Computer Programming 1 Lab

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1. Connect to ghost

```
ssh s111xx@ghost.cs.nccu.edu.tw
```

2. Please type the following command on ghost

```
cp ~s10816/.profile ~
cp ~s10816/.vimrc ~
cp ~g10611/.bashrc ~
```

3. Change your password

Outline

- Unix Command Review
- Vim Tips
- Simple C Program
- Compile
- Data Type
- Operators
- Exercise 1

Unix Command Review

`cd` -> change directory

```
cd ~
cd ~s111xx/test
cd ./test
cd /usr/share
cd ..
cd ../test
```

Unix Command Review

`ls` -> list files in current directory

```
ls
ls -l   -> list files details in current directory
ls -a   -> list all files (include hidden files) in current directory
ls -la  -> list all files with details in current directory
```

Unix Command Review

How to create/delete/copy files or directory?

- `mkdir test`
  Create a directory named "test" in current directory.
- `cp fileX dirY/dirZ`
  Copy fileX from current directory to `./dirY/dirZ`.
- `cp fileX dirY/fileZ`
  Copy fileX from current directory to dirY and rename to fileZ.
- `cp -r dirX dirY`
  Copy dirX from current directory to dirY.

Unix Command Review

How to create/delete/copy files or directory?

- `mv fileA dirB`
  Move fileA to dirB.
- `mv dirA dirB`
  - If dirB exists, then move dirA under dirB.
  - If dirB doesn't exist, dirA is renamed to dirB.
- `rm x`
  Remove file x or remove directory x if x is an empty directory.
- `rm -rf x`
  Remove directory x and all its contents regardless the file is write-protect or not.

Unix Command Review

- The path used on `cd`, `mkdir`, `cp`, `mv`, and `rm` can be absolute path or relative path.
- Type `pwd` to see what the current directory is.
- Type `whoami` to see your account's name.
- Type `logout` or `exit` to logout the system, or you can press `Ctrl+D`.
- Type `Ctrl+L` or `clear` to clean your screen.
- Type `Ctrl+C` to stop the program which is running.

Unix Command Review

- Remember, whenever you have problems using Unix, try `man` command.

```
man ls
man cp
```

- `man` stands for manual.

Vim Tips

- `i`, `o`, `a` -> change to insert mode
- `Esc` -> back to normal mode
- `:`, `/` -> enter command-line mode
- `:w` -> save your work
- `:q` -> quit vim
- `:wq`, `:x` -> save and quit
- `:q!` -> quit without saving
- `:xxx` -> go to line xxx
- `/xxx` -> search "xxx" in this file

Vim Tips

- `v` -> character visual
- `V` -> line visual
- `y` -> copy
- `p` -> paste
- `d` -> delete (cut)
- `u` -> undo
- `:nohl` -> no highlight
- `gg=G` -> auto indent

Simple C Program

- `main()` is a entry point of program

```c
#include <stdio.h>

int main(){
    int x;
    scanf("%d", &x);
    x = x + 2;
    printf("%d\n", x);
    return 0;
}
```

  - `#include <stdio.h>` is for preprocessor
  - `int main(){...}` -> main function
  - `scanf` -> input
  - `printf` -> output
  - `return 0` -> no error

Compile

How to compile your program?

- `make` if you have `Makefile`.
  - Like a script. It runs `gcc` automatically.
- `gcc`, GNU compiler.

```
gcc xxxxx.c
```

  - It will compile `xxxxx.c` and generate the executable file `a.out`.
  - Or dump a lot of errors.

Compile

```c
#include <stdio.h>

int main(){
    int a;
    printf("%d", a)
    return 0;
}
```

```
[ge10919@ghost]~ gcc test.c
test.c: In function 'main':
test.c:5: error: excepted ';' before 'return'
```

Compile

Type `./a.out` to run the program.

```
[s111xx@ghost]~ ./a.out
134511260
```

- Here is a "initialization" problem.

How to Copy Your C Script?

- `cat` is a standard Unix utility that reads files sequentially, writing them to standard output.

```
[ge10919@ghost]~ cat hello_world.c
#include <stdio.h>

int main(){
    printf("Hello World!\n");
    return 0;
}
[ge10919@ghost]~
```

Data Type

Here We Go

```c
#include <stdio.h>

int main(void){
    int num = 10;
    char c = 'G';
    double pi = 3.14;
    printf("%d_%c %f !!\n", num, c, pi);
}
```

```
10_G 3.14 !!
```

Data Type

- Type Conversion
  - Implicit type conversion

```
int number = 10;
printf("%d\n", number/3); // 3 (why?)
```

  - Conversion

```
int num = 3;
float fnum = 3.5;
float sum;
sum = (float)num + fnum;
```

Data Type

- Print float or double number
  - Number of digits

```c
double pi = 3.14159;
printf("%f\n", pi);
// 3.14159

// What if I want to print "3.14"?
printf("%.2f\n", pi);
// 3.14

printf("%d\n", pi);
// 1293080650
```

Operators

- Arithmetic Operator
  - `=`
    - Example: `x = 1`, `x = a`, `x = a = b = 1`
  - `+`, `-`, `*`, `/`
    - Example: `x = a + b`, `x = x + b`, `x += b`
  - `%` Module Operator and remainder of after an integer division.
    - Example: `z = x % y`
  - `++`, `--`
    - Increase/Decrease operator increases/decreases the integer value by one
    - Example: `i++`, `j--`, `++i`, `--j`

Operators

- Relational Operator
  - `==` , `!=`
    - Checks if the values of two operands are equal or not.
    - Example: `a == b` , `x != y`
  - `>` , `<`
    - Checks if the value of left operand is greater/less than the value of right operand.
    - Example: `a > b` , `c < d`
  - `>=` , `<=`
    - Checks if the value of left operand is greater/less than or equal to the value of right operand.
    - Example: `a >= b` , `c <= d`

Operators

- Logical Operator
  - `&&`
    - Called Logical AND operator.
    - Example: `A && B`
  - `||`
    - Called Logical OR operator.
    - Example: `A || B`
  - `!`
    - Called Logical NOT operator.
    - Example: `!(A && B)`

Exercise 1

There is a rectangle in plane coordinates. Give you the coordinates of the upper-left and bottom-right points of the given rectangle. Please calculate the area of the rectangle.

- Input:

  Two lines. Each line contains two numbers.

  The two numbers in the first line are the coordinate of the upper-left point (x_1, y_1).

  The two numbers in the secend line are the coordinate of the bottom-right point (x_2, y_2).

- Output:

  The area of the rectangle.

Any Questions?