



LOCALROOT SERVE YOURSELF THE ROOT+

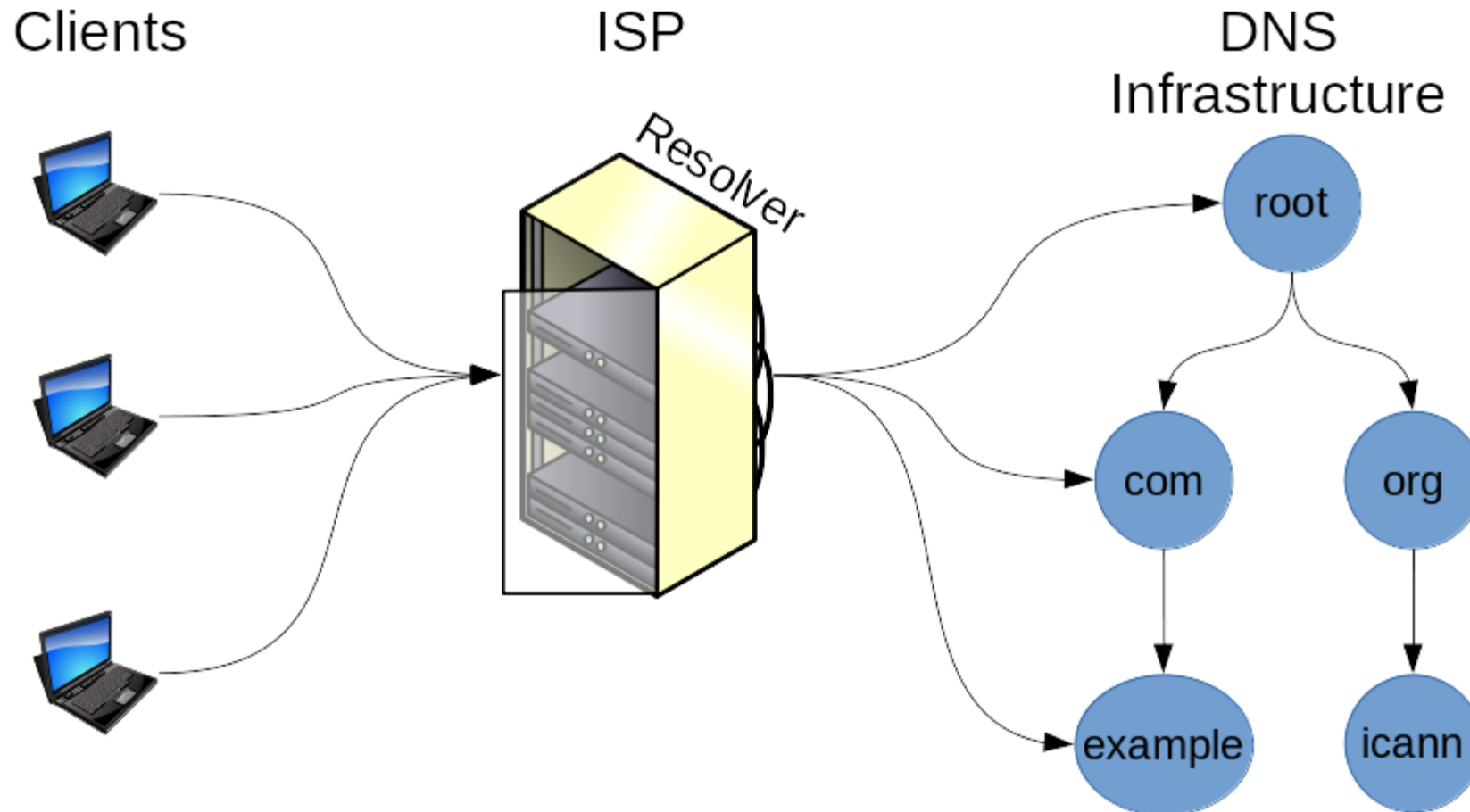


Wes Hardaker

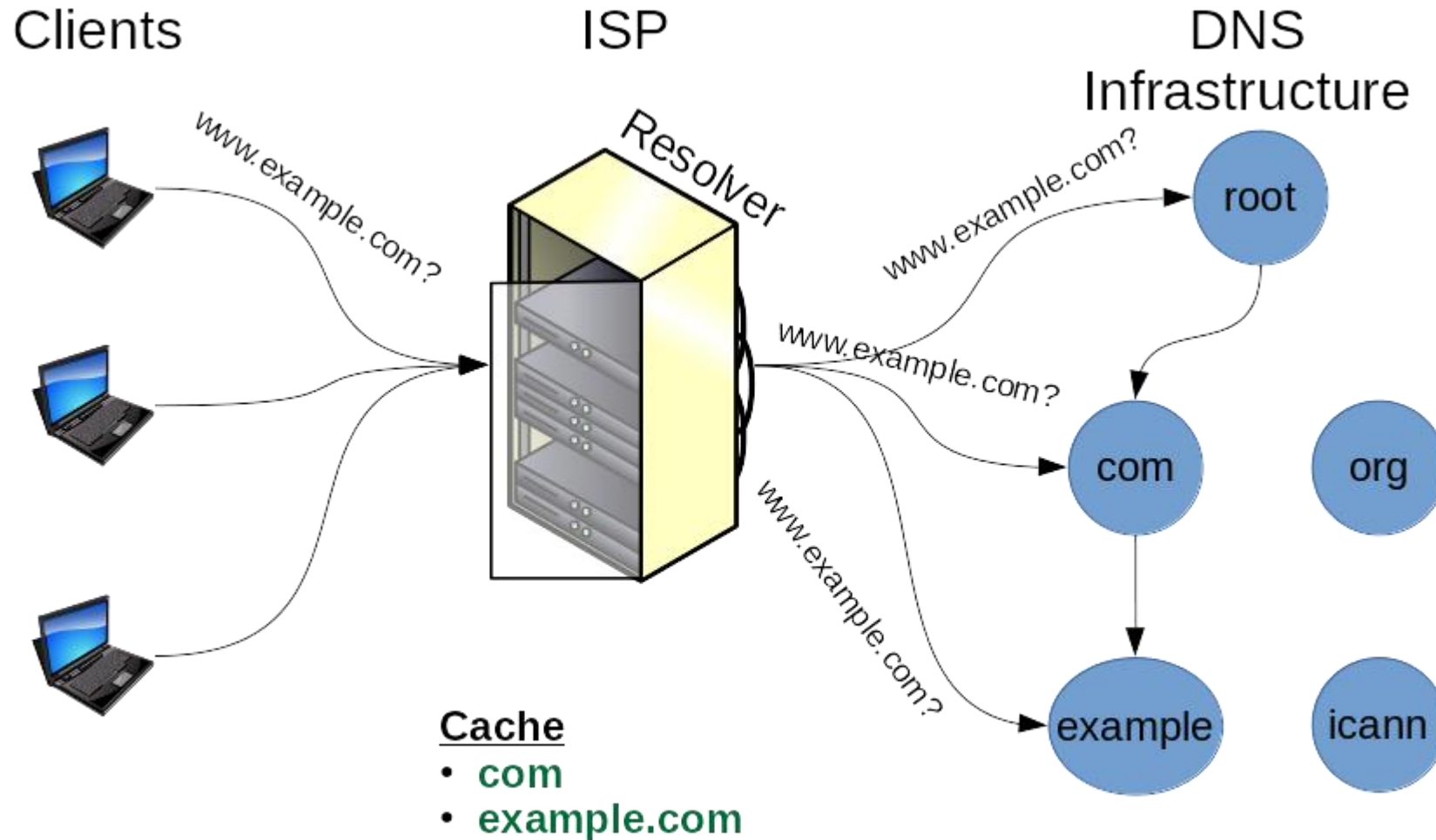
