Network Programming in Python

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- Computers that receive service are clients and servers provide service.
- Both client and server need a program to establish connection.

- 3 requirements to establish connection::
  - Hardware
  - Software
  - Protocol
- Protocol- Set of rules for computers in network for data transfer.
  - TCP(Transmission Control Protocol)/IP(Internet) Protocol
  - UDP(User Datagram Protocol)

TCP/IP Protocol

- It is a standard protocol used in many network.
- It has following 5 layers::
    - Application Layer-Topmost, interacts with application- passes data in stream to TCP.
    - TCP-Divides data into packets(group of bytes of data)-sent to IP layer.
    - IP-inserts packets into envelopes called frames(contains packet, destination IP, source IP, error detection bits)
    - Data Link Layer-dispatches frames to correct destination computer on network.
    - Physical Layer-physically transmit data using appropriate hardware.
- A computer in network is identified by IP address.-4 integer numbers separated by a dot as 216.58.194.197(numerical representation of gmail.com)
- Domain naming service/system maps IP address with website names.

- TCP is connection oriented protocol.
- Used for reliable data transfer.
  - HTTP-transfer web pages.
  - FTP- download or upload files from and to server.
  - SMTP- send emails on network.
  - POP-receive mails into mail boxes.
  - NNTP- transfer news articles on internet.

- UDP is connection less protocol.
- Not generally used to sent text as there may be some loss of bits.

Sockets

- Point of communication between server and client.
- Each socket can be given identification number-port number.
- We provide a new port number for every socket .
- For server to connect to client, a socket is needed.

- To create socket, socket module is used.

S=socket.socket(address family, type)

address family--socket.AF_INET/socket.AF_INET6

type = socket.SOCK_STREAM / Socket.SOCK_GRAM

IP address of a webpage->

- To know the of IP address of website

- **addr=socket.gethostbyname('www.google.in')**
- Will return IP address of google.co.in into addr variable

if there is no such website then it return 'gaierror'

ip.py

URL(Uniform Resource Locator)

- It represents the address that is specified to access some information or resource on internet.

e.g. http://www.blogpost.com:80/index.html

It contains 4 parts:

1)Protocol to use(http://)

2)The server name or IP address of server(www.blogpost.com)

3)Port number(80)(optional)

4)Last part is the file that is referred (index.html)

- When a URL is given , we can parse the URL and find out all the parts of the URL with the help of **urlparse()** function of **urllib.parse** module.

tpl=urllib.parse.urlparse('urlstring')

The parts that can be retrieved of URL from tuple tpl are:

scheme: this gives protocol name used in URL

netloc: gives website name on the net with port number if present.

path: path of web page

port: gives port number

We can also get a total URL from tuple by calling geturl() function

urlparse.py

Reading source code of web page

urlopen() function helps in getting source code of a web page

This function belongs to **urllib.request module**

f=urllib.request.urlopen(“https://www.python.org”)

sourcecode.py

Downloading a web page from internet

Program1:

pageread1.py

Program2(Download an image from internet):

imageread.py

TCP/IP Server

- Program to create a TCP/IP server and client program

Server1.py

client1.py

Program to create a UDP server and client program

server2.py

client2.py

Two way communication between client and server – simple chat program

chatserver.py

chatclient.py

Send an e mail to any mail address

mail.py

- To send a mail via python program we need SMTP class of smtplib module.
- An object of smtp class is created to connect to smpt server
- After connecting we can send mail via send_message(msg) method
- ‘msg’ represents total message to be sent including address to which and from which mail should be exchanged, subject and body of mail.
- It is represented as an object of MIMEText class which belongs to the email.mime.text module.
- MIME(Multi purpose Internet Mail Extensions) indicates an extension of original internet e mail protocol that lets people use the protocol to exchange different kinds of data on the internet .