

– LPI 102 –



(Linux Professional Institute Certification)

a

```
.~.  
/V\   by: Andrew Eager  
//  \\\   andy@linuxivr.com  
@._.@
```

\$Id: gl2.113.5.slides.tex,v 1.1 2003/11/05 09:03:09 geoffr Exp \$

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Setup and Configure basic DNS services

Objective

Candidate should be able to configure hostname lookups and troubleshoot problems with local caching-only name server. Requires an understanding of the domain registration and DNS translation process. Requires understanding key differences in configuration files for bind 4 and bind 8.

Setup and Configure basic DNS services

Key files, terms, and utilities

`/etc/hosts`

`/etc/resolv.conf`

`/etc/nsswitch.conf`

`/etc/named.boot` (v.4) or `/etc/named.conf` (v.8)

`named`

DNS - DOMAIN NAME SERVICE

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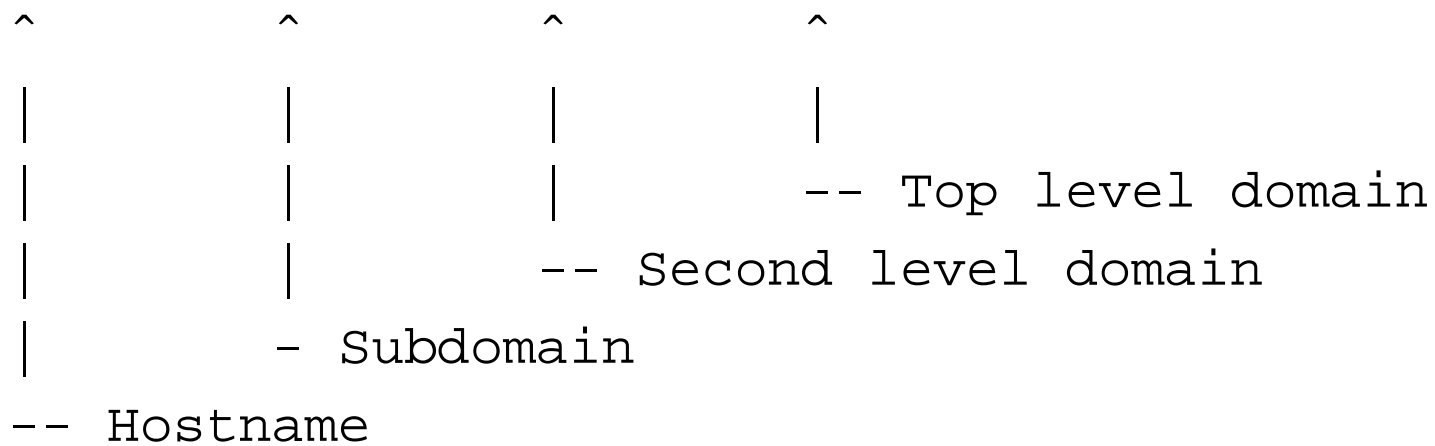
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- Below this is the Top Level Domain (TLD)
- Below the TLD is the Second Level Domain.
- The Second level domain is handled by whoever 'owns' that domain
- Third & lower level domains are handled by the domain owner.

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- Example:

node1.office.my-domain.com



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 - nsswitch says USE DNS:
 - * Read `resolv.conf` to see what nameserver to use
 - * Send request to nameserver and wait for response
 - nsswitch says USE HOSTS
 - * Lookup `/etc/hosts` for a matching hostname

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- An example:

passwd: files nisplus nis

shadow: files nisplus nis

group: files nisplus nis

hosts: db files dns

The `nsswitch.conf` file

- This is a file that determines what mechanisms are used by the hostname library calls to resolve names.
- The file contains lines with an identifier followed by a list of methods to use for name lookups.
- An example:
 - passwd:** files nisplus nis
 - shadow:** files nisplus nis
 - group:** files nisplus nis
 - hosts:** db files dns
- Note that the other entries like `passwd`, `shadow` and `group` are used for other applications like login and have nothing to do with DNS.

