Introduction to C++

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week 1

課程介紹

關於我...

- 戴偉璿（Tai, Wei Hsuan）
- 台大醫工大三
- 擅長：C++、資料結構與演算法、網際網路概論、網站前後端架設、Linux、機器學習...
- 興趣：寫程式、看棒球、打電動
- 張學友的粉絲

日期	主題	日期	主題
9/12	課程簡介、基礎輸入輸出	11/28	函式
9/19	變數與四則運算	12/5	遞迴
10/17	選擇結構與邏輯運算子	12/12	Struct
10/31	重複結構	12/19	Vector
11/7	字串處理	12/26	Stack, Queue
11/21	期中考	1/2	Set, Map, Priority Queue
		1/9	期末考

上課方式

- 觀念講解、範例示範
- 大量的練習題
- 大量的數學證明（如果有必要）

- Large Language Model
- ChatGPT、Grok、Claude、Gemini
- 以討論取代抄答案
- **請不要叫我檢查你用 LLM 寫的程式碼！**

Why C++?

當亞洲父母發現你學的
是C++而不是A++

C++ vs Python

- C++:
  - Compiled Language
  - Static Typing
  - High Performance
  - Working Close to Hardware
- Python:
  - Interpreted Language
  - Dynamic Typing
  - Easy to Learn and Use
  - Rich Libraries and Frameworks

C++ 就藏在生活中！

- Operating Systems（Windows、macOS、Linux）
- Web Browsers（Chrome、Firefox、Edge）
- Game Engines（Unreal Engine、Unity）
- Parallel Computing（CUDA、OpenCL）

What is C++?

Introduction to C++

- First released in Nokia Bell Labs by Bjarne Stroustrup
- C with Classes
- 1983s, C with Classes → C++
- Object-Oriented Programming
- Directly manipulate hardware resources(memory, CPU)

"Father" of Programming Languages

- CPython, Numpy, Pandas, Matplotlib, Scikit-learn, TensorFlow, PyTorch
- JavaScript V8 Engine, Node.js, Deno
- MySQL, PostgreSQL, MongoDB
- Even C++ compiler itself!

Simple C++ IDE

- Windows: Dev-C++
- macOS: Xcode

Standard I/O in C++

Hello World!

```cpp
1    #include <iostream>
2    using namespace std;
3
4    int main() {
5        cout << "Hello World!" << endl;
6        return 0;
7    }
```

Basic Structure of C++ Program

- Header Files
- Namespaces
- Main Function

Header Files

In python, we use `import` to include libraries.

In C++, we use `#include` to include header files.

The most common header file is `<iostream>`, which is used for input and output operations(io refers to input/output). But if you want to use other advanced features, you may need to include other header files(i.e. `<vector>`, `<algorithm>`). Therefore, we often use `#include <bits/stdc++.h>` to include most standard libraries in contests(Do not do this in production code!).

Namespaces