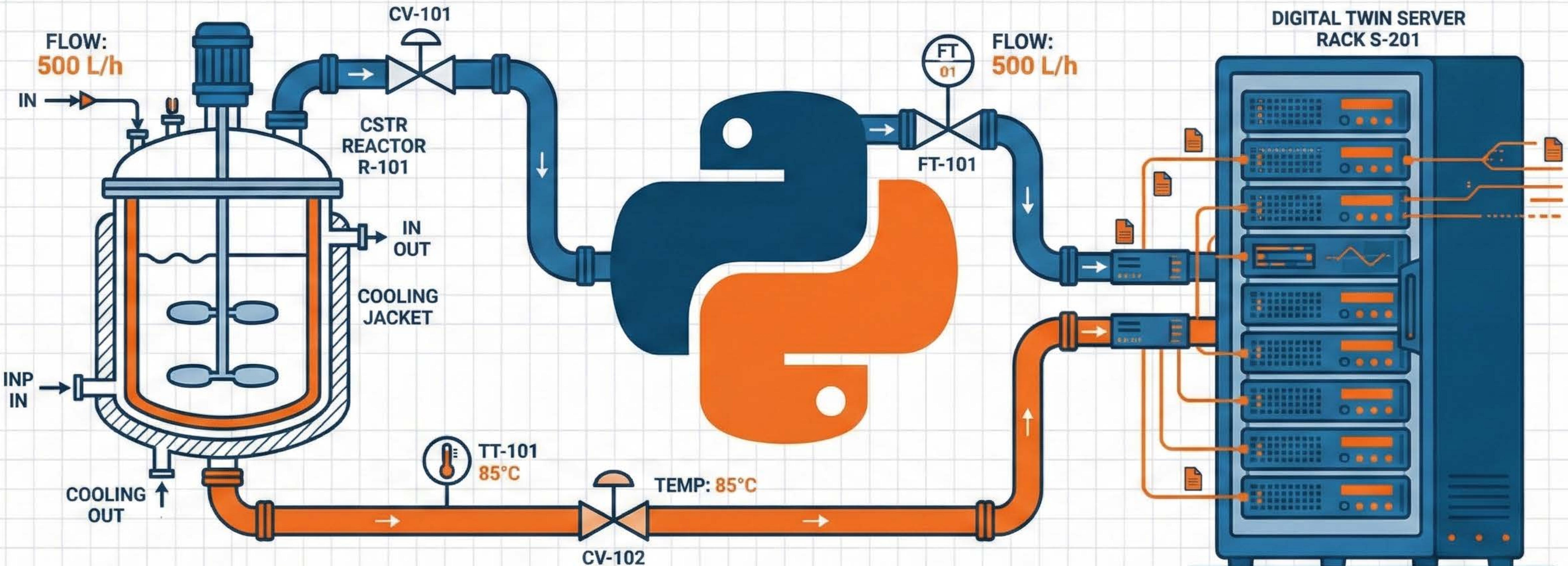
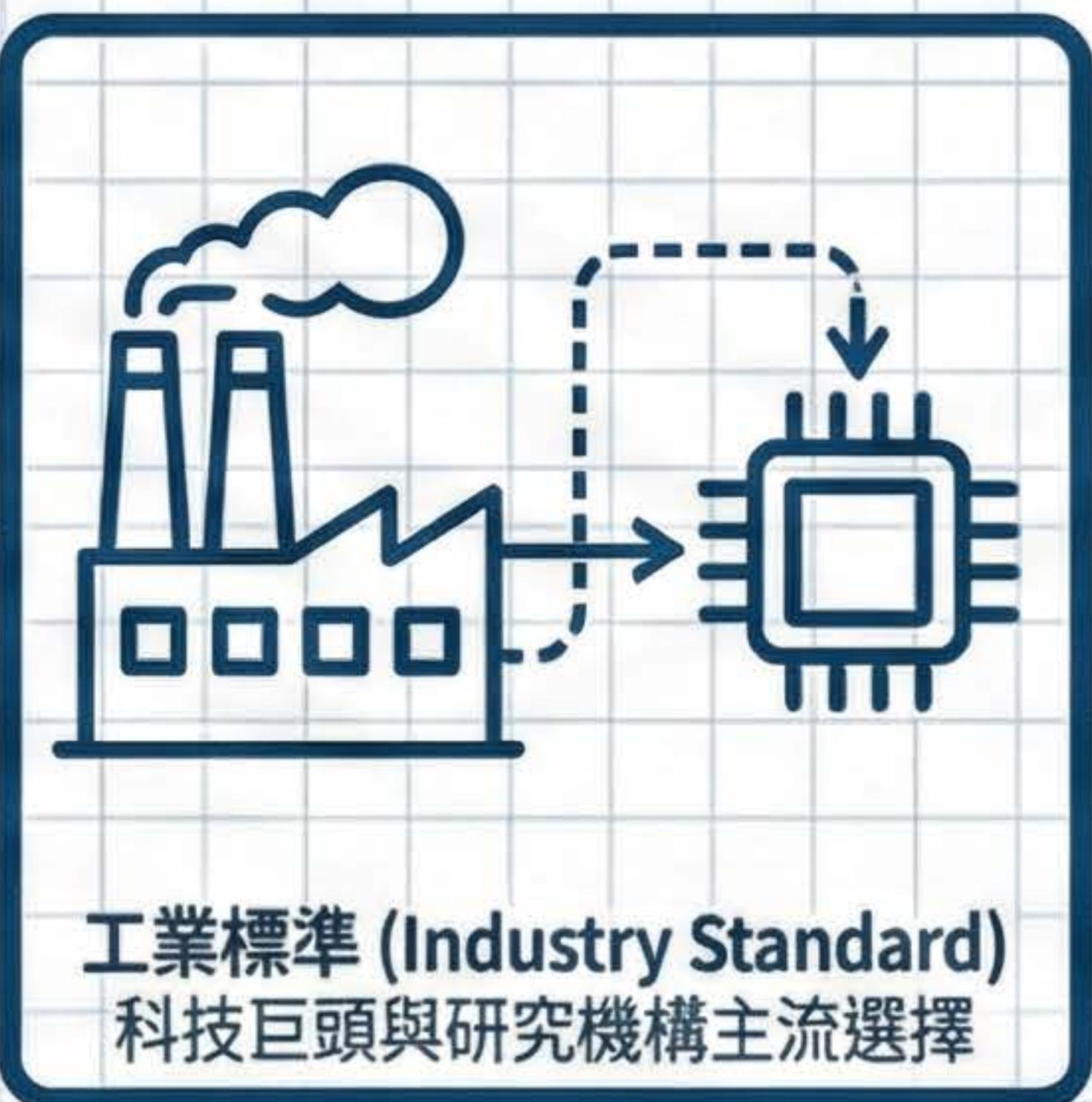
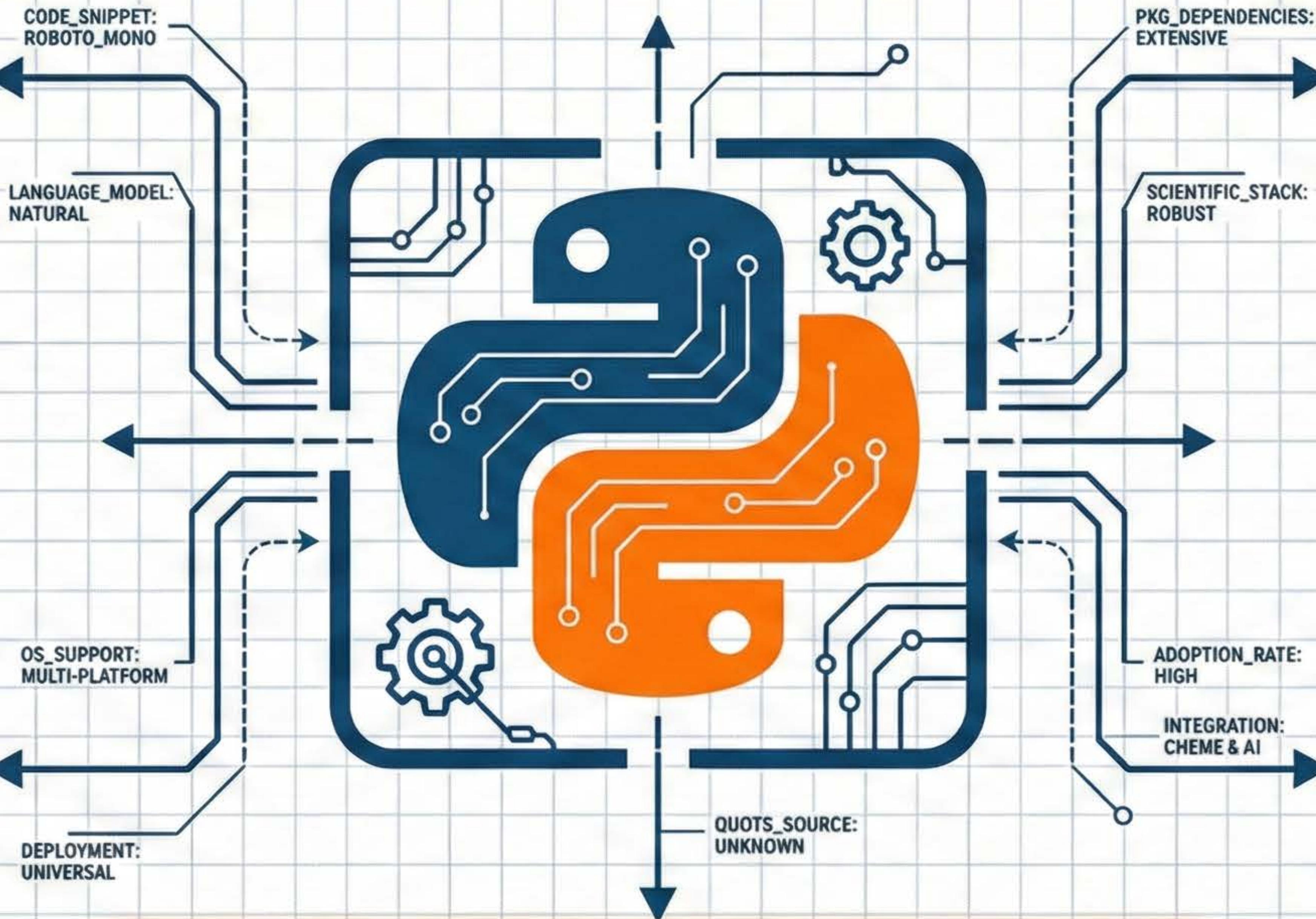
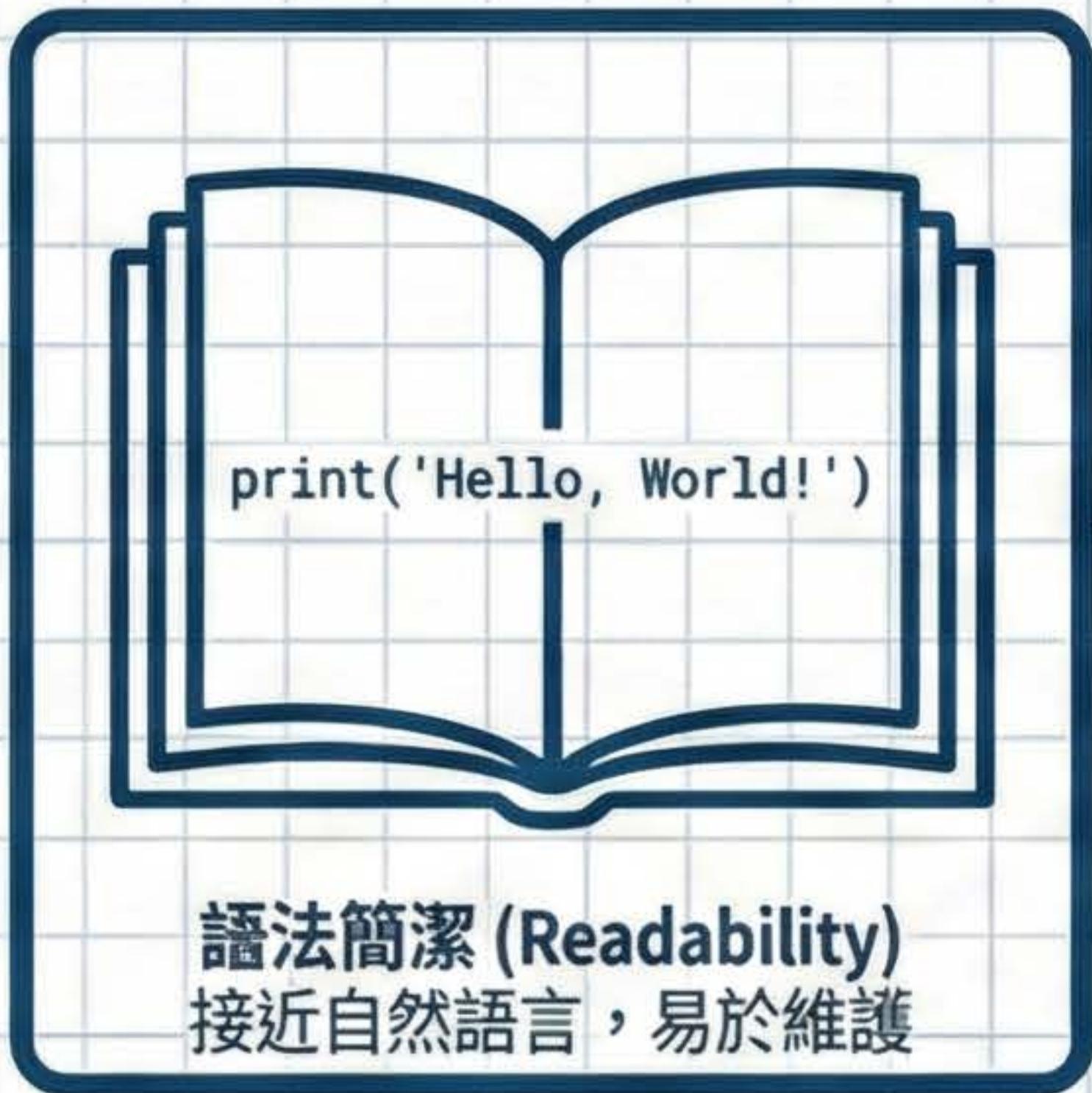


