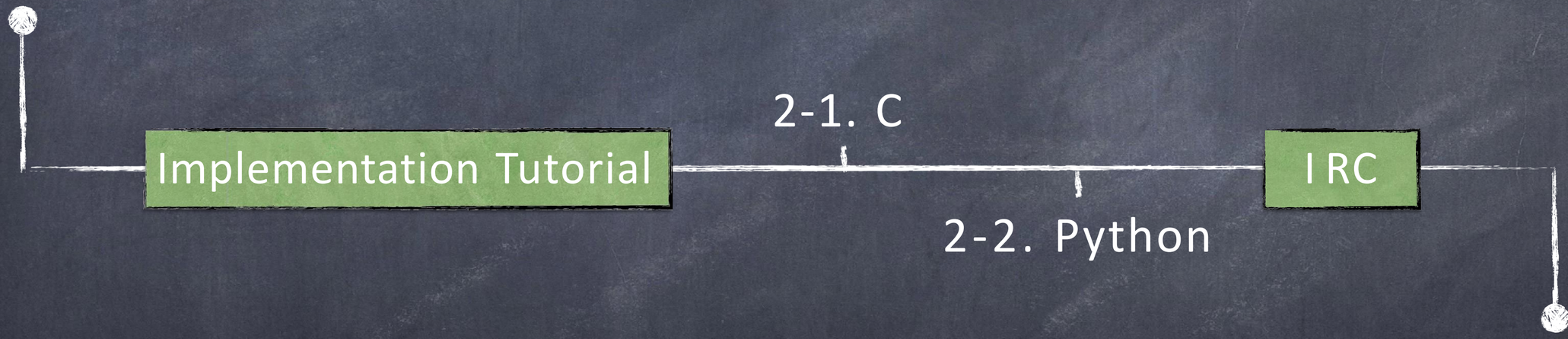
Homework Assignment 1 - Socket Programming & IRC Robot

