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函式編程 - FP

**FUNCTIONAL PROGRAMING**

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**“要怎麼從 1 加到 100?”**

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```
total = 0
```

```
for i in range(1, 101):  
    total = total + i
```

```
print(total)
```



```
total = sum(range(1, 101))  
print(total)
```



```
total = 0
```

```
for i in range(1, 101):  
    total = total + i
```

```
print(total)
```



```
total = sum(range(1, 101))
```

```
print(total)
```



```
total = 0
```

```
for i in range(1, 101):  
    total = total + i
```

```
print(total)
```

- 指令式編程 (**Imperative**)
- 改變變數狀態 (**Mutable**)



```
total = sum(range(1, 101))
```

```
print(total)
```

- 宣告式編程 (**Declarative**)
- 視函式為一種變數型態
- 不改變狀態 (**Immutable**)

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# 常用的函式

## **filter & map**

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匿名函数

**ANONYMOUS FUNCTION**

lambda

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# **LIST & DICTIONARY COMPREHENSION**

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```
numbers = [2, 3, 1, 4, 6, 3, 5]
```

```
for number in numbers:  
    print(number * 2)
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]
```

```
numbers2 = [  
    number * 2  
    for number in numbers  
]
```

## Filter



```
numbers = [2, 3, 1, 4, 6, 3, 5]

for number in numbers:
    print(number * 2)
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]

for number in numbers:
    if number % 2 is 0:
        print(number * 2)
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]

numbers2 = [
    number * 2
    for number in numbers
]
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]

numbers2 = [
    number * 2
    for number in numbers
    if number % 2 is 0
]
```

## Filter

## Map



```
numbers = [2, 3, 1, 4, 6, 3, 5]

for number in numbers:
    print(number * 2)
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]

for number in numbers:
    if number % 2 is 0:
        print(number * 2)
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]

for number in numbers:
    if number % 2 is 0:
        print(number * 2)
    else:
        print(number + 1)
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]

numbers2 = [
    number * 2
    for number in numbers
]
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]

numbers2 = [
    number * 2
    for number in numbers
    if number % 2 is 0
]
```



```
numbers = [2, 3, 1, 4, 6, 3, 5]

numbers2 = [
    number * 2
    if number % 2 is 0
    else number + 1
    for number in numbers
]
```



```
normal = {  
    "height": 175,  
    "weight": 75,  
}  
  
figure = {}  
  
for key, value in normal.items():  
    figure[key] = value / 100
```



```
normal = {  
    "height": 175,  
    "weight": 75,  
}  
  
figure = {  
    key: value / 100  
    for key, value in normal.items()  
}
```

## Filter



```
normal = {  
    "height": 175,  
    "weight": 75,  
}  
  
figure = {}  
  
for key, value in normal.items():  
    figure[key] = value / 100
```



```
normal = {  
    "height": 175,  
    "weight": 75,  
}  
  
figure = {}  
  
for key, value in normal.items():  
    if key is "height":  
        figure[key] = value / 100
```



```
normal = {  
    "height": 175,  
    "weight": 75,  
}  
  
figure = {  
    key: value / 100  
    for key, value in normal.items()  
}
```



```
normal = {  
    "height": 175,  
    "weight": 75,  
}  
  
figure = {  
    key: value / 100  
    for key, value in normal.items()  
    if key is "height"  
}
```

## Filter



```
normal = {
    "height": 175,
    "weight": 75,
}

figure = {}

for key, value in normal.items():
    figure[key] = value / 100
```



```
normal = {
    "height": 175,
    "weight": 75,
}

figure = {}

for key, value in normal.items():
    if key is "height":
        figure[key] = value / 100
```



```
normal = {
    "height": 175,
    "weight": 75,
}

figure = {
    key: value / 100
    for key, value in normal.items()
}
```



```
normal = {
    "height": 175,
    "weight": 75,
}

figure = {
    key: value / 100
    for key, value in normal.items()
    if key is "height"
}
```

## Map



```
normal = {
    "height": 175,
    "weight": 75,
}

figure = {}

for key, value in normal.items():
    if key is "height":
        figure[key] = value / 100
    else:
        figure[key] = value
```



```
normal = {
    "height": 175,
    "weight": 75,
}

figure = {
    key: (
        value / 100 if key is "height"
        else value
    )
    for key, value in normal.items()
}
```