QA Consulting – Pre-Assessment day exercise 1

# Polymorphism

## Definition

In Object Oriented Programming (OOP), polymorphism is the ability for a certain variable, object or function to have more than one form. In Java, this is typically achieved by using class inheritance, ‘extending’ a subclass or object from two or more parent classes.

## Example

A simple example or polymorphism may be found in a member database. A ‘USERID’ class may be extended from both a name class – a string – and a customer reference number (usually an integer). By extending the USERID class from these parent classes, customer details may be found by either inputting a name or a customer reference number, in cases where one of these isn’t known. This saves end users time and effort.

# Abstraction

## Definition

Abstraction is the property whereby only essential details are displayed to the user. It allows end users to view only the most relevant information. In Java, this may be achieved by using interfaces or abstract classes.

## Example

A company employs part-time and full-time staff and wishes to automate wage calculation. An abstract class ‘Employee’ would be suitable in this case as both subclasses will share the same methods (age, date of birth, rate of pay etc). Once these methods are defined, both subclasses will inherit them. However, the implementation will be different as full-time employees will work, for example, 40 hours per week, whereas part time workers may have variable working hours week on week. The subclasses would then have their own unique methods to calculate the wage accordingly.

# Encapsulation

## Definition

Encapsulation in OOP (also known as data hiding) is all about wrapping certain methods and variables into one single source code unit, then restricting access to said source code so it can then not be misused. We may choose to encapsulate when code has been previously tested and proven to work, or we may also use this when databases contain sensitive data.

## Example

Say we have a database of cars for a manufacturer. This class may contain a model name, and top speed for different car models in miles per hour. This has then been modified using a multiplication operator to give a top speed in kilometres per hour. We could then return a top speed in kilometres per hour without worrying about the inner workings of the previously tested private class.

# Inheritance

## Definition

Inheritance is a process in which characteristics are inherited from ancestors. This is achieved by using the keyword ‘extends’. This is a good time saving tool which prevents tedious code reuse.

## Example

A database for animals in a pet shop could employ inheritance in a useful way. Generic details about a given animal, such as age, gender, size, weight and so on could be defined in an ‘animal’ superclass. A subclass for dogs could then inherit these methods whilst adding new ones specific to dogs, such as breed, snout length, and ideal walking distance per day.