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- In the hosts line, we see that any hostname to be looked up will be done in the following order:
 1. Use local databases file (.db files in /var/db)
 2. Read /etc/hosts
 3. Search DNS

The `nsswitch.conf` file

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1. Use local databases file (.db files in /var/db)
2. Read /etc/hosts
3. Search DNS

- The Search options can be one of:

`nisplus` (or `nis+`) - Consult NIS+ (Yellow Pages)

`nis` (or `yp`) - Consult NIS

`dns` - Use a DNS server

`files` - Use local files like /etc/hosts

`db` - Use local database files

`compat` - Use NIS in compat mode

[NOTFOUND=return] - Stop searching and return host not found

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An example nsswitch file:

```
nisplus (or nis
passwd:      db files nisplus nis
shadow:      nisplus
group        db files nisplus nis

hosts:       db files nis dns

# Example - obey only what nisplus tells us...
#services:   nisplus [NOTFOUND=return] files
#networks:   nisplus [NOTFOUND=return] files
#protocols:  nisplus [NOTFOUND=return] files
#rpc:        nisplus [NOTFOUND=return] files
#ethers:     nisplus [NOTFOUND=return] files
#netmasks:   nisplus [NOTFOUND=return] files

bootparams:  nisplus [NOTFOUND=return] files

ethers:      files
netmasks:    files
networks:    files nis
```

```
protocols:  files nisplus
rpc:        files
services:   files nisplus

netgroup:   files nisplus

publickey:  nisplus

automount:  files nisplus
aliases:    files nisplus
```

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- This file configures how the system uses DNS. An example:

```
search aes
```

```
nameserver 10.27.1.10
```

```
nameserver 10.27.1.254
```

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- The 'search' line says what to append to a non-fully qualified name:
eg: ping node10 -> ping node10.aes

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- The 'search' line says what to append to a non-fully qualified name:
eg: ping node10 → ping node10.aes
- The nameserver lines tell the hostname routines which dns server to send requests to. (If first lookup fails, use the second, third etc)

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- Know that there is a difference between V4 & V8.

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- Bind is just one implementation of a DNS. Bind is to DNS what Apache is to http.
- Bind is configured with:
 - `/etc/named.conf` - For BIND V8
 - `/etc/named.boot` - For BIND V4
- Know that there is a difference between V4 & V8.
- Know how to configure V8 but not V4. (Different syntax)

BIND Configuration

- The configuration file contains subsections as follows:

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 - Options → How named will operate
 - logging → What/how named will log information
 - Access Lists → Who can use named & what they can do
 - Remote Servers → Characteristics of remote servers
 - zones → Information about our defined domains

An Example Config file:

```
options {
    directory "/var/named/";
    forward only;
    forwarders {
        203.2.75.132;
        203.2.75.108;
    };
    query-source address * port 53;
    listen-on {
        10.27.1.10;
        127.0.0.1;
    };
    notify no;
};

#### The root zone ###
zone "." {
    type hint;
    file "named.ca";
};
```

```
#### A zone for localhost ###
zone "0.0.127.in-addr.arpa" {
    type master;
    file "0.0.127.in-addr.arpa.zone";
};

zone "localhost" {
    type master;
    file "localhost.zone";
};

### A local domain ###
zone "1.27.10.in-addr.arpa" {
    type master;
    file "1.27.10.in-addr.arpa.zone";
};

zone "aes" {
    type master;
    file "aes.zone";
};
```

```
key "key" {  
    algorithm hmac-md5;  
    secret "JoqlFqtncqurkhMOrrbQLYRcxSYXoNROvNTZBqWJFumleNkzOvEvTAbqpbMV";  
};
```

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 - Forward file `zone.db`
 - Reverse file `zone.in-addr.arpa`

Zone files:

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 - Hostname to IP address translations (Forward lookups)
 - IP to Hostname translations (Reverse lookups)
- The names can be anything, but usually:
 - Forward file `hostname.domain.zone`
 - Reverse file `Net-IP.in-addr.arpa`
- Where the Net-IP is the network part of the IP address.

Zone Records:

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SOA record Marks the start of a zone.

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SRV record Defines what services are found where (eg ftp, http etc)

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SRV record Defines what services are found where (eg ftp, http etc)

A record Defines hostname to IP address translations (forward file)

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CNAME record Defines an alias for a hostname

LOC record Defines the physical location of the server

SRV record Defines what services are found where (eg ftp, http etc)

A record Defines hostname to IP address translations (forward file)

PTR record Defines IP address to hostname translations (reverse file)

Example Forward file /var/named/aes.zone

```
@          IN          SOA      node10.aes.  root.localhost (
                2 ; serial
                28800 ; refresh
                7200 ; retry
                604800 ; expire
                86400 ; ttl
                )

@          IN          NS       node10.aes.

node5      IN          MX       10          mail
node6      IN          MX       10          mail
node4      IN          MX       10          mail
node2      IN          MX       10          mail
node10     IN          MX       10          mail
gw         IN          MX       10          mail

node10     IN          A        10.27.1.10
node2      IN          A        10.27.1.2
node4      IN          A        10.27.1.4
```

node5	IN	A	10.27.1.5
node6	IN	A	10.27.1.6
cds	IN	A	10.27.1.99
gw	IN	A	10.27.1.254
ns	IN	CNAME	node10
mail	IN	CNAME	node10
node-4	IN	CNAME	node4

