ICT 奪星實戰精讀班

Lesson 6: Basic Programming Concepts (I)
基礎程式編寫概念（一）

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出版 | Lab Edu Limited

INTENSIVE COURSE

ICT 奪星實戰精讀班 – LESSON 6

Lesson Flow 課堂流程

- Introduction to Algorithm Design 算法設計簡介
- More on Boolean Logic 布爾邏輯進階
- IF Statement and Nested IF Statements IF 語句及嵌套 IF 語句

Learning Objectives 學習目標

- To revisit the ideas of algorithm design and practice IF statements with Boolean expression
  重溫算法設計的概念並練習使用 IF 語句與布爾表達式

Exercises 課後練習

- Introduction to Algorithm Design 算法設計簡介
- More on Boolean Logic 布爾邏輯進階
- IF Statement and Nested IF Statements IF 語句及嵌套 IF 語句

CONTENT

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Recap 重溫

- How do we order the result of a SQL `SELECT` statement?
  我們如何把 SQL `SELECT` 語句的結果排序？

- How do we group the result of a SQL `SELECT` statement?
  我們如何把 SQL `SELECT` 語句的結果組合起來？

- What tools are provided by DBMS to insert, query, and print out, data?
  DBMS 提供了甚麼工具來插入、查詢及打印數據？

Introduction to Algorithm Design 算法設計簡介

Problem-solving Procedures and Computational Thinking
解難程序及計算思維

Question: Suppose you want to teach a 6-year-old to make a cup of hot lemon tea. Write down a list of steps which will show him how to make a cup of hot lemon tea.
問題： 假設你要教一個六歲的小朋友如何製作一杯熱檸檬茶。寫下一系列的步驟來展示如何製作一杯熱檸檬茶。

Question: How good is the list you've produced?
問題： 你寫下的步驟有多好？

- Computational thinking is the process of realising a problem, analysing it, and providing a solution to the problem with the use of a computer.
  計算思維是指透過電腦找出問題，加以分析，並為問題提供解決方案的過程。
  - Logic thinking 邏輯思維
  - Algorithmic thinking 算法思維
  - Systems thinking 系統思維

- An **algorithm** is a list of finite steps to be performed as a solution to a particular problem.
  一個**算法**是一套有限的步驟，執行後會是特定問題的解決方法。
  - How do we come up with an algorithm?
    我們如何想到一個算法？

There are 6 steps in the problem-solving procedure:
解難程序中有 6 個步驟：

1. Problem identification 問題定義
2. Problem analysis 問題分析
   - Input-Process-Output (IPO) 輸入——處理——輸出（IPO）
3. Algorithm design 算法設計
4. Solution development and implementation 解決方案的開發和實施
5. Debugging and testing 除錯及測試
6. Documentation 文件編製
   - User manual 用戶手冊
   - Programme manual 程式手冊

Question: Which step is the hardest to remember?
問題： 哪個步驟最難記住？

- When developing a solution, there are two main approaches:
  開發一個解決方案時有兩個主要方法：
  - Top-down (stepwise refinement) 由上而下（逐步求精）
  - Bottom-up 由下而上

Exercise 練習

1. Write down the 6 steps of problem-solving procedures in the logical order of execution.
   把解難程序的 6 個步驟按邏輯執行次序寫下。

2. James finishes writing the source code of a programme. Which of the following should he do next?
杰明完成了一個程式的源代碼。他應進行下列哪項工作？

A. Analyse the input required from the users
分析需要從用戶取得的輸入數據

B. Test the boundary cases of the programme
測試程式的邊際個案

C. Determine the best algorithm for the problem
決定問題的最佳算法

D. Redefine the problem precisely
重新並準確地定義問題