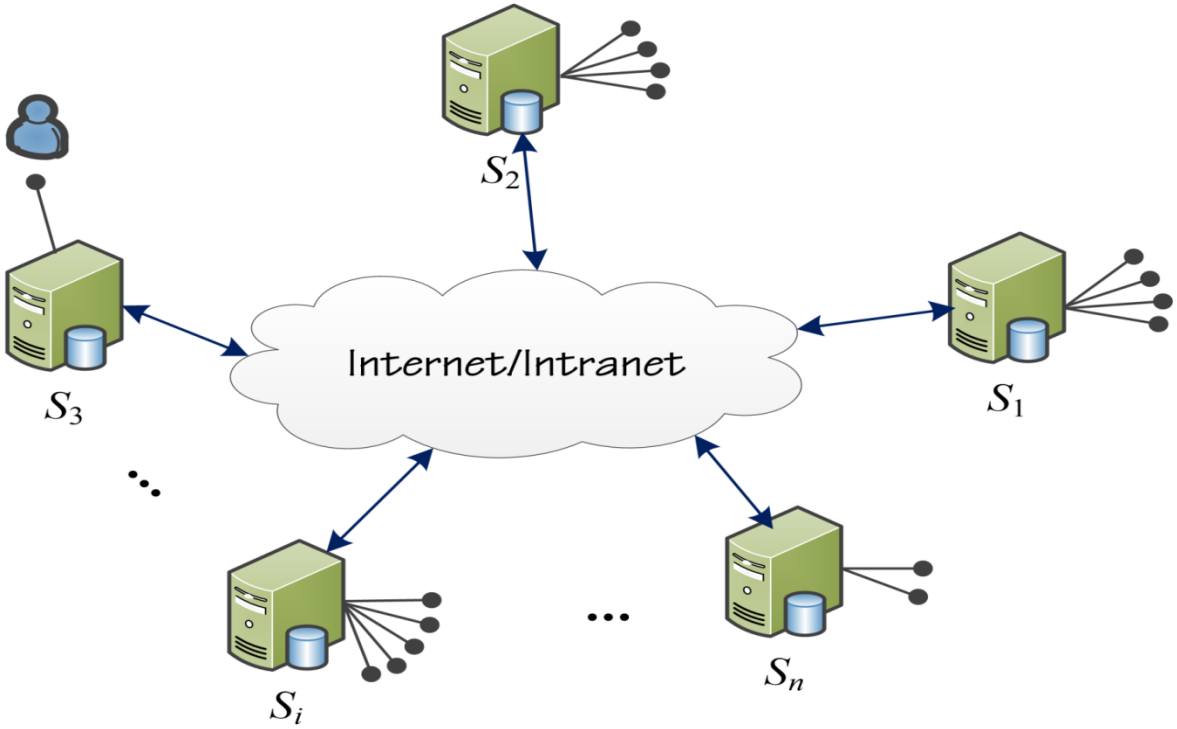
Chapter 6 - Part 2
Network communication

Content

- 1. Distributed System
- 2. Type of the TCP/IP protocol
- 3. Client/Server Communication by Socket
- 4. Port corresponding to a network service
- 5. Access to Website by Socket
- 6. Smtp Protocol
- 7. Remote Procedure Calls



