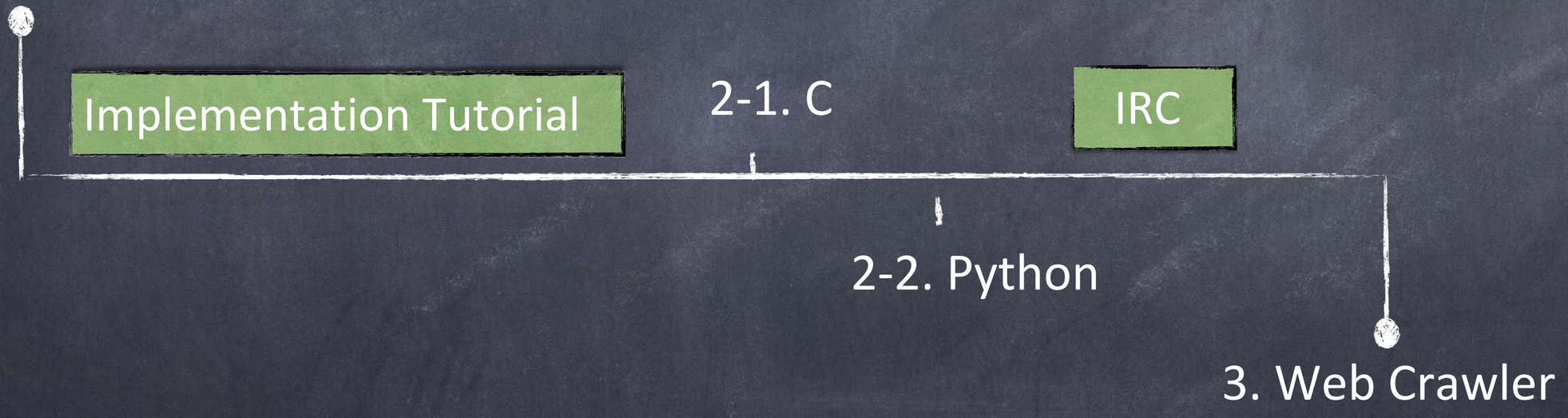
Homework Assignment1 - Socket Programming & IRC Robot

Outline

1. Introduction



Introduction

✶ **Socket** is the API for the TCP/IP protocol stack.
➔ Provides communication between Application layer and Transport layer.

✶ Process **sends/receives** messages to/from socket.

What is Socket Address ?

IP address + Port number

- IP address : Address the **machine**
- Port number : Address the **process**

Port Number

- **FTP** (21) - File Transfer Protocol
- **SSH** (22) - Secure Shell
- **telnet** (23) - Secure Shell
- **SMTP** (25) - Simple Mail Transfer Protocol
- **DNS** (53) - Domain Name Server
- **HTTP** (80) - Hyper Text Transfer Protocol
- **POP3** (110) - Post Office Protocol

Socket Programming in C

[Click] ReferenceSite

Socket Programming in Python

[Click] Python Tutorial
[Click] Python Socket

```
# AF_INET : IPv4
# SOCK_STREAM : TCP, SOCK_DGRAM : UDP
Socket = socket.socket( socket.AF_INET, socket.SOCK_STREAM )
```

Server Socket

Method	Description
Socket.bind() Socket.listen() Socket.accept()	Binds address (Hostname + Port number) to socket. Sets up and start TCP listener. Passively accepts TCP client connection, waiting until arrives.

