NCKUEE Freshman Camp

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Outline

- For-loop & While-loop
- Practice
  - Output Number 0-9
  - Multiplication table
  - Little star
- Random number
- Practice
  - Final code

Outline

- **For-loop & While-loop**
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For-loop

- for(initial ; condition ; step){
  // Do something here.
  }

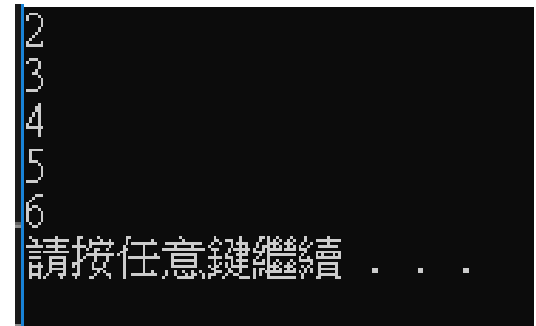- for (int x = 0; x < 5; x++) {
  cout << x << endl;
  }


```
0
1
2
3
4
請按任意鍵繼續 . . .
```

While loop

- while(condition){
  // Do something here.
  }

- int y=2;
- while(y<7){
  cout<<y<<endl;
  y++;
}

```
2
3
4
5
6
請按任意鍵繼續 . . .
```

Compare for/while loop

```
for (int x = 0; x < 3; x++) {
    cout << x << endl;
}
```

```
int x = 0;
while (x<3) {
    cout << x << endl;
    x++;
}
```

結果：

```
0
1
2
請按任意鍵繼續 . . .
```

Operator

- x++ v.s ++x

```
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

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 Setting

工具/選項

文字編輯器/c/c++/一般/行號

Visual studio

- Finish

```
/* 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;
}
```
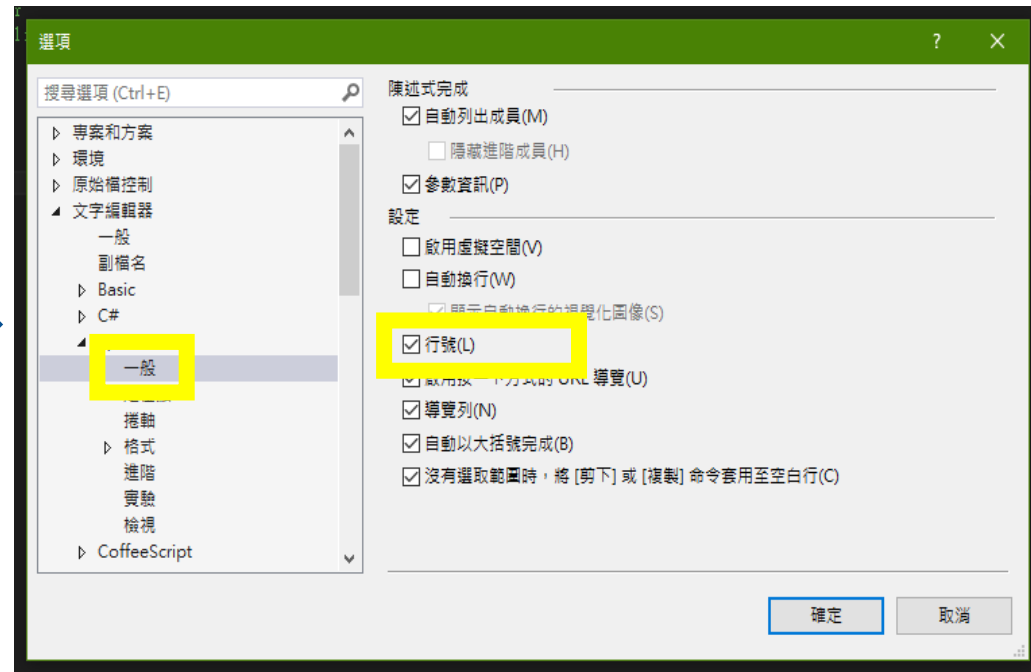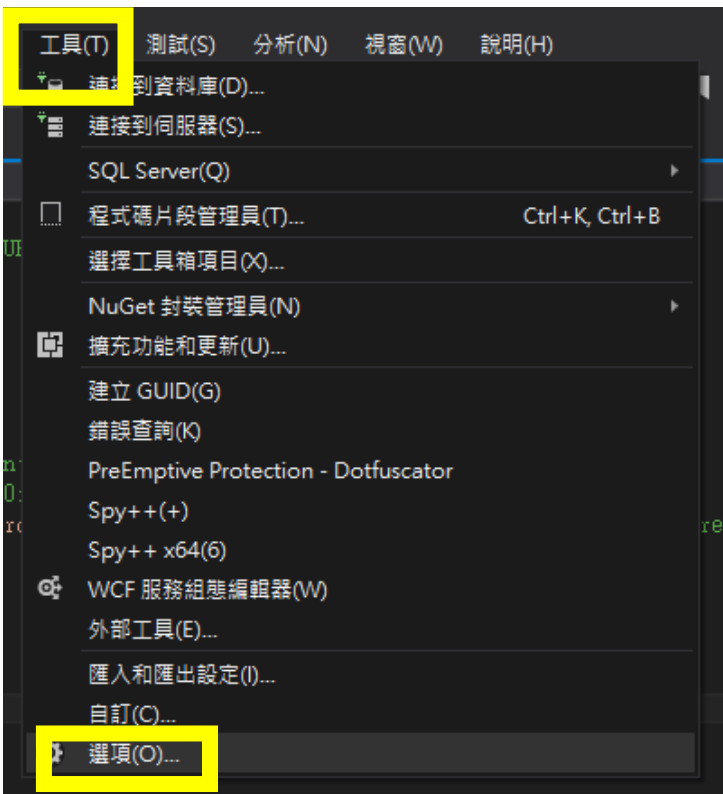
Outline

Output number 0-9

- Hint: You can think loop's

initial , condition ,step value.

Output number 0-9 (cont'd)

- Please modify Number0_9.cpp