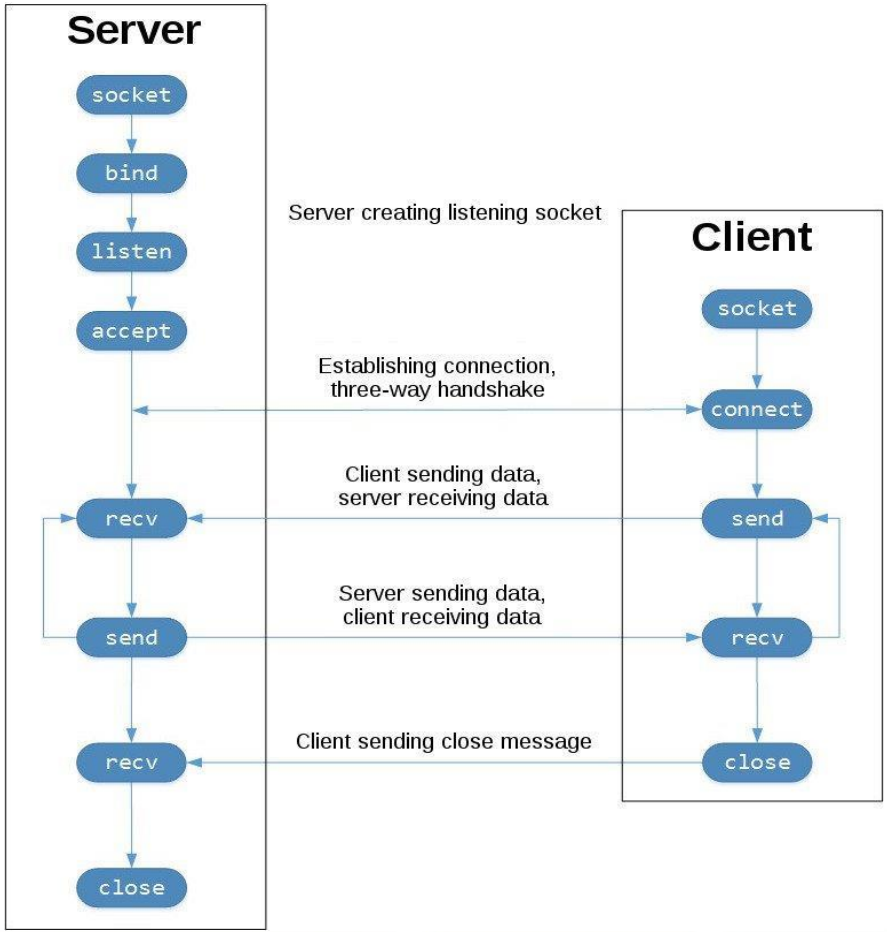
Connection model in Distributed System

2. Type of the TCP/IP protocol

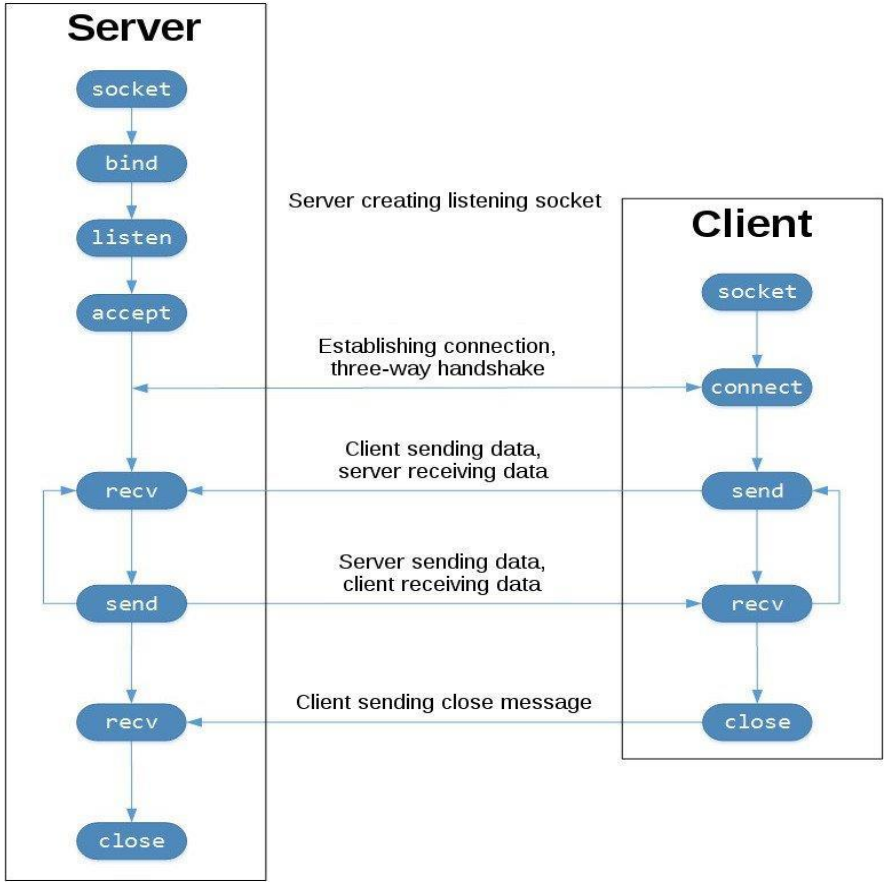
- FTP (File transfer Protocol)
- Telnet: The terminal allows login to the server.
- SMTP (Simple Mail Transfer Protocol)
- DNS (Domain Name Service)
- SNMP (Simple Network Management Protocol)
- TCP (Transmission Control Protocol)
- IP (Internet Protocol)