hardaker@isi.edu

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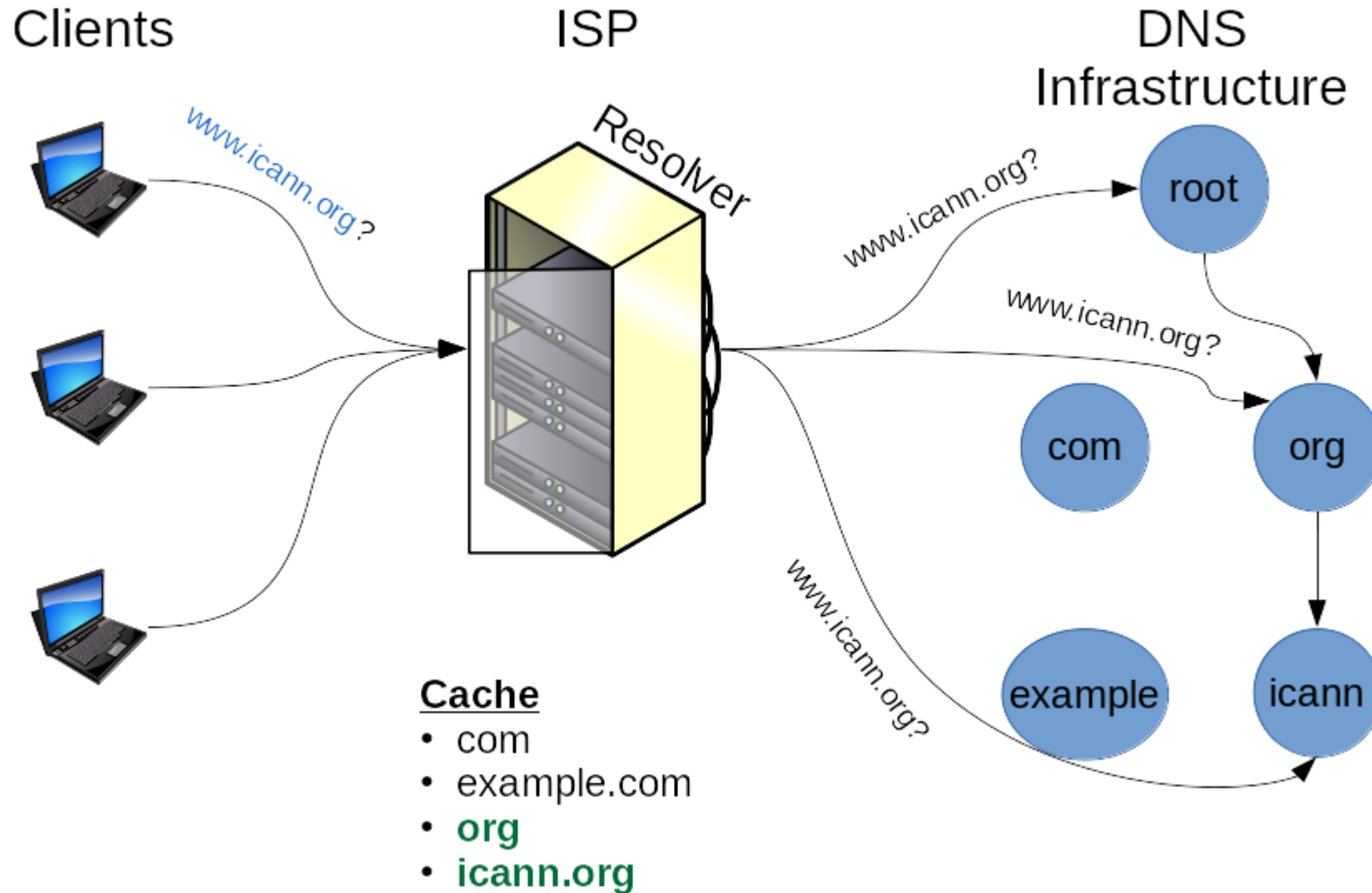
Classic DNS Resolution