Python 程式語言基礎：建構數位化工廠的基石

Unit 02 語法核心與資料科學應用



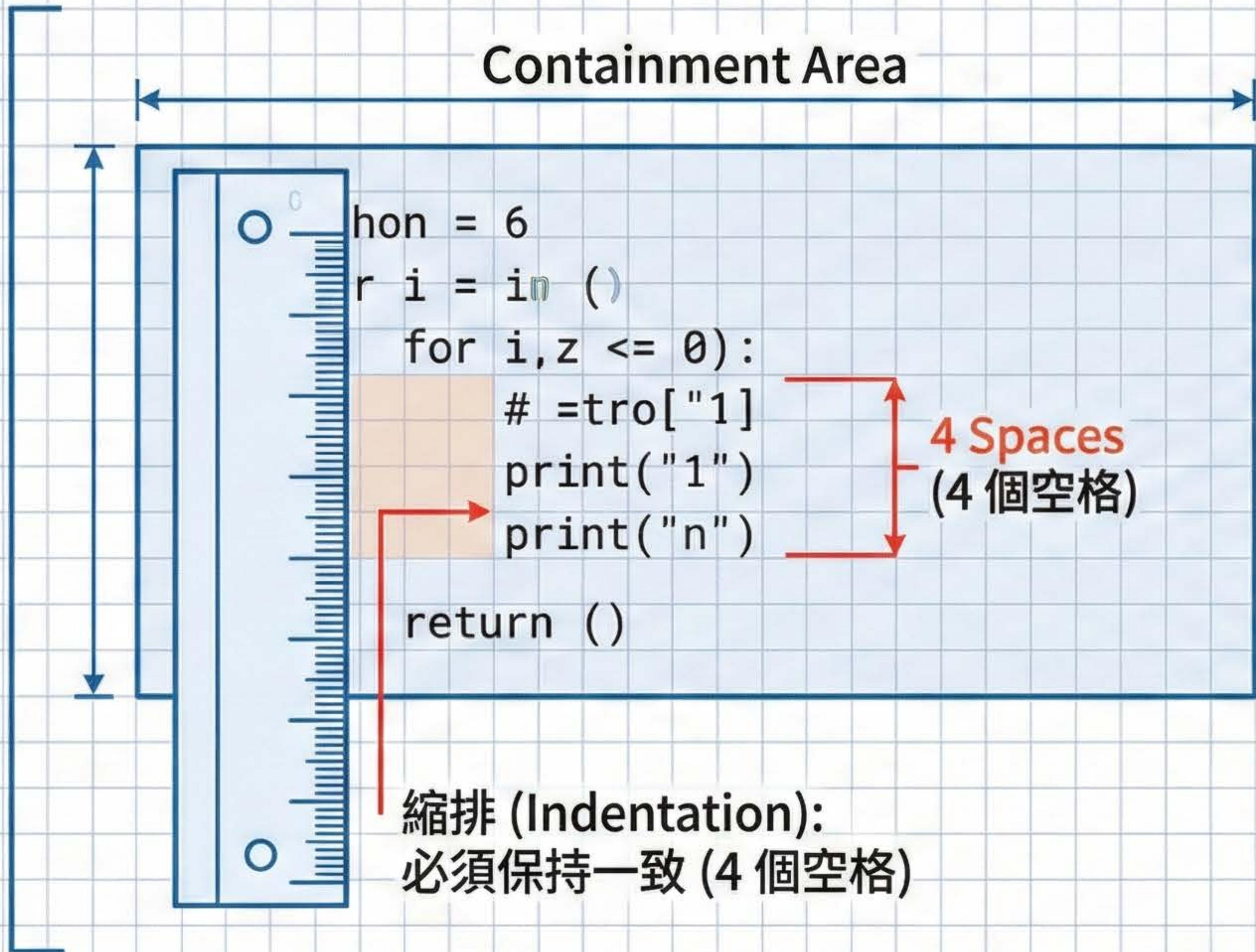
為什麼 Python 是化工 與資料科學的首選？



“Python 不僅僅是程式語言，它是連接化工原理
與人工智慧的通用語言。”

QUOTE_SNIPPET: FRIDAAMA
HEMERSAW_MAVSOLAI_DESIEE

程式碼的結構：語法與縮排規則



Good Code

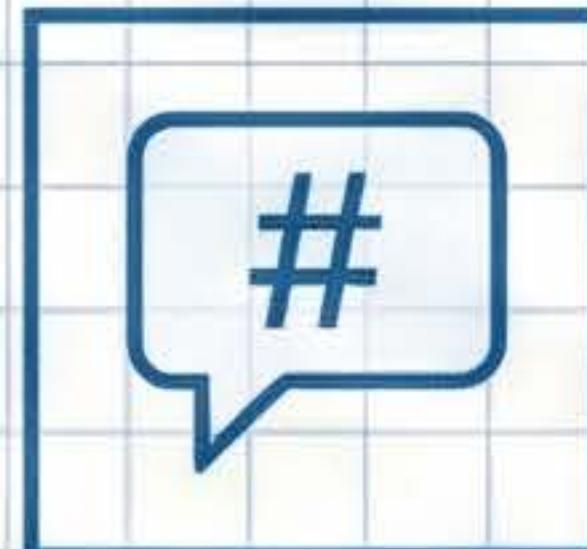
```
Python 0
for i = in():
for i,z <=(0):
# =tro["1"]
print("1")
print("n")
return ()
```

結構清晰，語法正確

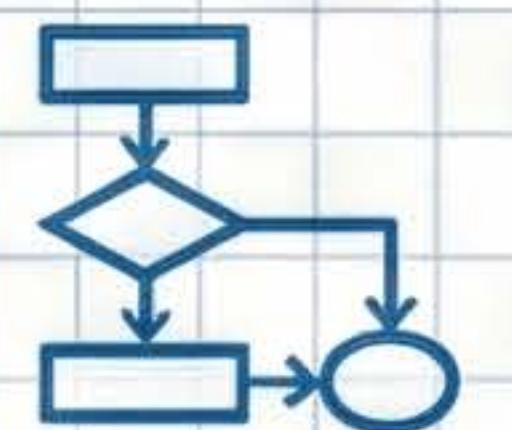
Bad Code

```
python= 6
for i in=l():
for i in <=(0):
# =stro[""1"]
print("1")
print("")
return ()
```