Outline

1. Introduction



3. Hints

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] Reference Site 1

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

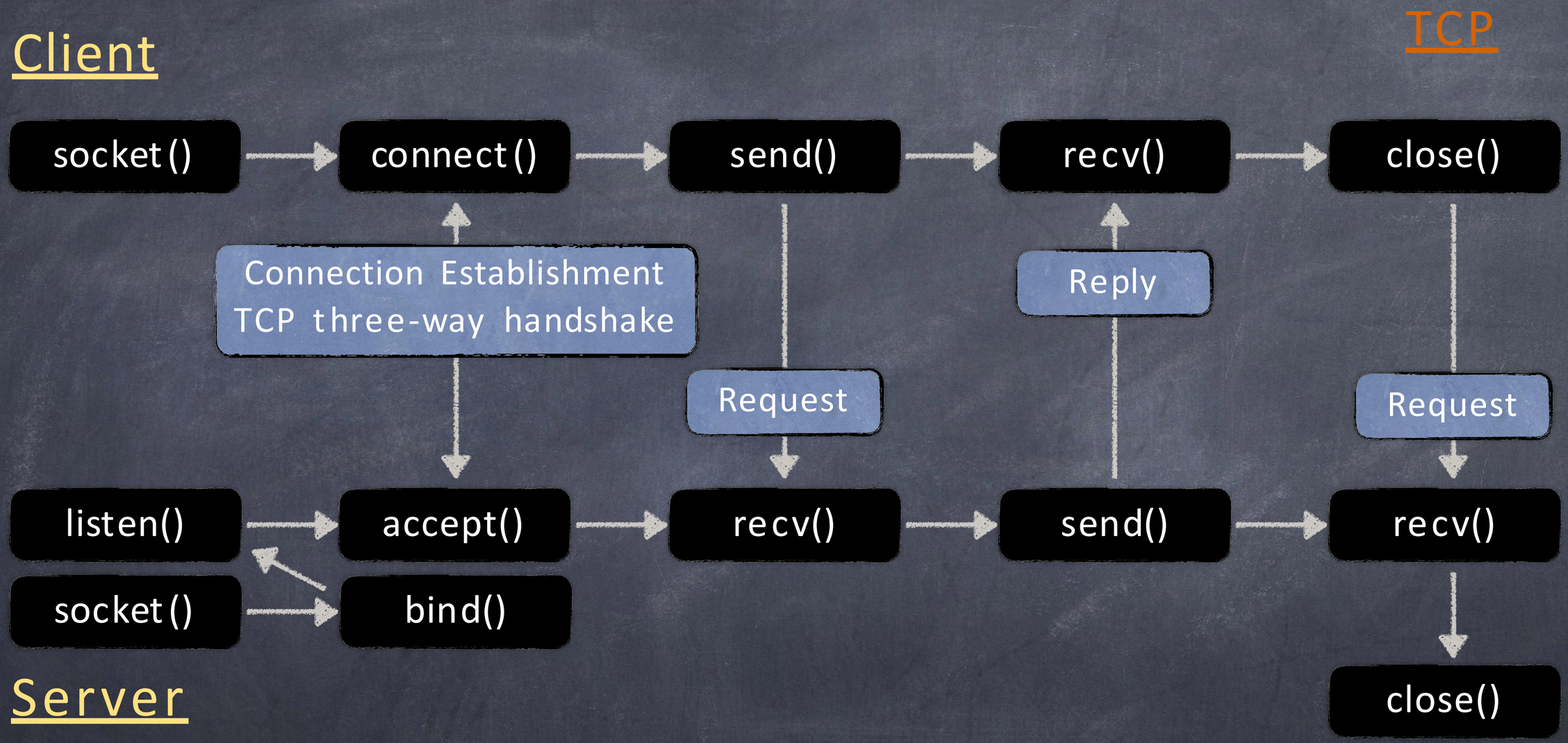
Client Socket

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

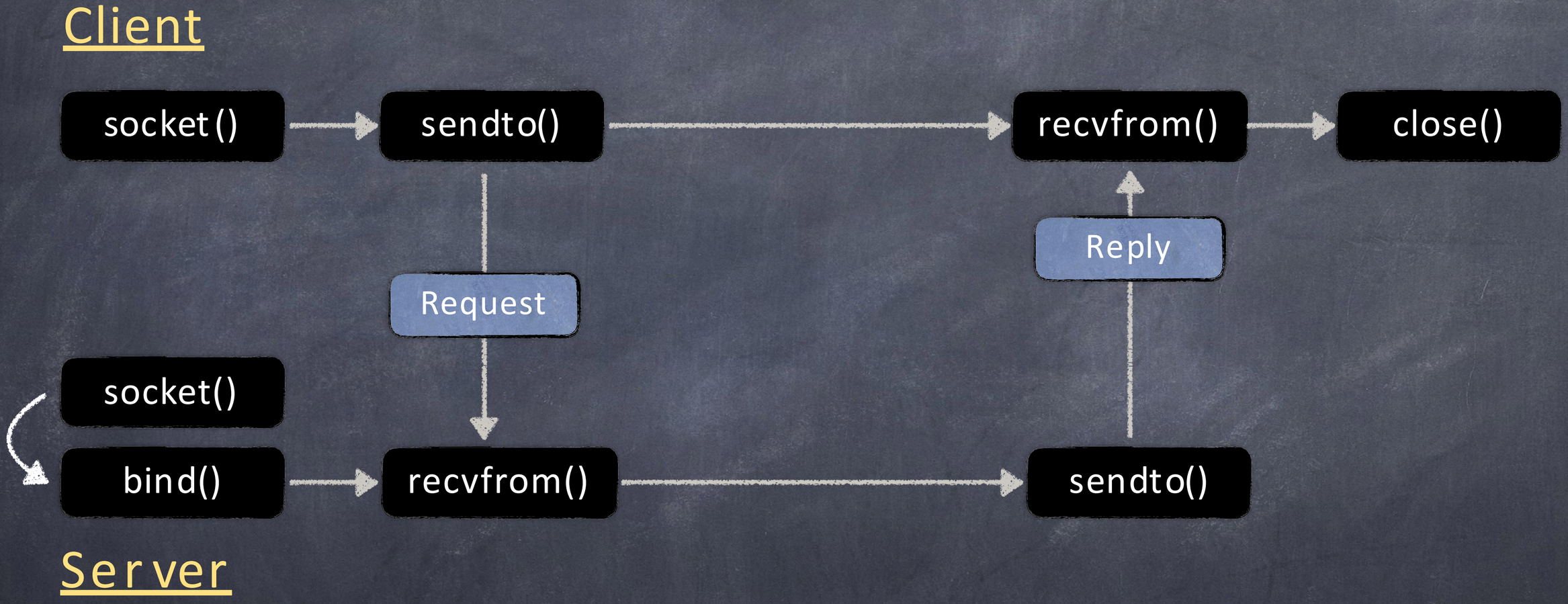
```
# AF_INET : IPv4
# SOCK_STREAM : TCP, SOCK_DGRAM : UDP
Socket = socket.socket( socket.AF_INET, socket.SOCK_STREAM )
```

