

Python to Java

Here is a quick tour of the differences between Python and Java. We will give more details on these over the next few classes.

1. Java is explicitly *typed*.

A *type* is a name that tells the system what values are possible for an object and what operations can be performed on it. Classes are types. There are also *primitive* or built-in types. Every variable in Java must be given a type before it can be used. Every method must have an explicit *return-type* (including void if the method doesn't return anything).

2. Classes, variables, and methods in Java have *access attributes* that determine who is allowed to access them. At one extreme you can say that a variable is *public* and anyone can see or alter it. At the other extreme you can say it is *private* and only elements of its class can see it. There are also several levels in between public and private.

3. A program in Java is just a collection of classes, one of which contains a method called `main()`. Python is essentially a scripting language; each statement can be executed on its own. Java is much more formal. All Java code must be inside a class.

4. In Java you need to explicitly throw and catch exceptions. Python allows you to do this with try-except statements. In many situations Java requires you to do this; your code won't compile without it.

5. Java ignores white space.

Python forces you to write well-formatted code. Java will let you write stupid code while it sits there and grins at you.

Consider

```
size = "big";  
if (x < 10)  
    digits = 0;  
    size = "small";
```

In Python, if `x` is 500 variable `size` ends up at "big". In Java it ends up at "small" because that last line isn't part of the if-statement even though you formatted it that way.

In Java that chunk of code would probably be written

```
size = "big";  
if (x < 10) {  
    digits = 0;  
    size = "small";  
}
```


6. For-loops in Java look really clunky.

Python has a great, flexible for-loop construct. Java uses the construct that has been around since C was developed in the early 1970's.

Here is a typical for-loop, which sums the numbers from 1 to n:

```
int sum = 0;
for (int i = 1; i <= n; i++)
    sum = sum + i;
```

7. Java makes a lot of use of *arrays* which are fixed-size blocks of data. Python uses lists, which are much more sophisticated, in place of arrays. In Lab 3 we'll implement lists in terms of arrays.

8. Java does not distinguish between terminal I/O and file I/O, which means that even simple operations like printing a value to the screen are more complex. Here is a basic print statement in Java:

```
System.out.print( foo );
```

9. Java has much more documentation than Python and you need to refer to it more often. You need to keep bookmarks to the documentation.

Alternatively, you can find almost anything you need by googling the name of a class, with a search string such as

`java class Scanner`

One of the first hits will be the standard documentation from Oracle for this class.