3. Client/Server Communication by Socket

- **Server:**
  - Used to **socket()** method to create a socket object
  - Used to **bind()** method to create to bind the address and service port.
  - Used to **listen()** method to listen and wait for signal from Client
  - Used to **accept()**: method accept connection from Client, return 02 values:
    - A Connection with Client
    - Address of Client
  - Used to **send()/recv()** method to send/receive messages. The return value of these methods is bytes
  - Used to **close()** method to close socket at Client



- **Client:**
  - Used to **socket()** method to create a socket object
  - Used to **conncet()** method to create a connection from client to Server
  - Used to **send()/recv** method to send/receive messages. The return value of these methods is bytes
  - Used to **close()** method to close socket at Client



Lab 6-1: Client/Server Communication by Socket

- **Server:**

```
import socket
HOST = '127.0.0.1„
PORT = 1400
socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
socket.bind((HOST, PORT))
socket.listen(1) #number of connection, windows: from 1 to 5
print("Wait from Client \n")
socket, add_client = socket_server.accept()
print(„Connected to address: ', add_client)
while (1):
data_from_client = socket.recv(1024)
if not data_from_client: break
answer1 = "Receive a Message from Client, That is : ".encode()
answer2 = ". Goode Bye, See you again".encode()
socket.send(answer1 + data_from_client + answer2)
socket.close()
```

Lab 6-1: Client/Server Communication by Socket

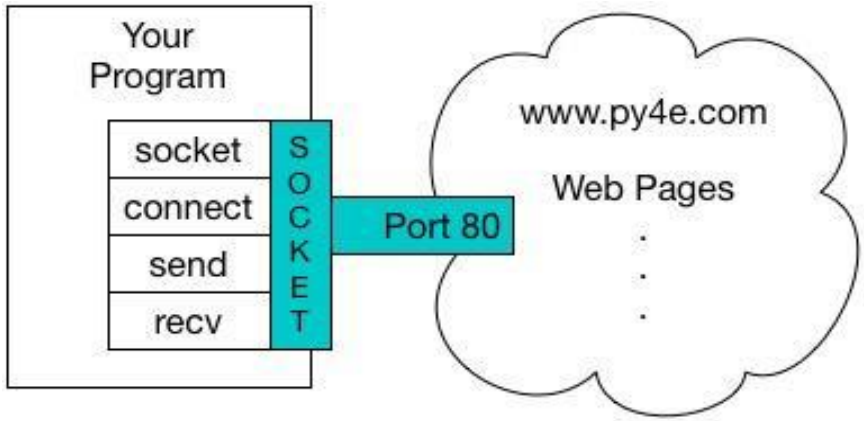
- **Client:**

```
import socket
HOST = '127.0.0.1„
PORT = 1400
socket = socket.socket(socket.AF_INET,
socket.SOCK_STREAM)
socket.connect((HOST, PORT))
send = input("Hi, Server: ").encode()
socket.send(send)
data_from_server = socket.recv(1024) #1024 Size
print(data_from_server.decode())
socket.close()
```

4. Port corresponding to a network service

Service	Port
FTP-Data	20
FTP-Control	21
SSH	22
Telnet	23
SMTP (Mail)	25
HTTP (WWW)	80
POP3	110
IMAP	143
HTTPS (Secure WWW)	443

- Used to Steps
  - **Step 1**: Used to **socket()** method to a socket object
  - **Step 2**: Used to **connect()** method to create a connection between client and Server
  - **Step 3**: Used to **send()** method to send a HTTP request to Web Sever
  - **Step 4**: Used to **recv()** method to reciever web page (HTML) or a file
  - **Step 5**: to **close()** method to close socket



Lab 6-2: Access to Website by Socket

- Access to http://data.pr4e.org

```
import socket
mysock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
mysock.connect(('data.pr4e.org', 80))
cmd = 'GET http://data.pr4e.org HTTP/1.0\r\n\r\n'.encode()
mysock.send(cmd)
while True:
        data = mysock.recv(512)
        if len(data) < 1:
                break
        print(data.decode())
mysock.close()
```