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
Request
Reply
Request
listen()
accept()
recv()
send()
recv()
socket()
bind()
close()
Server

UDP


Client
socket()
sendto()
recvfrom()
close()
Reply
Request
socket()
bind()
recvfrom()
sendto()
Server

TCP Server

```
import socket # Include library

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

HostIP = socket.gethostname()                    # Get the name of local machine
PortNumber = 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 “Got connection from ”, Address
    print “Msg from client : ”, Message
    Client.send( “Thank you for connecting” )    # Send message back to client
    Client.close()                               # Close the connection
```

TCP Client

```
import socket # Include library

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

HostIP = socket.gethostname()                    # Get the name of local machine
PortNumber = 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.

➔ **Freenode** : An IRC network.

How to use IRC ?

✶ Operating System : Linux, ubuntu 14.04

➔ Step 1. Install **irssi** package
➔ Step 2. Simply type irssi command in the shell
➔ Step 3. Connect to the Freenode IRC server
(**irc.freenode.net**)
➔ Step 4. IRC commands …

Useful Commands

- **CONNECT** <target server> [<port>]
- **INVITE** <nickname> <channel>
- **JOIN** <channel> [<keys>]
- **NAMES** [<channels>]
- **NICK** <nickname>
- **PRIVMSG** <username/channel> <message>
- **USER** <username>

[Click] Reference Site

irc.freenode.net
#CN2017

socket

@repeat hey

hey

IRC Client

```
import socket # Include library

IRCSocket = socket.socket( socket.AF_INET, socket.SOCK_STREAM )
IRCSocket.connect( ( irc.freenode.net, 6667 ) )

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

Msg = ‘JOIN #CN_DEMO ILoveTA \r\n’
IRCSocket.send( bytes( Msg ) )

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

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

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

Hints

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

Grading Policy

Language: c/c++/python

(a) Implementation (80%)

(b) Report (10%)

(c) Demo (10%)

Due Date : **23:59, October 18**, 2017.

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

NOT accept after 23:59, October 20, 2017.