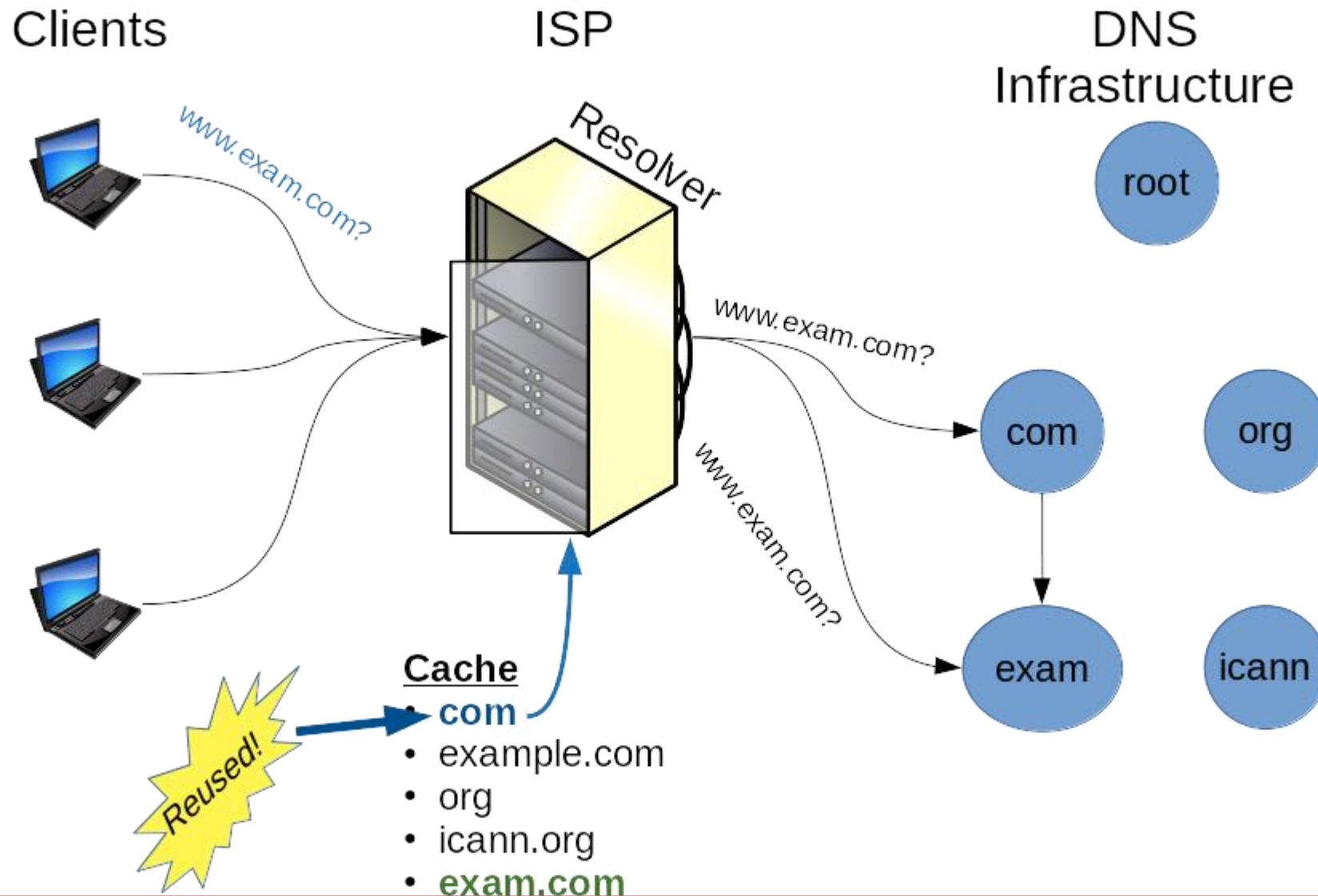
First request hitting the resolver starts from the top



