香港浸會大學
HONG KONG BAPTIST UNIVERSITY

COMP2045

Programming and Problem Solving

Migrate from Python

This course is colocated with *COMP2026* Problem Solving Using Object Oriented Programming

Where were we?

- Most of us have experience of **Python** or **Processing** or some other languages (C/C++, JS, etc..)
- I assume you still have some blurry memory with the following terms:
  - Loops
  - Variables
  - Operators
  - if-else
  - Functions/Methods

Processing vs Java

- Little cousin of Java
- Concepts are somewhat related and close to Java
    - Variables
    - if-then-else
    - Functions
    - Looping
    - Arrays
- Even syntax is almost the same as Java

Python vs Java

- Quite different from Java
- Python allows you to quickly come up with little programs for testing ideas
- Java allows you to build a larger software in a more structured way

> 👨‍🏫 💬 Assume you still remember Python a bit, this notes serves as a quick cheatsheet to migrate from Python to Java.

Python vs Java

Comment in Python

```python
# This is a comment in Python

'''
This is a multiple line comment
in Python.
'''
```

Comment in Java

```java
// This is a comment in Java

/* This is a multiple lines
   in Java. */
```

👨‍🏫 💬 Tips: in most IDE pressing 'CTRL' + '/' (or CMD + / in mac) is a comment toggle.

Python vs Java

Arithmetic in Python

```
a = 1 + 2 - 5
b = 4 / 2
c = 3 * 9
d = 3 ** 4   # power
e = 42 % 5   # remainder
f = 84 // 5 # floor division
```

Arithmetic in Java

```
a = 1 + 2 - 5;
b = 4 / 2;
c = 3 * 9;
e = 42 % 5;   // remainder
```

🧑‍🏫 💬 floor division and power needs to be done via the APIs `Math.floorDiv()` and `Math.pow()`

Python vs Java

Assignment in Python

```
a = 4
```

Assignment in Java

```
a = 4;
a++;     // same as a = a + 1
++b;     // same as b = b + 1
c--;     // same as c = c - 1
--d;     // same as d = d - 1
```

🧑‍🏫 💬 On top of that both language support assignment operators like `+=`, `-=` etc.

Python vs Java

If-then-Else in Python

```python
if a == 1:
    print("one command")
    print("Another command")
else:
    print("else")
```

multiple statements are grouped by indentation

If-then-Else in Java

```java
if (a == 1) {
    System.out.println("one command");
    System.out.println("another line");
} else
    System.out.println("else");
```

multiple statements are grouped by `{ }`

Python vs Java

If-then-Else in Python

```python
if a == 1:
    print("one command")
    print("another line")
elif b > 3:
    print("alternatively")
else:
    print("else")
```

Use the keyword `elif` to handle multiple cases.

If-then-Else in Java

```java
if (a == 1) {
    System.out.println("one command");
    System.out.println("another line");
} else if (b > 3) {
    System.out.println("alternatively");
} else
    System.out.println("else");
```

`else if` are two separated words

Python vs Java

Comparison in Python

Name	Operator	Example
Equal	`==`	`if 2 == 1:`
Not Equal	`!=`	`if x != 4:`
Greater than	`>`, `>=`	`if 2 > 3:`
Less than	`<`, `<=`	`if 2 < 3:`

Condition must be followed by semicolon `:`

Comparison in Java

Name	Operator	Example
Equal	`==`	`if (2 == 1)`
Not Equal	`!=`	`if (x != 4)`
Greater than	`>`, `>=`	`if (2 > 3)`
Less than	`<`, `<=`	`if (2 < 3)`

Condition must be enclosed by parenthesis `()`

Python vs Java

Logical Operator in Python

Name	Operator	Example
and	`and`	`if fat and tall:`
or	`or`	`if fat or tall:`
not	`not`	`if not tall:`

Logical Operator in Java

Name	Operator	Example
and	`&&`	`if (fat && tall)`
or	`||`	`if (fat || tall)`
not	`!`	`if (!tall)`

Python vs Java

Loops in Python

```
while x < 10:
    x = x + 1
    print(x)
```

```
for x in range(1,10):
    do_something()
```

Loops in Java

```
while (x < 10) {
    x = x + 1;
    System.out.println(x);
}
```

```
for (int x = 0; x < 10; x++)
    do_something();
```

Python vs Java

List in Python

```python
array = []
array.append(1)
array.append(10)
i = 0
j = 1
array.append(array[i] + array[j])
```

Array in Java

```java
int[] array = new int[3];
array[0] = 1;
array[1] = 10;
int i = 0; int j = 1;
array[2] = array[i] + array[j];
```

Python vs Java

Function in Python

```
def function(param1, param2):
    if (param1 > param2):
        return 1
    else:
        return 2
```

A function always starts with `def`.

Return values are **weak type** and nullable.

