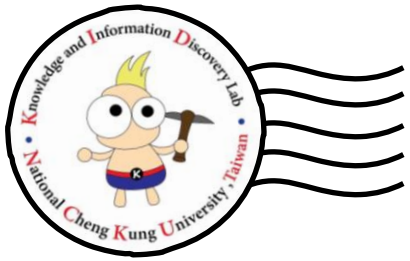

NCKUEE Freshman Camp

Hsiuyi

2017/08/16

Outline

- For-loop
- Multiplication table
- Little star
- Final code
- Fibonacci numbers

Outline

- For-loop
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For-loop

- for(initial ; condition ; step){
  // Do sth here.
  }
- for (int x = 0; x < 5; x++) {
  cout << x << endl;
  }

For-loop (cont'd)

- x++ v.s ++x

Code Writer

```
1  #include <iostream>
2  using namespace std;
3
4  int main(void) {
5
6      int x = 0;
7      cout << x;
8
9      cout << x++;
10     cout << x;
11
12     cout << ++x;
13     cout << x;
14
15     system("pause");
16 }
```

line7. x=0
line9. x=0
line10. x=1
line12. x=2
line13. x=2

Outline

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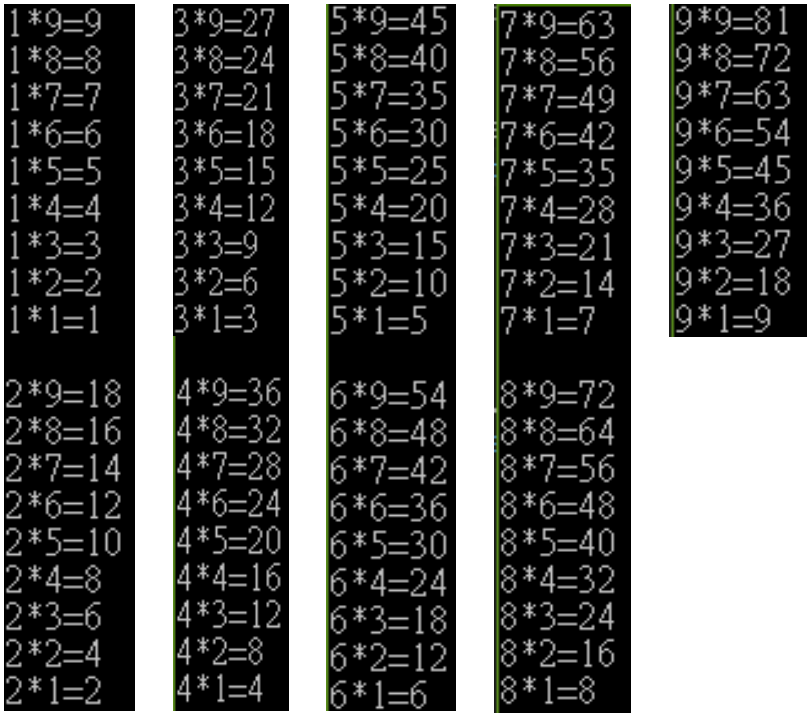
Multiplication table

- Mulitplicand from 1 to 9, Multiplier from 9 to 1.
- Hint: We can put for-loop in another for-loop.



Multiplication table (cont'd)

- Please modify MultiTable.cpp

Code Writer

```cpp
/* 20170816_MultiTable.cpp
* -- "The first program" for Day 2 in 2017 NCKUEE Freshman Camp --
* -- Purpose: for-loop practice.
*/
#include <iostream>
using namespace std;

int main(void){
    for (int i = 0 ; i <= 0 ; i++){ //Line9: control the multiplicand
        for (int j = 0; j <= 0;j++){ //Line10: control the multiplier
            cout << i << "*" << j << "=" << "product" << endl; //Line11: rewrite the "product" to correct answer
        }
        cout << endl;
    }
    system("pause");
    return 0;
}
```

