

If you encounter time out, please try again(eg. `socket.timeout: timed out`)

If you try many times(worst case), please wait a few minutes and try again. This is because of unstable network and congestion of network and so on.

1. How to run(in short)

(1) in the first terminal: run code, input flag (we take flag 1 for example)

```
(base) matengfei@matengfeideMacBook-Pro ECE4016 % python3 dns.py
please enter flag (1 or 0): 1
via: 202.12.27.33
via: 192.55.83.30
via: 220.181.33.31
CNAME: www.a.shifen.com.
via: 202.12.27.33
via: 192.55.83.30
via: 110.242.68.134
via: 180.76.76.95
The ip address for www.baidu.com. is 157.148.69.74
via: 202.12.27.33
via: 192.55.83.30
via: 202.12.27.33
via: 192.55.83.30
via: 199.43.135.53
via: 199.43.135.53
The ip address for www.example.com. is 93.184.216.34
get it from cache:157.148.69.74
The ip address for www.baidu.com. is 157.148.69.74
get it from cache:93.184.216.34
The ip address for www.example.com. is 93.184.216.34
^CTraceback (most recent call last):
  File "dns.py", line 124, in <module>
    message,clientAddress = serverSocket.recvfrom(2048)
KeyboardInterrupt
```

(2) in the second terminal: just dig.

Notice: in the example, we dig baidu,example,baidu,example totally, and twice query is from cache.

```
(base) matengfei@matengfeideMacBook-Pro ECE4016_Computer-Network_a1 % dig www.baidu.com @127.0.0.1 -p1234
;; Warning: query response not set

<>> Dig 9.10.6 <>> www.baidu.com @127.0.0.1 -p1234
;; global options: +cmd
;; Got answer:
;; -->HEADER<-- opcode: QUERY, status: NOERROR, id: 9208
;; flags: aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.baidu.com.                IN      A

;; ANSWER SECTION:
www.baidu.com.                0      IN      CNAME   www.a.shifen.com.
www.a.shifen.com.            120    IN      A       157.148.69.74
www.a.shifen.com.            120    IN      A       157.148.69.80

;; Query time: 901 msec
;; SERVER: 127.0.0.1#1234(127.0.0.1)
;; WHEN: Sat Oct 14 02:06:56 CST 2023
;; MSG SIZE rcvd: 90

(base) matengfei@matengfeideMacBook-Pro ECE4016_Computer-Network_a1 % dig www.example.com @127.0.0.1 -p1234
;; Warning: query response not set

<>> Dig 9.10.6 <>> www.example.com @127.0.0.1 -p1234
;; global options: +cmd
;; Got answer:
;; -->HEADER<-- opcode: QUERY, status: NOERROR, id: 39568
;; flags: aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.example.com.             IN      A

;; ANSWER SECTION:
www.example.com.             86400  IN      A       93.184.216.34

;; Query time: 995 msec
;; SERVER: 127.0.0.1#1234(127.0.0.1)
;; WHEN: Sat Oct 14 02:07:01 CST 2023
;; MSG SIZE rcvd: 49
```

```
(base) matengfei@matengfeideMacBook-Pro ECE4016_Computer-Network_a1 % dig www.baidu.com @127.0.0.1 -p1234
;; Warning: query response not set

; <<>> DiG 9.10.6 <<>> www.baidu.com @127.0.0.1 -p1234
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 61476
;; flags: aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.baidu.com.                IN      A

;; ANSWER SECTION:
www.baidu.com.                 0       IN      CNAME   www.a.shifen.com.
www.a.shifen.com.             120     IN      A       157.148.69.74
www.a.shifen.com.             120     IN      A       157.148.69.80

;; Query time: 0 msec
;; SERVER: 127.0.0.1#1234(127.0.0.1)
;; WHEN: Sat Oct 14 02:07:07 CST 2023
;; MSG SIZE rcvd: 90

(base) matengfei@matengfeideMacBook-Pro ECE4016_Computer-Network_a1 % dig www.example.com @127.0.0.1 -p1234
;; Warning: query response not set

; <<>> DiG 9.10.6 <<>> www.example.com @127.0.0.1 -p1234
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 4977
;; flags: aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.example.com.              IN      A

;; ANSWER SECTION:
www.example.com.              86400   IN      A       93.184.216.34

;; Query time: 0 msec
;; SERVER: 127.0.0.1#1234(127.0.0.1)
;; WHEN: Sat Oct 14 02:07:10 CST 2023
;; MSG SIZE rcvd: 49
```

2. How to run(in details)

- (1) open two terminals
- (2) first terminal runs code

①

```
% python3 dns.py
```

- (3) you will see hint to input flag

①

```
(base) matengfei@matengfeideMacBook-Pro ECE4016 % python3 dns.py
please enter flag (1 or 0): 1
```

②

you can input 1 or 0, 1 is iterative search, 0 is for query public server. Here we take 1 for example

- (4) second terminal use “dig” to query

①

```
% dig www.example.com @127.0.0.1 -p1234
```

②

wait a few seconds, you will see the result in the second terminal

```
(base) matengfei@matengfeideMacBook-Pro ECE4016_Computer-Network_a1 % dig www.example.com @127.0.0.1 -p1234
;; Warning: query response not set

; <<>> DiG 9.10.6 <<>> www.example.com @127.0.0.1 -p1234
;; global options: +cmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 43624
;; flags: aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0

;; QUESTION SECTION:
;www.example.com.              IN      A

;; ANSWER SECTION:
www.example.com.              86400   IN      A       93.184.216.34

;; Query time: 4227 msec
;; SERVER: 127.0.0.1#1234(127.0.0.1)
;; WHEN: Sat Oct 14 01:47:14 CST 2023
;; MSG SIZE rcvd: 49
```

1)

- ③ you also can see some middle nodes passed in the first terminal

```
The ip address for www.baidu.com is 202.106.0.177
via: 202.12.27.33
via: 192.55.83.30
via: 202.12.27.33
via: 192.55.83.30
via: 199.43.135.53
via: 199.43.133.53
via: 199.43.135.53
1) The ip address for www.example.com. is 93.184.216.34
```

- ④ you can use “control + c” to terminate the program