Project 3
Video Streaming

15-441: Computer Networks

Thanks to past TA's...
Video CDN: The Real World

[Diagram showing CDN architecture with DNS Server, Video Clients, and Video Servers]
Video CDN: Your System
Your Job: 2 Parts

HTTP Proxy
Adaptive bitrate selection

DNS Server
Load balancing
HTTP Proxy

- Browser requests video chunks
- Proxy forwards request to server, returns data to browser
- Proxy estimates throughput, selects appropriate bitrate for each chunk
- Re-using project 1 code is fine
HTTP Proxy

**Browser Listen Socket**
- IP: INADDR_ANY
- PORT: <listen-port>

**Browser Socket 1**

**Browser Socket n**

**Proxy**

**Server Socket 1**
- IP: <fake-ip>
- PORT: 0 (assign ephemeral)

**Server Socket m**
- IP: <fake-ip>
- PORT: 0 (assign ephemeral)
HTTP Proxy

Throughput Estimation

• Per chunk

\[ T = \frac{B}{t_f - t_s} \]

- size of chunk
- time chunk transfer from server completed
- time request received

• Average:

\[ T_{current} = \alpha T_{new} + (1 - \alpha)T_{current} \]

Exponentially-Weighted Moving Average (EWMA)
HTTP Proxy

Bitrate Selection

- Modify Request-URI

500 Kbps
/path/to/video/big_buck_bunny_500Seq2-Frag3

1 Mbps
/path/to/video/big_buck_bunny_1000Seq2-Frag3
DNS Server

Load Balancing

- Round robin
- Geographic proximity
  - Real world: IP prefix → location mapping
  - This project: Link State Advertisements

!!! This is not realistic, but it's easy and teaches you about LSA !!!
Network Simulator

- We provide a network simulator!
- More details in PDF
Logistics

- Starter Code
  - Virtual machine
  - Download VirtualBox

- Submission
  - CP1 and Final
  - See the submission guidelines in the handout