Visual studio

- Show the number of line

multiplication.cpp*

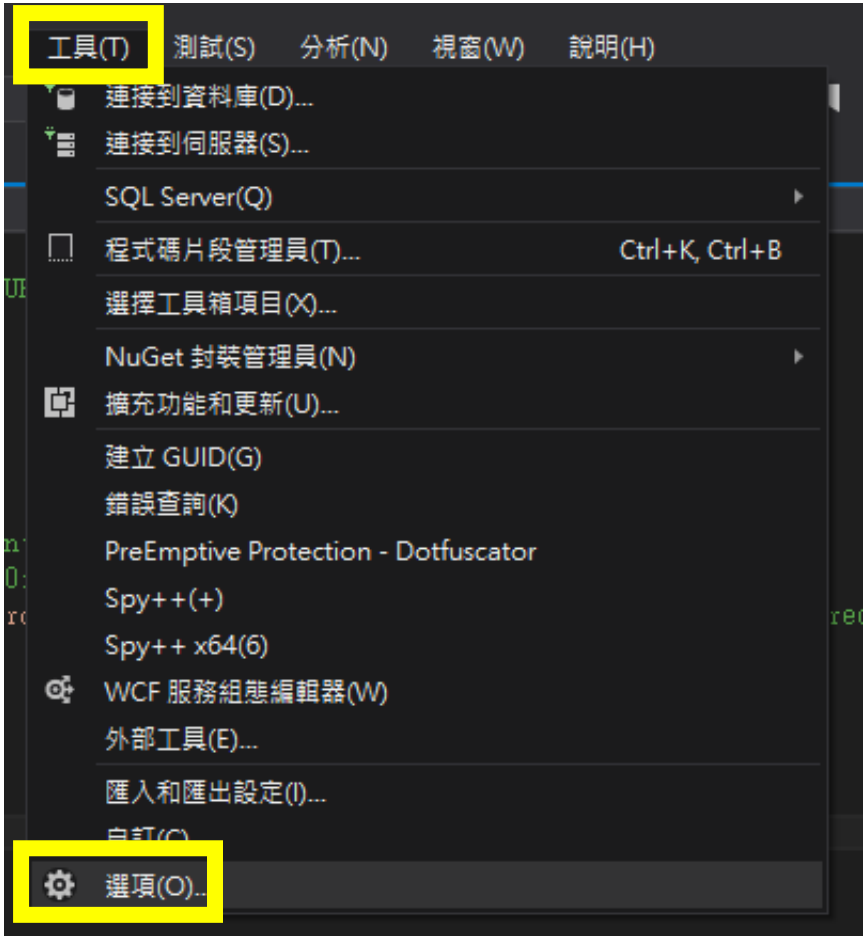
Project1 (全域範圍)

```
/* 20170816_MultiTable.cpp
 * -- "The first program" for Day 2 in 2017 NCKUEE Freshman Camp --
 * -- Purpose: for-loop practice.
 */
#include <iostream>
using namespace std;

int main(void) {
    for (int i = 0; i <= 0; i++) { //Line9: control the multiplicand
        for (int j = 0; j <= 0; j++) { //Line10: control the multiplier
            cout << i << "*" << j << "=" << "product" << endl; //Line11: rewrite the "product" to correct answer
        }
        cout << endl;
    }
    system("pause");
    return 0;
}
```