Lab 6-3: Access to Website by Socket

- Access to a text file at http://data.pr4e.org/romeo.txt

```
import socket
mysock = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
mysock.connect(('data.pr4e.org', 80))
cmd = 'GET http://data.pr4e.org/romeo.txt
HTTP/1.0\r\n\r\n„.encode()
mysock.send(cmd)
while True:
        data = mysock.recv(512)
        if len(data) < 1:
                break
        print(data.decode())
mysock.close()
```

Lab 6-4: Access to Website by Urlopen() method

- Access to file

```
import urllib.request
fhand = urllib.request.urlopen('http://data.pr4e.org/romeo.txt')
for line in fhand:
        print(line.decode().strip())
```

- Access to http://www.dr-chuck.com/page1.htm

```
import urllib.request
fhand = urllib.request.urlopen('http://www.dr-chuck.com/page1.htm')
for line in fhand:
        print(line.decode().strip())
```

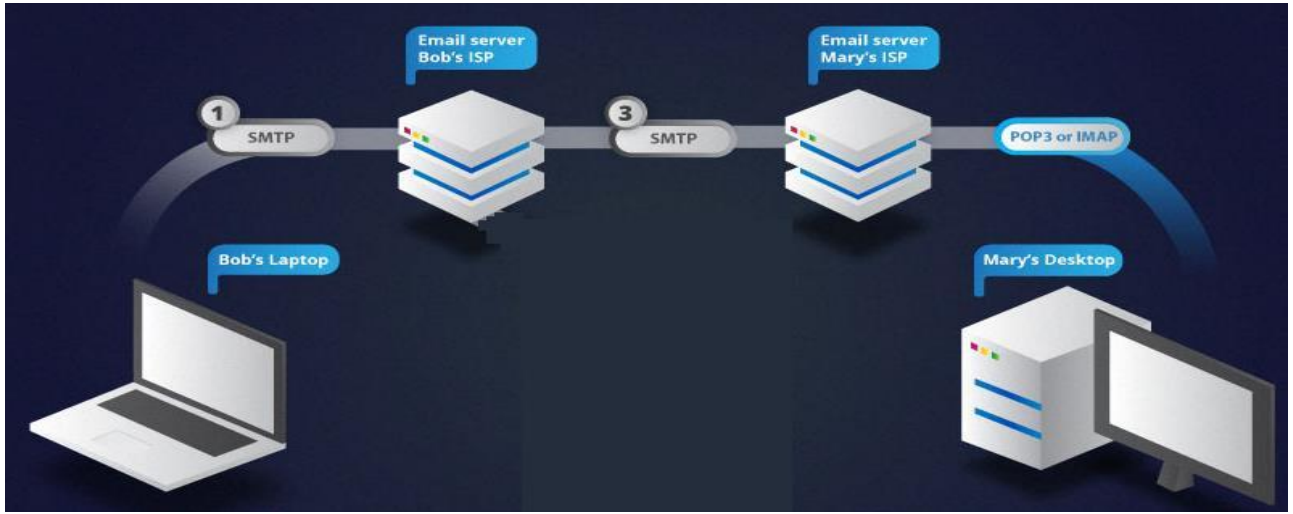
Lab 6-5: Access to Website by Urlopen() method

- Access to a file and return the frequency of occurrence of words in a file

```
import urllib.request
fhand = urllib.request.urlopen('http://data.pr4e.org/romeo.txt')
Dics_word = dict()

for line in fhand:
        word_in_line = line.decode().split()
        for word in word_in_line:
                Dics_word[word] = Dics_word.get(word, 0) + 1
print(Dics_word)
```

- SMTP (Simple Mail Transfer Protocol) is a standard TCP/IP protocol
- Used to transfer e-mail via internet.
- It establishes a connection channel between mail client and mail server; between the sending mail server and the receiving mail server.
- Email is pushed from a sending mail client to sending mail server ➔ from sending mail server to receiving mail server:



- Sử dụng thư viện smtplib
  - The ports of SMTP:
    - Port 25: not encode
    - Port 465: SSL - Secure Sockets Layer
    - Post 587: TLS - Transport Layer Security.
  - Các bước gửi thư:
    - Step 1: import smtplib library to used to SMTP:

```
import smtplib
```

    - Step 2: Create to a connection smtp with SSL encode

```
connect = smtplib.SMTP_SSL("address ip of mail server", 465)
```