Client Socket

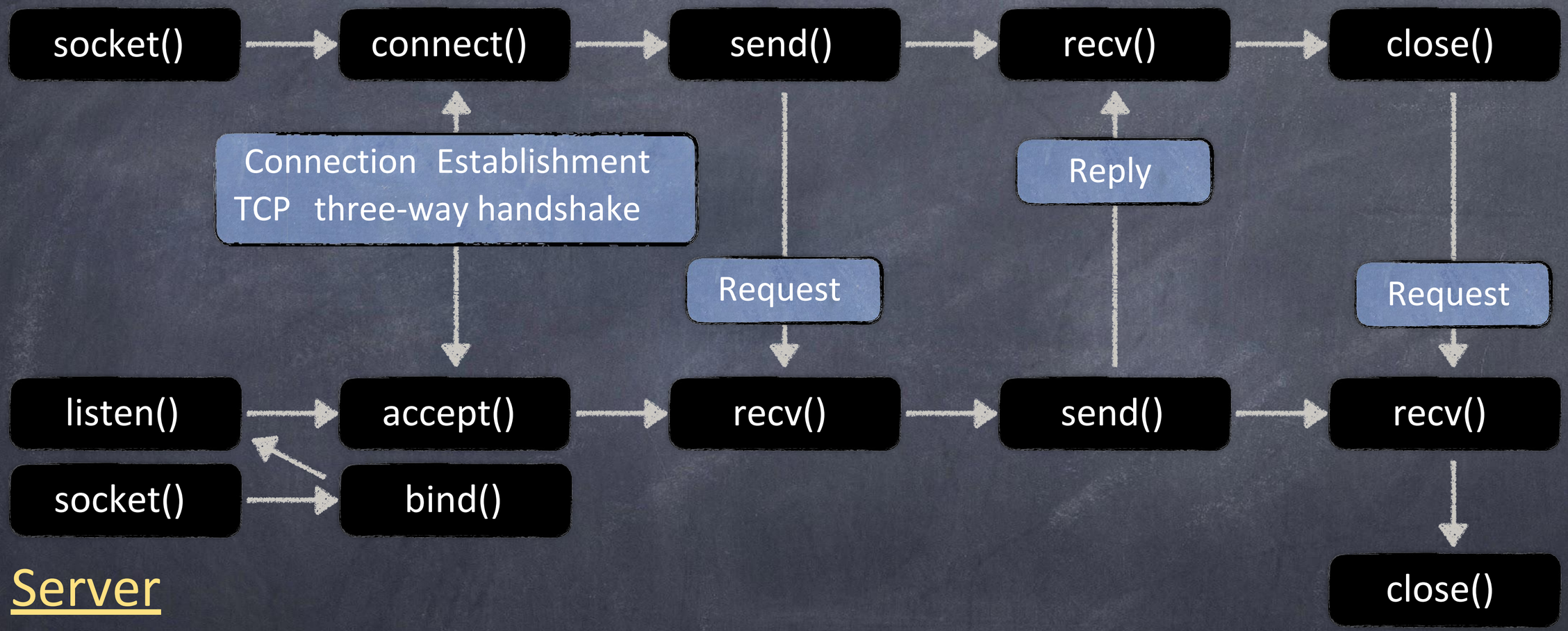
Method	Description
Socket.connect()	Actively initiates TCP server connection.

```
# AF_INET : IPv4
# SOCK_STREAM : TCP, SOCK_DGRAM : UDP
Socket = socket.socket( socket.AF_INET, socket.SOCK_STREAM )
```

