

Author

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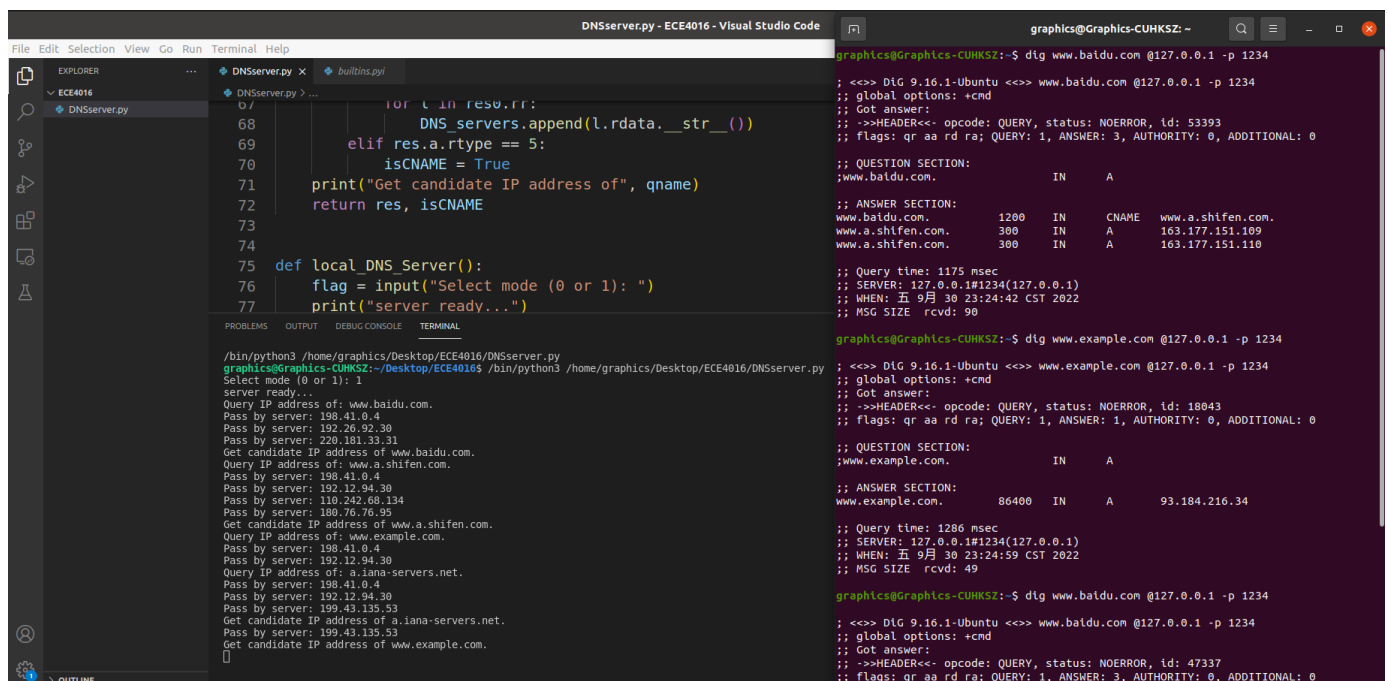
2022.9.30

Environment

```
graphics@Graphics-CUHKSZ:~$ python3 -V
Python 3.8.10
graphics@Graphics-CUHKSZ:~$ cat /etc/issue
Ubuntu 20.04.3 LTS \n \l
```

How to run local DNS server

1. Open the folder in a terminal.
2. Enter “python3 DNSserver.py” and run.
3. Select mode, 1 for iterative searching, and 0 for asking the public server for the IP address.
4. Open another terminal.
5. Enter “dig www.baidu.com @127.0.0.1 -p 1234” and run.