    - Step 3: Login sending mail:

```
connect.login(sender_email, password)
```

    - Step 4: Send

```
connect.sendmail(sender_email, receiver_email, text)
```

```
import smtplib
sender_email = "python02021972@gmail.com"
password = "123456“
receiver_email = minhnhutvh@gmail.com
text = "Hi, How are you? “
connect = smtplib.SMTP_SSL("smtp.gmail.com", 465)
connect.login(sender_email, password)
connect.sendmail(sender_email, receiver_email, text)
```

Note: To send to gmail:
Login mail and access link to turn on the less safe mode
https://myaccount.google.com/lesssecureapps

Lab 6-7: Client/Server Commuication by Socket (many client)

```
# Server
import socket
HOST = "127.0.0.1"
PORT = 1400
Socket= socket.socket(socket.AF_INET, socket.SOCK_STREAM)
Socket.bind((HOST, PORT))
Socket.listen(2)
print("Server is ready !!!")
while True:
        conn, addr= Socket.accept()
        Received_from_client = connect.recv(1024)
        print("Message of client: ", Received_from_client.decode())
        message = input("Enter message to send client: ")
        conn.send(message.encode())
        x = input("Shutdown Server? y/n: ")
        if x =="y":
                conn.close()
                break
```

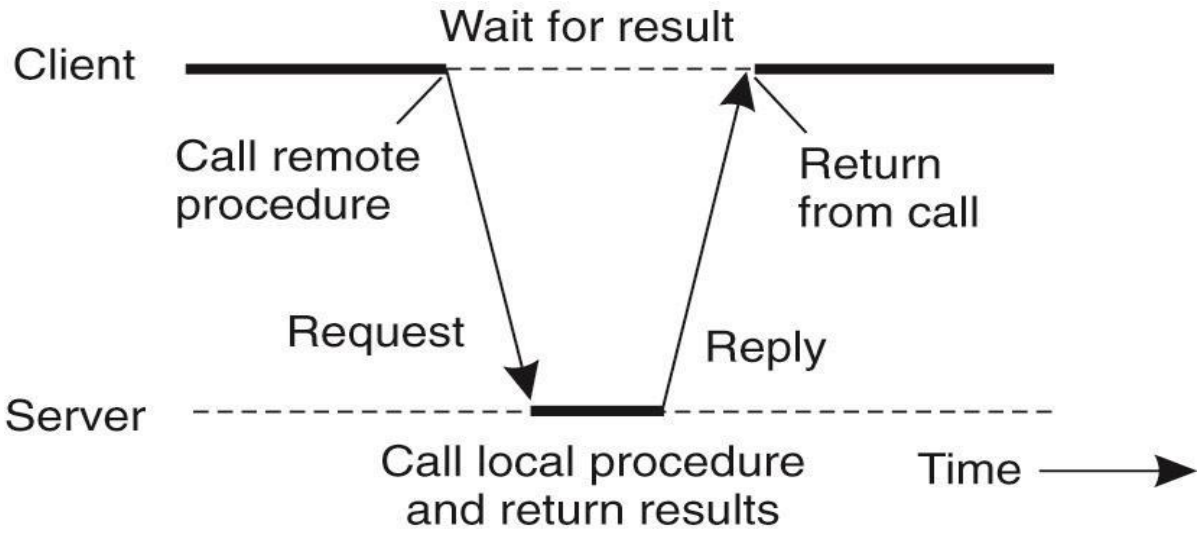
Lab 6-7: Client/Server Commuication by Socket (many client)

```
# Client 1
import socket
HOST = '127.0.0.1'
PORT = 1400
Socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
Socket.connect((HOST, PORT))
while True:
        message = input("Client 1 send a message to server: ")
        Socket.send(message.encode())
        data_from_server = Socket.recv(1024)
        print("message of Server sending: ",data_from_server.decode())
        x = input("Shutdown Client ? y/n: ")
        if x=="y":
                Socket.close()
                break
```