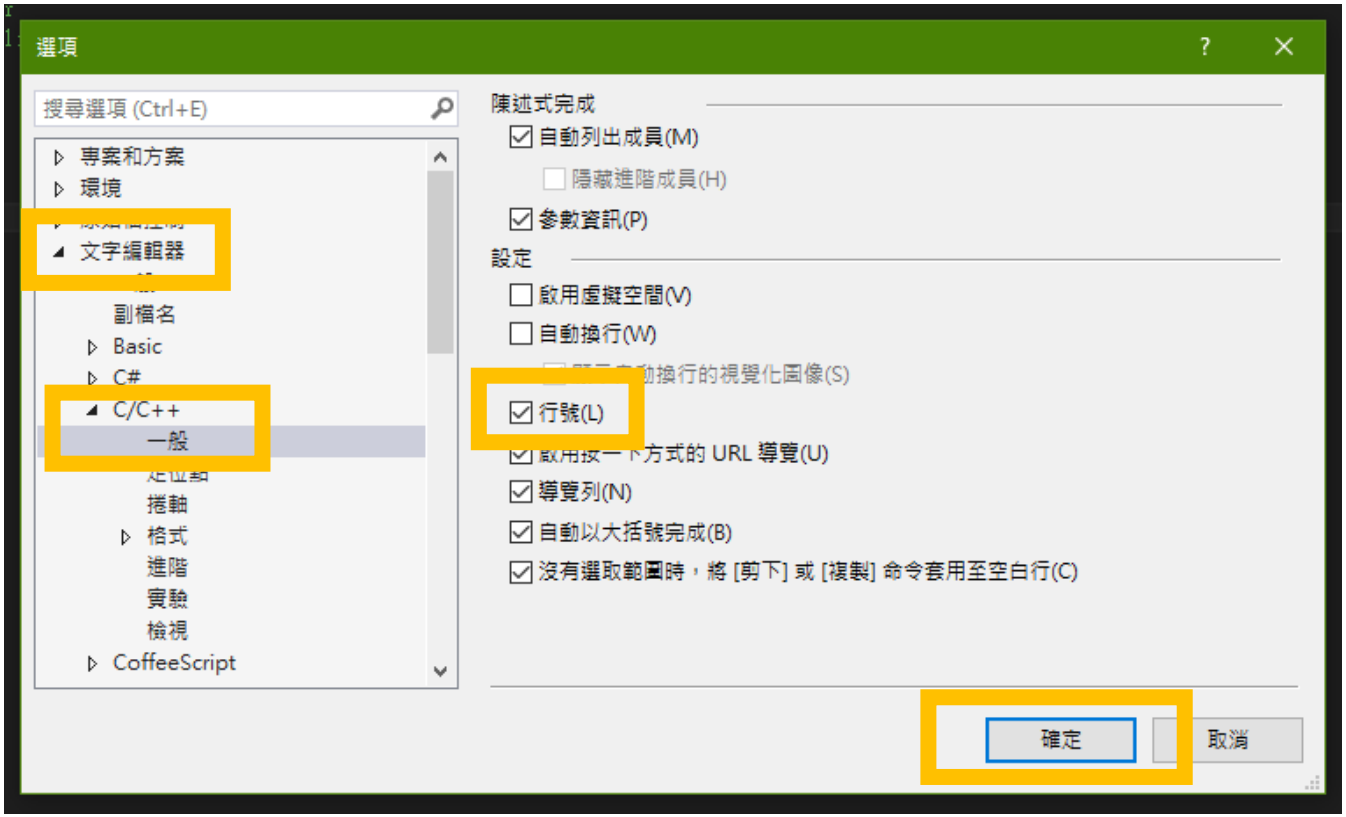
Visual studio

- 工具/選項



Visual studio

- 文字編輯器/c/c++/一般/行號



Visual studio

- finish

multiplication.cpp

(全域範圍)

```
1   /* 20170816_MultiTable.cpp
2   * -- "The first program" for Day 2 in 2017 NCKUEE Freshman Camp --
3   * -- Purpose: for-loop practice.
4   */
5   #include <iostream>
6   using namespace std;
7
8   int main(void) {
9       for (int i = 0; i <= 0; i++) { //Line9: control the multiplicand
10          for (int j = 0; j <= 0; j++) { //Line10: control the multiplier
11              cout << i << "*" << j << "=" << "product" << endl; //Line11: rewrite the "product" to correct answer
12          }
13          cout << endl;
14      }
15      system("pause");
16      return 0;
17  }
```

Outline

- For-loop
- Multiplication table
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Little star

- Using the sign * to build a triangle.
- Hint: You should know the amount of “space” and “star” in each level.

```
please input the height of triangle:10
         *
        ***
       *****
      *******
     *********
    ***********
   *************
  ***************
 *****************
*******************
```

Little star (cont'd)

- Please modify LittleStar.cpp

```
 9  int main(void) {
10
11      int height = 0;
12      cout << "please input the height of triangle:";
13      //Line13: GET a input from keyboard, then stores it in variable "height"
14
15      int space_level_amount = 0; //Line15: initial the amount of space
16      int star_level_amount = 1; //initial the amount of star
17
18      for (int i = 0; i < 0; ) { //Line18: control the height(level) of the triangle
19          for (int j = 0; j < 0; ) { //Line19: control the amount of space in level "i"
20              cout << " ";
21          }
22          for (int k = 0; k < 0; ) { //Line22: control the amount of star in level "i"
23              cout << "*";
24          }
25          space_level_amount -= 0; //Line25: modify the amount of space in next level "i+1"
26          star_level_amount += 0; //Line26: modify the amount of star in next level "i+1"
27          cout << endl;
28      }
29
30      system("PAUSE");
31      return 0;
32  }
```