ALERT: IndentationError!
縮排錯誤，程式無法執行。

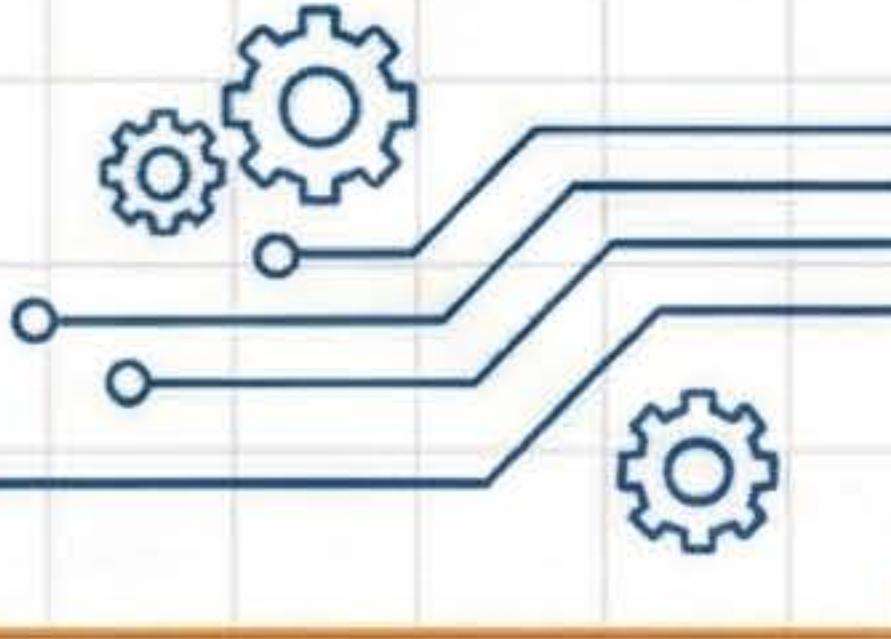


- 註解 (Comments): # 後的文字。寫給人類看的說明書，機器會忽略。
- 執行順序: 由上而下 (Top-down)，由左而右 (Left-right)。



變數與資料型態：數據的容器

Python 為動態型別 (Dynamic Typing)，自動識別內容物



數值 (Numeric)



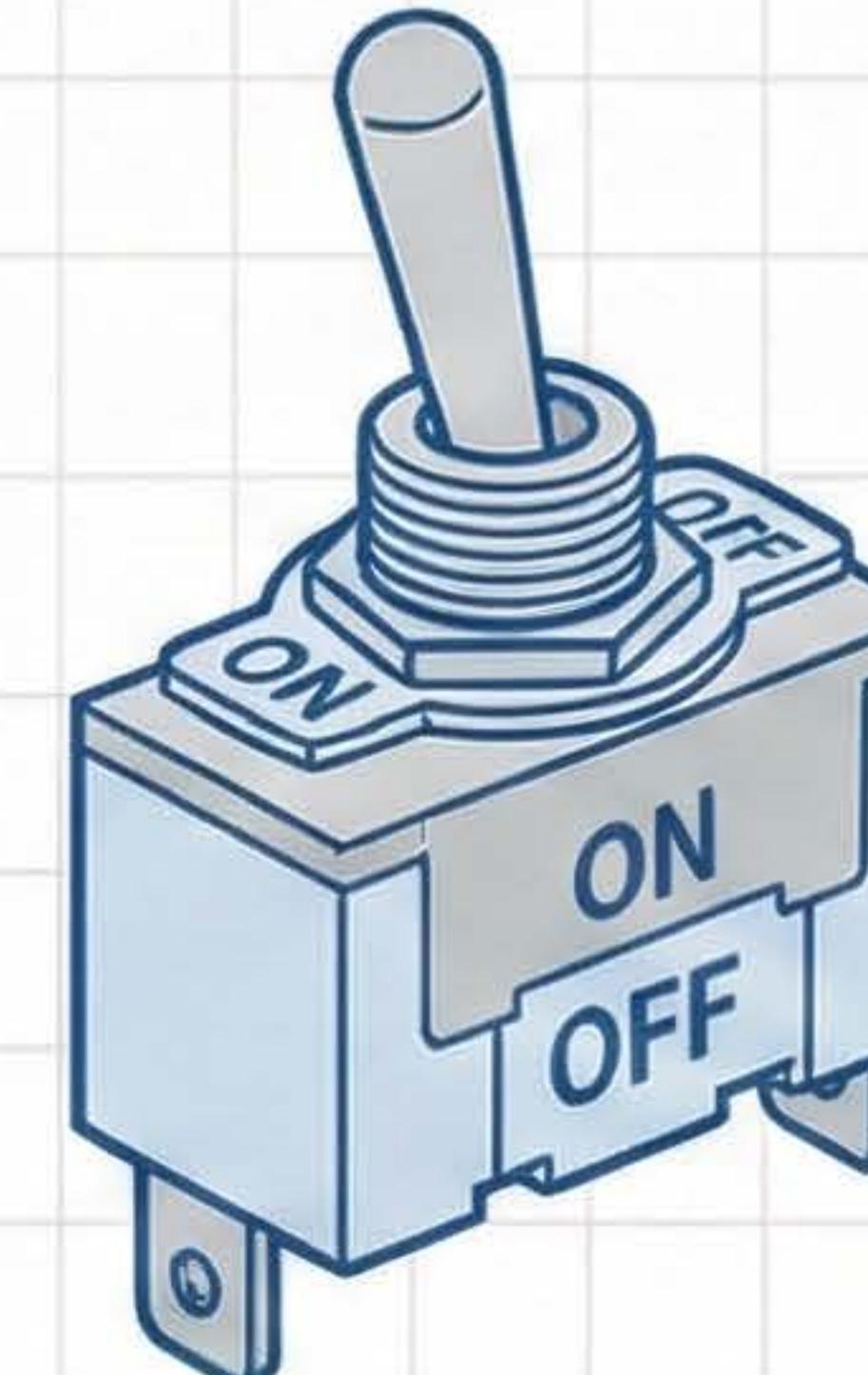
Noto Sans TC
Float: Temperature = 25.4
Int: Count = 10

字串 (String)



Noto Sans TC
Tag_ID = 'P-101'
Roboto Mono

布林值 (Boolean)



Noto Sans TC
Valve_Open = True
Roboto Mono

命名規則 (Naming Convention)

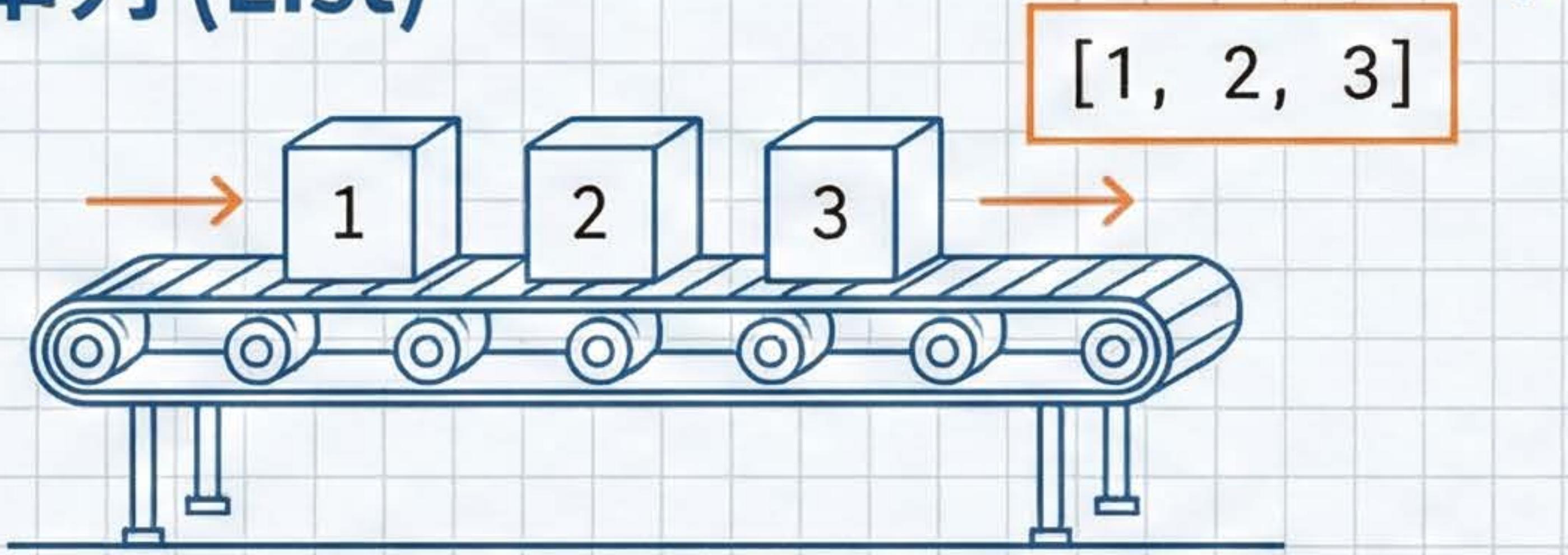
- 使用小寫與底線 (snake_case)
- 具有描述性 (例: reactor_temp)
- 避免使用 x, y 等無意義名稱

