

C++

程式語言（二）

Introduction to Programming (II)

Project: Battle Arena Game

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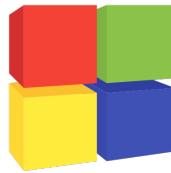
Platform/IDE

- Dev-C++



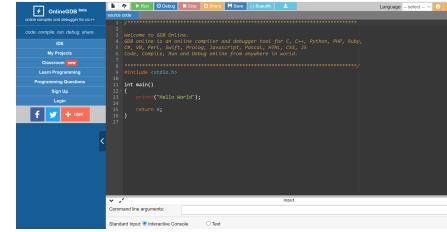
<https://www.pngegg.com/en/search?q=Dev-C>

- Codeblocks

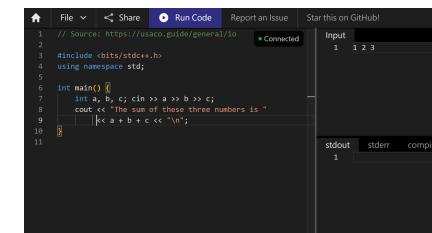


<https://icons8.com/icons/set/code-blocks>

- OnlineGDB (<https://www.onlinegdb.com/>)



- Real-Time Collaborative Online IDE (<https://ide.usaco.guide/>)



Textbooks (We focusing on C++11)

- *Learn C++ Programming by Refactoring* (由重構學習 C++ 程式設計). Pang-Feng Liu (劉邦鋒). NTU Press. 2023.
- *C++ Primer. 5th Edition*. Stanley B. Lippman, Josée Lajoie, Barbara E. Moo. 2019.
- *Effective C++*. Scott Meyers. O'Reilly. 2016.
- *Thinking in C++*. Vol. 1: *Introducing to Standard C++*. 2nd Edition. Bruce Eckel. Prentice Hall PTR. 2000.

Useful Resources

- Tutorialspoint
 - <https://www.tutorialspoint.com/cplusplus/index.htm>
 - Online C++ Compiler
- Programiz
 - <https://www.programiz.com/cpp-programming>
- LEARN C++
 - <https://www.learncpp.com/>
- MIT OpenCourseWare - Introduction to C++
 - <https://ocw.mit.edu/courses/6-096-introduction-to-c-january-iap-2011/pages/lecture-notes/>
- Learning C++ Programming
 - <https://www.programiz.com/cpp-programming>
- GeeksforGeeks
 - <https://www.geeksforgeeks.org/c-plus-plus/>

Battle Arena Game



Project Overview

- The goal of this project is to create a **Battle Arena Game**.
 - Two players control different types of fighters who battle against each other.
 - Players can choose their fighter, attack opponents, and use special abilities.
 - The project will involve OOP concepts such as *inheritance*, *function overloading/overriding*, *constructors*, *destructors*, *virtual functions*, *abstract classes*, and *dynamic memory allocation*.

Project Requirements

1. Classes and objects:

- a. Implement **Character**, **Warrior**, **Mage**, **Archer**, and **BattleArena** classes.
- b. Use appropriate **constructors** and **destructors**.

2. Inheritance:

- Create different fighter types (Warrior, Mage, Archer) that **inherit** from Character.

3. Function Overloading and Overriding:

- a. **Overload** functions for different attack types (e.g., swing a sword, shoots an arrow, etc. You can design your own attack types).
- b. **Override** attack() and specialAbility() in each derived class.

4. Abstract Class and Virtual Functions:

- a. Make Character an **abstract** class with a pure virtual function attack().
- b. Implement attack() differently in Warrior, Mage, and Archer.

5. Dynamic Memory Allocation:

- a. Use dynamic memory allocation for storing characters.
- b. Implement proper memory management with destructors.



warrior



mage



archer

Sample main function

```
int main() {  
    Character* player1 = new Warrior("Arthur");  
    Character* player2 = new Mage("Merlin");  
  
    BattleArena::startBattle(player1, player2);  
  
    delete player1;  
    delete player2;  
    return 0;  
}
```

Sample demo

Battle Begins: Legolas VS Thor!

Legolas shoots an arrow at Thor!
Thor takes 18 damage.

Thor swings a sword at Legolas!
Legolas takes 15 damage.

Legolas - Health: 85 | Attack Power: 18
Thor - Health: 102 | Attack Power: 15

Legolas shoots an arrow at Thor!
Thor takes 18 damage.

Thor swings a sword at Legolas!
Legolas takes 15 damage.

Legolas - Health: 70 | Attack Power: 18
Thor - Health: 84 | Attack Power: 15

Legolas shoots an arrow at Thor!
Thor takes 18 damage.

Thor swings a sword at Legolas!
Legolas takes 15 damage.

Legolas - Health: 55 | Attack Power: 18
Thor - Health: 66 | Attack Power: 15

Legolas shoots an arrow at Thor!
Thor takes 18 damage.

Thor swings a sword at Legolas!
Legolas takes 15 damage.

Legolas - Health: 40 | Attack Power: 18
Thor - Health: 48 | Attack Power: 15

Legolas shoots an arrow at Thor!
Thor takes 18 damage.

Thor swings a sword at Legolas!
Legolas takes 15 damage.

Legolas - Health: 25 | Attack Power: 18
Thor - Health: 30 | Attack Power: 15

Legolas shoots an arrow at Thor!
Thor takes 18 damage.

Thor swings a sword at Legolas!
Legolas takes 15 damage.

Legolas - Health: 10 | Attack Power: 18
Thor - Health: 12 | Attack Power: 15

Legolas shoots an arrow at Thor!
Thor takes 18 damage.
Thor is defeated!

Legolas wins the battle!

Project Submission

- Your source codes.
- A video (up to 5 minutes long) with your demo and explanations.
 - Describe how the requirements are fulfilled.
 - Demonstrate how to run (or play) your program.