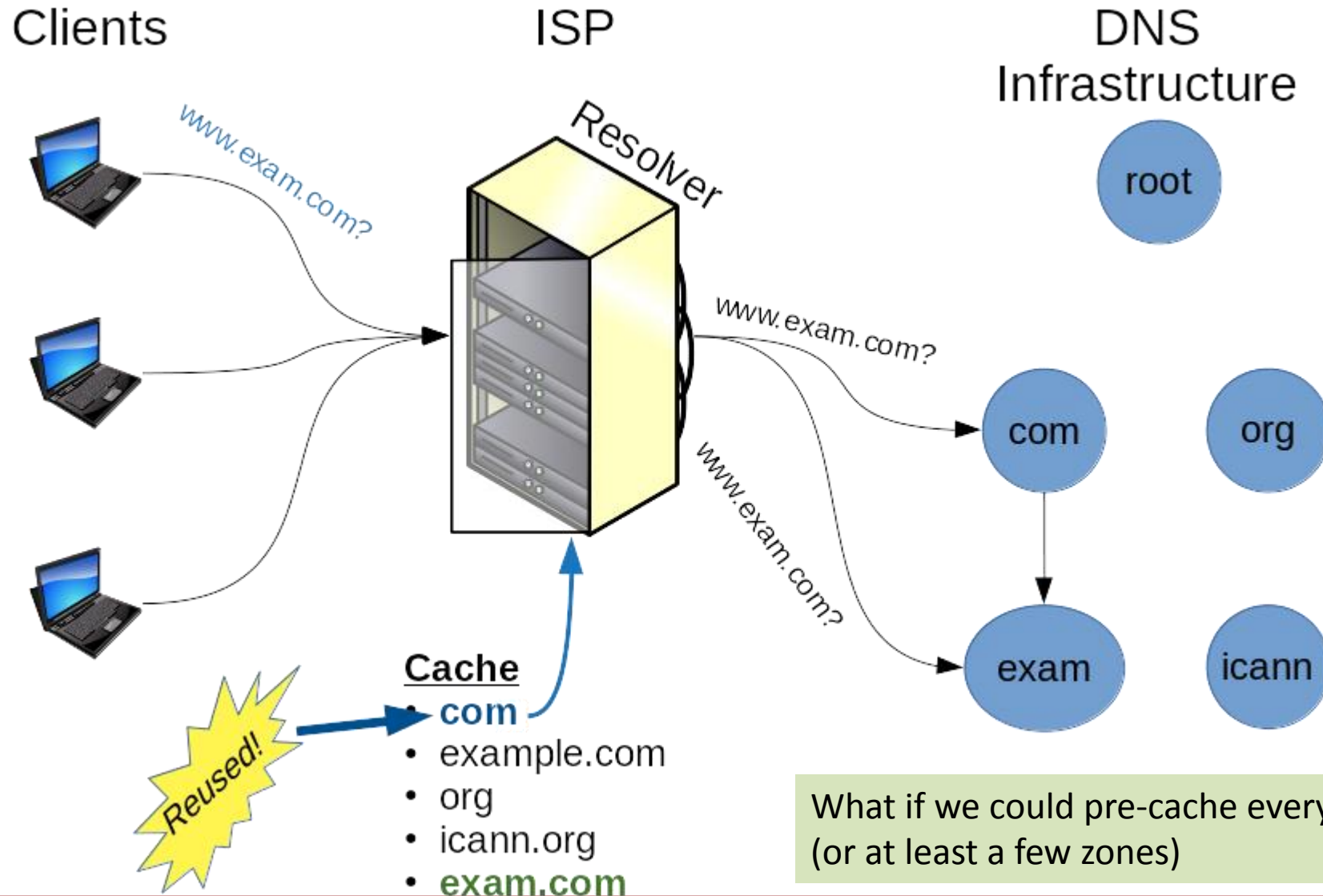
Second request may also start from the top (.org)