Outline

- For-loop
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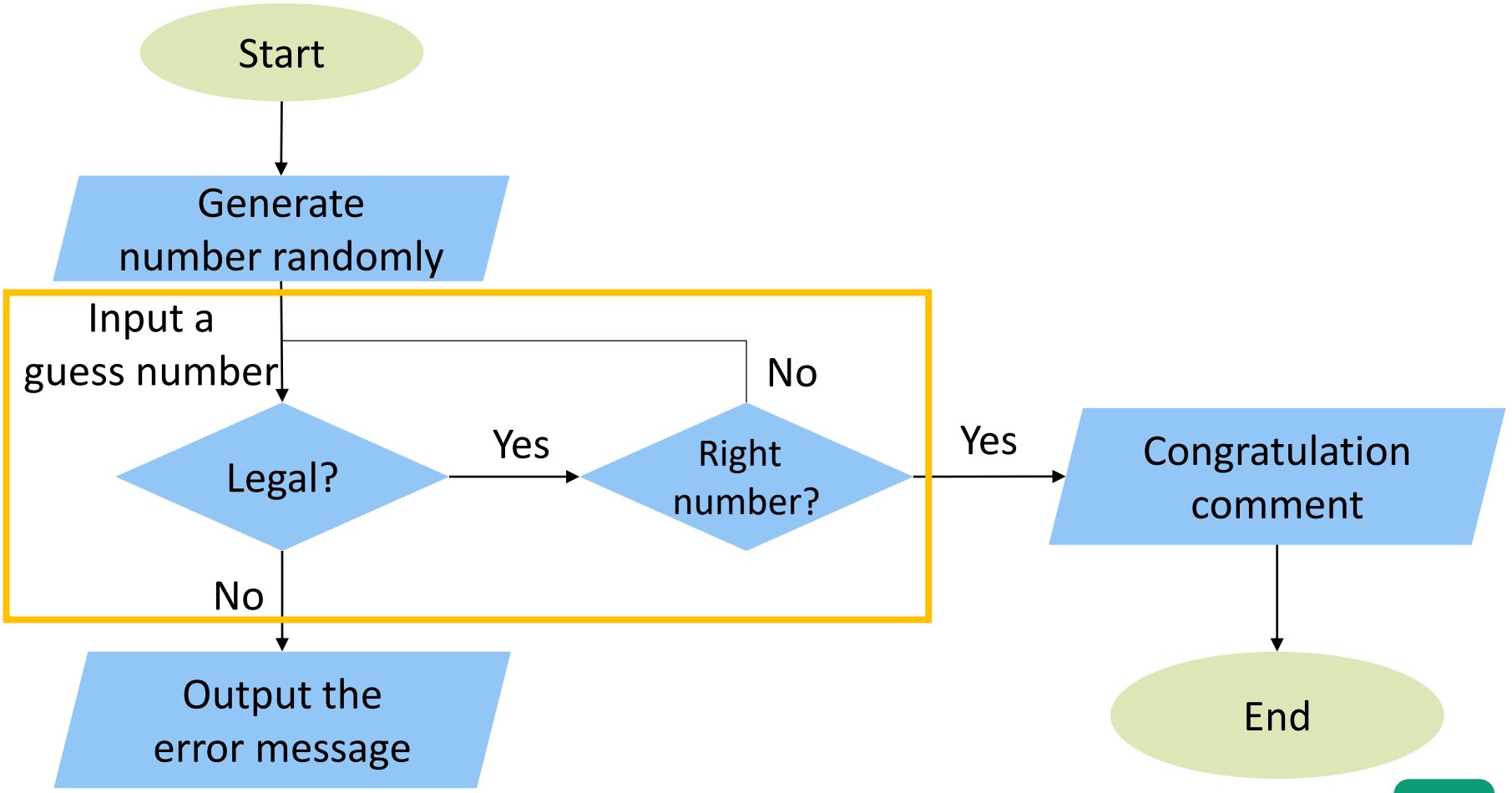
Final code

- The system randomly generate a secret number, lies between 1 and 100.
- We guess the number according to the hint (too big / too small) after each turn.
- Until we guessed the secret number.

Final code(cont'd) – Main step

1. Randomly generate a secret number between 1 and 100.
2. User inputs his/her guess via keyboard.
3. Determine this number is illegal or not.
   - If so, output the error message.
4. Give the user feedback (too big/small).
   - If right, congratulations to the user and give him/her comments.