Example reverse file /var/named/1.27.10.in-addr

```
@      IN      SOA      @      root.localhost (  
        2 ; serial  
        28800 ; refresh  
        7200 ; retry  
        604800 ; expire  
        86400 ; ttk  
        )
```

```
@      IN      NS      ns.aes.  
  
2      IN      PTR     node2.aes.  
4      IN      PTR     node4.aes.  
5      IN      PTR     node5.aes.  
6      IN      PTR     node6.aes.  
10     IN      PTR     node10.aes.  
99     IN      PTR     cds.aes.  
254    IN      PTR     gw.aes.
```

Configuring a Caching only Nameserver

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The first time a name is needed, a normal lookup occurs (Authorative)
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The first time a name is needed, a normal lookup occurs (Authoritative)
The next time that name is needed, it is returned from cache
(Non-authorative)
- Under `/etc/named.conf` in the options section, just make sure you have the following directives set:

```
options {  
    directory "/var/named/";  
    forward only;  
    forwarders {  
        <First DNS to query>;  
        <Second DNS to query>;  
    };  
};
```

```
listen-on {                                <Your local IP address>;  
    127.0.0.1;  
};
```

```
listen-on {                                <Your local IP address>;  
    127.0.0.1;  
};
```

```
listen-on {                                <Your local IP address>;  
    127.0.0.1;  
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```

```
listen-on {                                <Your local IP address>;  
    127.0.0.1;  
};
```

- Leave the root zone (.) and localhost entries as they are.

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 - nslookup (deprecated)
 - dig
 - host
- To use in their simplest form, just add the hostname you wish to query as the first option to the command:

```
nslookup node16.c222
```

```
dig node16.c222
```

```
host node16.c222
```

nslookup

nslookup

- Usage: nslookup [option] host-to-find
[-name-server]

Example:

```
$ nslookup node2.aes -10.27.1.10 ↵
```


nslookup

- Usage: `nslookup [option] host-to-find`
`[-name-server]`

Example:

```
$ nslookup node2.aes -10.27.1.10 ↵
```

- Note: nslookup is deprecated and may be removed from future releases. Consider using the ‘dig’ or ‘host’ programs instead. Run nslookup with the `-sil[ent]` option to prevent this message from appearing.

```
Server:          10.27.1.10  
Address:         10.27.1.10#53
```

```
Name:    node2.aes  
Address: 10.27.1.2
```

dig

dig

- Usage: `dig [@name-server] host-to-find
[query-type]`

dig

- Usage: dig [@name-server] host-to-find
[query-type]
- Example:

```
$ dig @10.27.1.10 node2.aes ↵
```

```
;; <<>> DiG 9.2.0 <<>> @10.27.1.10 node2.aes
;; global options:  printcmd
;; Got answer:
;; ->HEADER<<- opcode: QUERY, status: NOERROR, id: 43860
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 1, ADDITIONAL: 1

;; QUESTION SECTION:
;node2.aes.                IN      A

;; ANSWER SECTION:
node2.aes.                 86400  IN      A      10.27.1.2

;; AUTHORITY SECTION:
aes.                       86400  IN      NS     node10.aes.
```

;; ADDITIONAL SECTION:

node10.aes. 86400 IN A 10.27.1.10

;; Query time: 5 msec

;; SERVER: 10.27.1.10#53(10.27.1.10)

;; WHEN: Mon Sep 2 13:48:38 2002

;; MSG SIZE rcvd: 80

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host

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- Usage: `host [option] host-to-find [name-server]`

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- Usage: `host [option] host-to-find [name-server]`

- Example:

```
$ host node2.aes ↵
```

```
node2.aes has address 10.27.1.2
```

Exercise:

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1. Install bind on your machine:

```
# rpm -Uvh bind-9*.rpm
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2. Configure a Caching only nameserver on your machine. (Make all queries forward to 192.168.222.254)

3. Make changes to resolv.conf & nsswitch.conf as required (Default domain to use is c222)

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2. Configure a Caching only nameserver on your machine. (Make all queries forward to 192.168.222.254)
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4. Start the named.

```
# service named start
```

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1. Install bind on your machine:

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# rpm -Uvh bind-9*.rpm
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3. Make changes to resolv.conf & nsswitch.conf as required (Default domain to use is c222)