Cache Hit == Success

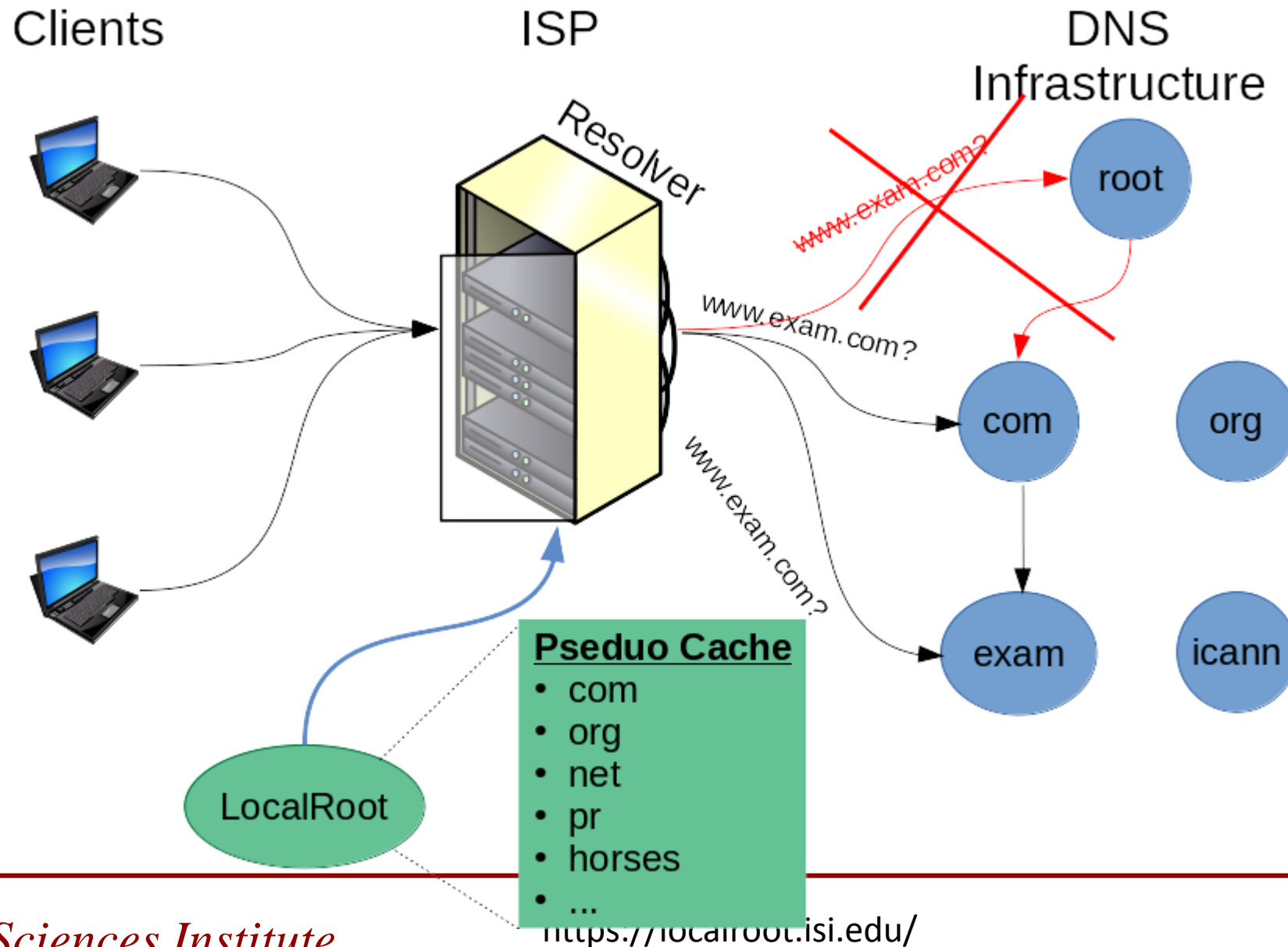


Cache Hit == Success

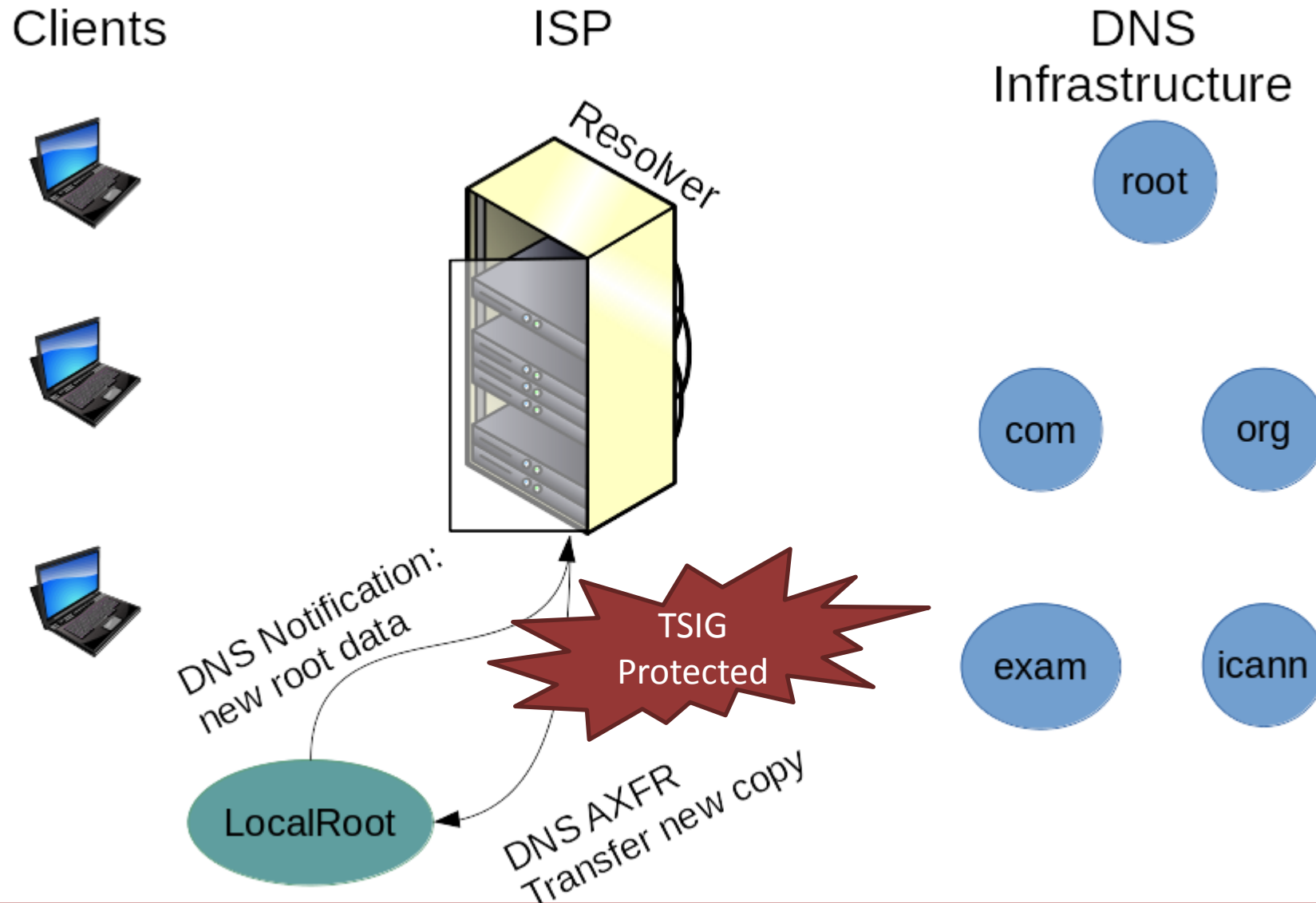


What if we could pre-cache everything??
