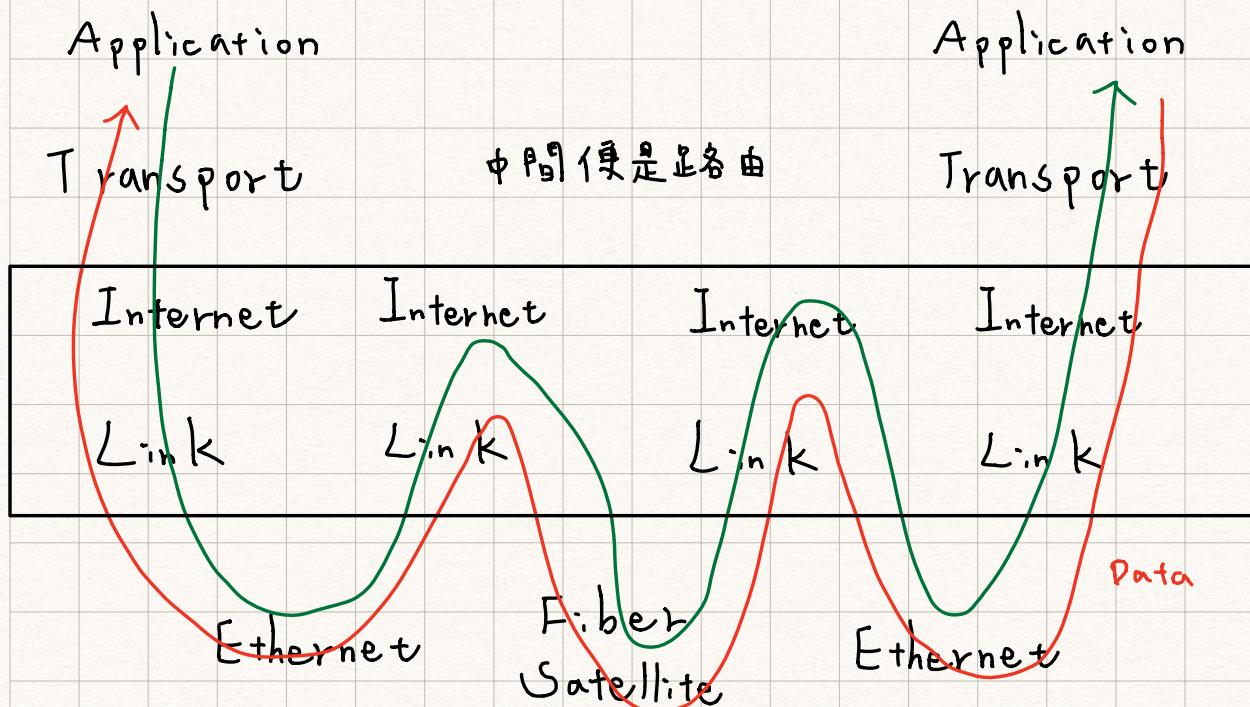


Networked Technology

Transport Control Protocol (TCP)

Built on top of IP (Internet Protocol)



TCP Connections / Sockets 建立通訊

An Internet **socket** is an endpoint of a bidirectional inter-process communication flow across an Internet Protocol-based computer network, such as the Internet.

TCP Port Numbers

A port is an application-specific or process-specific software communications endpoint.
每個 App 有不同 port

It allows multiple networked applications to coexist on the same server.

There is a list of well-known TCP port numbers.

Common TCP Ports 常用端口

SSH (22)
(Secure Login)

IMAP (143 / 220 / 993)
(Mail Retrieval)

HTTP (80)

POP (109 / 110)
(Mail Retrieval)

HTTPS (443)
(Secure)

DNS (53)
(Domain Name)

Sockets in Python

Python has built-in support for TCP
Sockets

```
import socket  
mysock = socket.socket(socket.AF_INET,  
                      socket.SOCK_STREAM)  
(準備好連接外界的接口)  
mysock.connect(('data.pr4e.org', 80))  
Host Port
```

上上 Code 類似於撥打電話，建立通訊

Hypertext Transfer Protocol (HTTP)

Application Protocol

Since TCP (and Python) gives us a reliable socket, what do we want to do with the socket? What problem do we want to solve?

Application Protocols: Mail, Worldwide Web

HTTP - Hypertext Transfer Protocol

The dominant Application Layer Protocol on the internet

Invented for the Web - to Retrieve HTML, Images, Documents, etc

Basic Concept - Make a Connection - Request a document - Retrieve the Document - Close the Connection

What is a Protocol?

A set of rules that all parties follow so we can predict each other's behavior.

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

protocol

host

document

Getting Data From The Server

Each time the user clicks on an anchor tag with an `href =` value to switch to a new page, the browser makes a connection to the web server and issues a "GET" request - to GET the content of the page at the specified URL.

The server returns the HTML document to the Browser which formats and displays the document to the user.

Internet Standards

The standards for all of the Internet protocols (inner working) are developed by an organization.

Internet Engineering Task Force (IETF)

Making an HTTP request

Connect to the server like

'www.dr-chuck.com'

Request a document
(or the default document)

Mac OS 10.11 telnet
telnet data.prte.org 80

An HTTP Request in Python

```
import socket
```

```
mysock = socket.socket(socket.AF_INET  
                      socket.SOCK_STREAM)
```

```
mysock.connect('data.prte.org', 80)
```

```
cmd = 'GET http://data.prte.org/romeo.txt HTTP  
/1.0\r\n\r\n'.encode()
```

```
mysock.send(cmd)
```

```

while True :
    data = mysock.recv(512)
    if (len(data) < 1) : # End of line
        break
    print(data.decode())
mysock.close()

```

執行完後，之後收到 HTTP Header 與 HTTP Body

Worked Example : Sockets (in MacOS)

```

telnet data.prte.org 80          connect to server
GET http://data.prte.org/romeo.txt HTTP/1.0
                                browser

```

以上在CMD的Code等效於

```

import socket
mysock = socket.socket(socket.AF_INET
                      ,socket.SOCK_STREAM)
mysock.connect(('data.prte.org', 80))

```

```

cmd = 'GET http://data.prte.org/romeo.txt HTTP
      /1.0\r\n\r\n'.encode()
mysock.send(cmd)

while True:
    data = mysock.recv(512)
    if len(data) < 1: # End of line
        break
    print(data.decode())
mysock.close()

```

Using the Developer Console to Explore HTTP

Chrome 開發者工具
 network → header / response
 (要有人送出請求才能看到相關訊息)

可用 ⌂ 清除請求記錄

在 URL 中的 Parameters

↑ (Query String Parameters)

gness = 12 & x=14 & abc = 22

Status Code : 404 Not Found

Status Code : 200 Good

Status Code : 302

Content - Type : text

Content - Type : image