General Socket

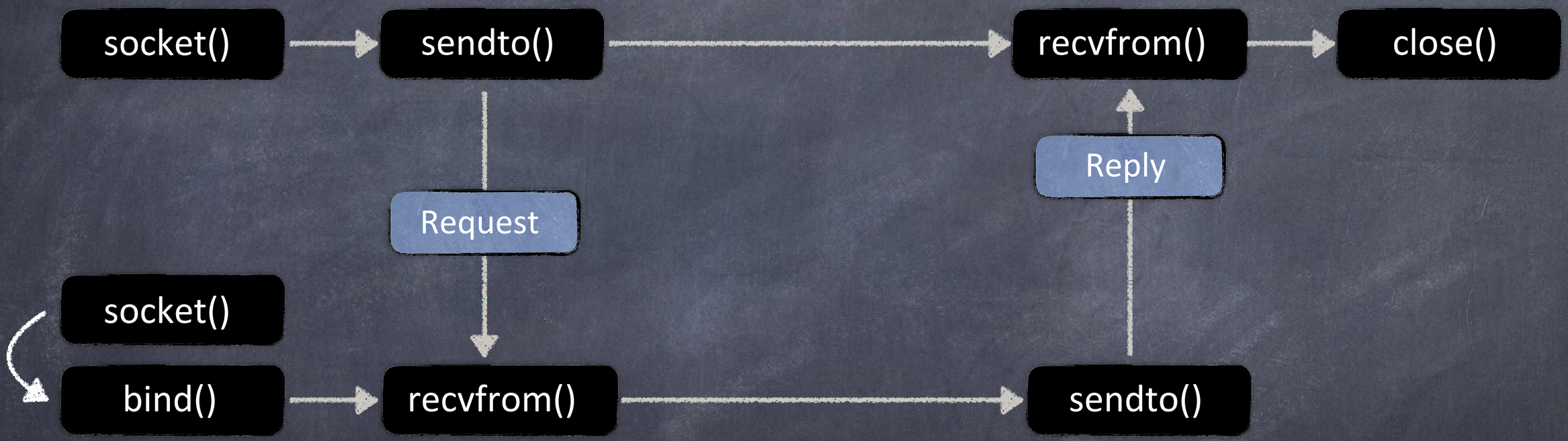
Method	Description
Socket.recv()	Receives TCP message.
Socket.send()	Transmits TCP message.
Socket.recvfrom()	Receives UDP message.
Socket.sendto()	Transmits UDP message.
Socket.close()	Close socket.
Socket.gethostname()	Returns the hostname.

TCP


Client
socket()
connect()
send()
recv()
close()
Connection Establishment
TCP three-way handshake
Reply
Request
Request
listen()
accept()
recv()
send()
recv()
socket()
bind()
close()
Server

UDP

Client



Server

TCP Server

```
import socket # Include library

ServerSocket = socket.socket( socket.AF_INET, socket.SOCK_STREAM )

HostIP = socket.gethostname()  PortNumber =     # Get the name  of local machine
15566                                           # Reserve a port for your  service
ServerSocket.bind( ( HostIP, PortNumber ) )     # Bind to the port
ServerSocket.listen( 5 )                        # Wait for client connection
while True  :
    Client, Address = ServerSocket.accept()     # Establish connection with client
    Message = Client.recv( 1024  )              # Get message from client
    print “Gotconnection from  ”, Address
    print “Msgfrom client : ”, Message
    Client.send( “Thank you for connecting” )   # Send message back  to
    Client.close()                              client
                                                # Close the connection
```

TCP Client

```
import socket # Include library

ClientSocket = socket.socket( socket.AF_INET, socket.SOCK_STREAM )

HostIP = socket.gethostname()  PortNumber =     # Get the name  of local machine
15566                                           # Reserve a port for your  service
ClientSocket.connect( ( HostIP, PortNumber ) )  # Connect to server

ClientSocket.send( ‘Message from client’ )      # Send message to server
print ClientSocket.recv( 1024 )                 # Output received message

ClientSocket.close()                            # Close the connection
```

Internet Relay Chat (IRC)

✷ **IRC** is an application layer protocol that facilitates communication in the form of text. The chat process works on a **client/server** networking model.

Useful Commands

- **NICK** <nickname>
- **USER** <username>
- **JOIN** <channel> [<keys>]
- **PRIVMSG** <username/channel> :<message>

[Click] Reference Site

How to use IRC ?

- Operating System：Linux, ubuntu16.04

- sudo apt-get install nodejs
- sudo apt-get install npm

==========全域安裝==========
sudo npm install -g ircdjs
ircdjs
==========

==========區域安裝==========
mkdir hw1_server
cd hw1_server
npm init
npm install ircdjs
node_modules/.bin/ircdjs
==========

IRC Client

```
import socket # Include library

IRCSocket = socket.socket( socket.AF_INET, socket.SOCK_STREAM )
IRCSocket.connect( ( ‘127.0.0.1’, 6667 ) )

... ... ... ... ... [????? ^_^ ?????] ... ... ... ... ...

Msg = ‘NICK bot_r06922075 \r\n’
IRCSocket.send( bytes( Msg , encoding = ‘utf-8’) )
... ... ... ... ... [????? ^_^ ?????] ... ... ... ... ...

while True  :
    IRCMsg = IRCSocket.recv(4096).decode()
    print (IRCMsg)

... ... ... ... ... [????? ^_^ ?????] ... ... ... ... ...
```

20 point GET ?