Noto Sans TC
Roboto Mono



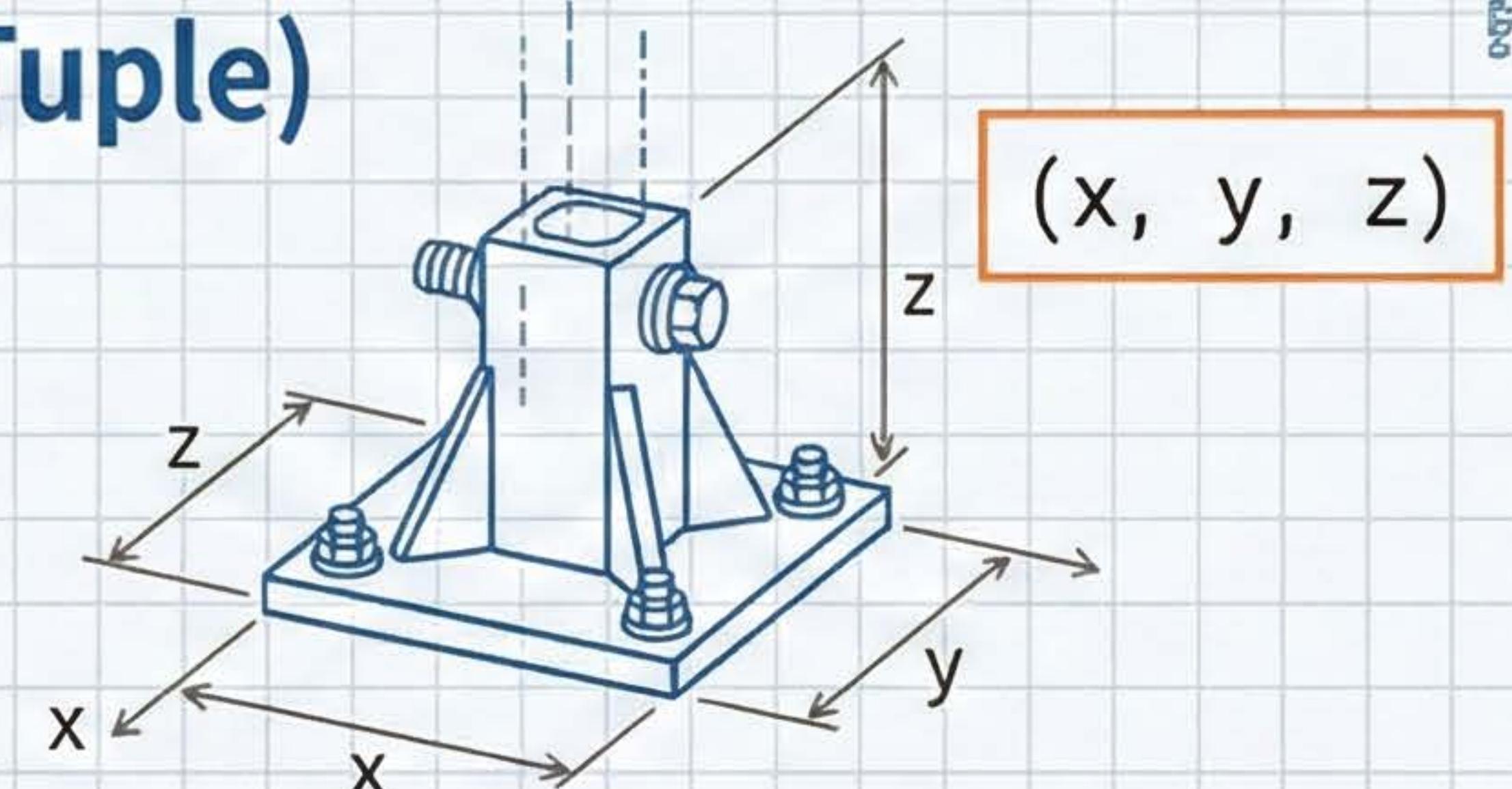
資料結構：組織與管理數據的方式

1. 串列 (List)



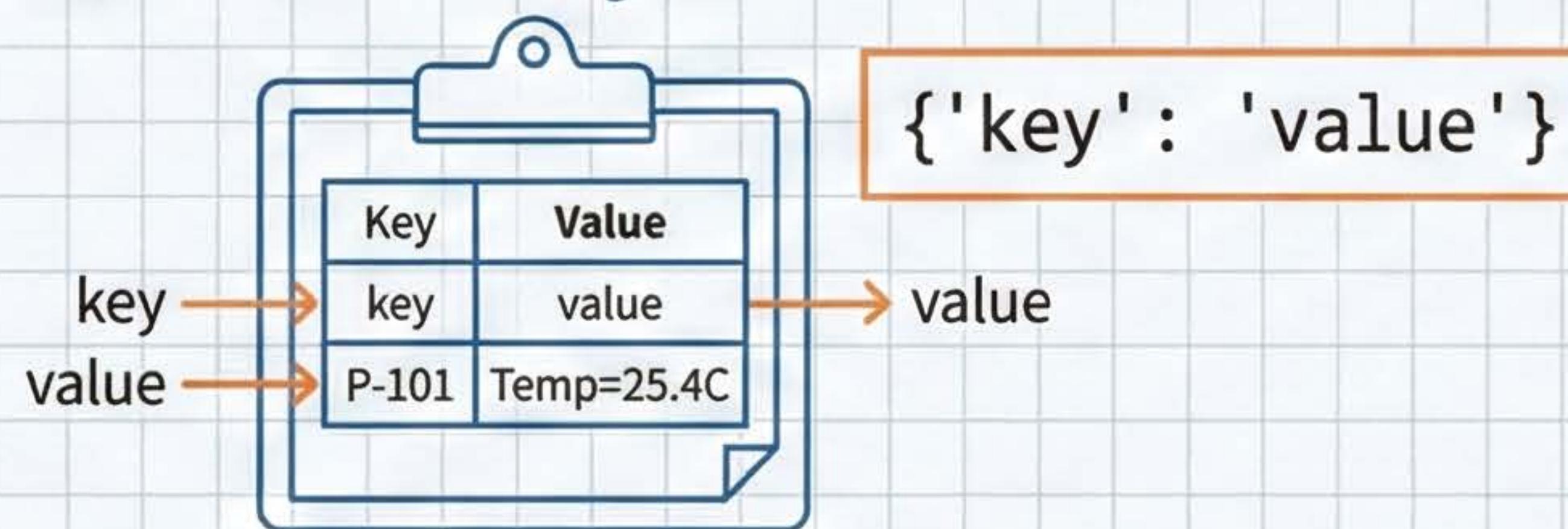
有序、可變 (Mutable)。類似輸送帶上的連續樣品。

2. 元組 (Tuple)



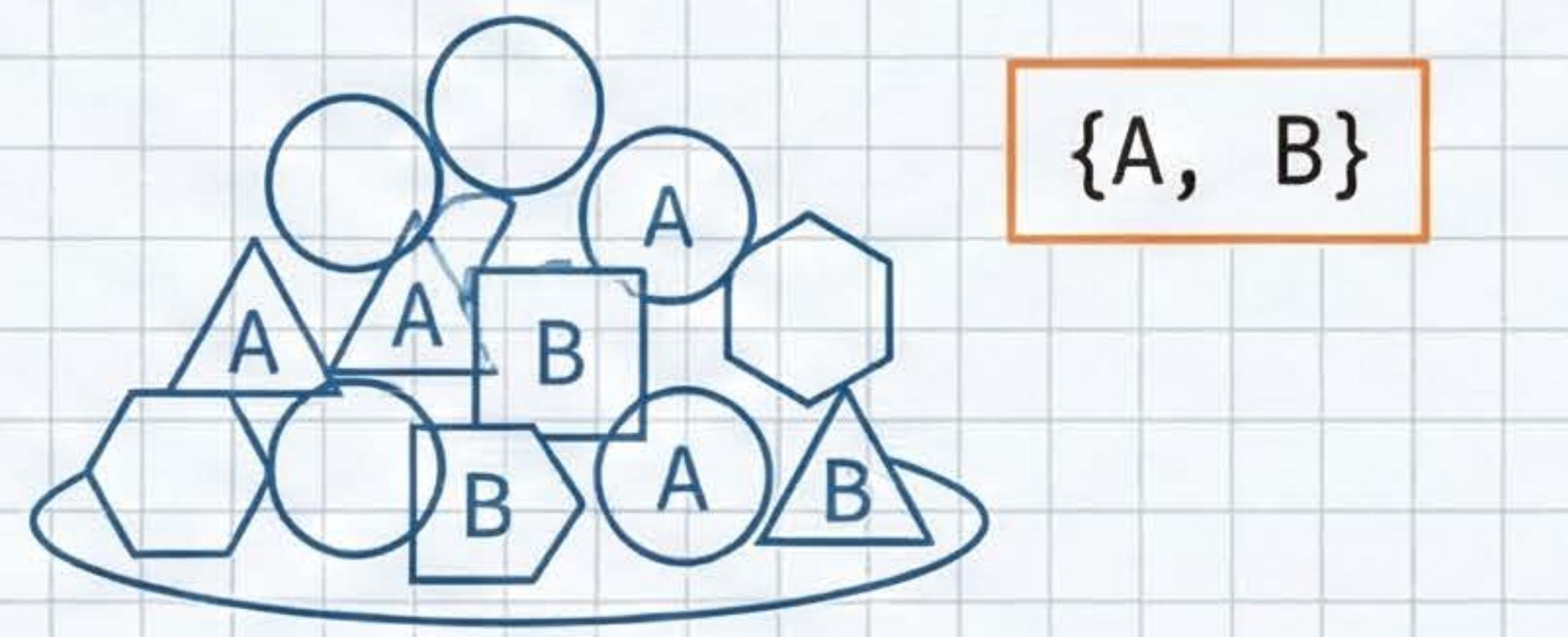
有序、不可變 (Immutable)。類似固定的設備座標。

3. 字典 (Dictionary)



