

Secure DNS using Pi-Hole

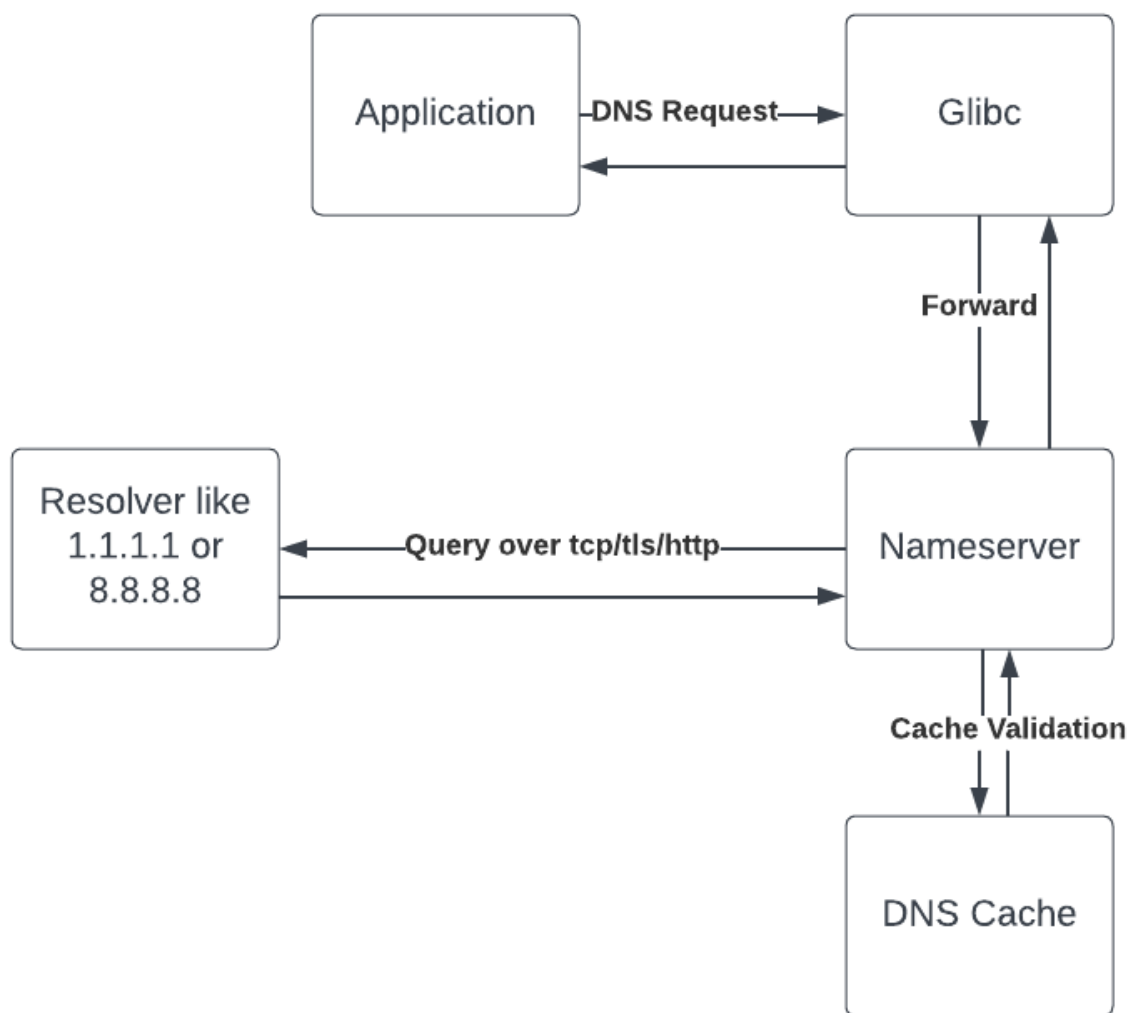
What is Pi-Hole?

Pi-Hole is a network-wide ad-blocking service that operates as a Domain Name System (DNS) sinkhole.

Pi-Hole works by intercepting DNS requests. This results in a faster and more private browsing experience.

It is typically used to block access to certain domain names, however it can also be used to redirect system DNS requests.

DNS in Linux Kernel.



DNS flowchart

Our Approach

We replace the nameserver of linux from systemd-resolve to our container.

Setup

Pre-setup : Freeing up port 53 from systemd-resolve

List the service running on port 53

```
sudo lsof -i :53
```

It generally is the systemd-resolved

```
sudo nano /etc/systemd/resolved.conf
```

Go to the Resolve section and change to-

```
[Resolve]
DNS=127.0.0.1
#FallbackDNS=
#Domains=
#LLMNR=no
#MulticastDNS=no
#DNSSEC=no
#DNSOverTLS=no
#Cache=no
DNSStubListener=no
#ReadEtcHosts=yes
```

Now run

```
sudo ln -sf /run/systemd/resolve/resolv.conf /etc/resolv.conf
```

Now reboot your system

Running Container

Run the following command

```
sudo docker compose up -d
```

Accessing the admin portal

Visit 127.0.0.1:7003 and current password will be change me but you can change it in docker-compose.yml file.

