

Faster Web through Client assisted CDN Server Selection

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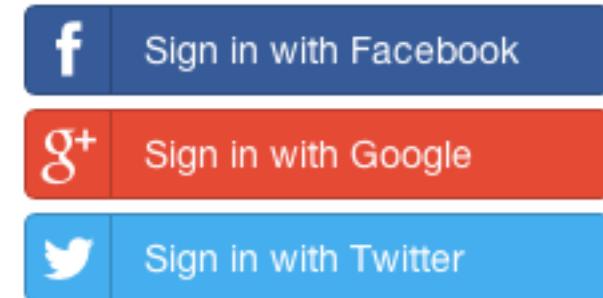
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Web is slow!

- **Webpages are content heavy**

- Several JavaScript, CSS, image files
- Advertisements
- Social network plugins
- “Cat” animations



- **Many many objects in one page...**

Web is slow!



- **Loading require multiple round trips**
 - Resolve several domain names in the page
 - Establish several TCP connections
 - Download **each** object in multiple round trips
- **Even worse when servers are far from user**
 - High latency
 - Retransmissions

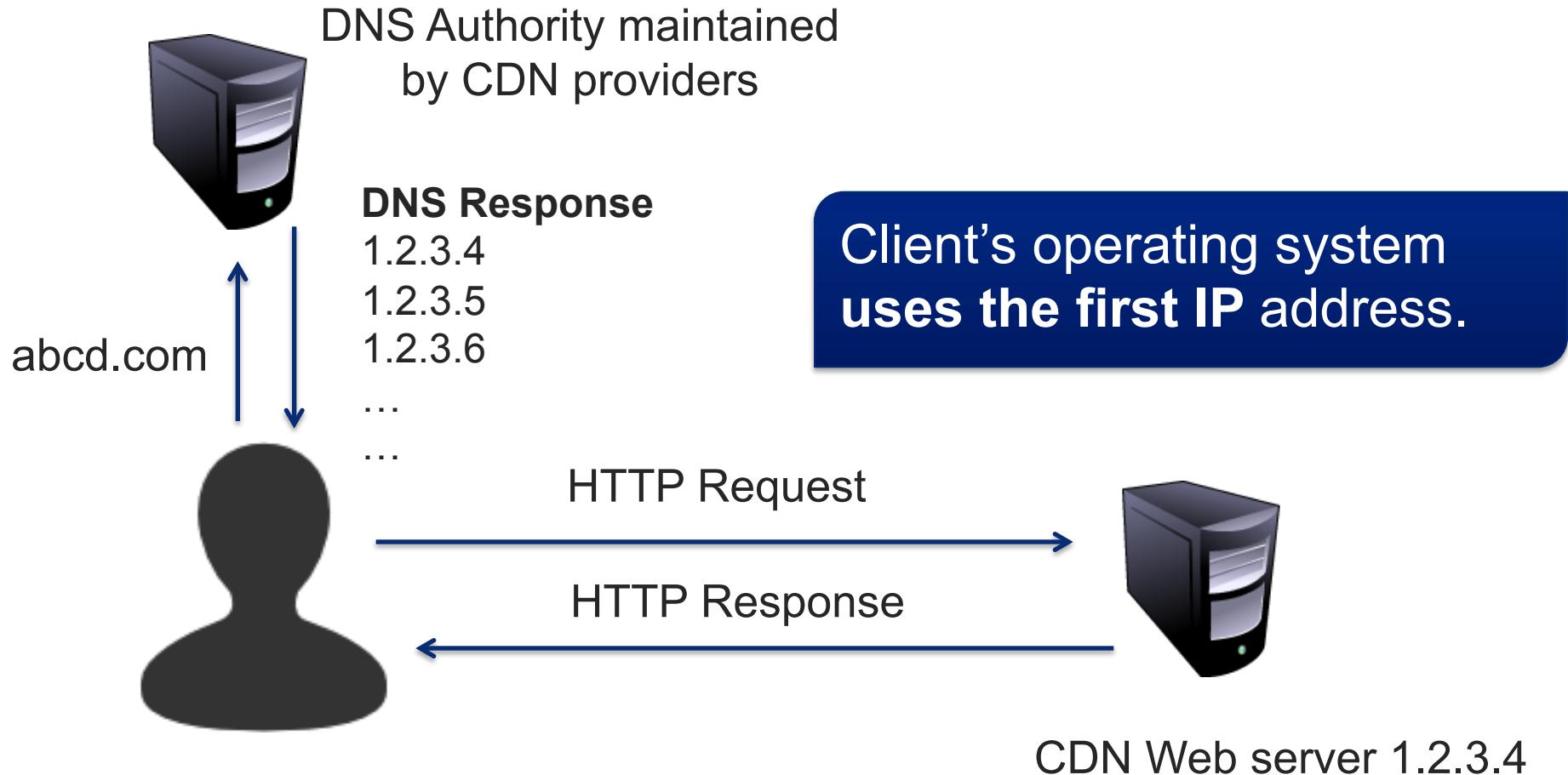
Offload the Web onto CDNs



- **Effective in reducing latency**
 - Users download content from a nearby server
 - Fast round trips
 - Websites load “faster”
 - Make users happy



DNS Lookup for CDN Domains



Parallel Lookup for CDN Domains



Resolver A



Resolver B



Response

1.2.3.4
1.2.3.5
1.2.3.6

...

...

Response time: 10 ms

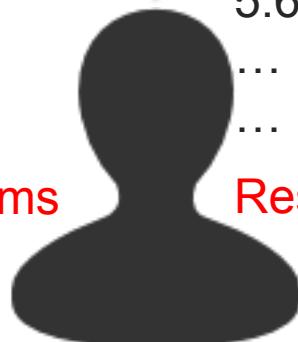
Response

5.6.7.8
5.6.7.9

...

...

