Department: BCA
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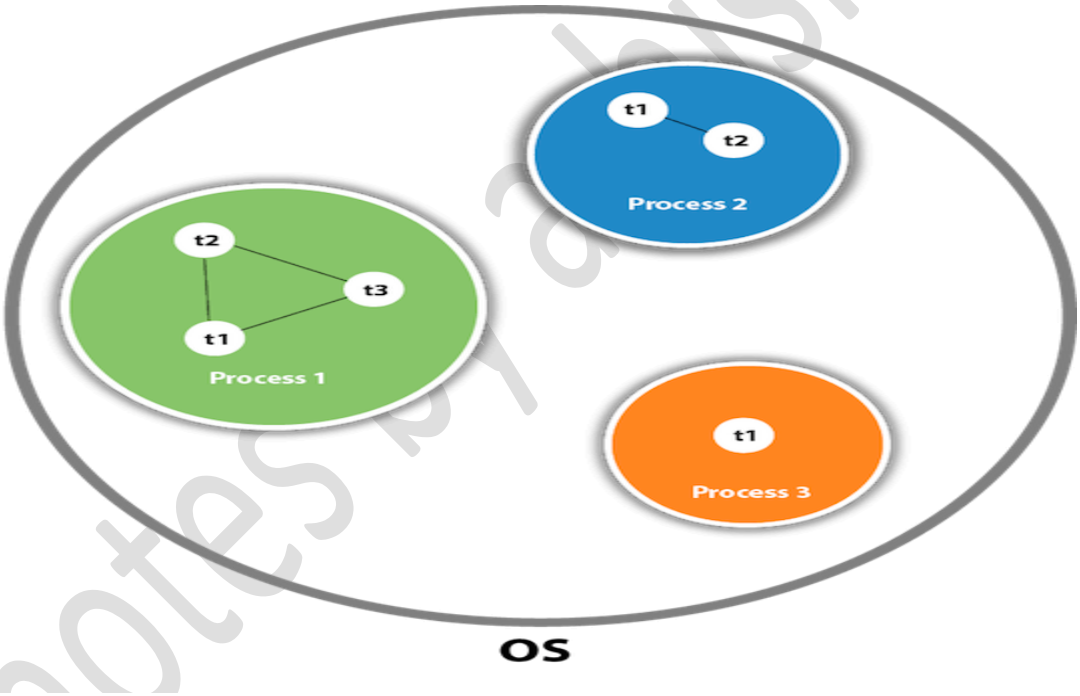
Subject: JAVA (5th sem.)
Topic: **Multithreading in Java**

Multithreading in Java:

- Multithreading is a Java feature that allows concurrent execution of two or more parts of a program for maximum utilization of CPU.
- Each part of such program is called a thread. So, threads are light-weight processes within a process.



Multitasking

Multitasking is a process of executing multiple tasks simultaneously. We use multitasking to utilize the CPU. Multitasking can be achieved in two ways:

- Process-based Multitasking (Multiprocessing)
- Thread-based Multitasking (Multithreading)

Process-based Multitasking (Multiprocessing)

- Each process has an address in memory. In other words, each process allocates a separate memory area.
- A process is heavyweight.
- Cost of communication between the process is high.
- Switching from one process to another requires some time for saving and loading registers, memory maps, updating lists, etc.

Thread-based Multitasking (Multithreading):

- Threads share the same address space.
- A thread is lightweight.
- Cost of communication between the thread is low.

Threads can be created by using two mechanisms:

1. Implementing the Runnable Interface
2. Extending the Thread class

1. Implementing the Runnable Interface:

- We create a new class which implements java.lang.Runnable interface and override run() method.
- Then we instantiate a Thread object and call start() method on this object.

Example:

C:\Users\ashish\Desktop\java\TestMultiThread.java - Notepad++

```java
class ABC implements Runnable
    {
        public void run()
        {
            int i;
            for(i=0;i<10;i++)
            {
            System.out.println("Thread ABC: "+i);
            }
        }

    }
class XYZ implements Runnable
    {
        public void run()
        {
            int i;
            for(i=0;i<10;i++)
            {
            System.out.println("Thread XYZ: "+i);
            }
        }

    }
public class TestMultiThread
    {
        public static void main(String args[])
            {
                Thread t1=new Thread(new ABC());
                Thread t2=new Thread(new XYZ());
                t1.start();
                t2.start();

            }
    }
```

Command Prompt

```
2 errors

C:\Users\ashish\Desktop\java>javac TestMultiThread.java

C:\Users\ashish\Desktop\java>java TestMultiThread
Thread ABC: 0
Thread XYZ: 0
Thread ABC: 1
Thread XYZ: 1
Thread ABC: 2
Thread XYZ: 2
Thread ABC: 3
Thread XYZ: 3
Thread ABC: 4
Thread XYZ: 4
Thread ABC: 5
Thread XYZ: 5
Thread ABC: 6
Thread XYZ: 6
Thread ABC: 7
Thread XYZ: 7
Thread ABC: 8
Thread XYZ: 8
Thread ABC: 9
Thread XYZ: 9

C:\Users\ashish\Desktop\java>
```