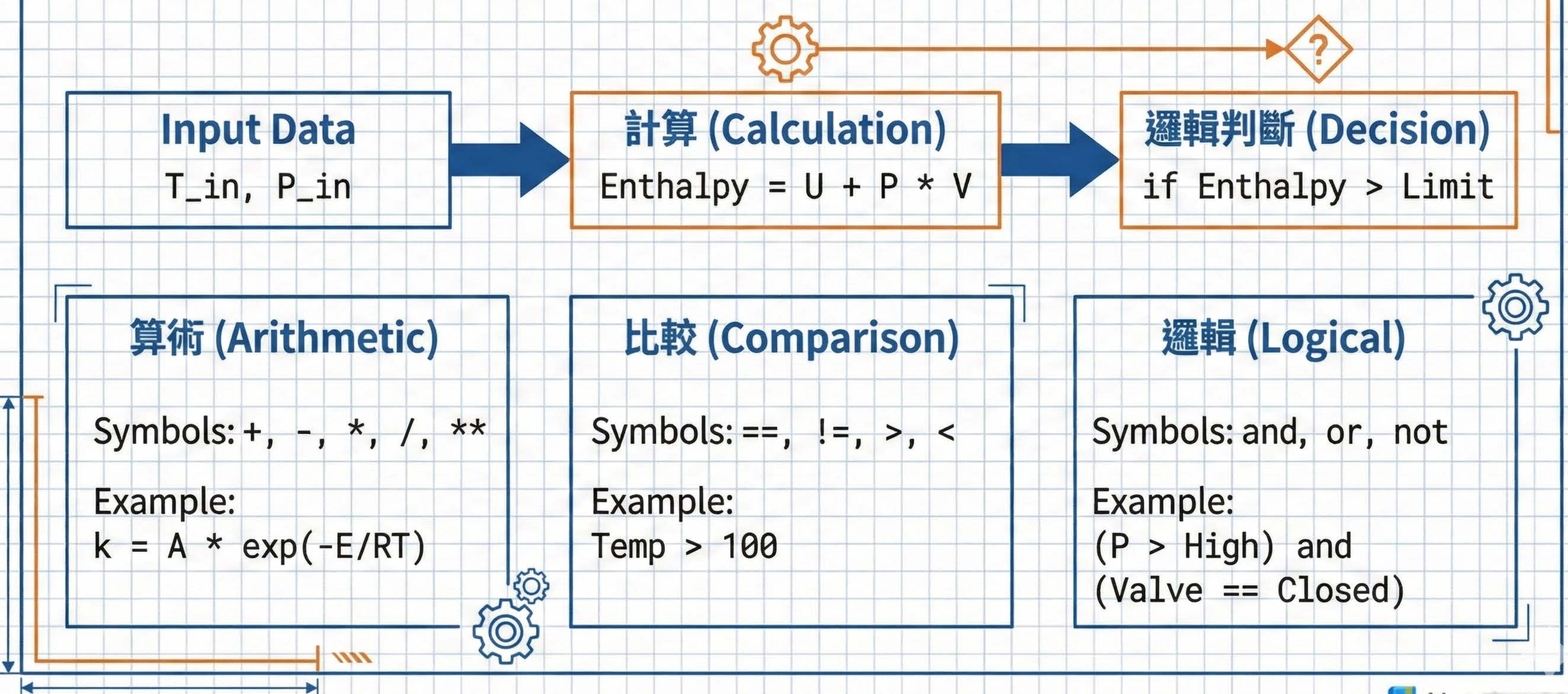
鍵值對應 (Key-Value)。類似物性查表。

4. 集合 (Set)



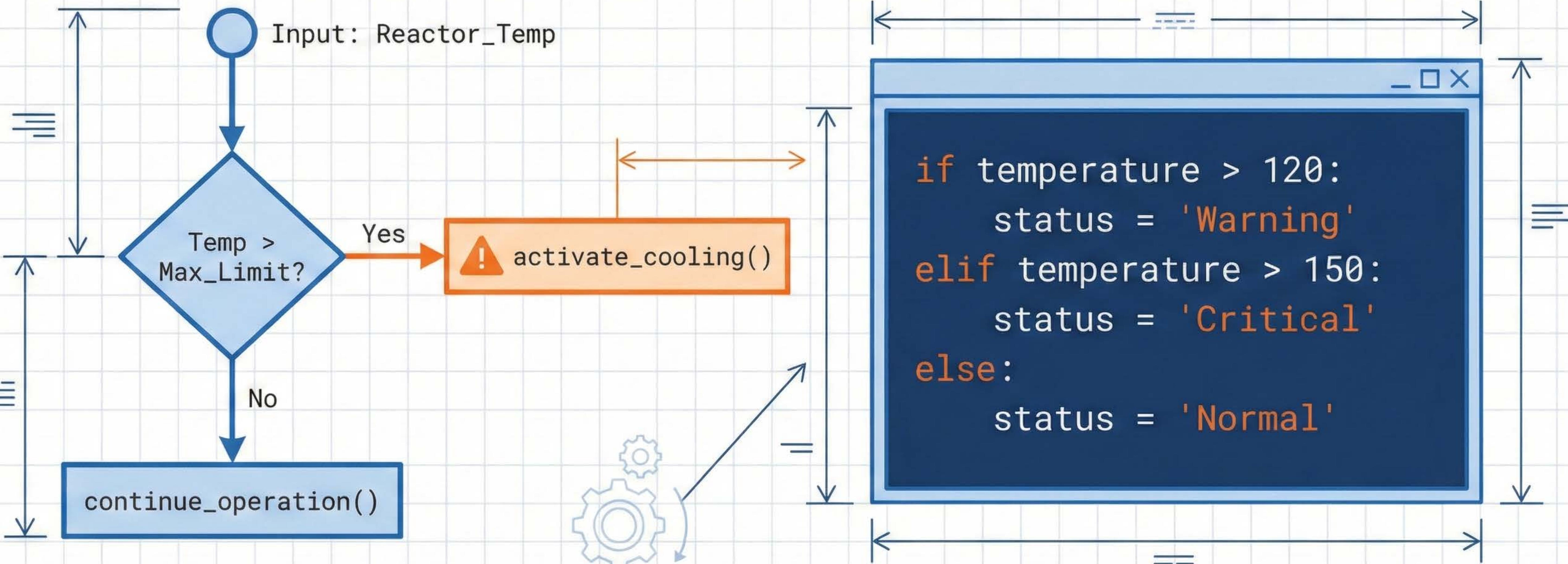
無序、不重複。類似獨特化學成分列表。

運算子：數學計算與邏輯判斷



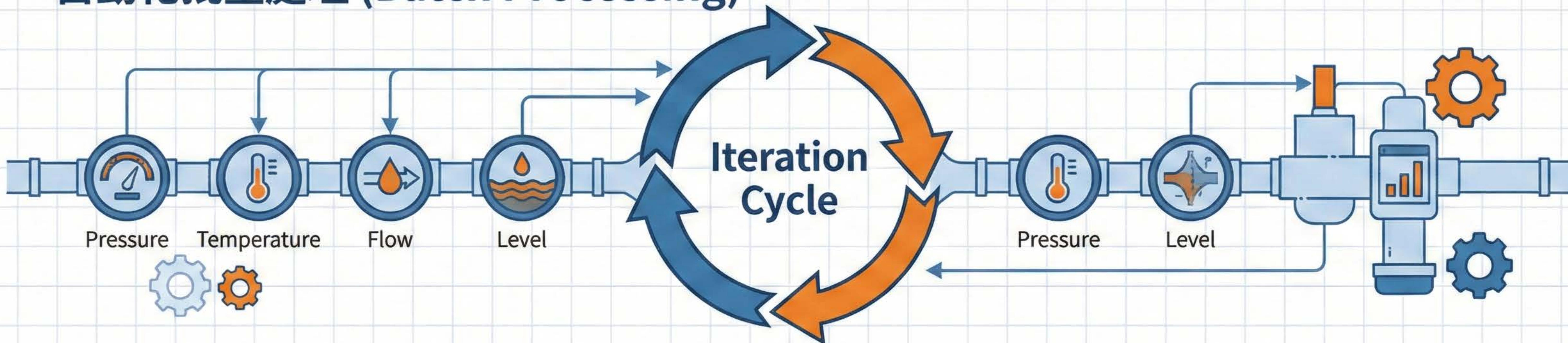
控制流程 (1) : 條件判斷 (Conditionals)

數位化工廠的安全連鎖系統 (Interlock System)



控制流程 (2) : 迴圈 (Loops)

自動化批量處理 (Batch Processing)



For 迴圈 (For Loop)

已知次數的重複。類似巡檢儀表板上的每一個儀表。

```
for sensor in sensor_list:  
    read(sensor)
```

ITERATE COLLECTION

While 迴圈 (While Loop)

執行直到條件滿足。類似加熱直到溫度達標。

```
while concentration < target:  
    add_reagent()
```

UNTIL TRUE

Rebote Mone

串列生成式 (List Comprehension)

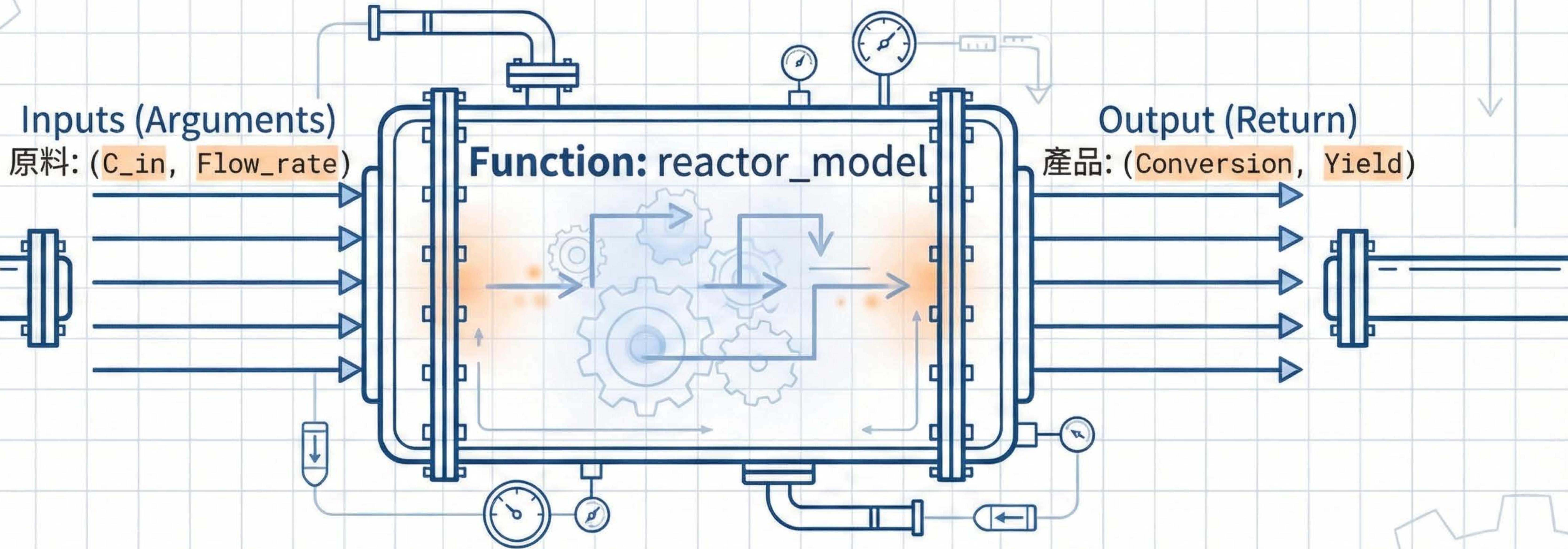
Python 特有的高速寫法。

```
[x**2 for x in range(10)]
```