(or at least a few zones)

LocalRoot is a pseudo cache



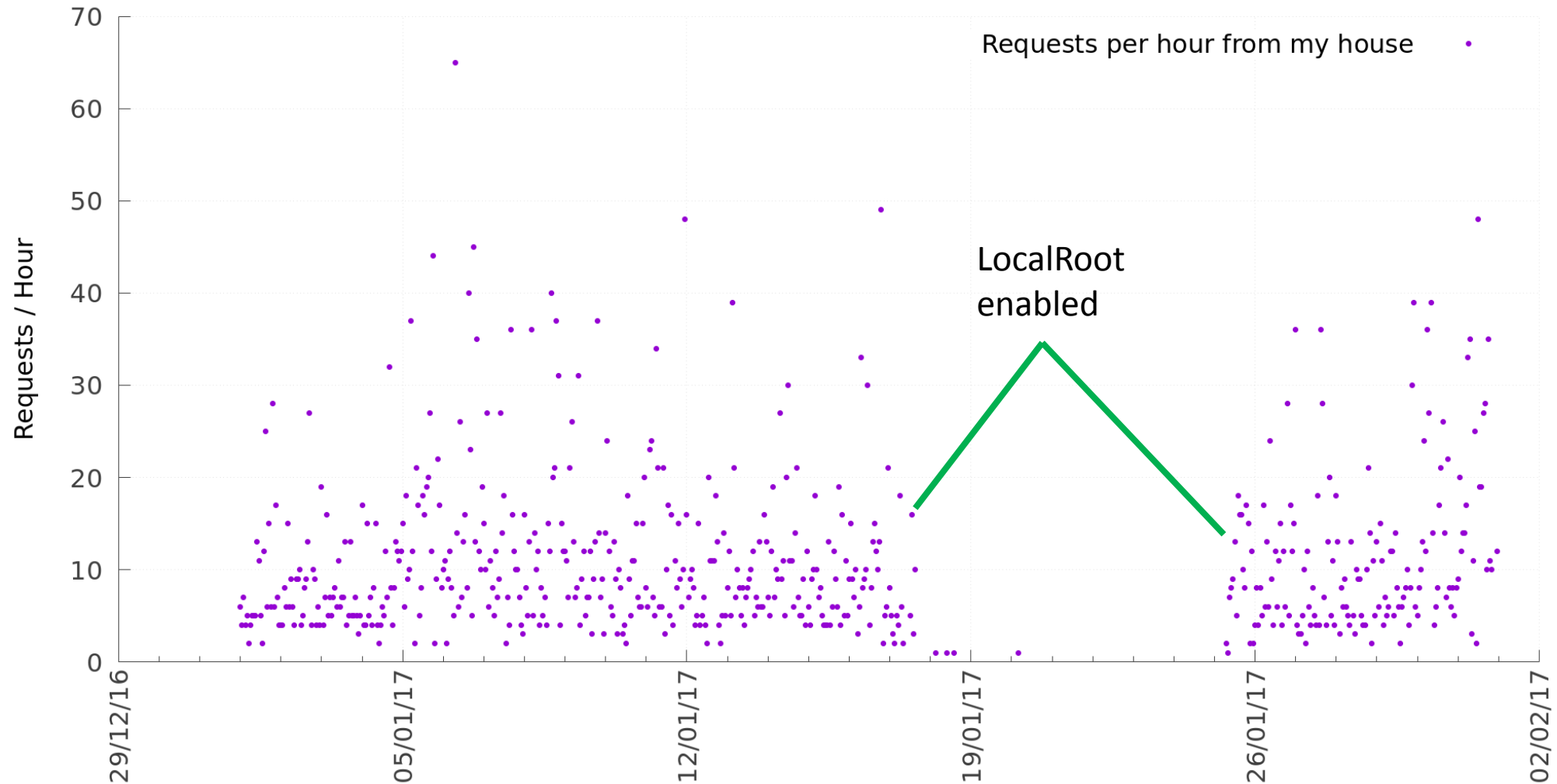
LocalRoot Extends RFC8806 -- add Security and Notifications