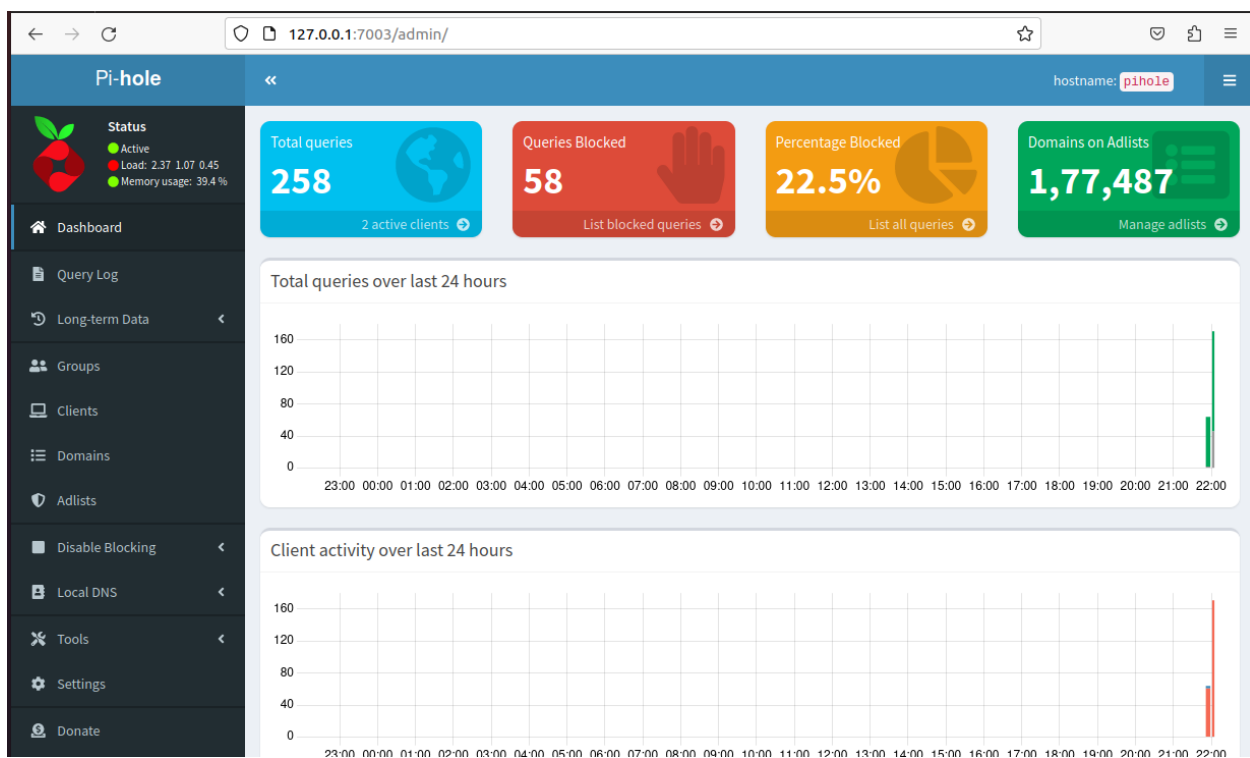
DoH in Action

running docker container

```
pushkar@SysPrac: ~/Systems-Practicum/pi-hole x pushkar@SysPrac: ~/Systems-Practicum/pi-hole x pushkar@SysPrac: ~/Systems-Practicum/pi-hole x
pushkar@SysPrac:~/Systems-Practicum/pi-hole$ sudo docker ps
[sudo] password for pushkar:
CONTAINER ID   IMAGE                                COMMAND                  CREATED        NAMES        STATUS               PORTS
73e970239059   pihole/pihole                       "/s6-init"              4 minutes ago Up 4 minutes (healthy) 0.0.0.0:53->53/tcp, 0.0.0.0:53->53/udp,
f5a1f22922cb   visibilityspots/cloudflared         "/bin/sh -c '/usr/lo..." 4 minutes ago Up 4 minutes (healthy) 53/tcp, 53/udp
ea30af42abbb   visibilityspots/cloudflared         "/bin/sh -c '/usr/lo..." 4 minutes ago Up 4 minutes (healthy) 53/tcp, 53/udp
                                     google-8.8.8.8
                                     cloudflare-1.1.1.1
pushkar@SysPrac:~/Systems-Practicum/pi-hole$
```