Note

- IRC will check your robot is “Alive or Not”
  - → PING, PONG

Grading Policy

Language: No Limited

(a) Implementation (90%)

(b) Report (10%)

Due Date : **23:59, October 24**, 2018.

Penalty for late submission is “**20%** per day”.

NOT accept after 23:59, October 26, 2018.

How to Submit

(a) Please compress all of your file into an archive. (Format: rar/zip) EX: hw1_bxxxxxxxx.rar

(b) Email to ntu.cnta@gmail.com before due date.

Email subject: [CN2018] Homework1_bxxxxxxxx

Demo Time (日期再公佈)

(a) Connection to Channel & Automatic Introduction Message (20%)

(b) Daily horoscope (10%)

(c) Guess Number (20%)

(d) Music robot (20%)

(e) Chat (20%)

DEMO可以帶自己的電腦

Homework Assignment 1 - Http Web Crawler

What is http?

✶ HTTP(Hypertext Transfer Protocol) is an application layer protocol, which implements request/response mechanism.

An Easy Example

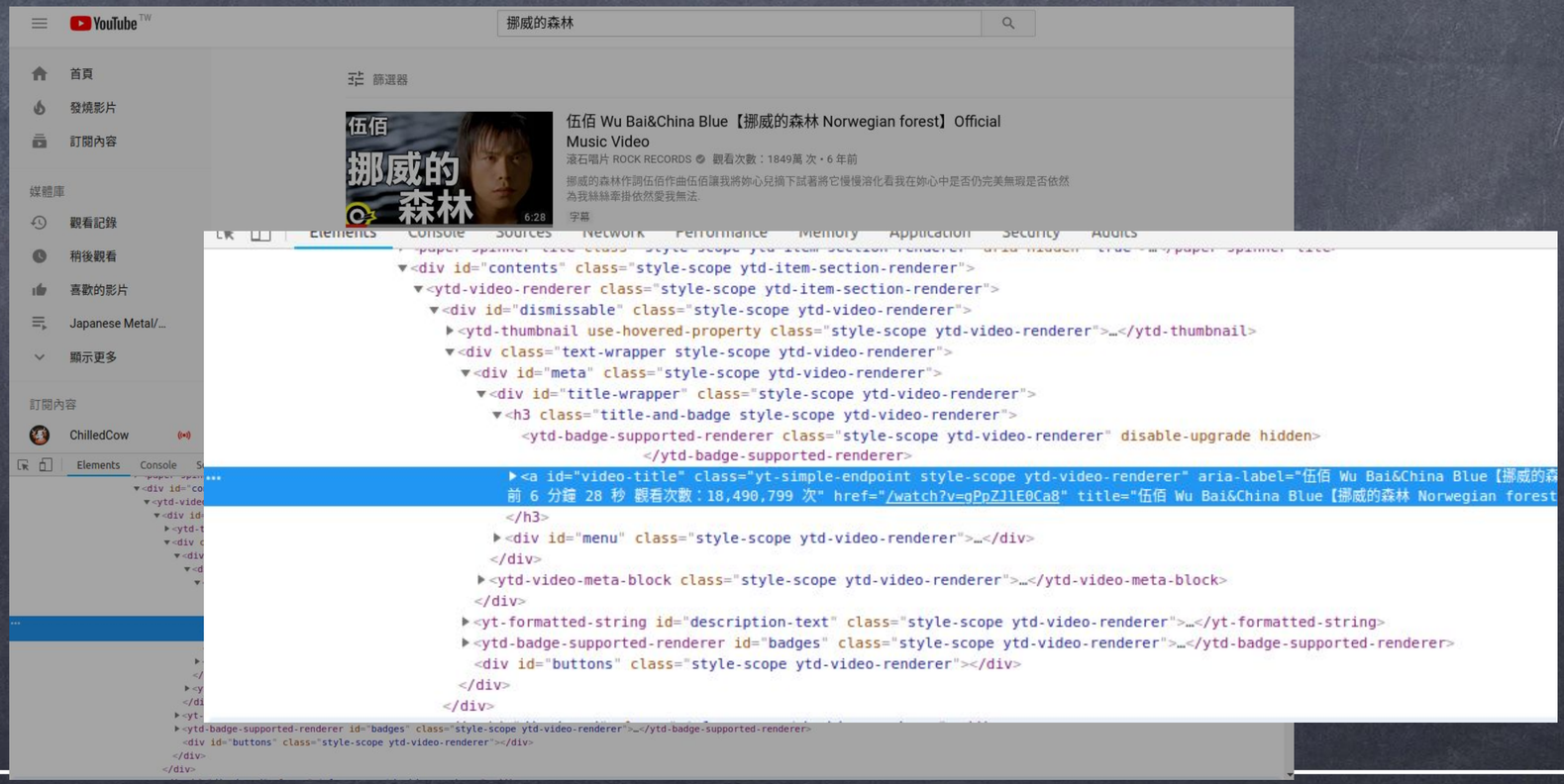
- Request: https://www.youtube.com/results?search_query=挪威的森林

