

CS Basics - Exercises

Control Structures in C

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1 Linking against GNU adns

Install the GNU adns library (including development headers).

Compile, link and run the following program:

```
#include <stdio.h>
#include <adns.h>
#include <arpa/inet.h>

int
main(int argc, char **argv)
{
    adns_state ads;
    adns_answer *answer;
    int ret;
    char buf[128];

    ret = adns_init (&ads, adns_if_none, NULL);
    if (0 != ret)
        return ret;
    ret = adns_synchronous (ads,
                           argv[1],
                           adns_r_a,
                           adns_qf_want_allaf,
                           &answer);

    if (0 != ret)
        return ret;
    if (adns_s_ok != answer->status)
        return 1;
    // TBC
```

```
adns_finish (ads);
return 0;
}
```

- What happens if you give a valid domain name as the argument?
- What happens if you give a non-existing domain name as the argument?
- What happens if you give no arguments?

Modify the code to handle error cases nicely by printing an appropriate error message.

2 IPv4 name resolution

At the “TBC” comment, the `answer` variable contains an IPv4 address of the domain that was given on the command line. You will need to study the `/usr/include/adns.h` header to understand what `answer` contains. Note that the IPv4 address is inside of `adns_answer` as a `struct in_addr` (see `man 7 ip` for details).

Modify the code to print out the IP address in the usual dotted decimal format. Use the `inet_ntop()` function to convert the `struct in_addr` to a string. You should provide a stack-allocated array of at least `INET_ADDRSTRLEN` bytes for the `dst` argument.

3 IPv6 support

Add a command-line option `-6` to optionally resolve a DNS name to an IPv6 (AAAA) record.

Explain the reasoning behind the design of the `adns_answer` type.

4 SOA

Start-of-authority (SOA) records provide additional information about a DNS zone’s authority. Add a command-line option `-soa` to resolve and print a given DNS zone’s SOA record.

5 Optional: DNS resolution

Enhance your tool:

- Add support for TXT, CNAME, MX and NS records
- Add support for reverse (PTR) lookups
- Print human-readable, specific error messages for the various types of resolution failures.

6 Structures

Write a program containing the definition of a new type. The `car`. A car has different members: brand, type, identification number, and price.

Write a program that asks the user to enter new cars. Enter "Control D" to finish the input.

Printout the list of all cars on screen.

7 Files

Open a file : "cars.txt". Modify the previous program, such that it writes all cars into the file. All the informations must be written in the file.

Write another file, that reads the file cars.txt. Creates the items in the structures (should use malloc for doing this). And print them out.

8 Low level programming

Write in C the function for computing the binary log, using no division (just shift).