How to Submit

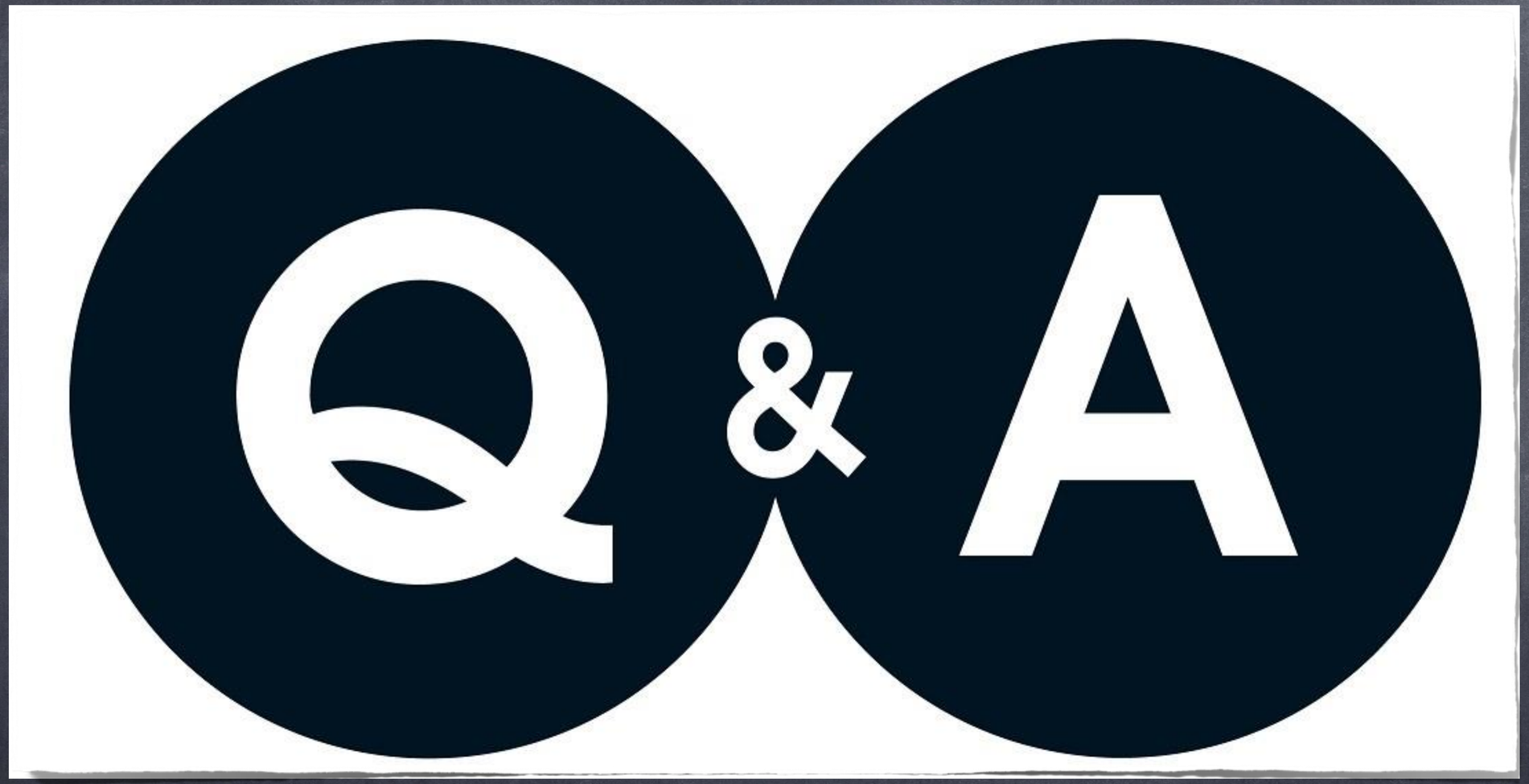
(a) Please compress all of your file into an archive.
(Format: rar/zip) EX: hw1_rxxxxxxxxx.rar

(b) Email to ntu.cnta@gmail.com before due date.
Email subject: [CN2017] Homework1_rxxxxxxxxx

Demo Time(Implementation)

(a) Connect to Channel & Introduction Message (30%)
(b) ‘Repeat’ Message (10%)
(c) Hexadecimal & Decimal Converter (15%)
(d) Valid IP Address Calculator (20%)
(e) Help (5%)

P.S. External library is not allowed.


Q&A