An Easy Example

- Request: https://www.youtube.com/results?search_query=挪威的森林
- Response:

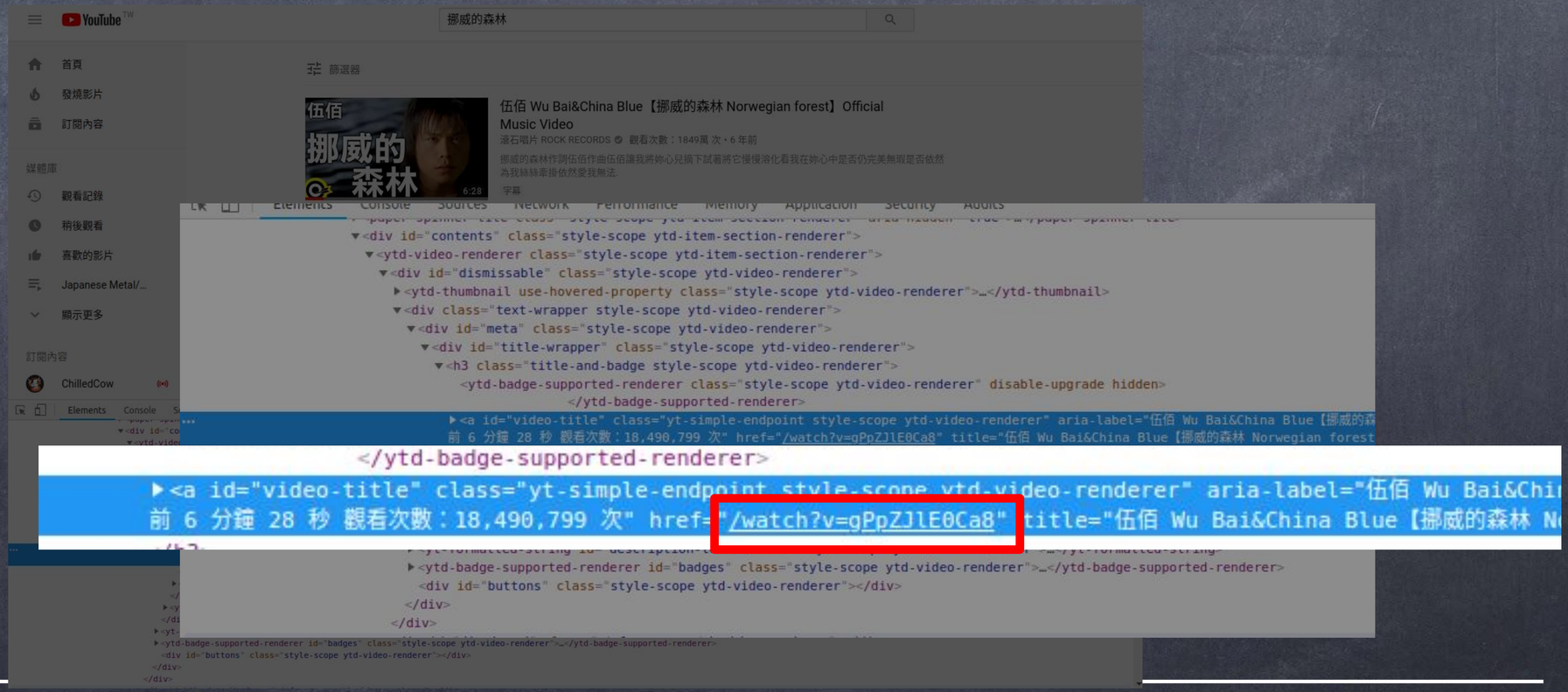
An Easy Example

- Request: https://www.youtube.com/results?search_query=挪威的森林
- Response:



An Easy Example

- Request: https://www.youtube.com/results?search_query=挪威的森林