```
5    #include <iostream>
6    using namespace std;
7
8    int main(void){
9
10       for (int i = 0;i< = 0;i++) {
11           cout << "?"<< endl;
12       }
13       // For output number 0-9 ,  modify Line10 & Line 11
14       system("PAUSE");
15       return 0;
16   }
17
```

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Multiplication table

- Rule
  - Multiplicand from 1 to 9, Multiplier from 9 to 1.

- Hint
  - Using **nested loop** to put for-loop in another for-loop.

```
1*9=9      3*9=27    5*9=45    7*9=63    9*9=81
1*8=8      3*8=24    5*8=40    7*8=56    9*8=72
1*7=7      3*7=21    5*7=35    7*7=49    9*7=63
1*6=6      3*6=18    5*6=30    7*6=42    9*6=54
1*5=5      3*5=15    5*5=25    7*5=35    9*5=45
1*4=4      3*4=12    5*4=20    7*4=28    9*4=36
1*3=3      3*3=9     5*3=15    7*3=21    9*3=27
1*2=2      3*2=6     5*2=10    7*2=14    9*2=18
1*1=1      3*1=3     5*1=5     7*1=7     9*1=9

2*9=18     4*9=36    6*9=54    8*9=72
2*8=16     4*8=32    6*8=48    8*8=64
2*7=14     4*7=28    6*7=42    8*7=56
2*6=12     4*6=24    6*6=36    8*6=48
2*5=10     4*5=20    6*5=30    8*5=40
2*4=8      4*4=16    6*4=24    8*4=32
2*3=6      4*3=12    6*3=18    8*3=24
2*2=4      4*2=8     6*2=12    8*2=16
2*1=2      4*1=4     6*1=6     8*1=8
```

Multiplication table (cont'd)

- Please modify MultiTable.cpp

```cpp
8   int main(void){
9       for (int i = 0 ; i <= 0 ; i++){ //Line9: control the multiplic
10          for (int j = 0; j <= 0;j++){ //Line10: control the multipl
11              cout << i << "*" << j << "=" << "product" << endl; //L
12          }
13          cout << endl;
14      }
15      system("pause");
16      return 0;
17  }
```

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Little star

- Rule: 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

```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

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  - Little star
- **Random number**
- **Practice**
  - **Final code**

