# Overview

This lab will implement a simple domain name server between the end clients host and the top level domain (TLD) DNS server. In this lab the *hades* server DNS will serve as the TLD, and the student will implement their own sub domain server on their Debian VM. The system will then be tested by using another client. The sub domain DNS server will be used to resolve local domain names passed to it.

Before starting the installation be sure your Debian VM is “clean”, i.e. it starts with no problems. You will need Apache on it from the previous lab. After installing and configuring DNS you will be able to use the host + domain name to access the html files instead of typing the IP address.

Also, keep in mind the VMs get assigned an IP address via DHCP. To get the bind package from hades.lab you must have an IP address in that network. Part of this lab has you change from the IP address being assigned by DHCP to using a static assigned address (but you will keep the address assigned originally by DHCP) The DHCP assigned address has a finite lifetime. The duration should last for the duration of the lab (that is the DHCP server within *hades* will not assign that IP address to another machine for a certain period of time), but if you stop the lab partway through and then resume it another day you should check to see if that address has been reassigned to another machine. If it has been, you must update the static address to a new address.

# Step 1: Install Bind

The procedure to install BIND is similar to the procedure used to install Apache for Lab 4:

* apt-get install bind9

Your VM must be in the same network as the hades server to be able to install Bind9. The easiest way to ensure that is to have DHCP enabled for this step on your VM.

# Step 2: Network Configuration

DNS needs to run on a server that has a static address. If you used DHCP in Step 1, change the address to a static address. You can change the address via configuration files via the CLI or through the GUI. Although you may use an address in the labs address space, it would be best to use a Class C address in the form: 192.168.pcNN.xxx where pcNN is your workstations number and xxx is an arbitrary address you chose (anything from 2 to 245).

## CLI

Stop the interface and edit the following files (or use the scripts from a previous lab):

* interfaces
  + you should know where the file is by now
  + make sure the ip is static with the right address and mask
* resolv.conf
  + The file is /etc/resolv.conf
  + Edit it so the nameserver is your VM’s address and the domain and search entries are localdomain

## Step 2.1: Trouble Shooting

If you see the **Error** screen most likely it is do to the NIC not being active. Go to a (root) Terminal and type the following command: ***ifdown eth0***

Then return to the **Networks Settings** window and click *Activate.*

# Step 3: Edit DNS configuration files

***Notes:***

* The bind configuration files are located in ***/etc/bind*** (contains some default files)
* The default zone files are located in ***/var/cache/bind/*** (initially empty)
* The name *jxi3.uncc* is used as the default domain in the following examples; replace *jxia3* with your own uid.

Open a Terminal, change to “root”

* Change to the **/etc/bind** directory
* Back up the **named.conf.local** file before editing:
  + cp named.conf.local named.conf.local.backup
* Edit with the editor of your choice the **named.conf.local** file e.g.:
  + vim.tiny /etc/bind/named.conf.local
* Use the following textbox as an example and enter information for two zones into the file:

//

// Do any local configuration here

//

// Consider adding the 1918 zones here, if they are not used in your

// organization

//include "/etc/bind/zones.rfc1918";

zone "jxia3.uncc" {

type master;

file "/var/cache/bind/db.jxia3.uncc";

};

zone "50.168.192.in-addr.arpa" {

type master;

file "/var/cache/bind/db.192";

};

* + For the first zone:
    - Substitute your UID name for jxia3 in the example
  + For the second zone:
    - Substitute your IP address (in reverse order for the top 3 addresses) for 50.168.192
  + Note that for the file names referenced in both zone definitions is not critical, you can use any name. But using the above notation is following the typical naming conventions used for such files
* Save and quit vim

# Step 4: Create and Edit Zone Files

Open a Terminal, change to “root”

* Create the zone file for the first zone
  + vim.tiny /var/cache/bind/db.jxia3.uncc
  + **Note**: the file name must match the file name in the above *named.conf.local* file, change the name in the above command to create the proper named file
* Modify the file to match the following text box:

$TTL 1d

jxia3.uncc. IN SOA ns1.jxia3.uncc. root.jxia3.uncc. (

2007102701 ;

3h ;

15 ;

1w ;

3h ;

)

jxia3.uncc. IN NS ns1.jxia3.uncc.

ns1.jxia3.uncc. IN A 192.168.50.128

[www.jxia3.uncc](http://www.jxia3.uncc). IN A 192.168.50.128

debian.jxia3.uncc. IN A 192.168.50.128

kerberos.jxia3.uncc. IN CNAME debian.jxia3.uncc.

;

;Sub-domain

;

[www.us.jxia3.uncc](http://www.us.jxia3.uncc). IN A 192.168.50.128

[ftp.us.jxia3.uncc](ftp://ftp.us.jxia3.uncc). IN CNAME www.us.jxia3.uncc.

* + Be sure to change the names in the file to match your UID names
  + **Warning:** Be sure to put the ending “.” on the names!
* Create the zone file for the second zone
  + vim.tiny /var/cache/bind/db.192
  + Again match the name of this file with the name of the second zone reference in the **named.conf.local** file
* Edit this file to match the data shown in following text box:

$TTL 1d

50.168.192.in-addr.arpa. IN SOA ns1.jxia3.uncc. root.jxia3.uncc. (

2007102701;

3h;

15;

1w;

3h;

)

50.168.192.in-addr.arpa. IN NS ns1.jxia3.uncc.