CONCISE SYNTAX

FAST EXECUTION

函式 (Functions)：模組化的單元操作

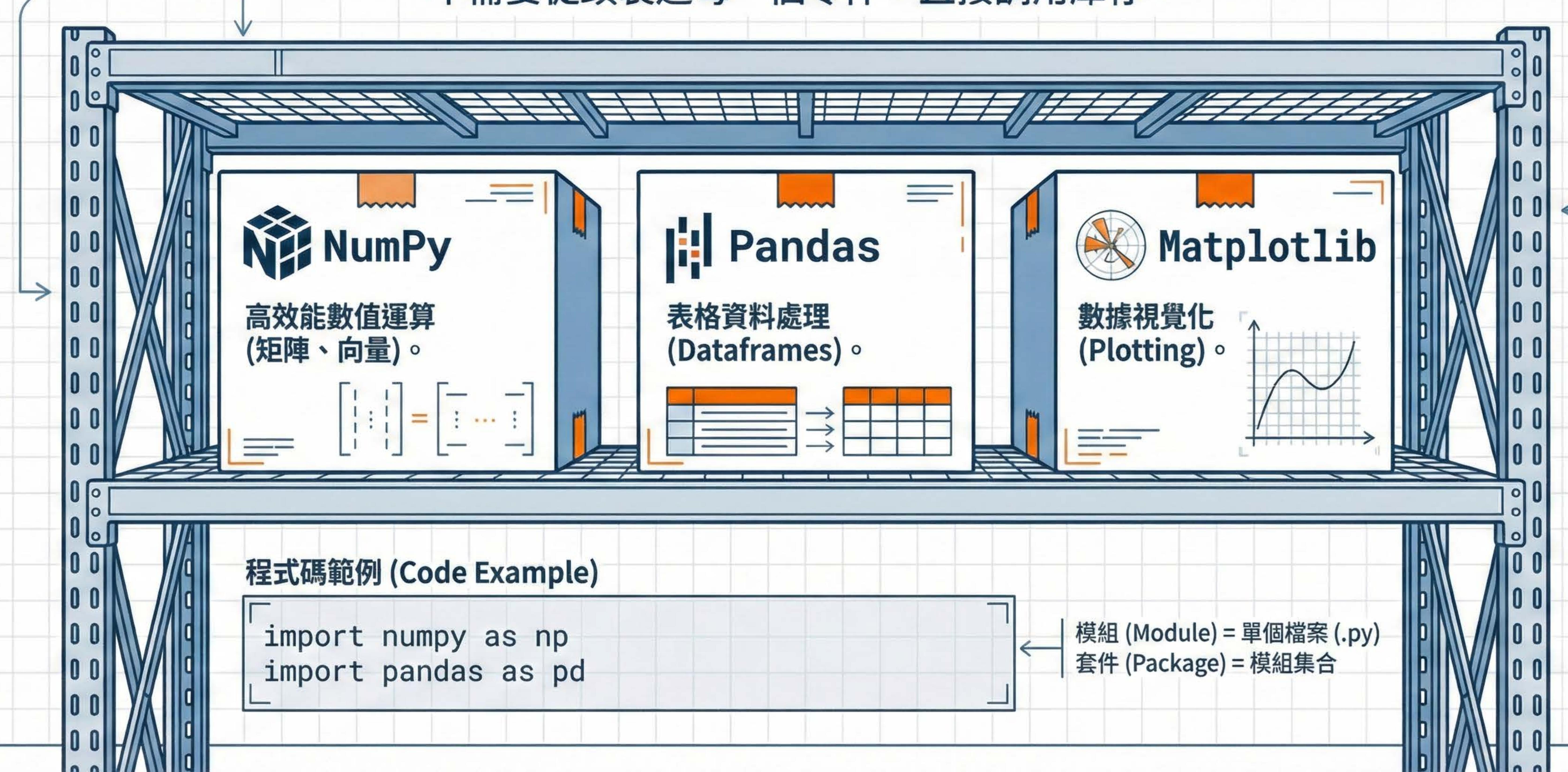


- **定義 (Def)**: 使用 `def function_name(params):` 告訴。
- **重用性 (Reusability)**: 避免重複造輪子 (Don't Repeat Yourself)。
- **Lambda**: 匿名函式，用於簡單運算。

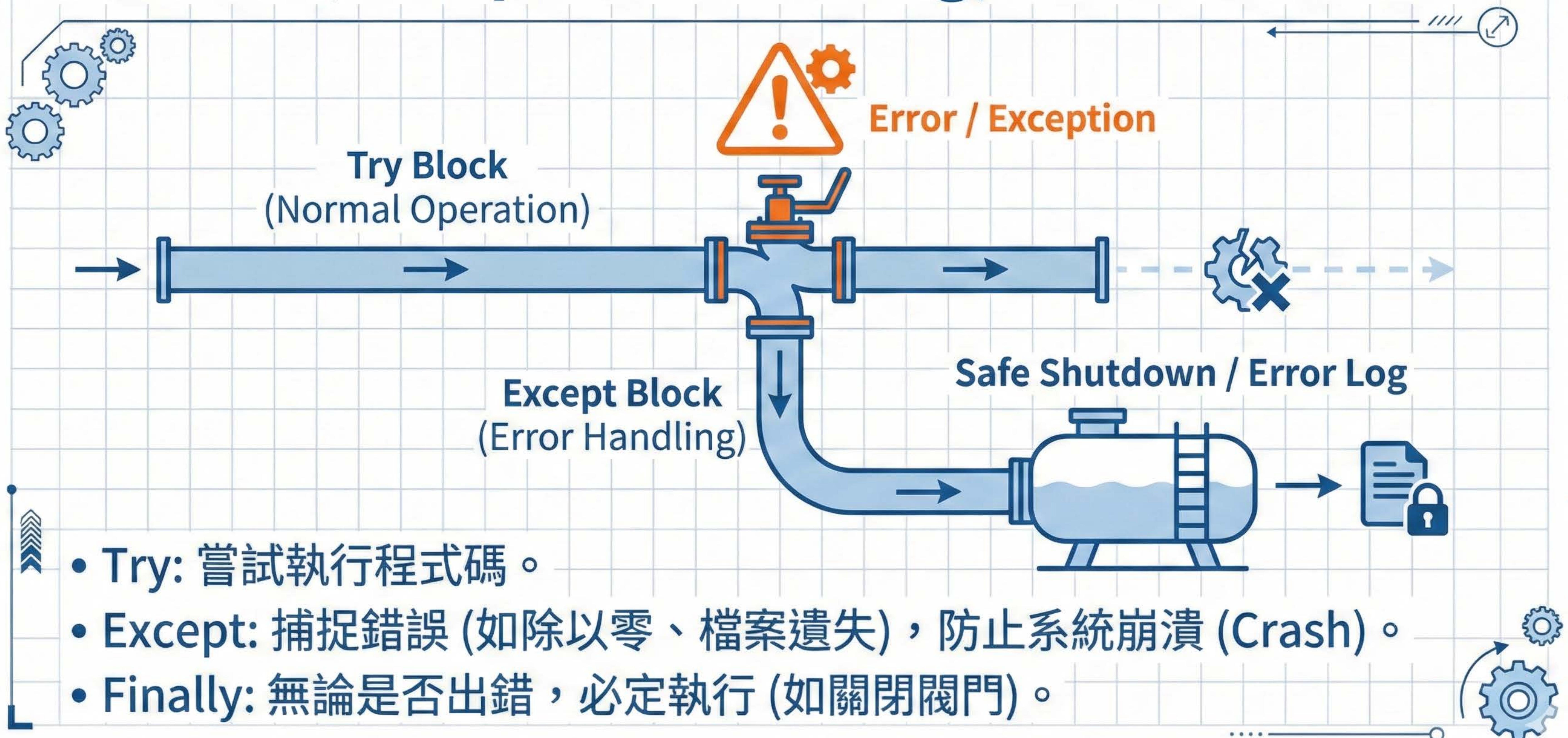
Swiss Style meets
Industrial Blueprint

模組與套件：巨人的肩膀

不需要從頭製造每一個零件，直接調用庫存。

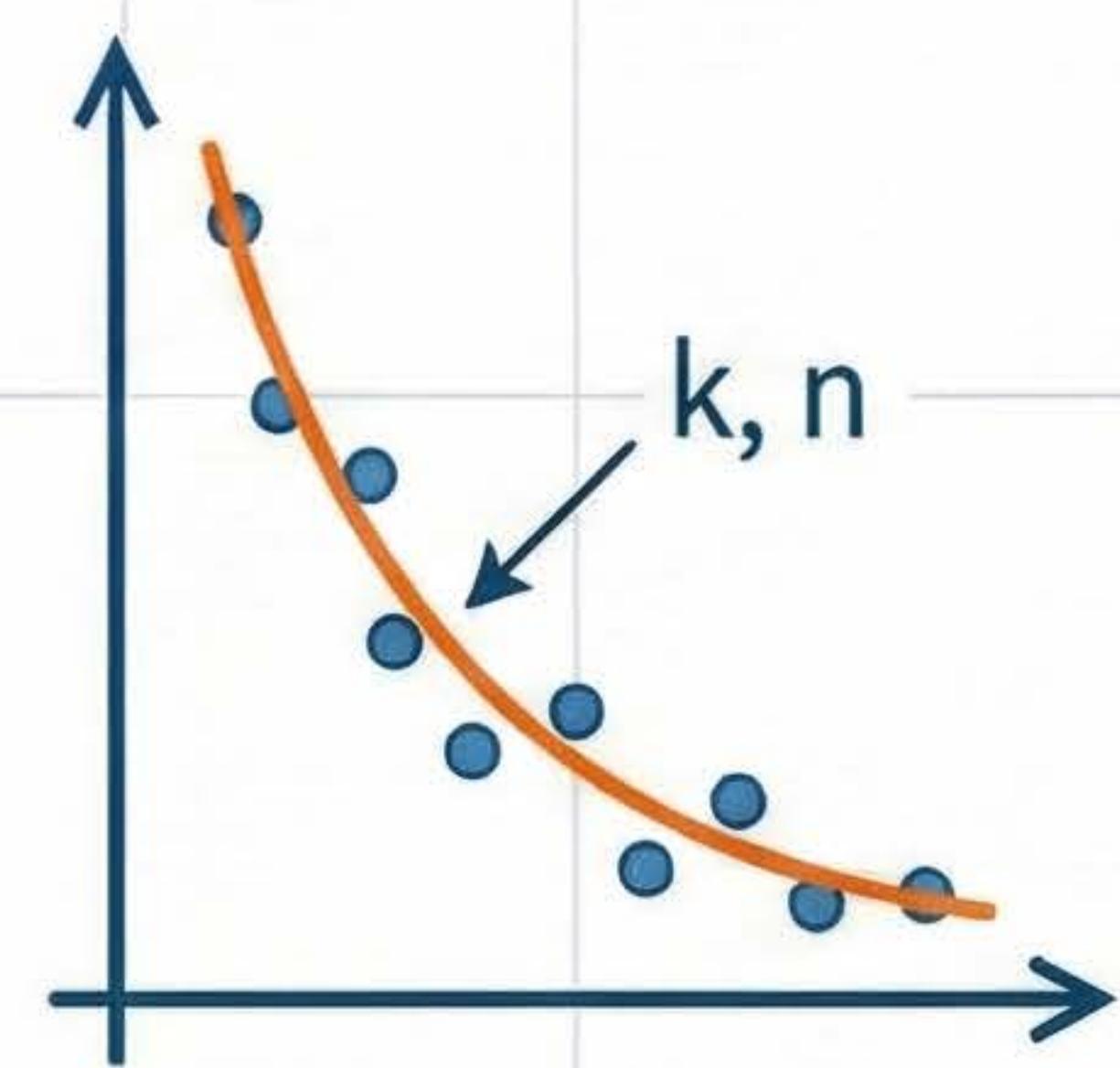


「例外處理 (Exception Handling)：系統的穩健性」



化工領域的 Python 實際應用

反應動力學擬合 (Kinetics)



