

TITLE

Laboratory 2. Concurrent Computation

PREREQUISITES

- OOP basic knowledge
 - Java programming language basic knowledge
 - Algorithms
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RESOURCES

- Course 1 slides
 - [Java Tutorial](#)
 - [Java Concurrency](#)
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LABORATORY INSTRUCTIONS

The Java programming language allows us to create programs that contain one or more parts that can run simultaneously. This is known as **multithreading** programming. Each part of the program is called a **thread**.

A **thread** is a lightweight process. (A thread is a subpart of a process that can run individually)

There are two ways to create threads in Java:

- Using **Thread class** (extending the class)

```
class MyThread extends Thread {
    public void run() {
        System.out.println("Thread is Running...");
        for(int i = 1; i <= 10; i++) {
            System.out.println("i = " + i);
        }
    }
}

public class Running_Thread {
    public static void main(String[] args) {
        MyThread t1 = new MyThread ();
        t1.start();
    }
}
```

- Using **Runnable interface** (implementing Runnable interface)

```
class MyThread implements Runnable{
```

```

    public void run() {
        System.out.println("Thread is Running...");
        for(int i = 1; i <= 10; i++) {
            System.out.println("i = " + i);
        }
    }
}

public class Running_Thread {

    public static void main(String[] args) {
        MyThread th1Object= new MyThread ();
        Thread th1= new Thread(th1Object);
        th1.start();
    }
}

```

The states of a thread in its life cycle are called: **new**, **ready(runnable)**, **running**, **blocked(wait)**, and **dead**.

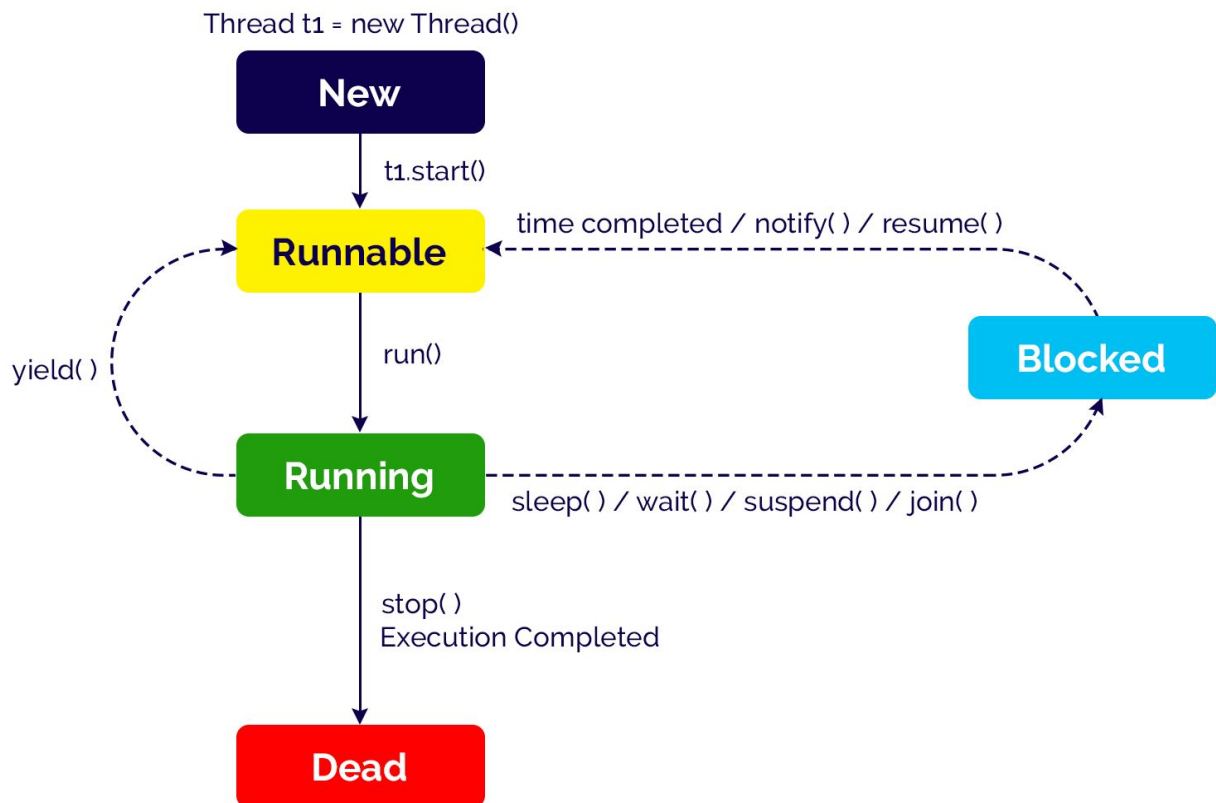


Fig. 1 - Thread Lifecycle

New - This is the state that a thread exists after being created using **new**.

```
Thread exampleThread = new Thread();
```

Ready (Runnable) - this is the state of a thread after the thread calls **start()** method.

```
exampleThread.start();
```

Running - is the state of the thread after calling the **run()** method. Attention! The **run()** method is automatically called by the **start()** method.

Blocked (Wait) - Some of the methods that can bring the thread in this state are **sleep()**, **wait()**, **suspend()**, **join()**.

Dead (Terminated) - The thread in the Running state moves to the Dead state after either **stop()** method is called or its execution completed.

LABORATORY TASKS

1. Create a new Java project and try to implement your first Java concurrency program.
2. Implement the following algorithm in Java using threads. What is the value of ***n*** ?

Numarare concurenta	
integer $n \leftarrow 0$	
p	q
integer $temp$ p1: do 10 times p2: $temp \leftarrow n$ p3: $n \leftarrow temp + 1$	integer $temp$ q1: do 10 times q2: $temp \leftarrow n$ q3: $n \leftarrow temp + 1$

Sursa: *M.Ben-Ari, 2006*