128.50.168.192.in-addr.arpa. IN PTR www.jxia3.uncc.

* + Again change the names to match your id:
    - *jxia3* to your UID
    - The reverse addresses to match your reverse addresses
* Save and quit vim
* Reload bind with the following command:
  + /etc/init.d/bind9 reload

# Step 5: Test DNS

Use **nslookup** to test DNS

* Open Terminal, change to “root”
* Type the following command:
  + nslookup domain-name or IP-address
* You should get a result similar to the following:

debian-jxia3:/# nslookup 192.168.50.128

Server: 192.168.50.128

Address: 192.168.50.128#53

128.50.168.192.in-addr.arpa name = www.jxia3.uncc.

debian-jxia3:/# nslookup www.jxia3.uncc

Server: 192.168.50.128

Address: 192.168.50.128#53

Name: www.jxia3.uncc

Address: 192.168.50.128

debian-jxia3:/# nslookup ftp.us.jxia3.uncc

Server: 192.168.50.128

Address: 192.168.50.128#53

ftp.us.jxia3.uncc canonical name = www.us.jxia3.uncc.

Name: www.us.jxia3.uncc

Address: 192.168.50.128

## More than likely at this point nslookup will have failed due to typos in the previous actions. There may be a misspelling in the contents of a file, in the name of a file, or in the changing of a configuration file. The rest of the lab will be spent tracking down those errors. Use the hints in the troubleshooting section and the end of this lab to help you debug the DNS.

Once DNS is working try bringing up the web page using the domain name instead of the IP address. Document the web page can be accessed via the domain name (screenshot).

* Start a browser
  + Check you can browse your Apache web site with the IP address
  + Now use the URL www.UID.uncc/home.html to browse
  + Next try the URL for the sub domain: www.us.UID.uncc/home.html

# Deliverables

Lab report including the following:

* Description of the lab steps completed and results
* Screenshots/listings of
  + installing Bind
  + ifconfig
  + named.conf.local file
  + Zone files
  + nslookup results
* Screenshot of a browsed a resource using the server (host) names:
  + Using a browser and the host name (e.g. www.jxia3.uncc) to browse the html files that you did in the Apache Lab.

# Other Info

## GUI

This info is for the curious. The network configuration can be edited by a GUI. These are the instructions for an earlier version of Debian. It is not certain if they are valid for your version of Debian.

From the VMs GUI use the “Networking” utility to modify your VM network configuration:

* Desktop 🡪 Administration 🡪 Networking
* Ensure the **Connections** tab is selected
  + Click *Wired connection* (in the big white box), then *Properties*
  + Check/change the following:
    - **Configuration:** change from *DHCP* to *Static IP address*
    - **IP address:** **use the value** you noted from ifconfig above
    - **Subnet mask**: use default (255.255.0.0)
    - **Gateway Address:** not needed at this time, can be any address right now, or even be blank.
* If you get an error (“Could not enable…”) go to the trouble shooting section at the end of this step
* Select the **DNS** tab to change the DNS configuration
  + In “DNS Servers”
    - Delete existing addresses
    - Add your VMs static address
  + In “Search Domains”
    - Delete *hades.lab*
    - Add *localdomain*



“DNS Servers” must be changed to your VM's IP address, because you will be using your VM as a DNS sub domain server.

If the above changes do not hold, restart the VM and check.

# Trouble Shooting

To debug a lot of information to help will be in the log files for the DNS. The log files can get rather large over time, and most likely the errors will have occurred recently (at the end of the file).

To look at the last 20 entries in the log files use the following commands:

**# tail -n 20 /var/log/syslog  
# tail -n 20 /var/log/messages**

You may want to also try tail –f filename and see what it does.

There are also some command-line tools to help you debug files:

**# /usr/sbin/named-checkconf**   
# /usr/sbin/named-checkzone path/filename

You can look up what these tools do yourself.

### Typical Typos:

For the TTL the first character is “$”, the number “1” preceeds the d, not charater “l” (low case of L).

The correct first line is: $TTL 1d not STTL ld (note the *$* AND # *1*)

## Backup the configuration files before do any changes!

Be careful about editing the configuration files. Linux is case sensitive.

***Comment out unused lines***

Put some thought into whether a line should be deleted or commented out. If it is commented out it is easy to restore later.

## Run your VM from /scratch directory

Bad things will happen if you don’t

## Before Step5, test the following:

1. Reload bind with the following command:
2. **#/etc/init.d/bind9 reload**
3. then check the syslog file for errors. Use the timestamp to ensure currency.
4. Check to see if your VM is set correctly DNS with the following command:
5. **cat /etc/resolv.conf**

If the DNS IP is 172.16.1.1, edit the file to use your VM’s IP address.

To make network changes it is safest and least frustrating to edit the interfaces and resolv.conf files and then reboot the VM. Using the GUI interface sometimes works, sometimes don’t.