4. Start the named.

```
# service named start
```

5. Test it out with the host node16.c222 using:

- nslookup
- dig

- host

- host

- host

- host

- host

- host

6. Test again this time with the host box16

- host

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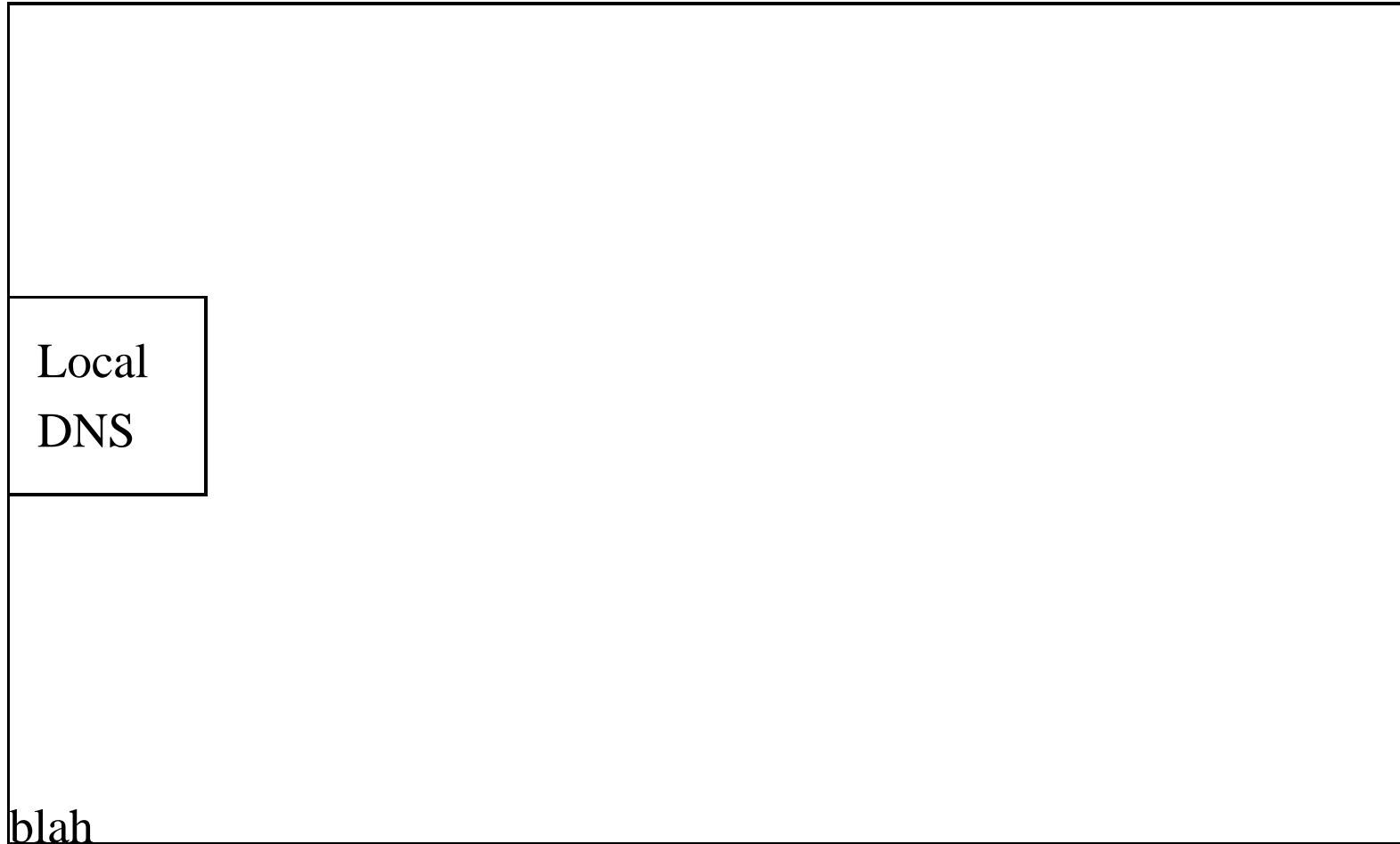
7. (For those who want a DNS challenge)

(a) Setup a set of zones for the .c222 domain.