Final code(cont'd) – Flow chart



Final code(cont'd) - Demo

```
Guess My Number!!
There is a chest of treasure on the desk, but it needs a PASSWORD to open!
The password lies between 1 and 100. Go and guess it!
請按任意鍵繼續 . . .

Please guess a number! >> 200
The password lies between 1 and 100!

Please guess a number! >> 50
Too small! Try again...

Please guess a number! >> 60
Too small! Try again...

Please guess a number! >> 70
Too big! Try again...

Please guess a number! >> 65
Too small! Try again...

Please guess a number! >> 66
Too small! Try again...

Please guess a number! >> 67
Too small! Try again...

Please guess a number! >> 68
Whoa! You hacked the password! All treasure in the chest belongs to you!
You attempted 8 times in total. Congratulations!
```

Random variable

- 整數變數 = rand();
  - We should include <cstdlib> before we use rand().
- Rule: (rand()%(MAX-min+1))+min
- Example:
  - 1-10 → a= (rand() % 10) +1
  - 1-100 → a= (rand() % 100) +1
  - 100-1000 → a= (rand() % 901) +100
- Problem: We will get a same random number every time.

Random variable(cont'd)

- srand(seed);
  - We should include <cstdlib> before we use rand().
- seed → use current time
- time(NULL);
  - We should include <ctime> before we use time().
- srand(time(NULL));

Final code(cont'd)

Step.1 指引與隨機生成數字

```
14      srand(time(NULL)); //randomize the seed of pseudorandom number generator
15
16      /* Declaring variables (for "telling" the OS how much space of RAM should be distributed) */
17      int password; //stores the actual password
18      int guess; //stores the number user entered
19      int attempts = 0; //records the number of attempts
20      bool password_hacked = false; //whether the password of the chest is hacked or not
21
22      /* Welcome message & instructions */
23      cout << "Guess My Number!!" << endl;
24      cout << "There is a chest of treasure on the desk, but it needs a PASSWORD to open!" << endl;
25      cout << "The password lies between 1 and 100. Go and guess it!" << endl;
26      system("pause");
27
28      /* Generate a password */
29      password = (rand() % 100) + 1;
```

Final code(cont'd)

Step.2開始猜、給回饋

```
31      /* Start guessing!! */
32      while (!password_hacked) {
33          attempts++;
34          cout << endl << "Please guess a number! >> ";
35          //Line35: GET a input from keyboard, then stores it in variable "guess"
36
37          /* determine the number entered by user is right or not */
38          //Line39, Line43, Line46, Line49: please rewrite the judgement in each condition
39          if (true) {
40              cout << "Whoa! You hacked the password! All treasure in the chest belongs to you!" << endl;
41              password_hacked = true;
42          }
43          else if (true) {
44              cout << "The password lies between 1 and 100!" << endl;
45          }
46          else if (true) {
47              cout << "Too small! Try again..." << endl;
48          }
49          else if (true) {
50              cout << "Too big! Try again..." << endl;
51          }
52      }
```

Final code(cont'd)

Step.3 若猜對、則恭喜並評分

```
54      /* Password hacked! Give the user comments */
55      cout << "You attempted " << attempts << " times in total. ";
56      if (attempts < 3) {
57          cout << "Wow! You are so lucky!" << endl;
58      }
59      else if (attempts < 6) {
60          cout << "You are a lucky guy!" << endl;
61      }
62      else if (attempts < 9) {
63          cout << "Congratulations!" << endl;
64      }
65      else {
66          cout << "It seems that you took lots of time to hack it..." << endl;
67      }
```

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Fibonacci numbers

- Fibonacci numbers are the numbers in the following integer sequence:

F_0	F_1	F_2	F_3	F_4	F_5	F_6	F_7	F_8	F_9	F_{10}	F_{11}	F_{12}	F_{13}	F_{14}	F_{15}	F_{16}	F_{17}	F_{18}	F_{19}	F_{20}
0	1	1	2	3	5	8	13	21	34	55	89	144	233	377	610	987	1597	2584	4181	6765

- $F_0 = 0, F_1 = 1$
- $F_n = F_{n-1} + F_{n-2}, n >= 2$

Fibonacci numbers(cont'd)

- Write a program to compute the Fibonacci numbers.
- Output the Fibonacci numbers F_0 to F_n with a user input parameter "n".

Fibonacci numbers(cont'd)

- Don't forget to include necessary libraries.
  - For example: <iostream>
- Add system("PAUSE") at the end of program.

Tips: 寫好程式的小訣竅

- 勤寫註解(非常重要！)
- 使用有意義的變數名稱
- 保持各層級縮排一致
- …
- Thanks!