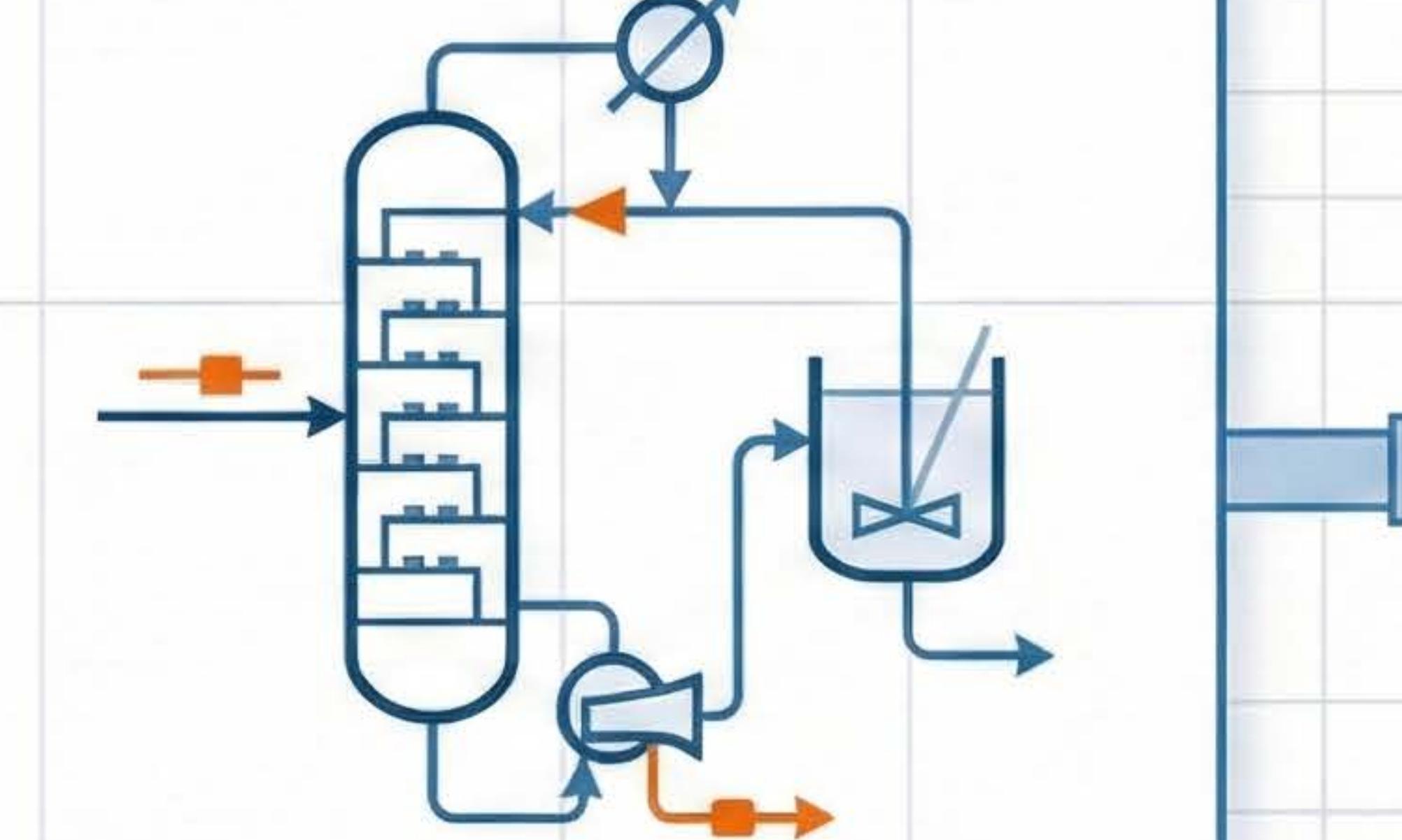
使用 SciPy 擋合實驗數據，求出反應速率常數 **k** 與級數 **n**。

異常檢測 (Anomaly Detection)



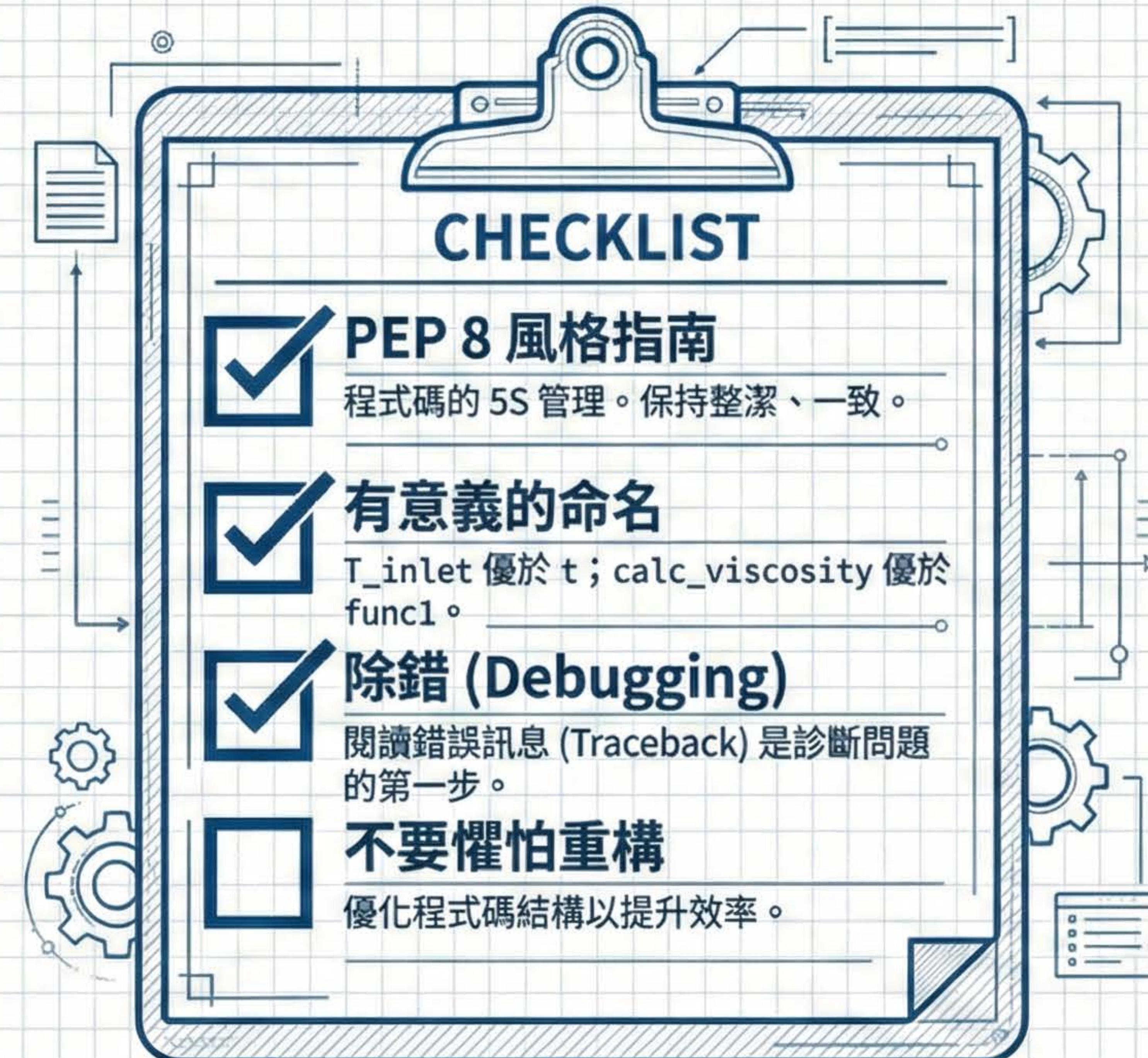
監控製程數據，自動識別偏離常態的**孤立點** (**Outliers**)。

單元操作模擬 (Simulation)