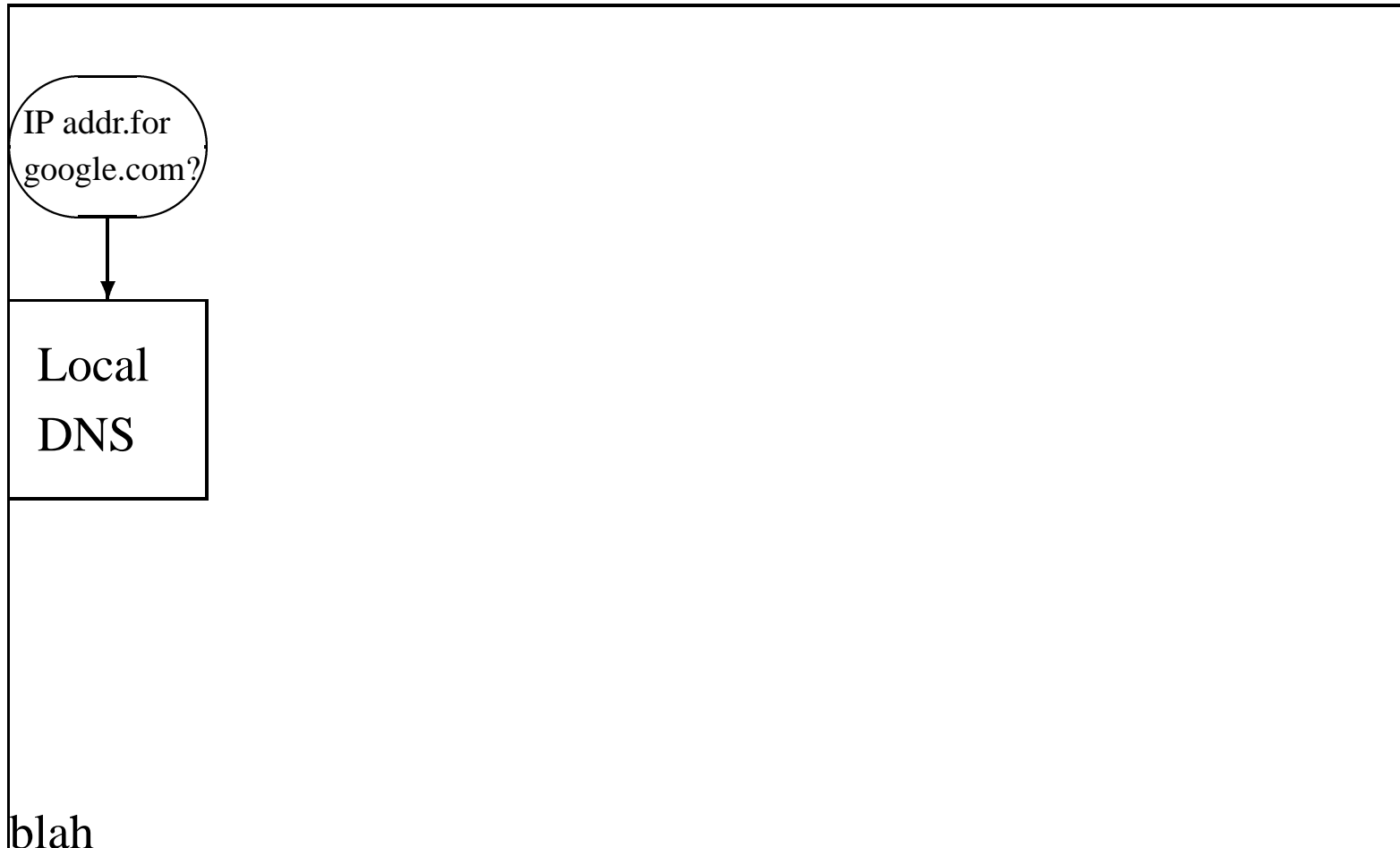
(b) Insert the new zone into the main configuration file

(c) Restart the named and test it.