- Response:



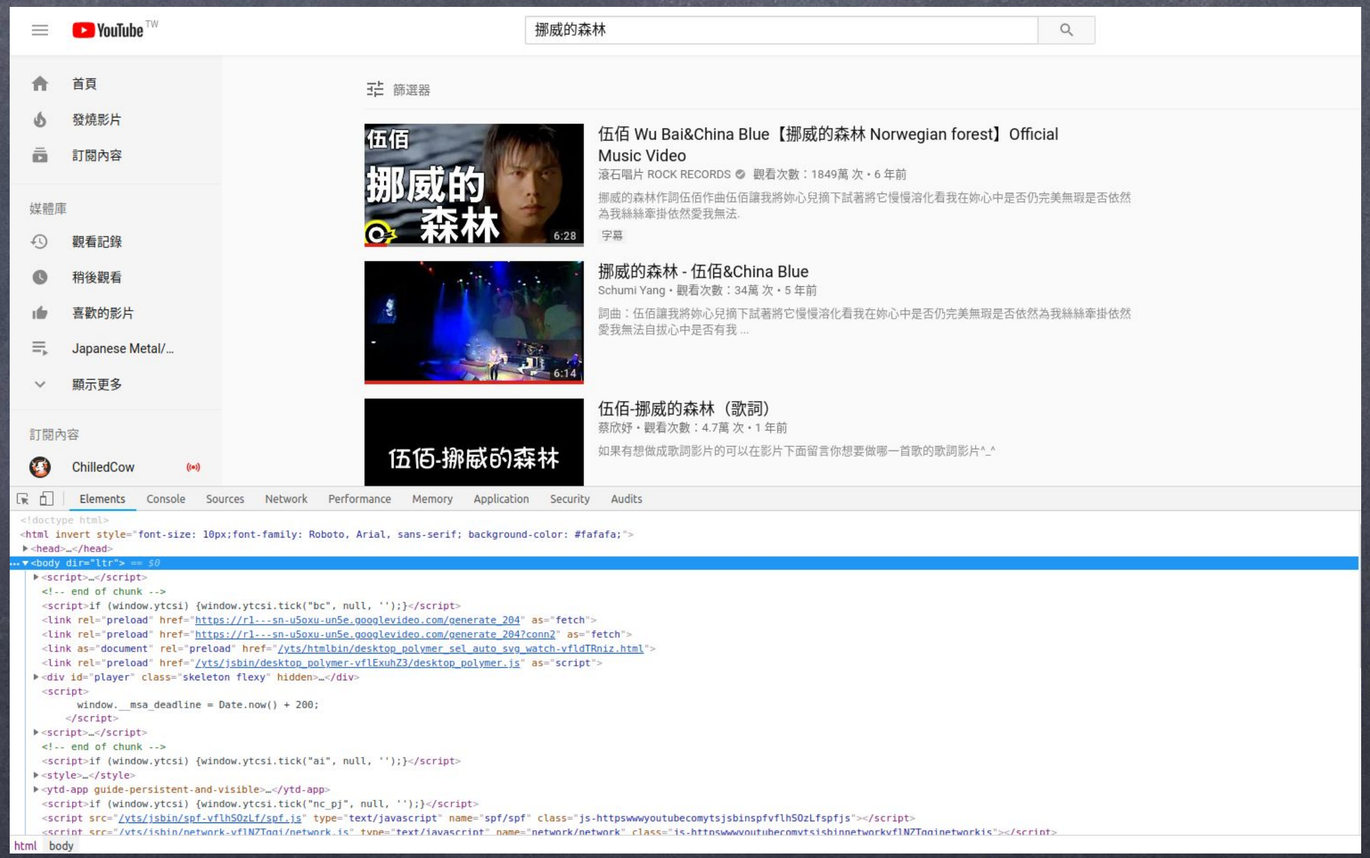
```
1 #! /usr/bin/env python3
2 import requests
3
4 url = "https://www.youtube.com/results?search_query="\
5     + "%E6%8C%AA%E5%A8%81%E7%9A%84%E6%A3%AE%E6%9E%97"
6
7 resp = requests.get(url)
8 print(resp.text)
```