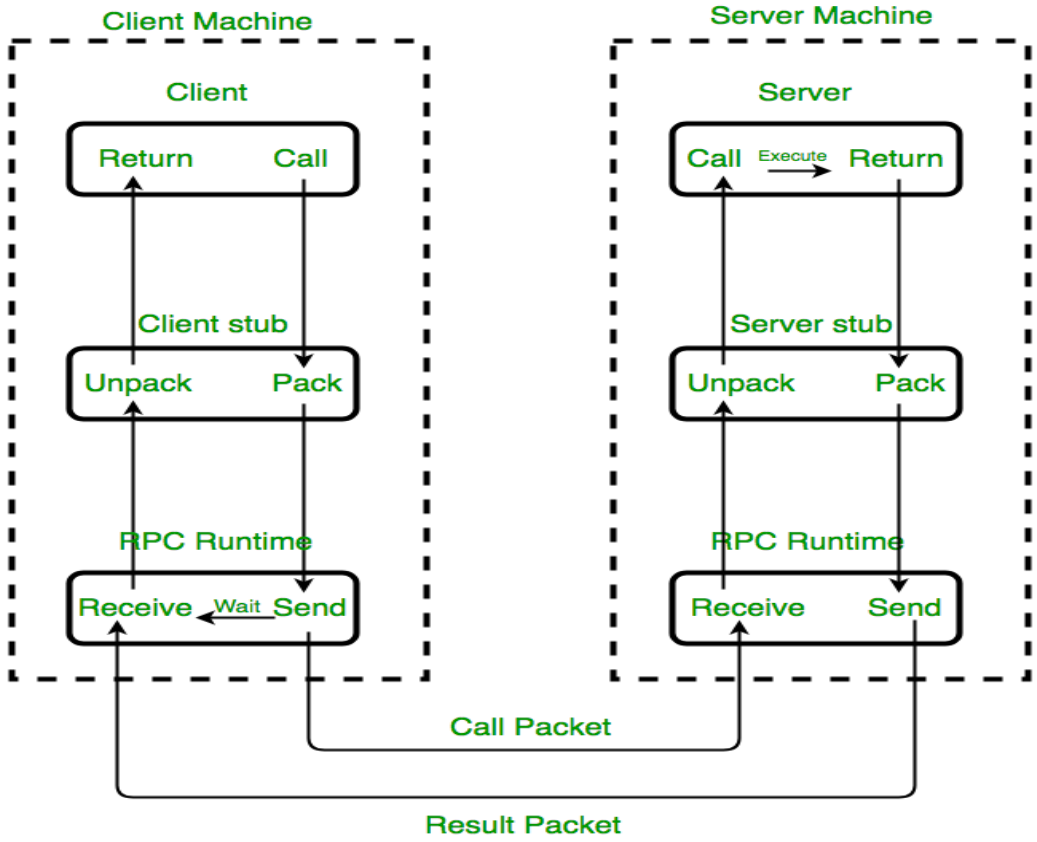
Lab 6-7: Client/Server Commuication by Socket (many client)

```
# Client 2
import socket
HOST = '127.0.0.1'
PORT = 1400
Socket = socket.socket(socket.AF_INET, socket.SOCK_STREAM)
Socket.connect((HOST, PORT))
while True:
        message = input("Client 2 send a message to server: ")
        Socket.send(message.encode())
        data_from_server = Socket.recv(1024)
        print("message of Server sending: ",data_from_server.decode())
        x = input("Shutdown Client ? y/n: ")
        if x=="y":
                Socket.close()
                break
```

- Remote Procedure Calls (RPC): A technique for transmitting information between separate programs in a distributed system/Network.



- Step to Remote Procedure Calls (RPC):
  - **Client stub**: the process to execute the procedure at the client
  - **Server stub**: the process to execute the procedure at the Server



Lab 6-8: Remote Procedure Calls

```
# Server
from xmlrpc.server import SimpleXMLRPCServer
def is_even(n):
        return n**2

server = SimpleXMLRPCServer(("localhost", 8000))
print(" Listen to the signal from the port 8000...")
server.register_function(is_even)
server.serve_forever()
```