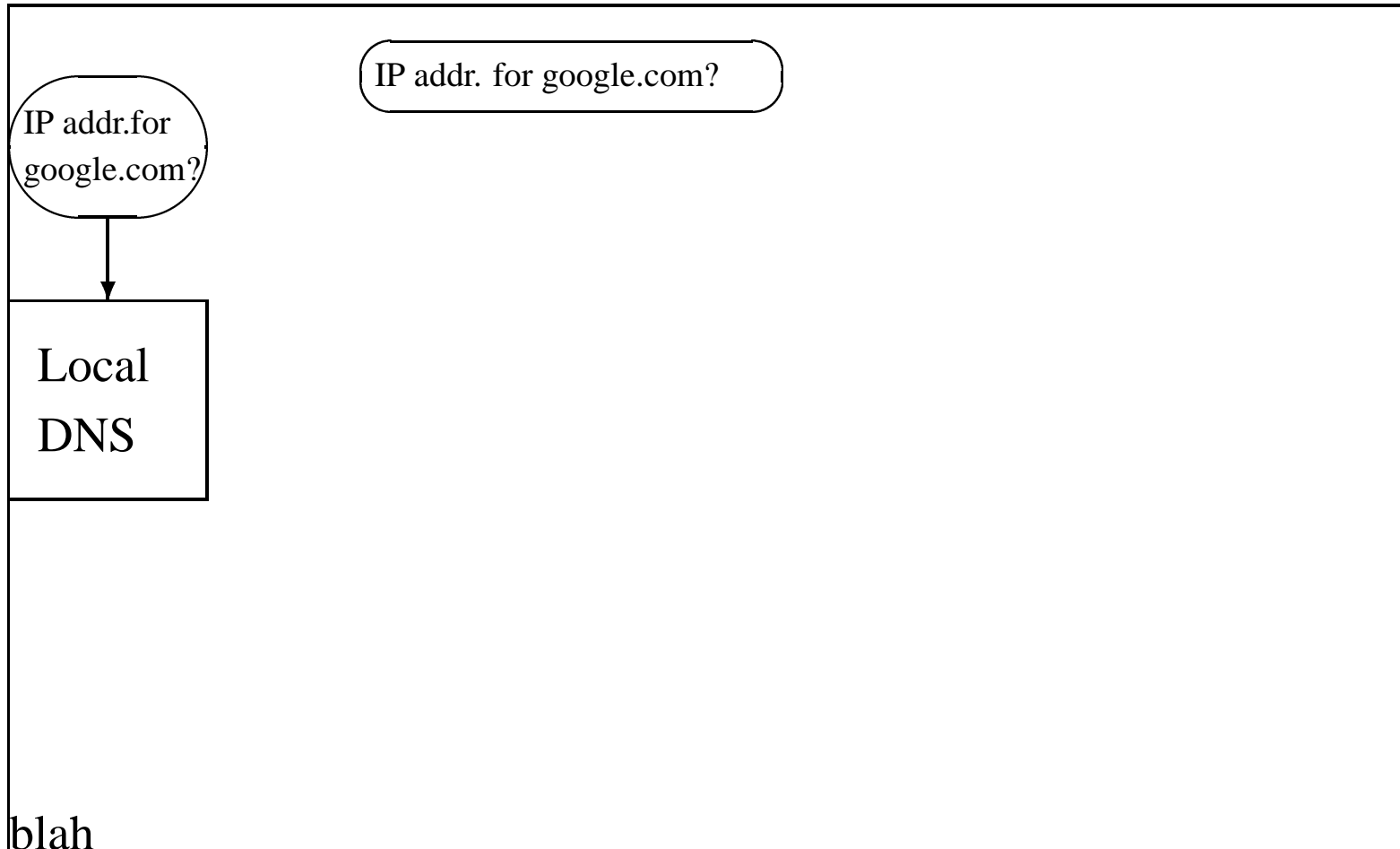
DNS Name Lookup Procedure



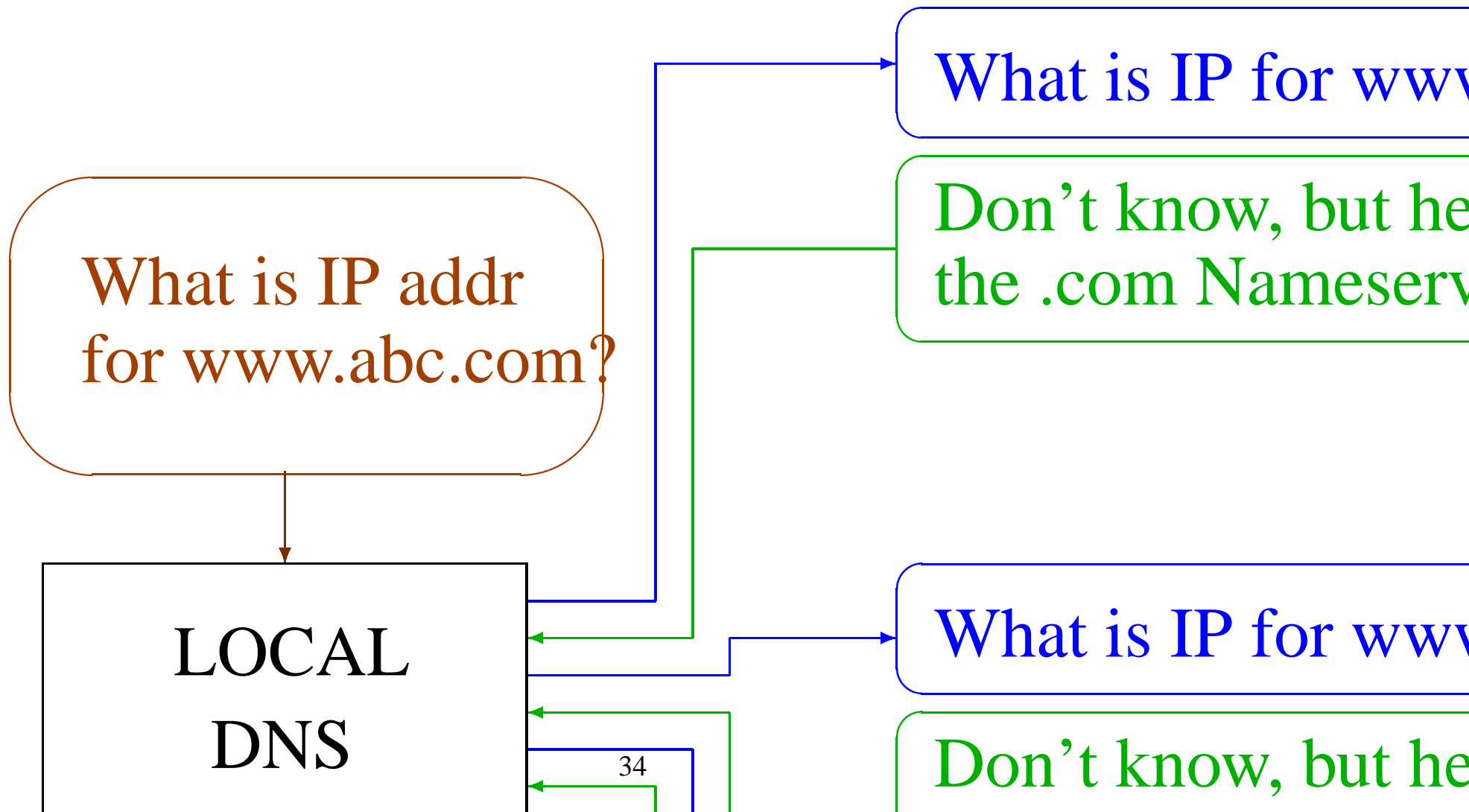
DNS Name Lookup Procedure



DNS Name Lookup Procedure



