# Internet Technology

Welcome!

Please mention your info in the chat box. About your experience, background and motivation for taking up this course.

Introduction

- Internet happens to be the one of the primary application areas of Python programming language

- Python standard library has wide support for network protocols, data encoding/decoding and other things you need to make it work

- Writing network programs in Python tends to be substantially easier that C/C++

The Challenge
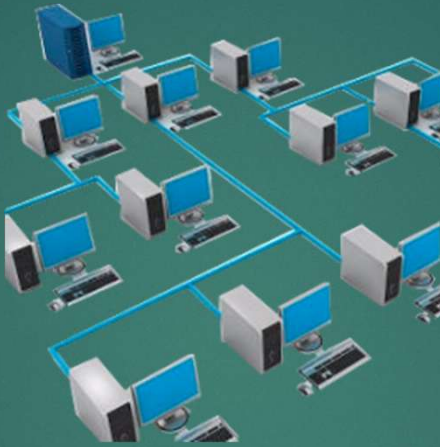
- Communication between computers
- It's just sending and receiving bits
- But how?

Two Main Issues

- ▶ Addressing
  - ▶ Specifying a remote computer and service
- ▶ Data Transport
  - ▶ Moving bits back and forth

Network Addressing

- ▶ Machines have a host name and IP address
- ▶ Programs/services have port numbers

foo.bar.com
205.172.12.4

www.python.org
82.94.237.218

Network

Port 4521

Port 80
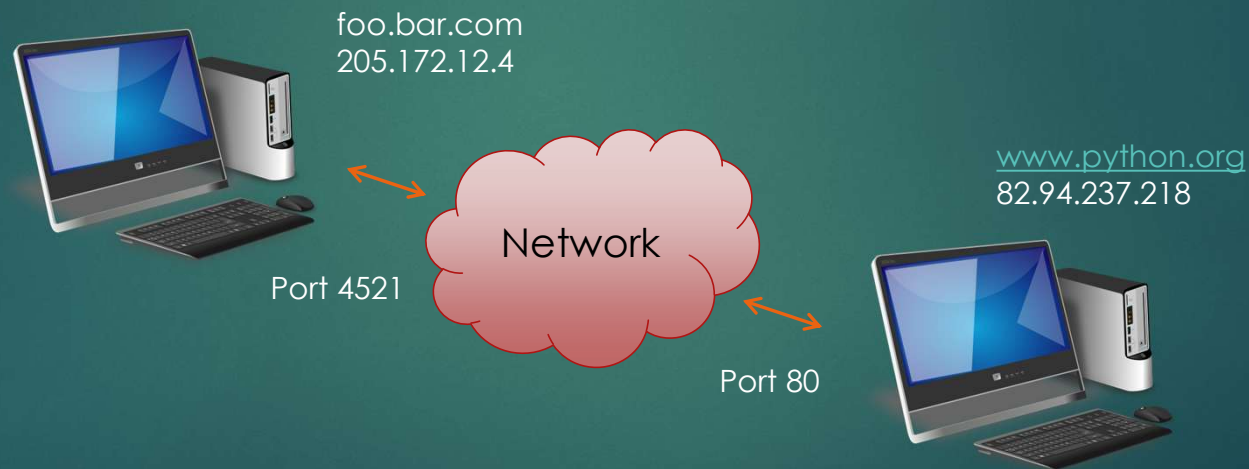
Standard Ports

▶ Ports for common services are pre-assigned

```
21      FTP

22      SSH

23      Telnet

25      SMTP (Mail)

80      HTTP (Web)

110     POP3 (Mail)

119     NNTP (News)

443     HTTPS (web)
```

▶ Other port numbers may just be randomly assigned to programs by the operating system

Client/Server Concept

- ▶ Each endpoint is a running program
- ▶ Servers wait for incoming connections and provide a service (e.g., web, mail, etc.)
- ▶ Clients make connections to servers

Client

Server

www.python.org
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Browser

Web

Port 80

Request/Response Cycle

▶ Most network programs use a request/response model based on messages

▶ Client sends a request message (e.g., HTTP)

```
 GET /index.html HTTP/1.0
```

▶ Server sends back a response message

```
HTTP/1.0 200 OK

Content-type: text/html

Content-length: 48823

<HTML>

...
```

▶ The exact format depends on the application

Sockets

socket

Script

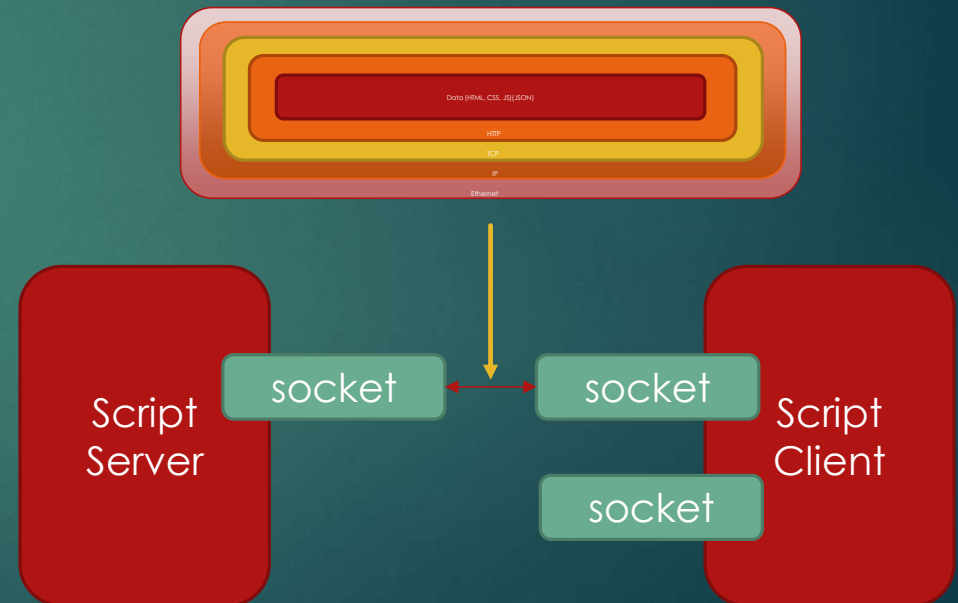- Programming abstraction for network code
- Socket: A communication endpoint

Socket ⟷ Socket

Network

- Supported by socket library module
- Allows connections to be made and data to be transmitted in either direction

Using a Socket

- ▶ Server
  - ▶ Listen for incoming connections
- ▶ Client
  - ▶ Make an outgoing connection

Data (HTML, CSS, JS)(JSON)

HTTP
TCP
IP
Ethernet

Script Server

socket

socket

Script Client

socket

MVC Architecture