

## 【2021 Advanced Computer Networks Homework 4】

### 【簡介】

使用 `c` 語言製作類似 `traceroute` 之程式，  
從 `TTL = 1` 開始，每次發出一個 `ICMP` 封包，  
等收到 `reply` 後，再送出 `TTL+1` 的 `ICMP` 封包，  
直到抵達 `destination`

### 【指令】

編譯

```
make
```

執行

```
sudo ./prog <hop-distance> <destination>
```

### 【執行結果】

1. 指令參數不為 3 個時，print **command error**

The screenshot shows the Visual Studio Code editor interface. The top bar indicates the file is named 'makefile - hw4 - Visual Studio Code'. The left sidebar contains the Explorer view, showing a project structure with folders '.vscode' and 'main.c', and files 'main.o' and 'prog'. The main editor area displays a terminal window with a bash shell. The terminal output shows a series of 'ping' commands being executed in a loop, with the IP address '140.117.11.1' visible in the last command. The status bar at the bottom shows the current line and column (Ln 17, Col 15), tab size (4), encoding (UTF-8), language (LF), and the active file (Makefile).

2. 輸入正確的指令，print **<hop distance>**

A screenshot of the Visual Studio Code editor interface. The top bar shows the application name 'Visual Studio Code' and the current file 'makefile - hw4 - Visual Studio Code'. The left sidebar contains the Explorer view, showing a file tree with 'HW4' as the root. Under 'HW4', there are files '.vscode', 'main.c', 'main.o', 'makefile', and 'prog'. The 'makefile' file is selected. The main editor area displays the 'makefile' file, which contains a loop of 'ls' commands. The terminal window at the bottom shows the output of these commands, which are all 'ls' commands executed from the directory '~/Desktop/TCPIP/hw4\$'. The terminal output shows the directory contents for each command, which are consistent across all iterations. The status bar at the bottom indicates the current line and column (Ln 17, Col 15), the tab size (Tab Size: 4), the encoding (UTF-8), the language (LF), and the file name (Makefile).

A screenshot of the Visual Studio Code editor interface. The title bar at the top reads "makefile - hw4 - Visual Studio Code". The Explorer sidebar on the left shows a file tree with "HW4" expanded, containing ".vscode", "main.c", "main.o", "makefile", and "prog". The "makefile" file is selected. The main editor area shows the "makefile" content with a single line: "1 all: prog". Below the editor, the TERMINAL panel is active, displaying a series of 15 identical lines: "miksuki@miksuki-VirtualBox: ~/Desktop/TCPIP/hw4\$". The status bar at the bottom indicates "Ln 17, Col 15", "Tab Size: 4", "UTF-8", "LF", and "Makefile".

3. hop distance 超過時目標距離時，  
print hop distance > destination distance

The image shows a screenshot of the Visual Studio Code editor interface. The title bar at the top indicates the file being edited is 'makefile - hw4 - Visual Studio Code'. The interface is in Chinese, with the top menu bar showing 'File', 'Edit', 'Selection', 'View', 'Go', 'Run', 'Terminal', and 'Help'. The left sidebar contains the Explorer view, showing a file tree for a project named 'HW4'. The files listed are '.vscode', 'main.c', 'main.o', 'makefile', and 'prog'. The 'makefile' file is selected. The main editor area displays the 'makefile' file, which contains a loop of commands: '1 all: prog' followed by a series of 'hop distance > destination distance' commands. The terminal window at the bottom shows the output of these commands, with the prompt 'miksuki@miksuki-VirtualBox:~/Desktop/TCPIP/hw4\$' repeated for each command. The terminal also shows the command 'sudo ./prog 8 140.117.11.1' and the output 'hop distance > destination distance'. The status bar at the bottom indicates the current line is 17, column 15, and the file size is 4 bytes. The encoding is UTF-8, and the language is set to 'Makefile'.