DNS NAME LOOKUP



What is IP addr
for www.abc.com?

LOCAL
DNS

34

What is IP for www

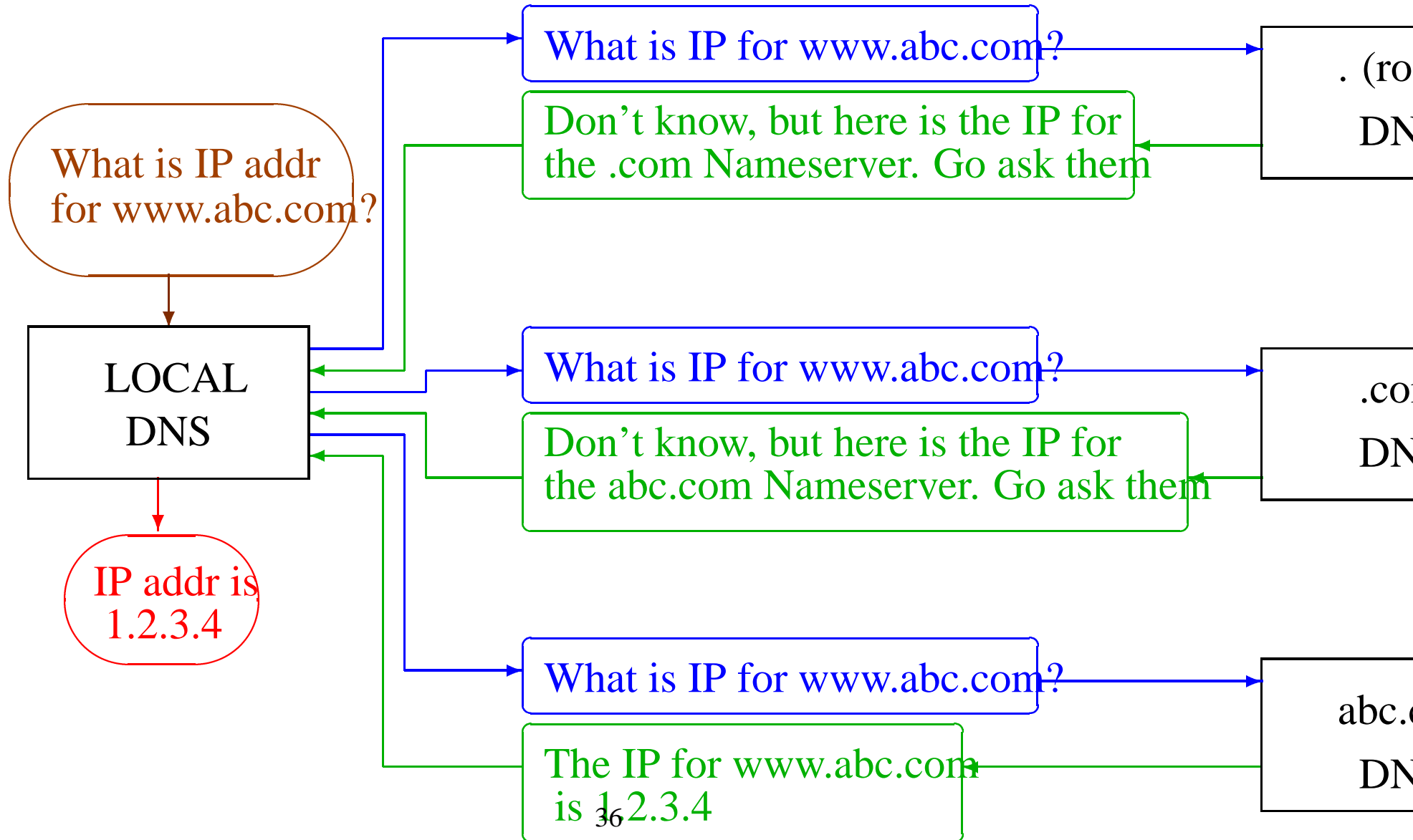
Don't know, but here
is the .com Nameserver