Time For Some String Processing!

In Case You Don’t Know…

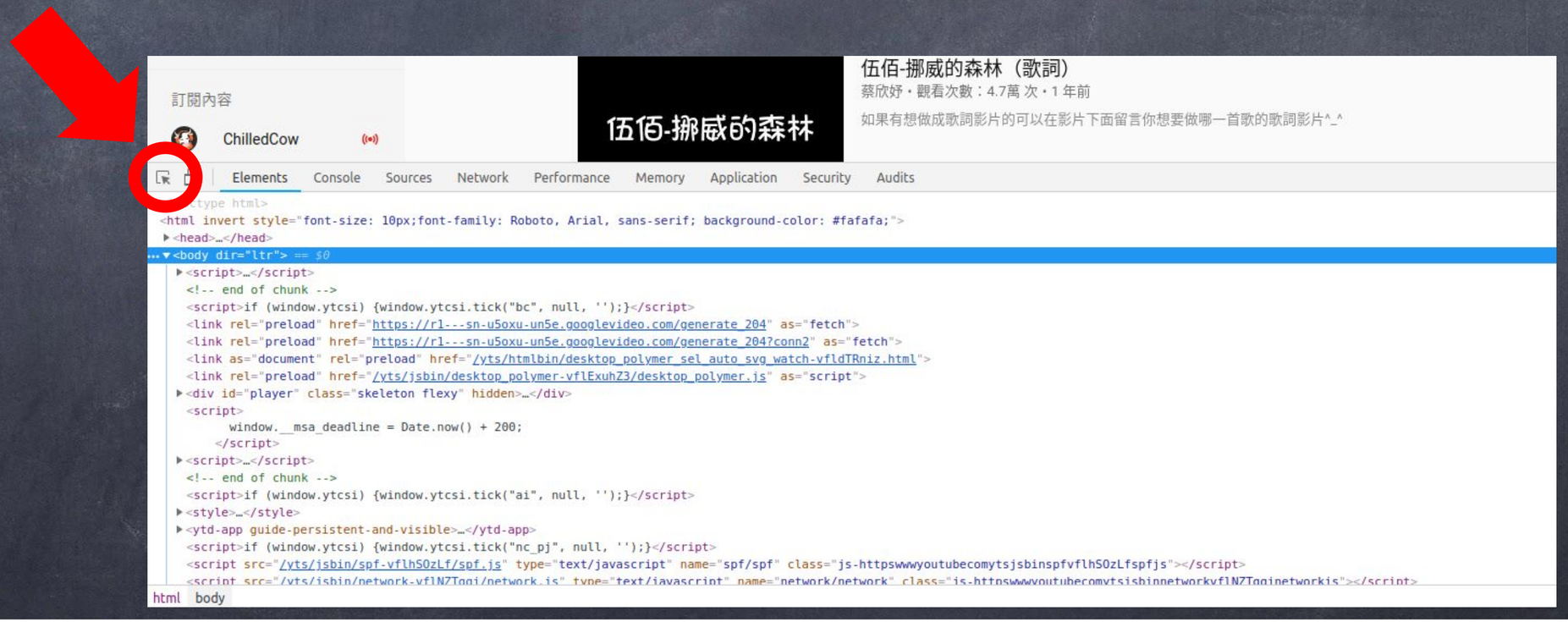
Open the developer tool in chrome/firefox/any browser you like