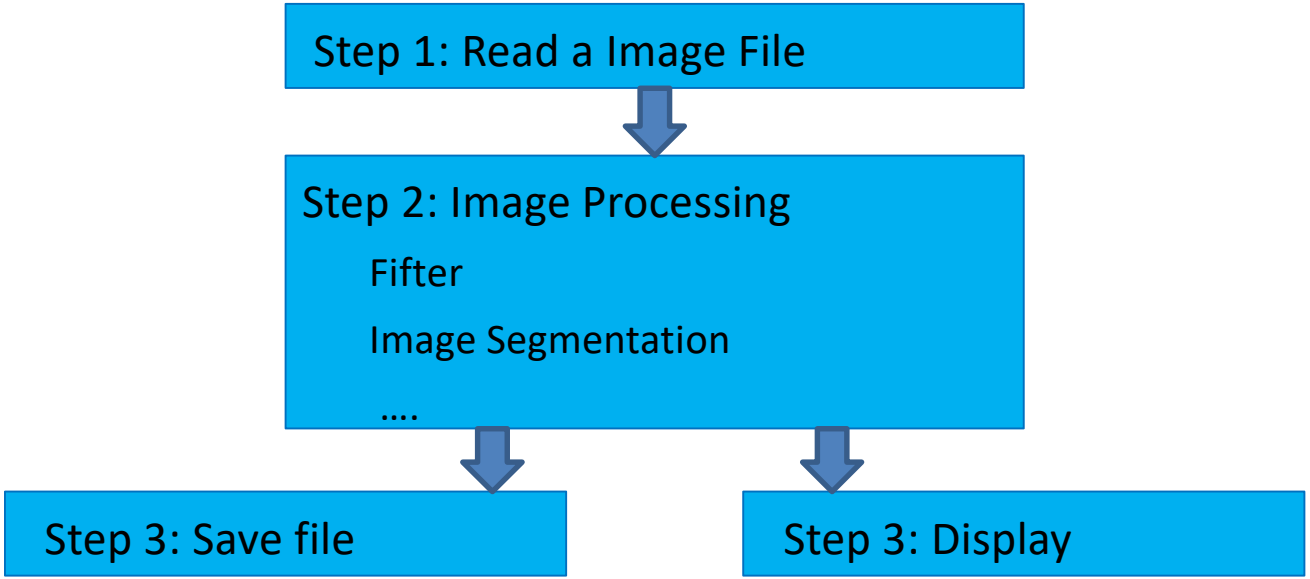
```
Listen to the signal from the port 8000...
127.0.0.1 - - [05/Dec/2020 14:16:01] "POST / HTTP/1.1" 200 -
```

Lab 6-8: Remote Procedure Calls

```
# Client
import xmlrpc.client
with xmlrpc.client.ServerProxy("http://localhost:8000/") as proxy:
        print("Square a number ")
        a = int(input("Enter a positive integer :"))
        print(" Square a number is:", str(proxy.is_even(a)))
```

```
Square a number
Enter a positive integer: 34
```

```
Square a number is: 1156
```


Step 1: Read a Image File
Step 2: Image Processing
Fifter
Image Segmentation
….
Step 3: Save file
Step 3: Display

Appendix: Image Processing

- Install Pillow Library: Pip install Pillow
- Open

```
from PIL import Image
Img = Image.open("VD.jpg")
```

- Display: `img.show()`
- Rotate: `img_rotate = img.rotate(90)`
- Save: `img_rotate.save("VD_new.jpg")`
- Thumbnail: `img.thumbnail((400, 600))`
- Convert to grayscale image : `img_trang_den = img.convert("L")`
- Crop : `img_cat_xen = img.crop((100, 100, 350, 350))`
- Resize: `img_resize = img.resize((5000, 1000))`

- Filter:

```
from PIL import Image, ImageFilter
img = Image.open("mau3.jpg")
img_smoothed = img.filter(ImageFilter.SMOOTH)
blurred = img.filter(ImageFilter.BLUR)
img_sharpenned = img.filter(ImageFilter.SHARPEN)
contoured = img.filter(ImageFilter.CONTOUR)
emboss = img.filter(ImageFilter.EMBOSS)
```

- Constrast

```
from PIL import Image, ImageEnhance
img = Image.open("mau3.jpg")
img_contrast = ImageEnhance.Contrast(img)
img_contrast.enhance(2.0).save("mau3_img_contrast.jpg")
img_new = Image.open("mau3_img_contrast.jpg")
img_new.show()
```

- Merge

```
from PIL import Image
img1 = Image.open("mau1.jpg")
img2 = Image.open("mau2.jpg")
img1.paste(img2)
```

- Blend two images: Sử dụng phương thức blend()

```
from PIL import Image
image1 = Image.open("mau1.jpg")
image2 = Image.open("mau2.gif")
image3 = image1.resize((800, 500))
image4 = image2.resize((800, 500))
image5 = image3.convert("RGBA")
image6 = image4.convert("RGBA")
alphaBlended = Image.blend(image5, image6, alpha=.2)
alphaBlended1.show()
```

Lab 6-9: Used to Remote Procedure Calls to Image Processing