CS420 Computer Communication and Networks

Assignment 2
Assigned: 9/10/2015
Due: 9/17/2015 11:59 PM

Write a Java application that simulates the Domain Name Service (DNS) functionality using UDP sockets. DNS translates between URLs and IP addresses (both ways). Unlike the real DNS protocol which follows RFC 1034, your program will use APIs provided by Java to do the name resolution. In addition, you would only need to translate a URL to an IP address.

To see how DNS works, open a command window and type **nslookup**. At the prompt, enter a URL (for e.g., toolman.wiu.edu). You should see the URL translated to an IP address.

Client Specification

Write a java program with the name **DNSClient.java** that carries out the following. The client should be run as follows:

java DNSClient *servername:port_num*

servername is the name or IP address of the server, and *port_num* is the port number on which the server is listening on. If no other arguments are specified, the client should run a loop to prompt the user to enter a URL, and resolve the URL to an IP address. The client should then be terminated by typing in "exit" or by pressing Control-C. See below for an excerpt from a sample run.

```
C:\> java DNSClient toolman.wiu.edu:5959
>toolman.wiu.edu
toolman.wiu.edu 10.10.209.11
>wiu.edu
www.wiu.edu 10.10.125.43
>invalid.host.com
invalid.host.com is an invalid URL
>exit
C:\>
```

Server Specification

Write a java program with the name **DNSServer.java** that carries out the following. The server should be run as follows:
java DNSServer *port_num*

where *port_num* is the port number to which the server is bound and listening for client requests. The server should passively listen for client requests and resolve URLs as the requests come in. If the requested URL is a fully qualified domain name (e.g. www.wiu.edu), then the resolution should be done without any modification of the request. However, if the requested string is not a fully qualified domain name, then the string should be treated as follows. Any string that does not have a suffix should be treated with the default domain name **wiu.edu**. Any string that is of the form x.y should be treated as www.x.y. For e.g., "toolman" should be treated as

"toolman.wiu.edu" and "google.com" should be treated as www.google.com. Both the URL and the resolved IP address should be then returned to the client.

In case of a URL that cannot be resolved, an appropriate error message should be returned to the client.

Name Resolution

Name resolution by the server should be carried out as follows: the server should first check a file called "hosts.txt" to see if the requested domain name is an entry in the file. You can assume that this file is located in the same directory as the server's class file (note: please do not hard code the location of the file such as C:\DNSServer\hosts.txt). The file should contain two columns, one for the domain name and the second for the IP address.

Sample "hosts.txt" file:

www.netsolutions.com 101.12.100.24
www.wiu.edu 10.10.125.43

If the file contains the requested URL, then the server should return the corresponding IP address. If not, the server should then try to resolve the query by using the ***InetAddress.getByName***() method, and return the IP address if the resolution is successful. If this too fails, the server should return an error code or message indicating that the URL is invalid.

What to submit

Upload your code in WesternOnline as well as toolman.wiu.edu. Use the *submit_cs420* program to submit your source code (both DNSClient.java and DNSServer.java) only on toolman.

For this assignment, you should use the command

```
submit_cs420 –s hw2 DNSClient.java
submit_cs420 –s hw2 DNSServer.java
```

to submit your program. To verify submission, use the command

```
submit_cs420 –l hw2
```

Note: DO NOT hard code port numbers in your client program. This beats the purpose of dynamically providing the server port number to the client via command line argument.
To test the program on toolman, run your server on a port number between 5900 and 5999. To avoid conflict with other students in the class, use the following port selection rule

port number = 5900 + (WIU ID mod 100)

Coding Style

Your code should start with an Author block which contains your name, date and brief description of the code as follows.

```
/**
 * Author:
```

```
 * Date:
 * Brief Description:
 */
```

Additional methods should have a descriptive block which contains method description, parameters and return value.

```
/**
 * Method Overview:
 * Parameters:
 * Returns:
 */
```

In addition, all code should be sufficiently commented so that code flow and logic is easy to understand.