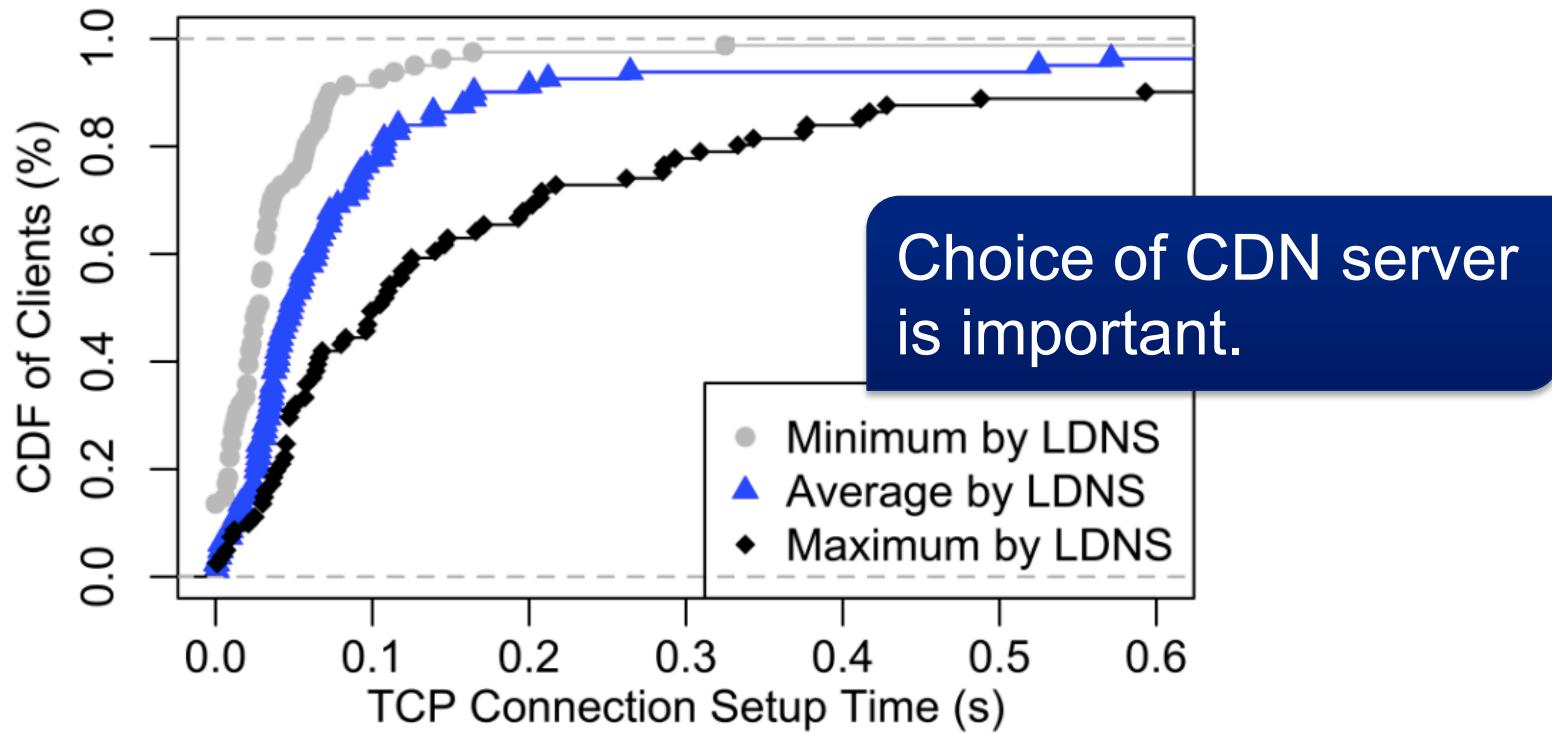
Response time: 25 ms



Different DNS servers may return different CDN answers.