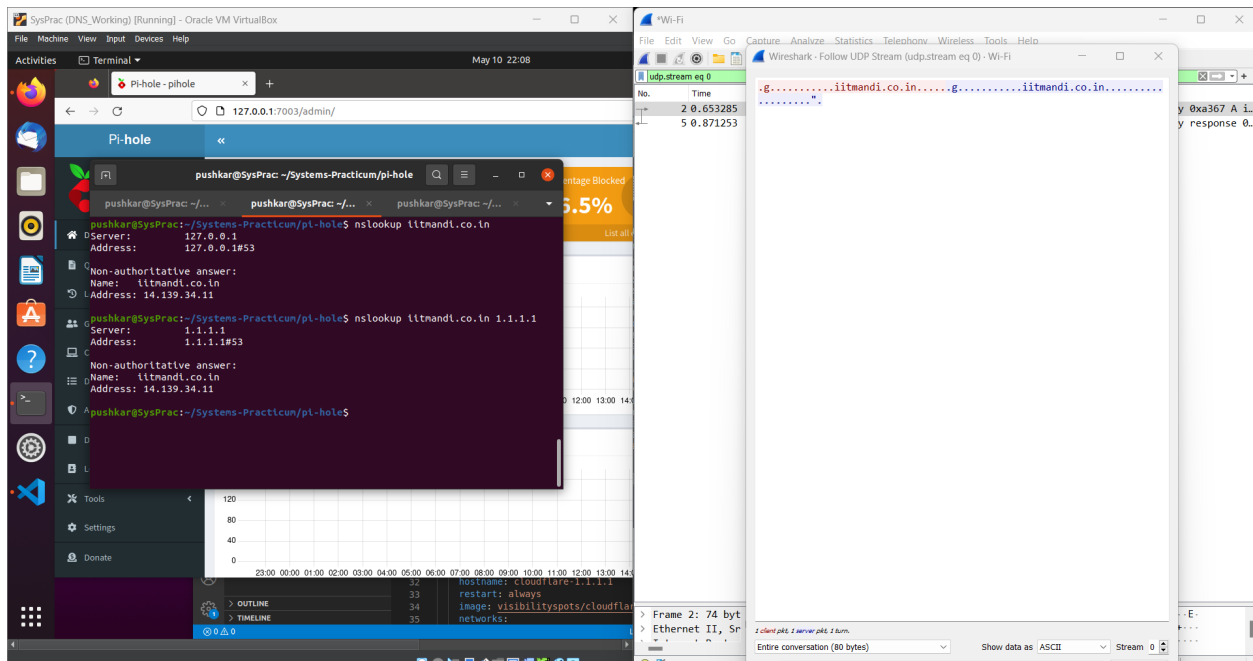
docker containers

pi-Hole Server



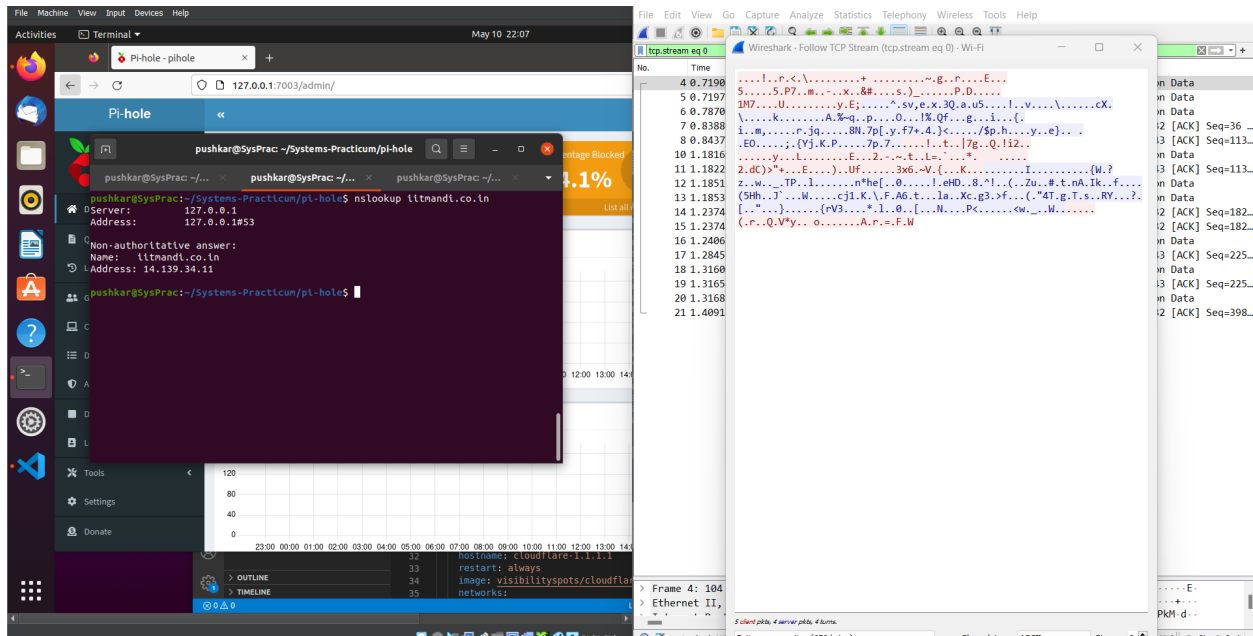
pi-Hole Admin portal

Unencrypted DNS Request



normal dns

Encrypted DNS Request



normal dns