JAVA VARIABLES
(Non Primitive Data Types In Depth)

⇒ Reference Data Types / Non-Primitive Data Types

* There are mainly 4 type of reference data types:
  - Class
  - String
  - Interface
  - Array

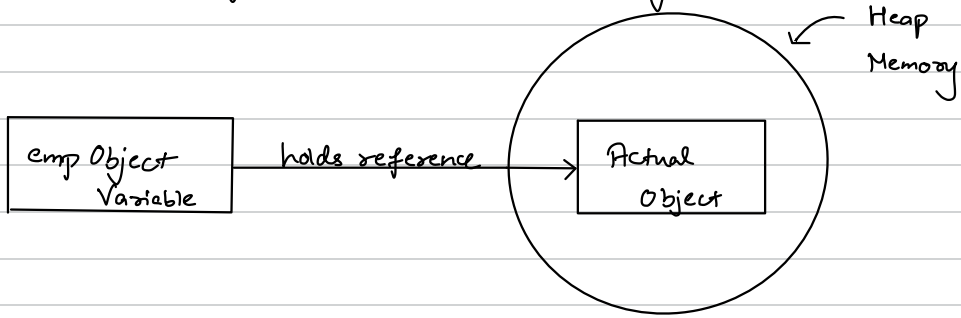
* What is reference ?
let's understand with an example of class
So let's create a class

```
public class Employee {

    int empId;

    public int getEmpId() {
        return empId;
    }

    public void setEmpId(int empId) {
        this.empId = empId;
    }
}
```

Now to create an object of class Employee

```
public class Student {

    public static void main(String args[]){

        Employee empObject = new Employee();
    }
        .

}
```

new keywood allocates a memory block object & the variable's name holds a reference to actual memory.

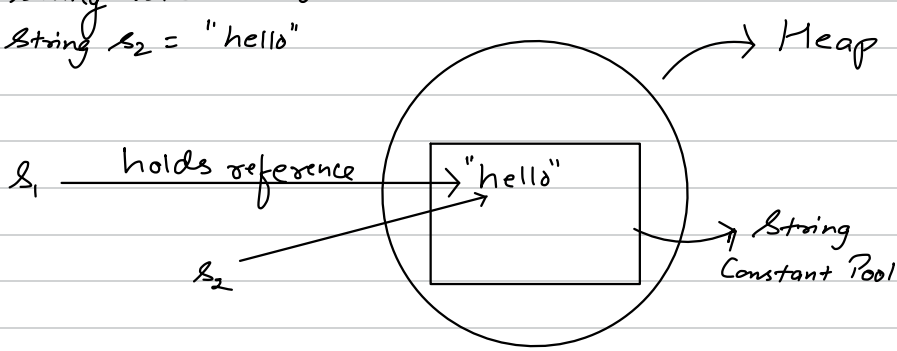


* In Java, everything is pass by value. So with the help of reference variables we're achieving the functionality of pointers in CPP.

* String
  - Strings are immutable in Java
  - It contains String literal.

Inside heap, there is a fixed memory space kla String Constant Pool so the String variable holds a reference of corresponding String literal in String Constant Pool.

Eg:- String s_1 = "hello".
String s_2 = "hello"



Since strings are immutable, 2 same strings holds reference to same string literal in String Constant Pool
So both s_1 & s_2 holds reference to same string literal "hello".
This applies for normal strings. If we create using new keyword, it'll be stored as normal object in heap.
Eg:- String s_3 = new String ("hello")

* Interface
To understand better, let's create an interface & implement it.

