01-Collection Classes - Linear Data Structures

A **Class** is a description of an object - the data and behavior for an object.

An **Object** is an instance of a class.

A recipe is description of a dish.

A Cake recipe describes how to make a cake; ingredients and the steps of how to use them to make a cake.

The cake you make using the recipe is an instance of the recipe.

Making a a cake using the recipe is instantiation of the cake recipe.

Collection classes are **provided by Java** to allow us to **create groups of objects** that can be **mainipulated/processed as a group.**

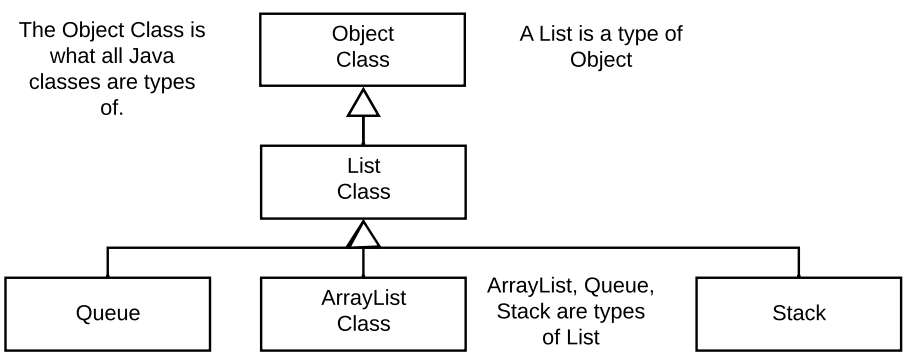
ArrayList is a Collection class that allows us to easily use objects in an array.

Arrays were **fixed-length, only one type of data, use an index to access an element.**
we have to know how many elements we need to store when we define the array.

ArrayLists are **variable # of elements, hold more than one <u>type of objects</u>, use methods to access the elements** in the ArrayList.
The number elements to be stored does not need to be known when defined.

An **ArrayList <u>can only contain Objects</u>**. Primitives (int, double, boolean, etc) are not allowed in an ArrayList.

An **Array may contain primitives or Objects.**



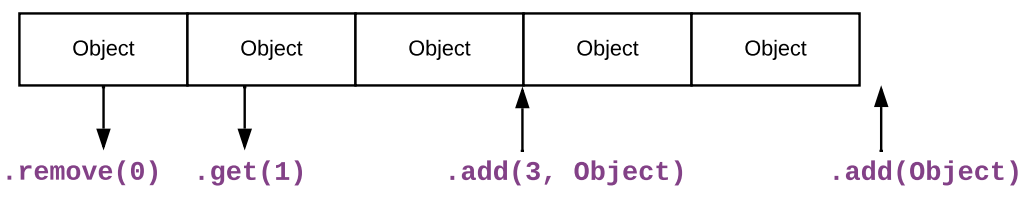
To define an ArrayList:

```
List<data-type>   name     = new ArrayList<data-type>();

List<String>      students = new ArrayList<String>();
ArrayList<String> students = new ArrayList<String>();
ArrayList<String> students = new ArrayList<>();
ArrayList<String> students = new ArrayList();

<datatype-stored-in-ArrayList>
```

An ArrayList is a type of List that treats a Collection of Objects as an Array.

Elements are stored in the same order they are added when using **`.add(Object)`**
The number of elements in an Arraylist can be found using **`.size()`**
Elements may be accessed by relative index number using: **`.get(index)`**
Elements may be added to any place in the ArrayList using **`.add(index, Object)`**
Elements may be removed from the ArrayList using: **`.remove(index)`**
There are many methods available to process/access an ArrayList.

Java ArrayList documentation site: https://docs.oracle.com/javase/8/docs/api/java/util/ArrayList.html



A Queue is a type of List that treats a Collection of Objects as FIFO data structure:

Elements are stored at the end.
Only the top most element is available.
The number of elements in an Arraylist can be found using **`.size()`**
Elements may be accessed by relative index number using: **`.get(index)`**
Elements may be added to any place in the ArrayList using **`.add(index, Object)`**
Elements may be removed from the ArrayList using: **`.remove(index)`**
There are many methods available to process/access an ArrayList.

Java ArrayList documentation site: https://docs.oracle.com/javase/8/docs/api/java/util/ArrayList.html