(For chrome, just press F12)



In Case You Don’t Know…

Click on the select tool



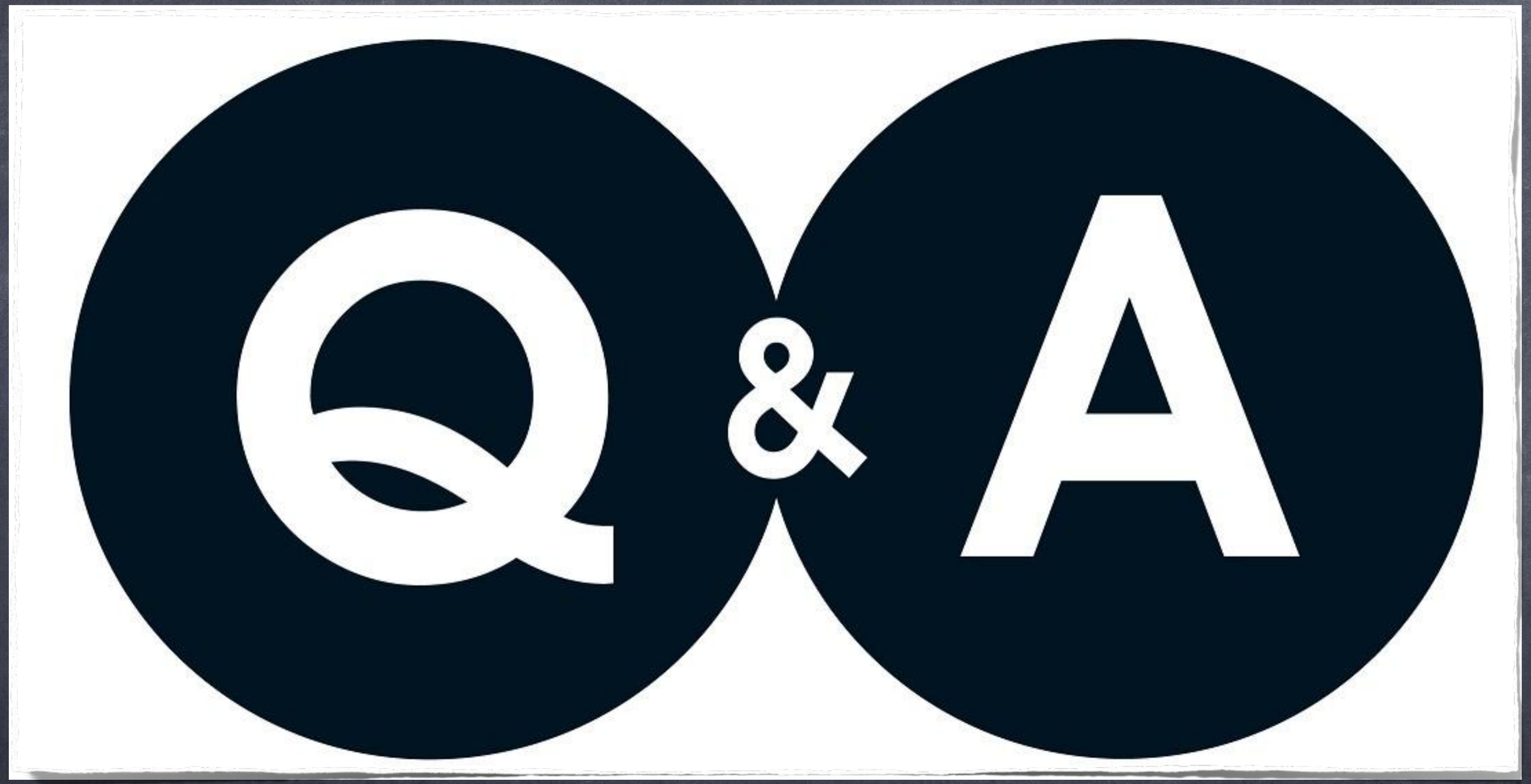
In Case You Don’t Know…

Hover the link with your mouse…

Hey! It’s there!

Keywords

- html element
- web crawler


Q&A