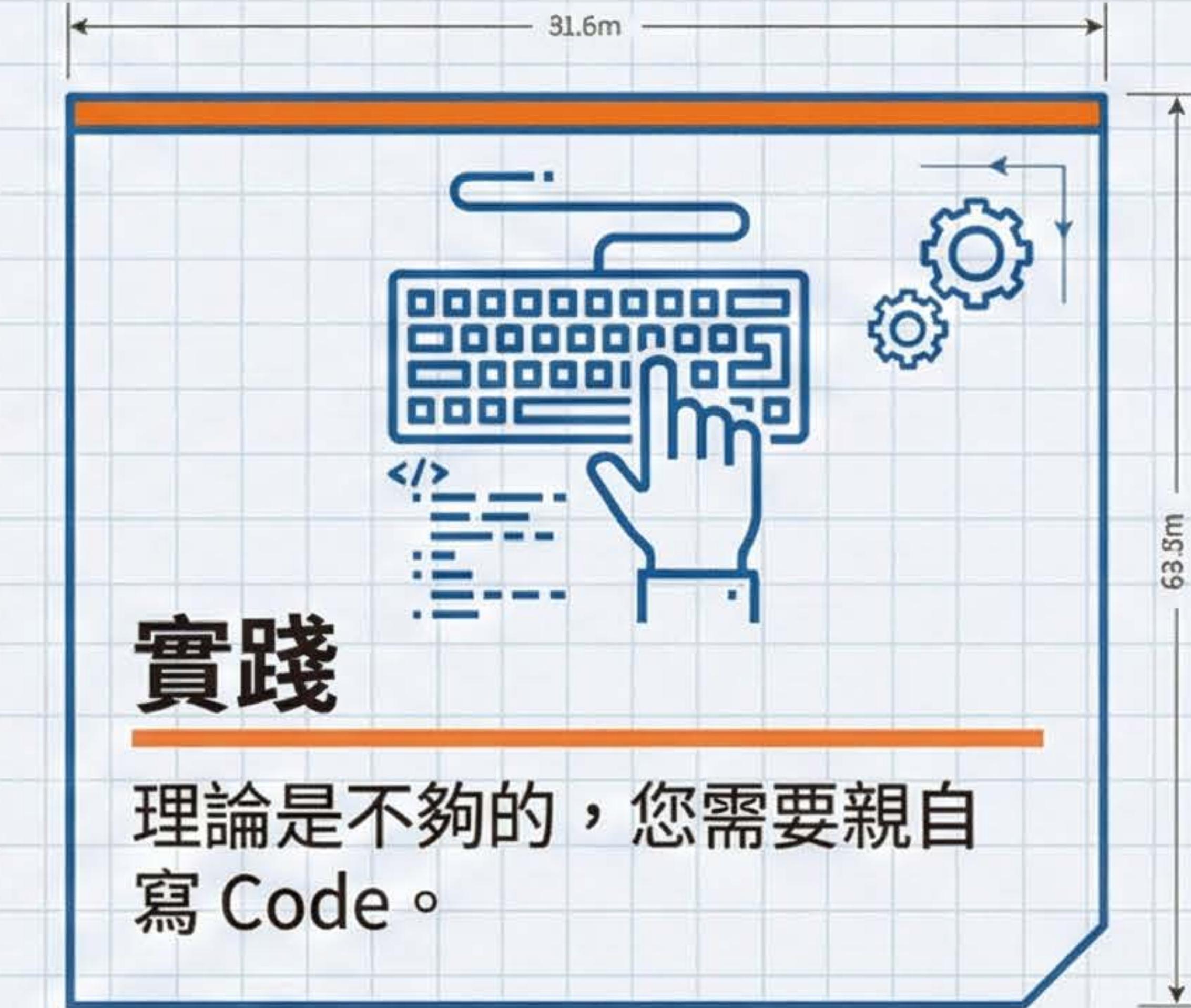
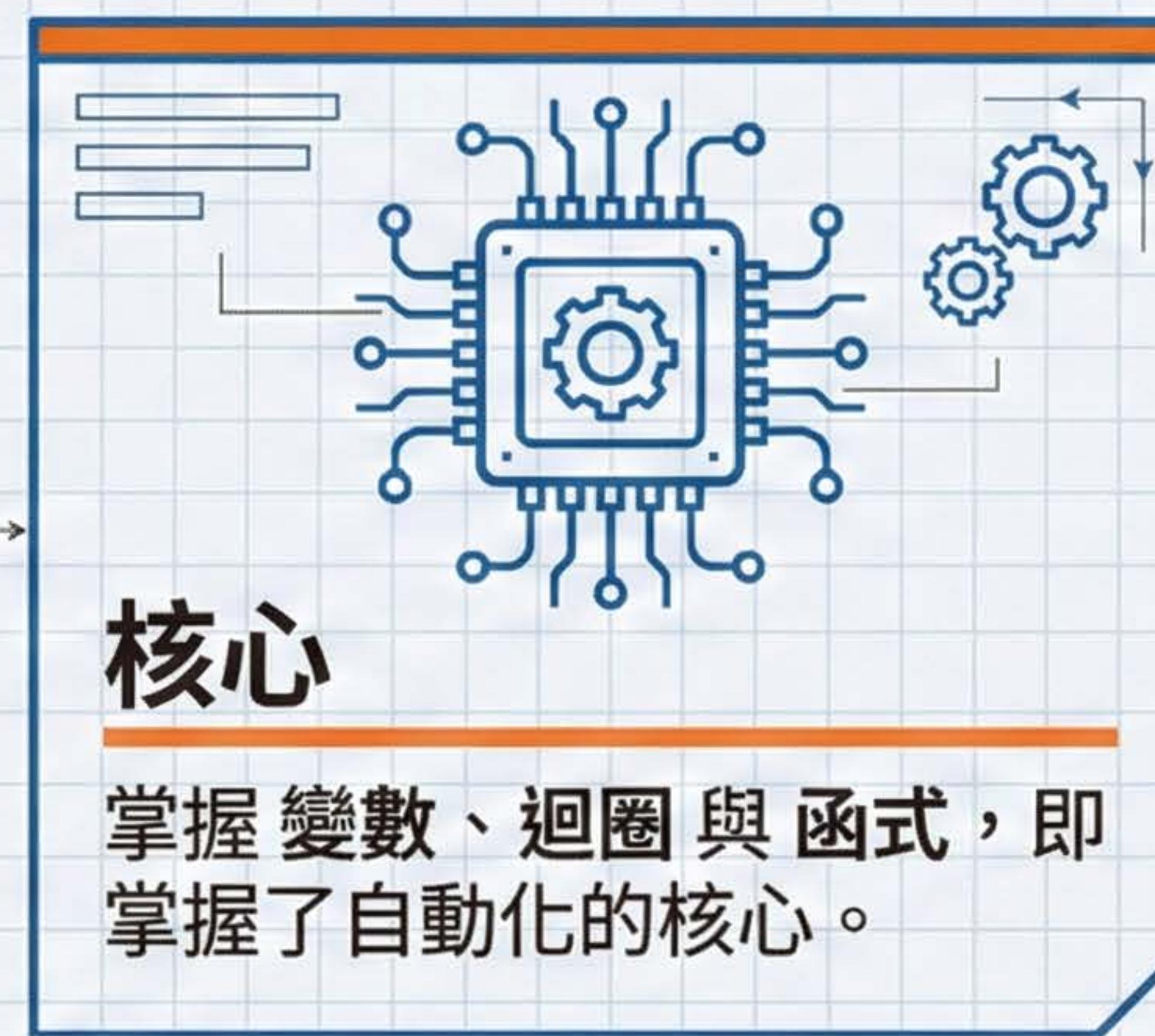
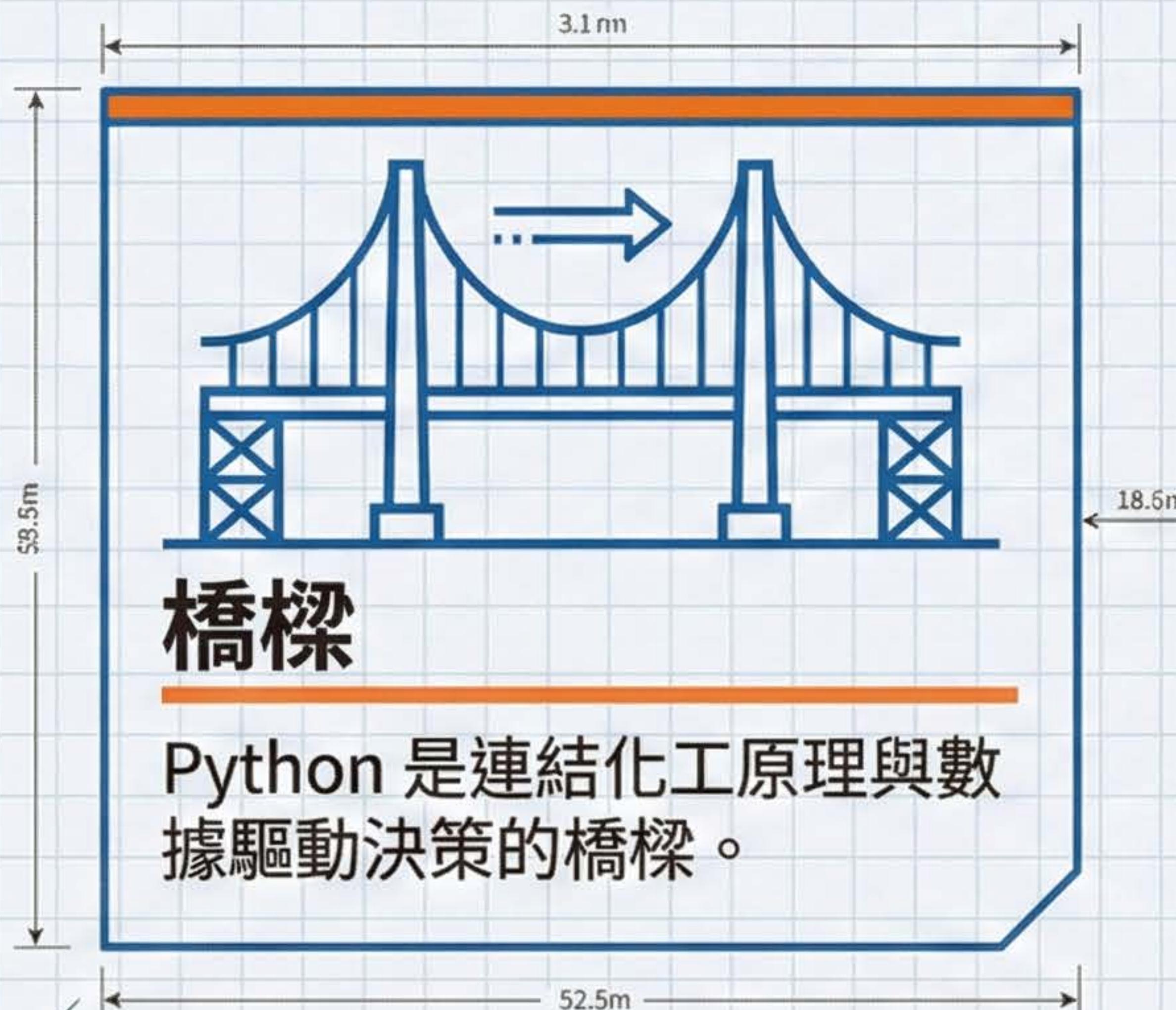
模擬**蒸餾塔**或**CSTR**在不同條件下的穩態輸出。

實務建議與最佳實踐 (Best Practices)



"Code is read much more often than it is written."

結語：您的數位工具箱已備妥



下一步 (Next Step)：
→ 開啟 `Unit02_Python_Basics.ipynb`
現在就開始您的實作練習！