Why Use LocalRoot

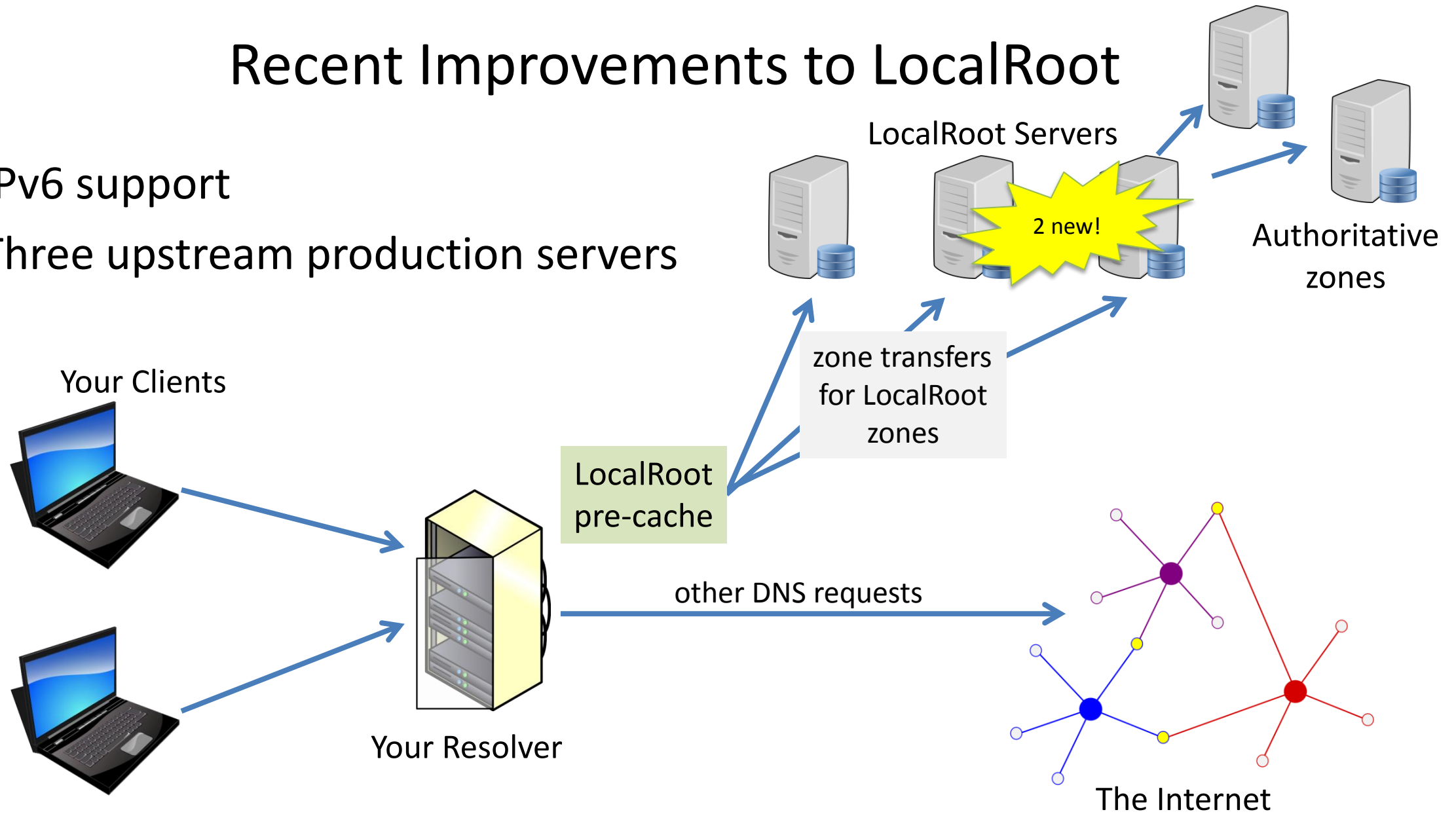
- Benefits
 - “Psuedo-caching” of the root and other zones
 - Removes the need to query them frequently
 - Protects ISPs from outages
 - Faster DNS lookups for first TLD and other lookups
 - Faster NXDOMAIN results
 - Negative answers make up most root traffic
 - 2020/05/06 DITL data: of 6.7B requests to b.root-servers.net, only 1.34B were valid
 - 80% were NXDOMAIN answers == TLD didn't exist!
- Research project of your own?
 - Trigger events after root-change notification?

