Content Delivery Networks (CDNs)

CS 240 - The University of Illinois
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Project MIX

The final project for CS 240 this semester is a course-wide microservice called “Project MIX”.
Project MIX
Cloud-Scale Content Distribution
DNS Translation

As we deploy to a cloud-scale, there are three different types of content we need to deliver:
Example
The University of Illinois at Urbana-Champaign
Content Delivery Networks (CDNs)
Motivation

Does the user need to visit our server for content that is served to all users?

- If not, what service could we rent?
Motivation

● What advantages can we get by renting caches?
Content Delivery Networks (CDNs)

A Content Delivery Network (CDN) is a system of many servers physically located in geographically diverse locations.

- All CDNs must have a source for the content. This source is known as the _________________.
- All CDNs have many caches called _________________.


Content Delivery Networks (CDNs)

- Once the data from the origin is in the CDN cache, the CDN can serve this content. There are five key benefits!
Geographical Locations of Edge Servers

https://www.cloudflare.com/network/
Geographical Locations of Edge Servers

https://aws.amazon.com/cloudfront/features/
Technical Details of CDNs within DNS
DNS lookup for **cs.illinois.edu** (complete cache miss):

(1): Ask the **root name server** for the NS records for “edu.”

⇒ IP address for the **TLD name servers** for “edu.” returned.
DNS lookup for cs.illinois.edu (complete cache miss):

(1): Ask the root name server for the NS records for “edu.”
    ⇒ IP address for the TLD name servers for “edu.” returned.

(2): Ask a “edu” TLD name server for the NS records for “illinois.edu.”
    ⇒ IP address for the SLD name servers for “illinois.edu.” returned.
DNS lookup for **cs.illinois.edu** (complete cache miss):

(1): Ask the **root name server** for the NS records for “edu.”
⇒ IP address for the **TLD name servers** for “edu.” returned.

(2): Ask a “edu” **TLD name server** for the NS records for “illinois.edu.”
⇒ IP address for the **SLD name servers** for “illinois.edu.” returned.

(3): Ask a “illinois.edu” **SLD name server** for the NS records for “cs.illinois.edu.”
⇒ IP address for the **sub-domain name servers** for “cs.illinois.edu.” returned.
DNS lookup for **cs.illinois.edu** (complete cache miss):

1. Ask the **root name server** for the NS records for “edu.”
   ⇒ IP address for the **TLD name servers** for “edu.” returned.

2. Ask a **“edu” TLD name server** for the NS records for “illinois.edu.”
   ⇒ IP address for the **SLD name servers** for “illinois.edu.” returned.

3. Ask a **“illinois.edu” SLD name server** for the NS records for “cs.illinois.edu.”
   ⇒ IP address for the **sub-domain name servers** for “cs.illinois.edu.” returned.

4. Ask a **“cs.illinois.edu” sub-domain name server** for the A (or AAAA) records for “cs.illinois.edu.”
   ⇒ IP address for web server for cs.illinois.edu returned.
Q: Could we program a specific DNS server that was geographically aware to return different data?

...what should the TTL of these A records be?