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.
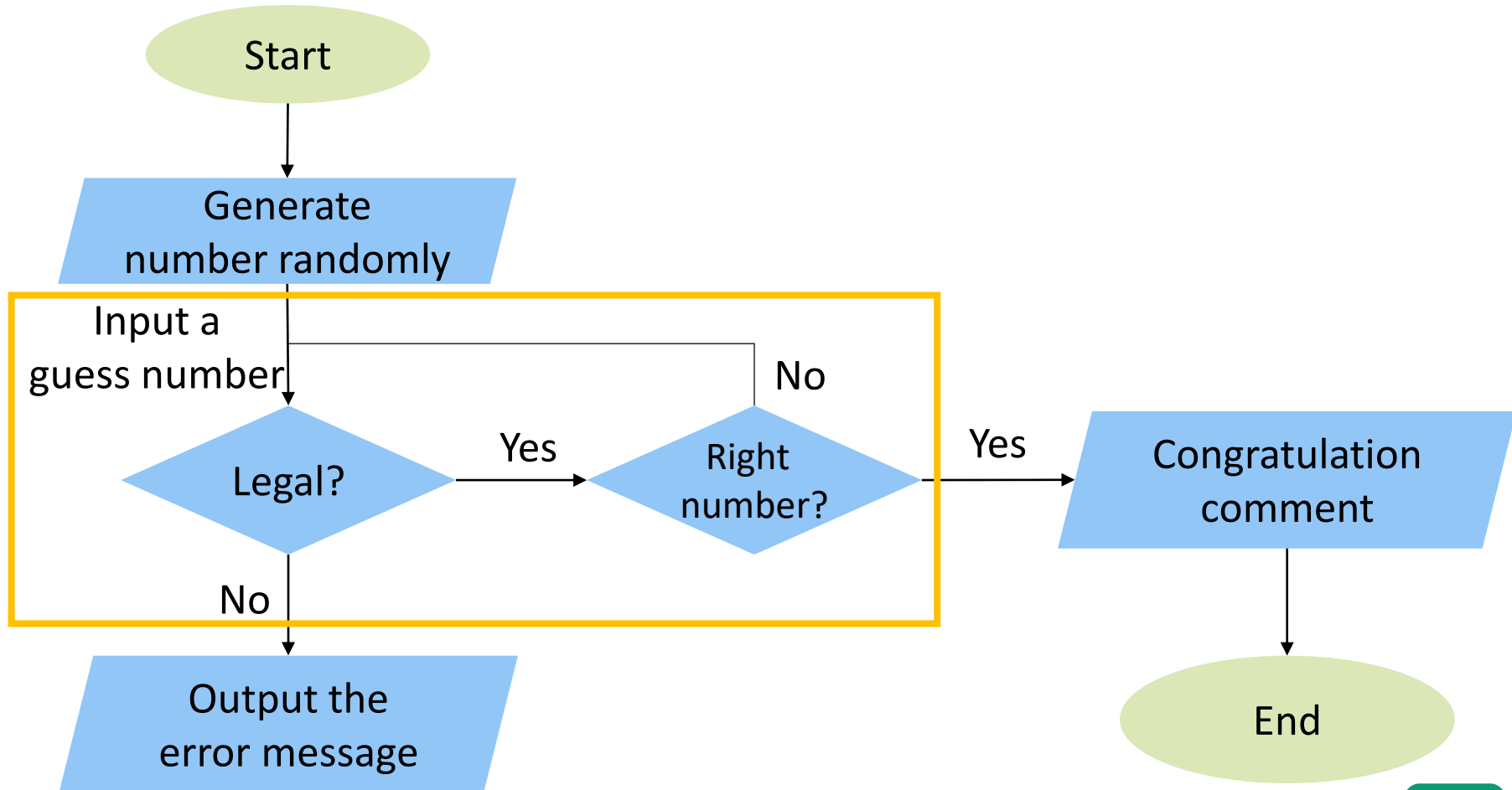
- Until we guessed the secret number.

Final code — Main step

1. Computer generate a secret number between 1 and 100 Randomly.

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– Flow chart

Start → Generate number randomly → Input a guess number → Legal? → No → Output the error message

Legal? → Yes → Right number? → No

Right number? → Yes → Congratulation comment → End

Final code —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)

- Get a different random number every time.

- srand(seed);
  - A Generator initialize seeds

- 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（修改的地方）

```
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      }
```

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!