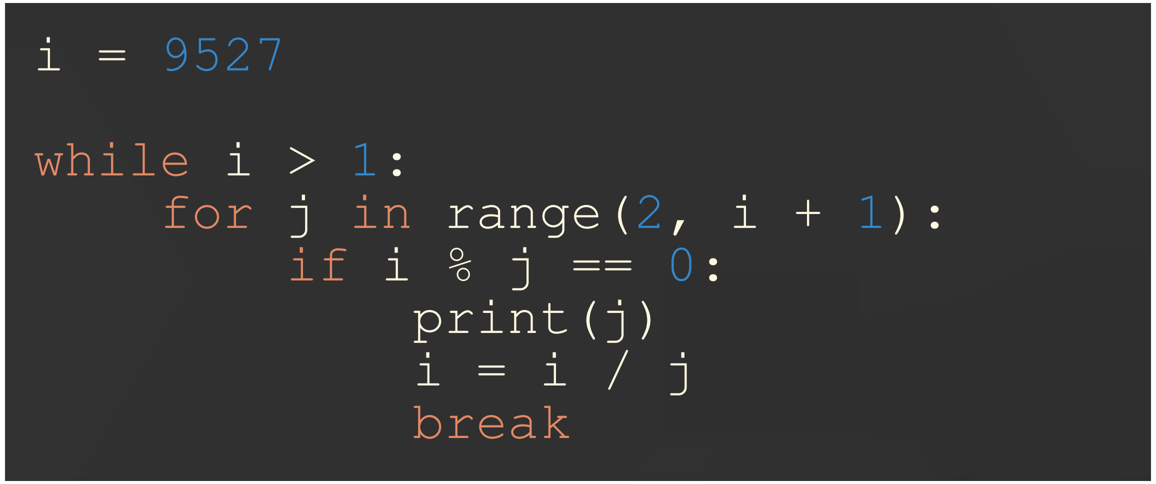
Method in Java

```
public int method(int param1,
                  int param2) {
    if (param1 > param2)
        return 1;
    else
        return 2;
}
```

The **return type** of a Java method must be defined. A non-void method must have a return statement on every possible path.

Python vs Java

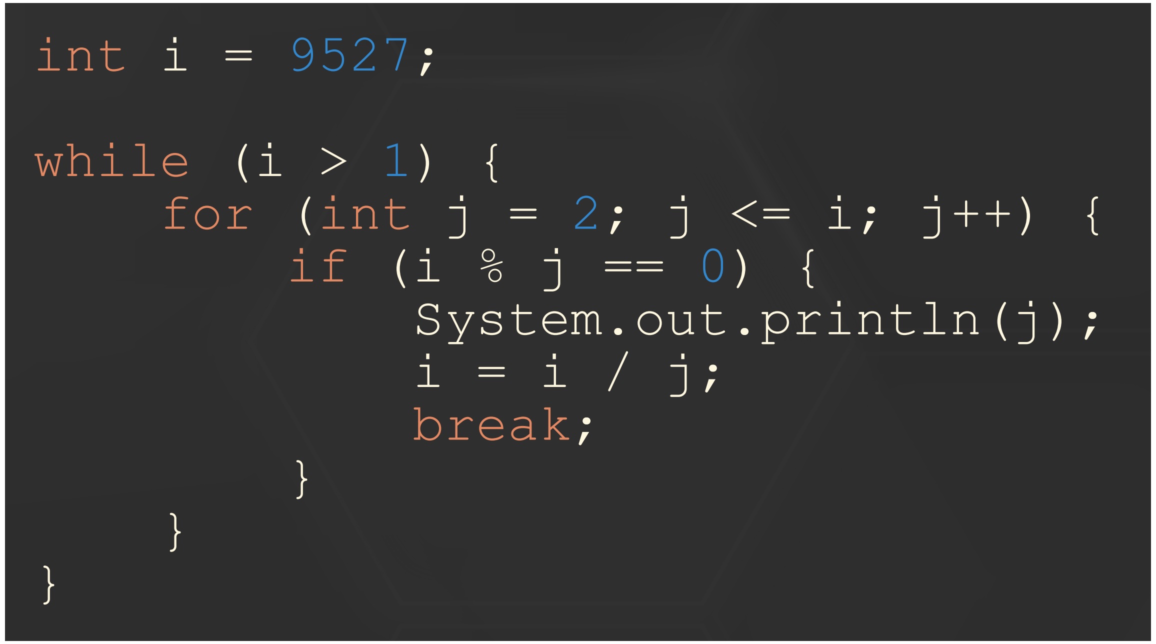
Simple Program in Python



```python
i = 9527

while i > 1:
    for j in range(2, i + 1):
        if i % j == 0:
            print(j)
            i = i / j
            break
```

Simple Program in Java



```java
int i = 9527;

while (i > 1) {
    for (int j = 2; j <= i; j++) {
        if (i % j == 0) {
            System.out.println(j);
            i = i / j;
            break;
        }
    }
}
```

More about Java

1. Java must have a class

- A complete Java program must include at least one class.
- Code are placed inside **methods** of a class.

```
System.out.println("Hello"); //does not work alone
```

```
public class Main {
    public static void main(String[] arg) {
        System.out.println("Hello"); //code placed inside method
    }
}
```

More about Java

2. Java starts from public static void main

- All Java executable program must include a method called `public static void main`. All code starts there.

```
public class Main {
    public static void main(String[] arg) {
        System.out.println("Hello"); //Programme entry point
    }
    public static void hi(String[] arg) {
        System.out.println("hi"); //would not go here
    }
}
```

More about Java

3. Java needs to be compiled before runs

- The compilation procedure is transparent to you for most of the time.
- **Compile**: the process to convert source code (.java) to byte code (.class)

4. Running Java Byte code needs a JRE/JDK

- **JRE**: Java Run-time Environment (most PC installed that)
- **JDK**: Java Development Kits. Include JRE as well.

More about Java

5. Java variable needs to be declared

- All variable needs to be declared before it can be used.
- Java is a **strong type** language. Each variable has a fixed type.

Next

- Read flipped lecture notes (Quiz is coming~)
- Watch Video
- Install Java
- Attending the lab
    - May bring your laptop if you want.