Basics: From C to C++

Computer Programming for Engineers (DSAF003-42)
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Practice 2 : C++ Basics

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Console input & output

- **cin, cout**
  - cout (same about printf() in C)
  - cin (same about scanf() in C)

- **<iostream> is standard header file**
- **Using “using namespace std;” we can use “cout” instead of “std::cout”**

```cpp
#include <iostream>

using namespace std;

int main(){
    cout << "Helloworld\n";
    cout << "Helloworld" << endl;
    return 0;
}
```

```
Helloworld
Helloworld
```

- “₩n”, "**\n” or endl begin a new line.**

Console input & output

- **string is a data type to store sequence of characters.**

```cpp
#include <iostream>
#include <string>

using namespace std;

int main(){
    string myname;
    int studentNumber;
    float myScore;

    cout << "What is your nmae?" <<endl;
    cin >> myname;

    cout << "What is your studentNumber?" <<endl;
    cin >> studentNumber;

    cout << "What is your score?" << endl;
    cin >> myScore;

    cout << myname << "(" << studentNumber << ")'s score is " << myScore << endl;

    return 0;
}
```

```
What is your nmae?
허태훈
What is your studentNumber?
2021711919
What is your score?
80.0
허태훈(2021711919)'s score is 80
```

Exercise 1

- Write the code to convert Celcius to Fahrenheit, according to input value
- Fahrenheit = Celsius * 9/5 + 32
- Output Example

```
How many Celsius now?
32
Then it is 89.6 degrees Farenheit
```

Boolean Expression

- **Logical operators**
  - Logical AND(&&)
  - Logical OR (||)

Operator	Meaning	Value of the expression
<	Less than	If the expression is false, the result value is 0 If the expression is true, the result value is 1
>	Greater than	
<=	Less than or equal to	
>=	Greater than or equal to	
==	Equal to	
!=	Not equal to	

Boolean Expression Example

```cpp
#include <iostream>

using namespace std;

int main(){
    int a = 5;
    int b = 3;
    int c = 1;

    if ((a > b) && (a > c)){
        cout << "a is bigbest" << endl;
    }
    else{
        cout << "a is not biggest" <<endl;
    }

    return 0;
}
```

```
a is bigbest
```

if conditional statement

Formal Syntax:

if(<Boolean_expression>)

<yes_statement>

else

<no_statement>

<statement>

```cpp
#include <iostream>

using namespace std;

int main() {
    cout << "Enter a number: ";
    int x;
    cin >> x;

    if (x > 10){
        cout << x << " is greater than 10\n";
    }
    else if (x < 10){
        cout << x << " is less than 10\n";
    }
    else{
        cout << x << " is exactly 10\n";
    }
    return 0;
    }
```

```
Enter a number: 21
21 is greater than 10
```

```
Enter a number: 7
7 is less than 10
```

```
Enter a number: 10
10 is exactly 10
```

Exercise 2

- Make grading program
- Math and Science score is the input of grading program
- Grade A : 90 <= the average score

  Grade B : 80 <= the average score < 90

  Grade C : 70 <= the average score < 80

  Grade D : 60 <= the average score < 70

  Grade F : Otherwise
- The average score must be float

- Output Example

```
Enter a math score: 90
Enter a science score: 85
Average score: 87.5
Grade : B
```

```
Enter a math score: 55
Enter a science score: 40
Average score: 47.5
Grade : F
```

Reference

- conceptually similar to pointer, but is simpler
  - We can use it, as if it has the same type as the source has.
- Specified by ampersand (&) after type
- Name of a storage location or alias to a variable
- Must be a valid reference! no null/invalid reference exist.

```cpp
#include <iostream>

using namespace std;

int main() {
  int a = 3;
  int& another_a = a;
  cout << "a : " << a << endl;
  cout << "another_a : " << another_a << endl;

  another_a = 5;
  cout << "a : " << a << endl;
  cout << "another_a : " << another_a << endl;

  return 0;
}
```

```
a : 3
another_a : 3
a : 5
another_a : 5
```

Reference

- **Reference must be initialized in declaration**

```cpp
#include <iostream>

using namespace std;

int change_val(int &p) {
  p = 5;

  return 0;
}

int main() {
  int number = 3;

  cout << "number : " << number << endl;
  change_val(number);
  cout << "changed number : " << number << endl;
}
```

```
number : 3
changed number : 5
```

Assignment

- Fill the codes(void SwapScore, int main)
- Minsu and Haeun took a math and science test.

  Teacher entered their scores into the system.

  After typing, the teacher noticed that entered their math score was switched.

  So, using SwapScore the teacher swapped their math score.
- Lastly, the system printed their average score and who got a higher score or same score.

```cpp
#include <iostream>
using namespace std;

struct Student
{
    int mathScore;
    int scienceScore;
    float averageScore;
};
void SwapScore(int &score1, int &score2){
}
int main(){
    Student Minsu;
    Student Haeun;

    cout << "Enter Minsu's math score: ";
    cin >> Minsu.mathScore;

    return 0;
}
```

Output Examples

```
Enter Minsu's math score: 77
Enter Minsu's science score: 80
Enter Haeun's math score: 89
Enter Haeun's science score: 62
Minsu average score: 84.5
Haeun average score: 69.5
Minsu got a higher score
```

```
Enter Minsu's math score: 90
Enter Minsu's science score: 70
Enter Haeun's math score: 60
Enter Haeun's science score: 80
Minsu average score: 65
Haeun average score: 85
Haeun got a higher score
```

```
Enter Minsu's math score: 70
Enter Minsu's science score: 70
Enter Haeun's math score: 80
Enter Haeun's science score: 80
Minsu average score: 75
Haeun average score: 75
Minsu and Haeun got a same score
```