The screenshot shows a Visual Studio Code editor with the file `DNSserver.py` open. The code defines a `local_DNS_Server()` function that prompts the user to select a mode (0 or 1). Mode 0 uses a public DNS server, and mode 1 uses a local iterative search. The terminal window shows the output of the program, including the selection of mode 1 and the successful resolution of `www.baidu.com` to `127.0.0.1`. The terminal also shows the output of the `dig` command, which returns the IP address of `www.baidu.com` as `127.0.0.1`.

```
graphics@Graphics-CUHKSZ:~$ python3 -V
Python 3.8.10
graphics@Graphics-CUHKSZ:~$ cat /etc/issue
Ubuntu 20.04.3 LTS \n \l
```

```
graphics@Graphics-CUHKSZ:~$ python3 DNSserver.py
Select mode (0 or 1): 1
server ready...
Query IP address of: www.baidu.com.
Pass by server: 198.41.0.4
Pass by server: 192.26.92.30
Pass by server: 220.181.33.31
Get candidate IP address of www.baidu.com.
Query IP address of: www.a.shifen.com.
Pass by server: 198.41.0.4
Pass by server: 192.12.94.30
Pass by server: 110.242.68.134
Pass by server: 180.76.76.95
Get candidate IP address of www.a.shifen.com.
Query IP address of: www.example.com.
Pass by server: 198.41.0.4
Pass by server: 192.12.94.30
Pass by server: 199.43.135.53
Get candidate IP address of a.iana-servers.net.
Pass by server: 199.43.135.53
Get candidate IP address of www.example.com.
```

```
graphics@Graphics-CUHKSZ:~$ dig www.baidu.com @127.0.0.1 -p 1234
;<<<> DiG 9.16.1-Ubuntu <<> www.baidu.com @127.0.0.1 -p 1234
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 53393
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0
;; QUESTION SECTION:
;www.baidu.com.                IN      A
;; ANSWER SECTION:
www.baidu.com.                1200    IN      CNAME   www.a.shifen.com.
www.a.shifen.com.            300     IN      A       163.177.151.109
www.a.shifen.com.            300     IN      A       163.177.151.110
;; Query time: 1175 msec
;; SERVER: 127.0.0.1#1234(127.0.0.1)
;; WHEN: 五 9月 30 23:24:42 CST 2022
;; MSG SIZE rcvd: 98

graphics@Graphics-CUHKSZ:~$ dig www.example.com @127.0.0.1 -p 1234
;<<<> DiG 9.16.1-Ubuntu <<> www.example.com @127.0.0.1 -p 1234
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 18043
;; flags: qr 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: 1286 msec
;; SERVER: 127.0.0.1#1234(127.0.0.1)
;; WHEN: 五 9月 30 23:24:59 CST 2022
;; MSG SIZE rcvd: 49

graphics@Graphics-CUHKSZ:~$ dig www.baidu.com @127.0.0.1 -p 1234
;<<<> DiG 9.16.1-Ubuntu <<> www.baidu.com @127.0.0.1 -p 1234
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 47337
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0
```

```
DNSserver.py - ECE4016 - Visual Studio Code
graphics@Graphics-CUHKSZ: ~

File Edit Selection View Go Run Terminal Help

EXPLORER
  ECE4016
    DNSServer.py
    local_DNS_Server

DNSServer.py
89
90 while True:
91     message, clientAddress = serverSocket.recvfrom(2048)
92     message_parse = dnslib.DNSRecord.parse(message)
93     print("Query IP address of:", message_parse.q.qname)
94
95     # Judge whether the query is already in the cache
96     if message_parse.q.qname in cache:
97         responseMessage = cache[message_parse.q.qname]
98         # Set the id of response packet same with query
99         responseMessage.header.id = message_parse.header.id
100         serverSocket.sendto(responseMessage.pack(), clientAddress)
101     else:
102         r = dnslib.DNSRecord.question(message_parse.q)
103         for j in public_servers:
104             try:
105                 rr = r.send(j, timeout=5)
106                 cache[message_parse.q.qname] = rr
107                 responseMessage = rr
108                 serverSocket.sendto(responseMessage.pack(), clientAddress)
109
110 PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL
graphics@Graphics-CUHKSZ:~/Desktop/ECE4016$ /bin/python3 /home/graphics/Desktop/ECE4016/DNSServer.py
Select mode (0 or 1): 0
server ready...
Query IP address of: www.baidu.com.
Query public server: 77.68.88.76
Query IP address of: www.example.com.
Query public server: 77.68.88.76
Query IP address of: www.baidu.com.
[]

graphics@Graphics-CUHKSZ:~$ dig www.baidu.com @127.0.0.1 -p 1234
;<<<> DiG 9.16.1-Ubuntu <<> www.baidu.com @127.0.0.1 -p 1234
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 30905
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0
;; QUESTION SECTION:
;www.baidu.com.                IN      A
;; ANSWER SECTION:
www.baidu.com.                 466     IN      CNAME  www.a.shifen.com.
www.a.shifen.com.             7       IN      CNAME  www.wshifen.com.
www.wshifen.com.             252     IN      A      183.232.231.173

graphics@Graphics-CUHKSZ:~$ dig www.example.com @127.0.0.1 -p 1234
;<<<> DiG 9.16.1-Ubuntu <<> www.example.com @127.0.0.1 -p 1234
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 58526
;; flags: qr rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 0, ADDITIONAL: 0
;; QUESTION SECTION:
;www.example.com.              IN      A
;; ANSWER SECTION:
www.example.com.              79009   IN      A      93.184.216.34

;; Query time: 203 msec
;; SERVER: 127.0.0.1#1234(127.0.0.1)
;; WHEN: 五 9月 30 23:38:36 CST 2022
;; MSG SIZE rcvd: 49

graphics@Graphics-CUHKSZ:~$ dig www.baidu.com @127.0.0.1 -p 1234
;<<<> DiG 9.16.1-Ubuntu <<> www.baidu.com @127.0.0.1 -p 1234
;; global options: +cmd
;; Got answer:
;; ->HEADER<- opcode: QUERY, status: NOERROR, id: 31641
;; flags: qr rd ra; QUERY: 1, ANSWER: 3, AUTHORITY: 0, ADDITIONAL: 0
```