



Department of Information and Communication Technology
Network Programming

C Program to resolve domain names

Prepared by: DUONG Tuan Minh - BI11-172

Instructor: TRAN Giang Son

Date: May 26, 2022

Abstract

This document specifies a method and procedures to implement a DNS resolver program in C language. Specifically, two functions C functions `gethostbyname()` and `inet_ntop()` are used to resolve domain name to IP addresses and present the result.

Contents

1	Problem Analysis	1
1.1	Get domain name from user	1
1.2	Resolve domain name	1
2	Get domain name from user	1
2.1	Domain name comes from program's arguments	1
2.2	Domain name comes from user input	1
3	Resolve domain name	2
3.1	Hostname is not found	2
3.2	Hostname is resolved successfully	2
4	Demonstration	3
4.1	Run the program locally	3
4.2	Run the program on a VPS in Singapore	3

1 Problem Analysis

1.1 Get domain name from user

- Domain name comes from program's arguments
- Domain name comes from user input

1.2 Resolve domain name

- Hostname is not found
- Hostname is resolved successfully

2 Get domain name from user

Initially, a char array of length 255 is declared to store the domain name

```
char domain[MAX_LENGTH];
```

2.1 Domain name comes from program's arguments

`argc` is the argument count. If `argc` is greater than one, there is at least one argument. We copy the second argument of `argv` (the first argument is the program name) into the domain char array

```
if (argc > 1)
{
    strncpy(domain, argv[1], MAX_LENGTH);
}
```

2.2 Domain name comes from user input

If no argument is provided, we prompt the user to enter a domain name and store the input into the domain char array

```
else
{
    printf("Enter a domain name: ");
    scanf("%255s", domain);
}
```

3 Resolve domain name

Utilizing the function `gethostbyname()`, we can resolve the domain and obtain either a pointer to a `struct hostent` or a null pointer.

3.1 Hostname is not found

If we obtain a null pointer, the domain name cannot be resolved. Then we inform the user and exit the program

```
if (host_ptr == NULL)
{
    printf("Cannot find address for hostname: %s\n", domain);
    return 0;
}
```

3.2 Hostname is resolved successfully

If we obtain a pointer to a `struct hostent`, we loop through its address list, convert each address to a char array using the function `inet_ntop()` and print the result

```
printf("Official hostname: %s\n", host_ptr->h_name);

char ip_addr[32];

for (int i = 0; host_ptr->h_addr_list[i] != NULL; i++)
{
    printf("Address: %s\n", inet_ntop(host_ptr->h_addrtype,
    host_ptr->h_addr_list[i], ip_addr, sizeof(ip_addr)));
}
return 0;
```

4 Demonstration

Compile the program to an output file name `mynslookup`

4.1 Run the program locally

```
> ./mynslookup facebook.com
Official hostname: facebook.com
Address: 157.240.211.35

> ./mynslookup
Enter a domain name: facebook.com
Official hostname: facebook.com
Address: 157.240.211.35

> ./mynslookup stackoverflow.com
Official hostname: stackoverflow.com
Address: 151.101.193.69
Address: 151.101.129.69
Address: 151.101.65.69
Address: 151.101.1.69

> ./mynslookup
Enter a domain name: stackoverflow.com
Official hostname: stackoverflow.com
Address: 151.101.193.69
Address: 151.101.129.69
Address: 151.101.65.69
Address: 151.101.1.69

> ./mynslookup randomtext
Cannot find address for hostname: randomtext

> ./mynslookup
Enter a domain name: randomtext
Cannot find address for hostname: randomtext
```

4.2 Run the program on a VPS in Singapore

```
> ./mynslookup facebook.com
Official hostname: facebook.com
Address: 157.240.235.35

> ./mynslookup
Enter a domain name: facebook.com
Official hostname: facebook.com
Address: 157.240.235.35
```

```
> ./mynslookup stackoverflow.com
Official hostname: stackoverflow.com
Address: 151.101.193.69
Address: 151.101.1.69
Address: 151.101.129.69
Address: 151.101.65.69

> ./mynslookup
Enter a domain name: stackoverflow.com
Official hostname: stackoverflow.com
Address: 151.101.193.69
Address: 151.101.1.69
Address: 151.101.129.69
Address: 151.101.65.69

> ./mynslookup randomtext
Cannot find address for hostname: randomtext

> ./mynslookup
Enter a domain name: randomtext
Cannot find address for hostname: randomtext
```

The resolved IP address of facebook.com on my local machine 157.240.211.35 is different from the one from my VPS 157.240.235.35 because one domain name can map to multiple IP addresses and the geographical distance can cause the mapping to behave differently in different region.