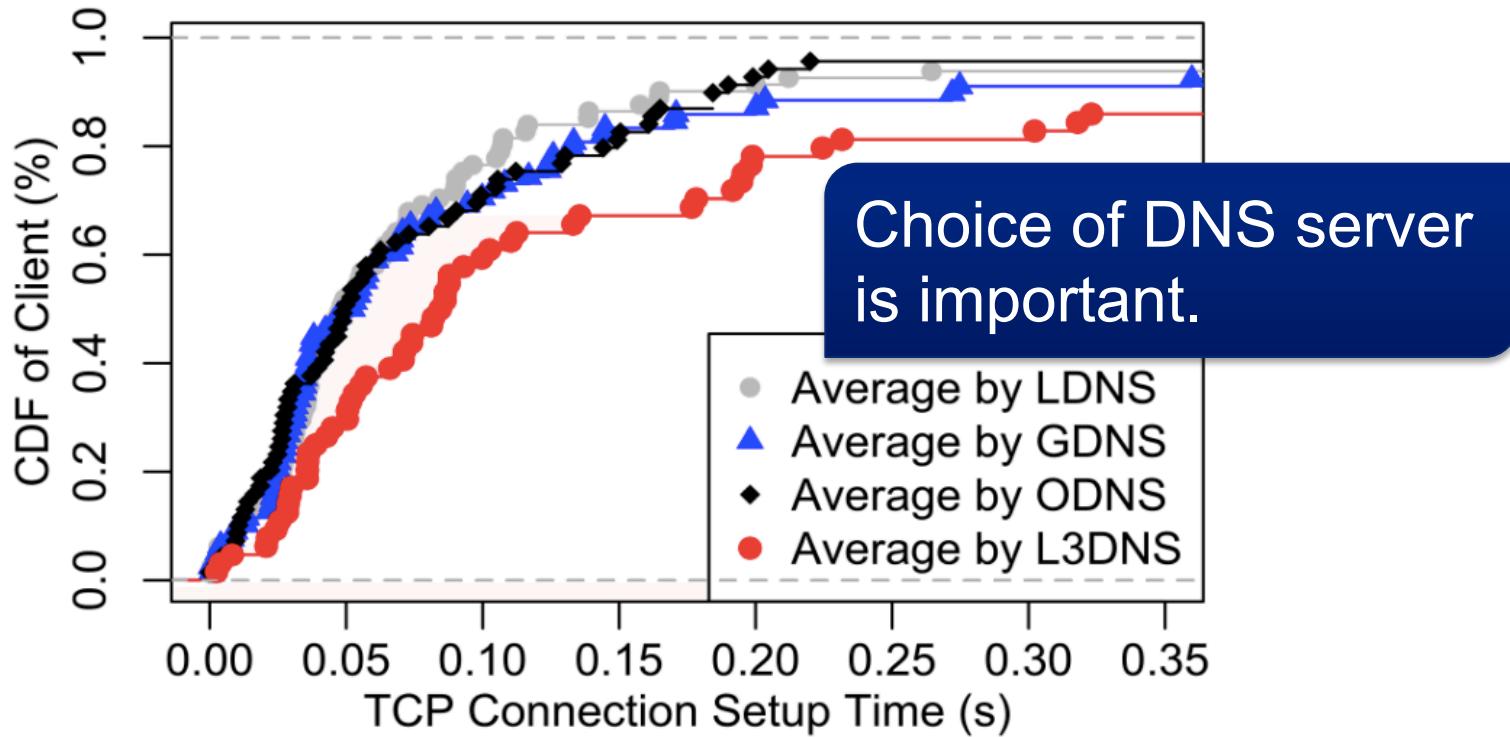
Is there a difference between
different servers resolved by
any one DNS server?