Real World Effects of Running LocalRoot



Recent Improvements to LocalRoot

- IPv6 support
- Three upstream production servers



Recent Improvements to LocalRoot

- Configuration support for **bind, unbound and NSD**
- **3 upstream servers** (2 US west coast, one east)
- **Multiple zones** supported:
 - the root zone
 - .arpa
 - root-servers.net
 - dnssec-tools.org
- User preferences
 - E-mail notifications
- Moved inside our production provisioning and service monitoring
- UI and documentation Improvements

LocalRoot Home Page



LocalRoot

Our *LocalRoot* service allows you to serve a copy of the DNS Root Zone from your recursive resolver. For more information about *LocalRoot*, please see our [About LocalRoot](#) page and [Getting Started](#) pages.

- [Register](#)
- [Login](#)

NEWS

2020-06-05: Major update!

- IPv6 support
- Three upstream name-serves for localroot mirrored instances
- Support for new nameserver configuration generation:
 - Bind
 - Unbound
 - Knot
 - NSD
- Infrastructure in place to mirror zones other than just the root. Currently available:
 - . (The root zone)


Server List

LocalRoot -- Serve Yourself the Root


hardaker@isi.edu
preferences
Your TSIG Keys
Your Servers
Logout

About LocalRootGetting Started

Server List

Administrative Name	Address	TSIG	Last Transfer (UTC)	Enabled	Active	Delete	Config
dawn.hardakers.net	68.78.72.17	dawn.hardakers.net	Wed Jun 17 13:30:22 2020	✓	✓		[get config]

Add a New Server

(Click on the enabled buttons to toggle)


Servers will not be listed **active** until an hour after an initial AXFR has been seen.

Servers not marked as active **will still work**. Active simply means localroot will send DNS notifications to the registered address. Even without notifications, the server will properly cache root zone data.

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Configuration Generator Options

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Configuration Generator

Generating configuration for server *dawn.hardakers.net* at 68.78.72.17

Type of configuration to generate:

ISC BIND - Full recursive resolver configuration

Other configuration options:

Where do you want to store zonefile data?
(This directory must exist and be writable by the user running your name server!):

/var/named

Add support for listening to other network private address blocks:

☐ 10.0.0.0/8
☐ 172.16.0.0/12
☐ 192.16.0.0/12

Select zones to mirror:

☒ root
☒ arpa
☒ root-servers.net
☐ dnssec-tools.org

Update

Configuration Example

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About LocalRootGetting Started

Your generated configuration for **dawn.hardakers.net** at **68.78.72.17** is:

Place the following configuration in your `/etc/unbound/conf.d/` directory as a "localroot.conf" file, for example.

Note: this only works with Unbound 1.8 and above!

```
auth-zone:
  name: "."
  zonefile: "root.zone"

master: "128.9.28.5" # localroot-w-4
master: "2001:1878:401::8009:1c05" # localroot-w-6
master: "128.9.63.145" # localroot-e-4
master: "2001:470:7:b8:1:0:8009:3f91" # localroot-e-6
master: "206.117.5.93" # localroot-lax-4
master: "2001:500:204::1:0:93" # localroot-lax-6

# Backup servers that allow axfr today:

master: "192.228.79.201 # b-v4.root-servers.net
master: "2001:500:200::b # b-v6.root-servers.net
master: "192.33.4.12 # c-v4.root-servers.net
master: "2001:500:2::c # c-v6.root-servers.net
master: "199.7.91.13 # d-v4.root-servers.net
```


Account Preferences

LocalRoot -- Serve Yourself the Root



[About LocalRoot](#) [Getting Started](#)

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Account: hardaker@isi.edu

Email me on LocalRoot news:



Email me on required configuration changes:



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Lessons Learned: things that got in the way

- COVID-19
 - IP renumbering requirement was slowed significantly
 - Our IT department's deployment of new 10G cabling slowed
 - Slowed our own ability to physically update our side
- ReCaptcha
 - Presented LocalRoot at the ICANN DNSSEC Workshop
 - A bug in ReCaptcha processing meant errors got swallowed
 - Result was some users couldn't create accounts
 - Conclusion: Captchas are a pain
 - Related: DNS Cookies probably are too

Outstanding Questions

- What other zones would be useful to serve?
 - Currently only planning on serving zones with owner permission
 - In theory, anything with AXFR support would be served
- What types of zones are best served by LocalRoot?
 - CC tlds?
 - Critical infrastructure zones?
- Zone size limits
 - Clearly, huge zones are out of scope
 - What is the size boundary line?

Future Improvements

- E-Mail notifications on out-of-date detection
 - Support for other small-medium zones:
 - ***Your zone here!***
 - Contact me if interested
 - A REST API
 - Group accounts
-
- Please send feature requests / feedback my way!
 - `hardaker@isi.edu`

