LocalRoot – Serve Yourself

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What Is LocalRoot?

- A project to let you load root data into your resolvers
Classic DNS Resolution
Classic DNS Resolution

Clients

ISP

Resolver

Cache
- com
- example.com

DNS Infrastructure

root

www.example.com?

com

www.example.com?

example

www.example.com?

org

www.example.com?

icann
Classic DNS Resolution

Clients

ISP

DNS Infrastructure

Cache
- com
- example.com
- org
- icann.org

www.icann.org?

www.icann.org?

root

www.icann.org?

com

org

example

icann
Classic DNS Resolution

Clients → ISP → Resolver → DNS Infrastructure

Cache:
- com
- example.com
- org
- icann.org
- exam.com

ISP

www.exam.com?

DNS Infrastructure

root

com

org

exam

icann
DNS Resolution With LocalRoot

Clients ➔ ISP ➔ Resolver ➔ DNS Infrastructure

Psuedo Cache:
- com
- org
- net
- cx
- horses
- ...

DNS Infrastructure:
- root
- com
- org
- exam
- icann
DNS Resolution With LocalRoot

Clients

ISP

Resolver

DPSO Cache
- com
- org
- net
- cx
- horses
- ...

LocalRoot

root

www.exam.com?

com

org

exam

icann
LocalRoot: notifications on change

Clients

ISP

Resolver

DNS Infrastructure

Root

Com

Org

Exam

Icann

LocalRoot

DNS Notification: new root data

DNS AXFR Transfer new copy
Why Use LocalRoot?

- **Benefits**
  - "Psuedo-caching" of the root-data
  - Remove need to contact the root
  - Faster DNS lookups for first TLD lookups

- **Always up to date copy of the root**

- **Research project of your own?**
  - Trigger events after DNS notification?
LocalRoot Security

- The root data is DNSSEC signed
  - You can get it from anywhere
- LocalRoot transfers data using TSIG security
Demo!
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.

- About LocalRoot
- Getting Started
- Register
- Login

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Register

Email

Password

Password

I'm not a robot

Register

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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.

- About LocalRoot
- Getting Started
- Your TSIG Keys
- Your Servers
- Logout
LocalRoot: Getting Started

To deploy the LocalRoot service within your recursive resolver, please follow these steps:

1. Create a **TSIG key** to protect the transactions.

2. Create a **server entry** for your recursive resolver using its public IP address.

3. Perform a manual AXFR transfer from your recursive resolver. Within 5 minutes after you perform this step, the checkbox in the **Active** column will switch to a checkbox (✔️). **Note:** the transfer MUST come from the IP address you registered in step 2.

4. After the checkmark becomes active in your list of servers, add the configuration snippet from the link in the **Config** column for either **ISC's Bind** or **Unbound** and add it to your recursive resolver's configuration file. **Note:** If you are using views (e.g., internal recursive and external authoritative), the configuration for the root zone copy will need to be put inside the internal view.
TSIG List

No TSIG keys generated yet

Create New TSIG
Create a new TSIG key

Provide a name of your choice for the new TSIG to be created. The TSIG secret key and algorithm will be automatically assigned.

my cool TSIG key

Create New TSIG Record

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## TSIG List

<table>
<thead>
<tr>
<th>Administrative Name</th>
<th>Algorithm</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>my cool TSIG key</td>
<td>hmac-sha256</td>
<td>p9lbZHNNqKlqxHbtav5OU6g==</td>
</tr>
</tbody>
</table>

Create New TSG

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Server List

No servers created yet

Add a New Server
Add a localroot-copy server

my enterprise server

192.0.1.1

TSIG to use:

my cool TSIG key -- p9ibZHNgKlqxHbtav5OU6g==

Create Server

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# Server List

<table>
<thead>
<tr>
<th>Administrative Name</th>
<th>Address</th>
<th>TSIG</th>
<th>Enabled</th>
<th>Active</th>
<th>Config</th>
</tr>
</thead>
<tbody>
<tr>
<td>my enterprise server</td>
<td>192.0.1.1</td>
<td>my cool TSIG key: p9ibZHNqKlqxHbtav5OU6g==</td>
<td>✔️</td>
<td>✘</td>
<td>[bind]</td>
</tr>
</tbody>
</table>

*Click on the enabled buttons to toggle*

Servers will not be listed **active** until an hour after an initial AXFR has been seen.
LocalRoot:
ISC Bind Configuration File for Root-Zone RFC 7706 Support

This configuration file was generated at http://localroot.isi.edu
For server "my enterprise server" at address: 192.0.1.1

TSIG keys

key "my_cool_TSIG_key" {
  algorithm hmac-sha256;
  secret "p9ibZHNqK1qXHbtav50U6g==";
};

upstream servers to transfer from

server 128.9.36.81 { keys { "my_cool_TSIG_key"; }; }; // localroot.isi.edu

zone "." {
  type slave;
  file "/var/named/slaves/root.zone";
  notify no;
  masters {
    128.9.36.81; // localroot.isi.edu
    // backup root servers that allow axfr today
    192.228.79.201; // b.root-servers.net
    2001:500:200::b; // b.root-servers.net
    192.33.4.12; // c.root-servers.net
    2001:500:2::c; // c.root-servers.net
    192.5.5.241; // f.root-servers.net
    2001:500:2f::f; // f.root-servers.net
    192.112.36.4; // g.root-servers.net
    2001:500:12::d0d; // g.root-servers.net
    193.0.14.129; // k.root-servers.net
    2001:7fd::1; // k.root-servers.net
    192.0.32.132; // xfr.lax.dns.icann.org
    2620:0:2d0:202::132; // xfr.lax.dns.icann.org
    192.0.47.132; // xfr.cjr.dns.icann.org
    2620:0:2830:202::132; // xfr.cjr.dns.icann.org
  }
};
Real World Effects
Questions?

- Please try it and let me know what you think
  - https://localroot.isi.edu/
- I would love feedback!
  - How are you using it?
  - If research-focused, what are you doing with it?
  - What other features would you like to see?