Lookup from local resolver

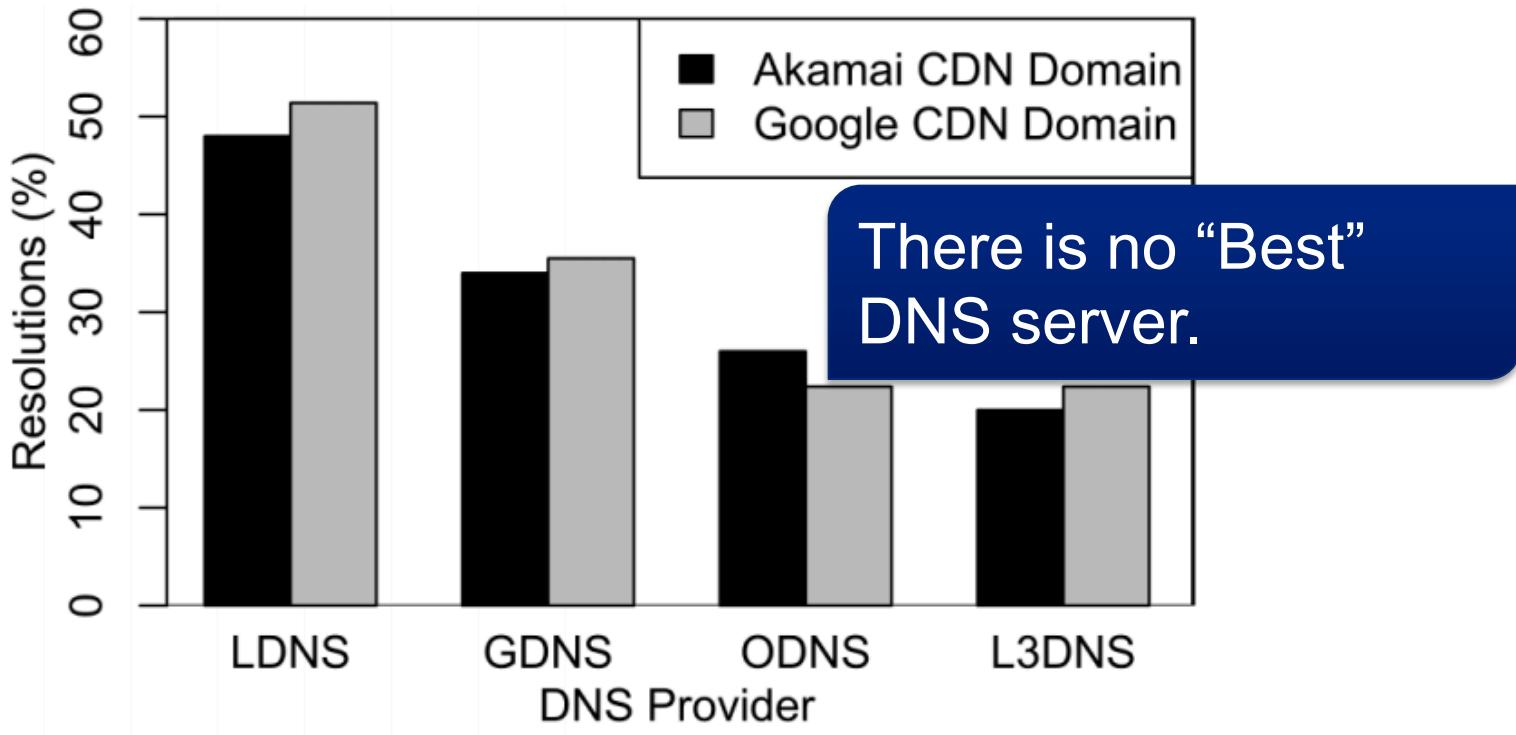


Is there a difference between
servers resolved by
different DNS servers?

Lookup from multiple resolvers



Who has the fastest CDN?



Goals

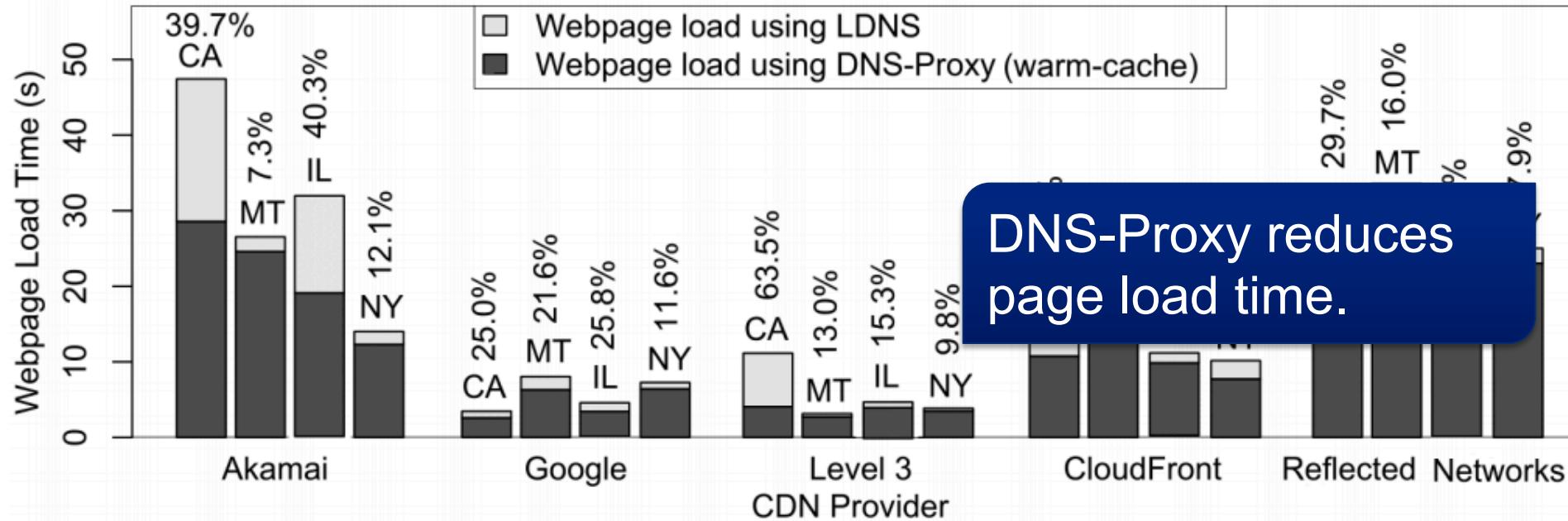


- **Reduce time on DNS lookup** by resolving domains from multiple resolvers.
- Understand differences **within one DNS response**.
- Understand differences **within multiple DNS responses**.
- Direct users to **fastest available servers**

- **Client-assisted CDN server selection**
 - Allows **clients to participate** in server selection at the time of DNS lookup.
 - Resolves domains from multiple DNS servers.
 - TCP Ping to each CDN server in DNS response.
 - Estimate the CDN server with least RTT.
 - Send users to the fastest available CDN server.
 - Temporarily caches the answer for future use.

