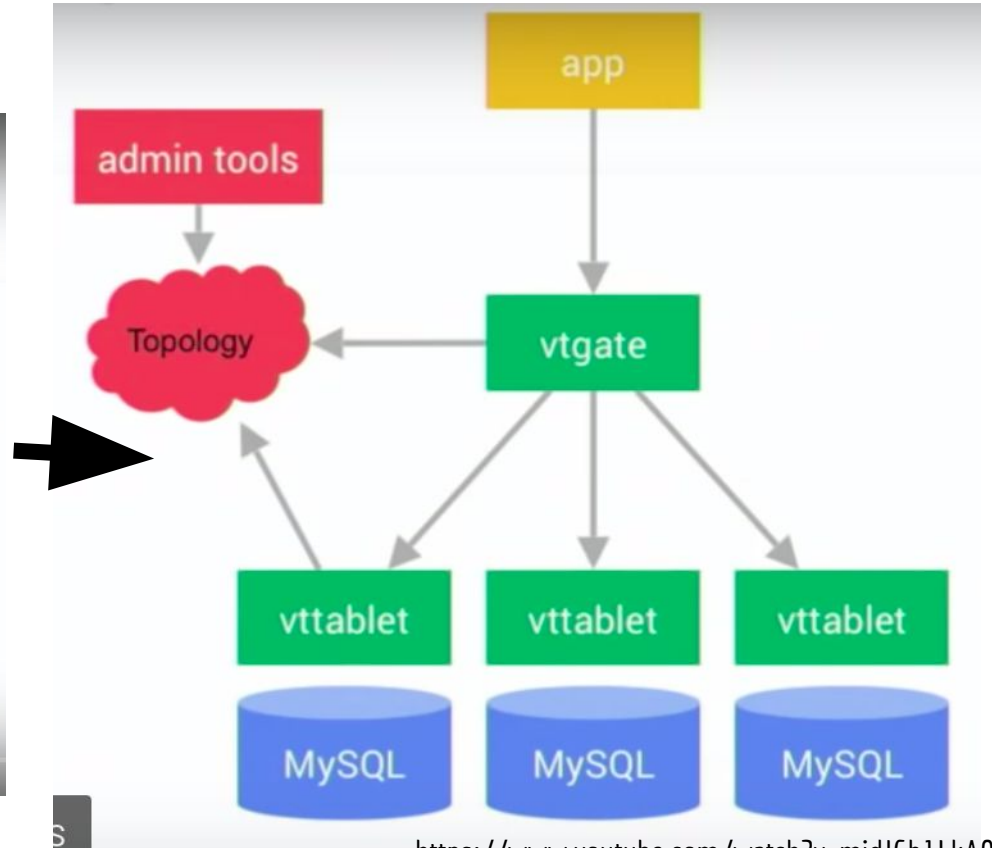
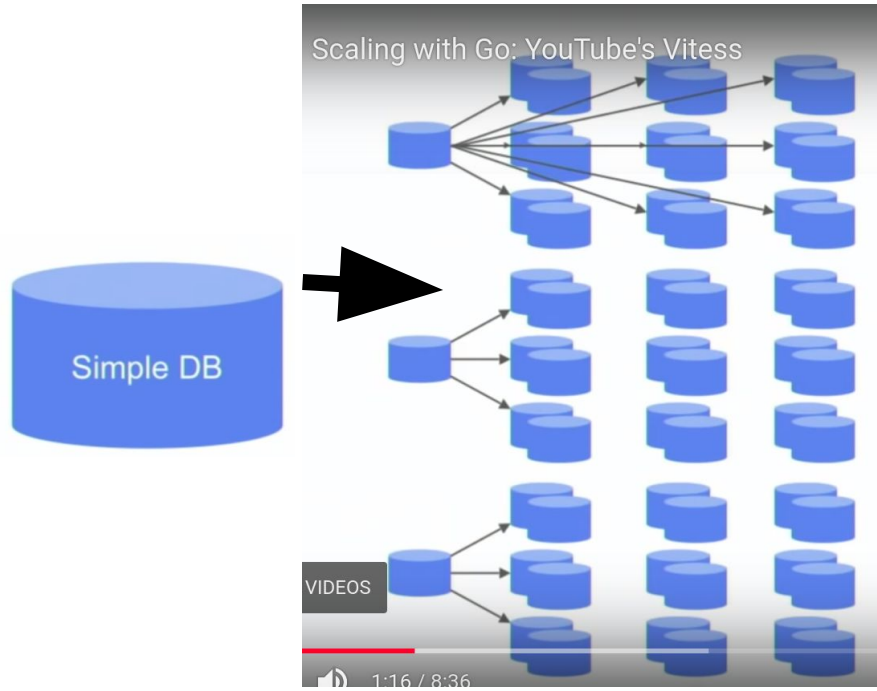
 **CS75 (Summer 2012) Lecture 9 Scalability Harvard Web Development David Malan**  
George Schott • 384K views • 6 years ago  
David Malan teaching CS75 lecture 9, Scalability. <http://www.cs75x.net/>



# YouTube - metadata



# YouTube - metadata



<https://www.youtube.com/watch?v=midJ6b1LkA0>

END