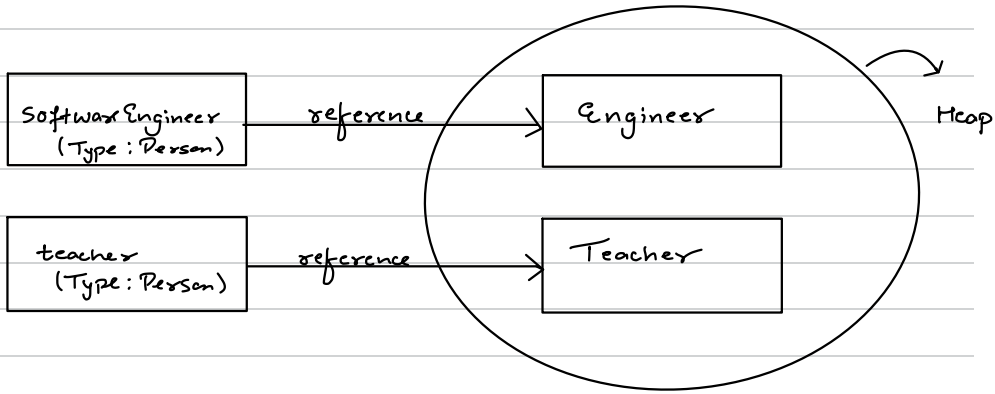
```
public interface Person {

    public String profession();
}
```

```
public class Teacher implements Person{

    @Override
    public String profession() {
        return "teaching";
    }
}
```

```
public class Engineer implements Person{

    @Override
    public String profession() {
        return "software engineer";
    }
}
```

Now let's create a few objects in a class:-

```
Public class Student {
    public static void main ( String args [ ]) {
        Person softwareEngineer = new Engineer ( );
        Person teacher = new Teacher ( );
        Teacher teacher1 = new Teacher ( );
        Engineer softwareEngineer1 = new Engineer ( );
```



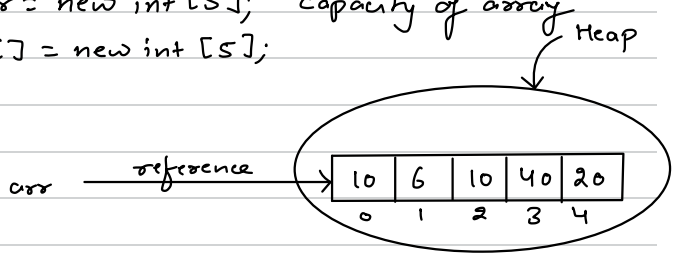
So here the variables softwareEngineer & teacher holds a reference of Engineer & Teacher type objects in the heap memory.
So we can store the objects of a child in a parent one or we can store the objects in same class itself but we cannot create an object of interface.

ie Person person = new Person();

This is wrong.

⇒ Array
- Sequence of memory storing same data type.

For eg:- int [] arr = new int [5]; capacity of array
or int arr [] = new int [5];



arr[0] = 10, arr[1] = 6, arr[2] = 10, arr[3] = 40, arr[4] = 20

* Arrays can be assigned in multiple ways & can be of multiple types like 1D, 2D etc.

⇒ Wrapper Class

Autoboxing — Unboxing

For each of the primitive data types, we have corresponding reference types that are known as Wrapper Classes

int	→	Integer
char	→	Character
Short	→	Short
byte	→	Byte
long	→	Long
float	→	Float
double	→	Double
boolean	→	Boolean

* Why the need for wrapper classes ?
  → We get the advantages of passing by reference. For example if we've declared a wrapper type of int i.e Integer type, we can change it later on & it'll change in memory as well because in wrapper we're storing reference.
  In primitive this won't be possible as they're stored in stack & not heap.

- The collections works on objects only i.e on reference data types, so we need wrapper class to use collections.

* Autoboxing
  - To convert a primitive data type to its wrapper.

```
Eg:-  int a = 10;
      Integer a1 = a;
```

(primitive to its wrapper)

* Unboxing :-
  - To convert a wrapper class to primitive

```
Eg: Integer x = 20;
    int x1 = x;
```

(wrapper to primitive)

⇒ Constant Variable
  - We cannot change the value of a constant variable. This is usually created using final keyword.

```
Eg:- static final VAR = 10;
```

static: It means only one copy exist

final: It means the value of VAR can't be changed.