ARQUITETURA DE COMUNICAÇÕES

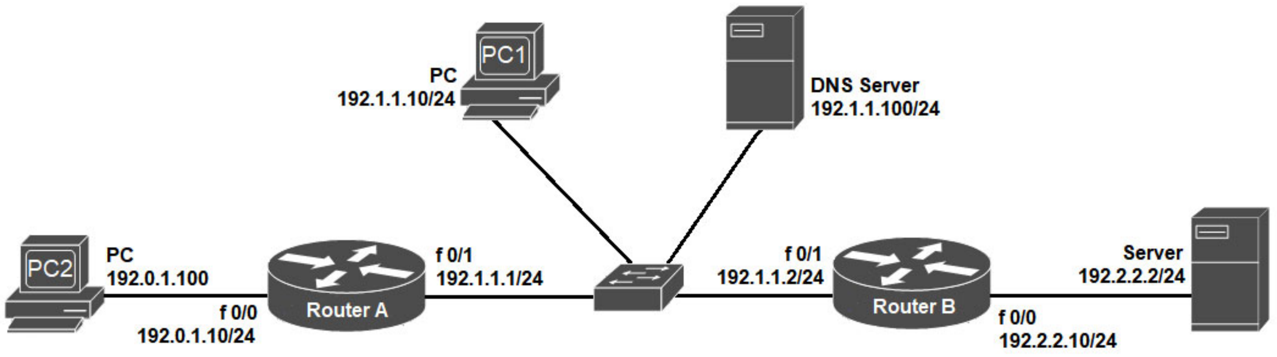
LABORATORY GUIDE

CDN DEPLOYMENT WITH CONDITIONAL DNS - UPDATE

Objectives

- Understand the basic mechanisms for CDN deployment.
- Conditional DNS.

Geographically aware DNS Server for CDN Deployment



1. Set up and configure the above depicted network. PC1 and PC2 are students' computers and Server is one of the Lab's PC. The DNS server is the other PC in the lab.

Note: this can be run in GNS3, and the PCs may then be emulated **with routers with "disable routing"**. Example for PC1 configuration:

```
PC1(config)#no ip routing                              !disables IPv4 routing
PC1(config)#ip default-gateway 192.0.1.10 !defines default gateway
PC1(config)#ip name-server 192.1.1.100     !defines DNS server
PC1(config)#ip domain lookup               !domain names should be resolved using DNS
PC1(config)#int f0/0
PC1(config-if)#ip address 192.0.1.100 255.255.255.0
PC1(config-if)#no shutdown
```

Make adequate configurations for Server1 and Server2.

Note: this can be run in GNS3, with the DNS Server implemented as a virtual Ubuntu/Debian server.

With the DNS Server connect to the internet, download the file GeoIP.acl (from http://geoip.site/download/MaxMind/GeoIP.acl) and place it on the /etc/bind/ folder of your server:

```
# sudo su
# dhclient
# cd /etc/bind/
# wget http://geoip.site/download/MaxMind/GeoIP.acl
```

Configure DNS Server IPv4 address and gateway:

```
# sudo ifconfig eth0 192.1.1.100/24
# sudo route add default gw 192.1.1.2/24
```

Test full connectivity, and analyze the contents of the file GeoIP.acl. The file contains a set of BIND Access Control Lists that map each IPv4 network of the world with a country prefix. It was constructed based on the GeoIP tools and database from MaxMind.

2. On the DNS Server, load the ACL file to BIND configuration by adding the following line to /etc/bind/named.conf (before the other include directives):

```
  include /etc/bind/GeoIP.acl;
```

If present, comment the line

```
  //include /etc/bind/named.conf.default-zones;
```

Restart your DNS server: `service bind9 restart` , and check its status: `service bind9 status`

Note: If the service restart fails, check the syslog file for reason: `tail /var/log/syslog`

3. Assuming that you own the domain **ACCDN.com** configure your DNS server to act as a master server (zone) for that domain. Start by creating the definition of the zones conditioned by the views (which are dependent of the client geographic position obtain from the ACL) with the associated *statements* (zone specific parameters), edit the file /etc/bind/named.conf.local (with root privileges) and add the following definitions:

```
view "europe" {
  match-clients { PT; ES; FR; GB; };
  recursion no;
  zone "accdn.com" {
    type master;
    file "/etc/bind/accdn.com-europe.db";
  };
};
```

```
view "north_america" {
  match-clients { US; CA; MX; };
  recursion no;
  zone "accdn.com" {
    type master;
    file "/etc/bind/accdn.com-north_america.db";
  };
};

view "other" {
  match-clients { any; };
  recursion no;
  zone "accdn.com" {
    type master;
    file "/etc/bind/accdn.com-other.db";
  };
};
```

4. Create the files /etc/bind/accdn.com-*.db (with root privileges) and add distinct contents.

Example for accdn.com-europe.db:

```
$TTL      604800
$ORIGIN accdn.com.
@         IN        SOA       ns1.accdn.com. adm.accdn.com. (
                                   2                 ; Serial
                               604800                ; Refresh
                                86400                ; Retry
                              2419200                ; Expire
                               604800 ) ; Negative Cache TTL
          IN        NS        ns1.accdn.com.
          IN        A         192.2.2.2
ns1       IN        A         192.1.1.100
```

Example for accdn.com-north_america.db:

```
$TTL      604800
$ORIGIN accdn.com.
@         IN        SOA       ns1.accdn.com. adm.accdn.com. (
                                   2                 ; Serial
                               604800                ; Refresh
                                86400                ; Retry
                              2419200                ; Expire
                               604800 ) ; Negative Cache TTL
          IN        NS        ns1.accdn.com.
          IN        A         192.2.2.2
ns1       IN        A         192.1.1.100
```

Example for accdn.com-other.db:

```
$TTL      604800
$ORIGIN accdn.com.
@         IN        SOA       ns1.accdn.com. adm.accdn.com. (
                                   2                 ; Serial
                               604800                ; Refresh
                                86400                ; Retry
                              2419200                ; Expire
                               604800 ) ; Negative Cache TTL
          IN        NS        ns1.accdn.com.
          IN        A         192.2.2.2
ns1       IN        A         192.1.1.100
```

Verify if your zone files are correctly defined:

```
 named-checkzone accdn.com accdn.com-europe.db
 named-checkzone accdn.com accdn.com-north_america.db
 named-checkzone accdn.com accdn.com-other.db
```

Restart your DNS server:

```
 service bind9 restart
```

Start a packet captures on PC1.

Using PC1, test the configuration of your DNS by forcing a DNS query with the following ping command:

```
ping accdn.com
```

Analyze the content of the DNS packets (server response) and PC1 DNS cache (show hosts).

5. Configure the PC2 and the server as belonging to different IPv4 networks in different world locations, e.g:

US: 12.111.196.0/24, 64.20.253.0/24;
PT: 176.124.252.0/24; 192.112.45.0/24;
BR: 65.205.133.0/24; 192.207.204.0/23;

After each address change, clear PC2's DNS cache (clear host ***) to force new DNS queries.**

Start a packet captures on PC2.

Using PC2, test the configuration of your DNS by forcing a DNS query with the following ping command:

```
ping accdn.com
```

Analyze the content of the DNS packets (server response) and PC2's DNS cache (show hosts) and correlate them with PC2 network's “world location”.

Use the GeoIP.acl file to identify more networks in different countries.