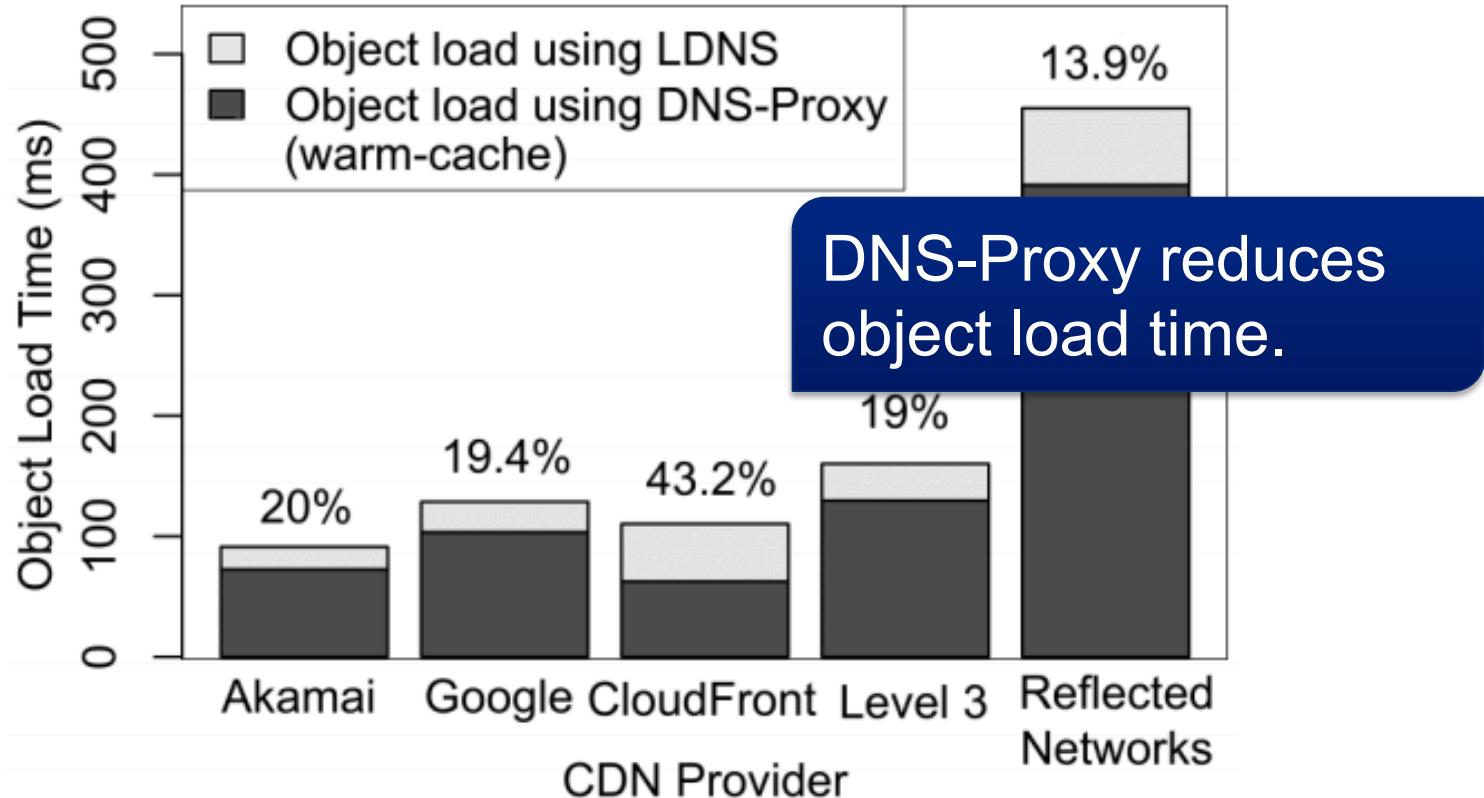
Does not break CDN load-balancing

Webpage Load Time



- **Cannot compare page load times across CDNs**
 - We used different sized webpages.

Object Load Time



Some Take Aways



- Client OS does not select the fastest available CDN server.
- Client participation can improve CDN server selection.
- Light-weight probing helps and safe.
- Does not break CDN load balancing.

Questions?



Thank you

Download DNS-Proxy from:

<https://github.com/msu-netlab/dp>

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