What is IP for www

Don't know, but here

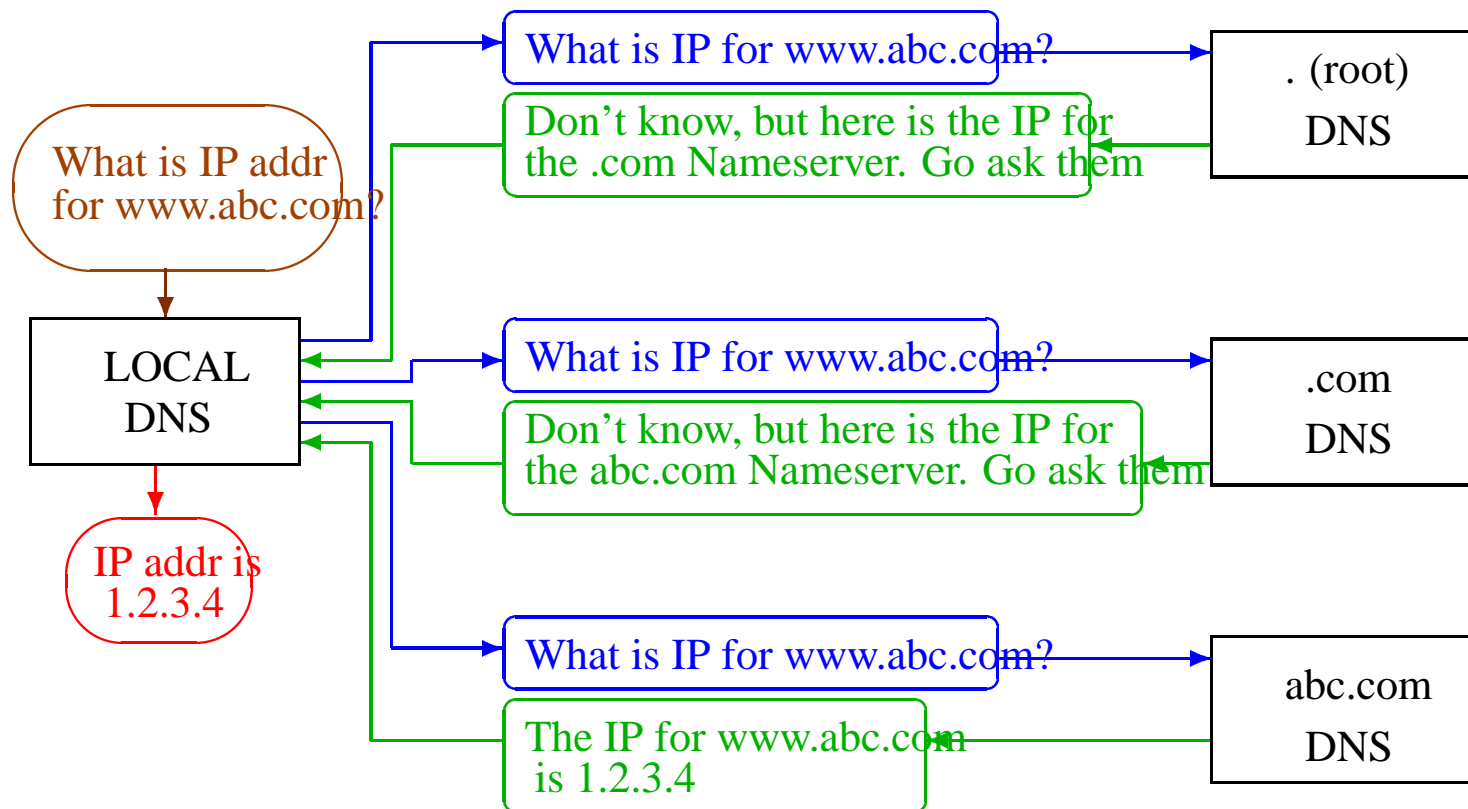
2

DNS NAME LOOKUP PROCEDURE



3

DNS NAME LOOKUP PROCEDURE



The End