



Data structure and Programming II

TP01:

Getting started with C++ programming

Deadline:
6 days

- Objective:
 - To review some lectures learnt in Semester 1 and apply with C++
 - Variable (number, string, character), decision making, loop, structure, function,
 - Main topics: Function, structure, while loop
 - To be ready for semester 2
- Submit to Moodle (individually)
 - *A pdf report (cover, team member, percentage of contribution for each member, exercise and solution with screenshot)*
 - *Source codes*

```
1  #include<iostream>
2  using namespace std;
3  main(){
4      string name;
5
6      cout<<"Hello world!\n";
7      cout<<"Welcome to C++ language!\n";
8
9      cout<<"What is your name?: ";
10     cin>>name;
11     cout<<"\tHi, "<<name<<endl;
12 }
```

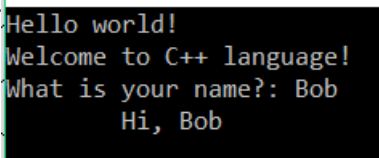


Figure 1: An example of C++ program: Structure

Write programs using C++ to solve each problem below:

1. Write a C++ program to ask information from a student such as name, gender, major, age then display the greeting message on screen. Say he/she is eligible to vote the election if the age is at least 18.

Hi, Mr. **name!** your age is **age** year old and you learn **major!** : for male (M)

Hi, Mrs. **name!**, you are **age** year old and you are majoring in **major** : for female (F)

For either Male or Female:

You can vote. If age is at least 18.

You can not vote Otherwise.

2. Write a C++ program to check whether an input character is a vowel or a consonant. Hint: Use ASCII code to test condition.
 - Uppercase letters from: 65 to 90, lowercase letters from 97 to 122
 - Vowel and its ASCII code: a = 97, e = 101, i = 105, o = 111, u = 117
3. A program to compute tax salary of a person. The program asks for name, gender and salary of a person and tell him/her how much tax he/she is required to pay. The tax is computed based on the rules below:
 - **For males**
 - Salary more than 1000 USD, pay tax 9.5%
 - Salary 500 – 1000 USD, pay tax 7%
 - Salary 300 – 500 USD, pay tax 5%
 - Salary less than 300, no need to pay tax
 - **For females**
 - Salary more than 1000 USD, pay tax 8%
 - Salary 500 – 1000 USD, pay tax 6.5%
 - Salary 300 – 500 USD, pay tax 3.5%
 - Salary less than 300, no need to pay tax
4. Create a C++ program that can play a game Rock-Paper-Scissor. The game plays between the user against the computer.
5. Write a C++ program to convert a minute to a time format which consists of hour, minute, and second (h:m:s). A user is required to input a minute.
 - $\text{Hours} = \text{minutes} / 60$
 - $\text{Remainderminutes} = \text{minutes} \% 60$
 - $\text{Seconds} = \text{remainderminutes} * 60$
6. Write a C++ program to find the summation of numbers from 1 to n except number 10 and 30, where n is a number input by a user and n should be greater than 50.
7. Write a C++ program to create a new data structure for storing info of book (book ID, book ISBN, book title, published year, author names and price (\$)). Each book could have more than one author. To do:
 - Create an array that can store 5 books' info.

- Create a function to display a book info based on ISBN. This function takes a parameter which is an ISBN of a book.

```
void displayBookByISBN(Book books[], int size, string isbn){.... }
```

- Create a function to display information of all books.

```
void displayAllBooks(Book books[], int size) { ... }
```

8. Create 5 functions to:

- i) convert temperature Celsius to Fahrenheit: $\text{Fahrenheit} = (\text{Celsius} * 9.0 / 5.0) + 32$
- ii) convert temperature Fahrenheit to Celsius: $\text{Celsius} = (\text{Fahrenheit} - 32) * 5.0 / 9.0$
- iii) find root of quadratic equation $ax^2+bx+c=0$.
- iv) compute BMI of a person's weight and height and tell whether he/she is overweight, underweight and other terms according to BMI list:
 - $\text{bmi} = \text{weight} / (\text{height} * \text{height})$
 - $\text{bmi} < 18.5$, underweight
 - $\text{bmi} < 25$, normal weight
 - $\text{bmi} < 30$, overweight
 - else, obese
- v) sum numbers from 1 to n except those numbers that are divisible by 3, n is a parameter of the function.

Design a menu program to demonstrate these 5 functions with different test cases during the run time of the program.