Saraswati Vandana

या कुन्देन्दु तुषार हार धवला
या शुभ्र वस्त्रान्विता ।
या वीणा वर दंड मंडितकरा
या श्वेत पद्मासना ॥

या ब्रह्मा अच्युत शंकर प्रभ्रतिभिः
देवै सदा पूजिता ।
सा मां पातु सरस्वती भगवती
निःश्येश जाड्यापह ॥

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Faculty of Engineering & Technology
Sankalchand Patel College of Engineering, Visnagar

Java Programming
(1ET1030406)

Unit-9 : Multithreading in Java

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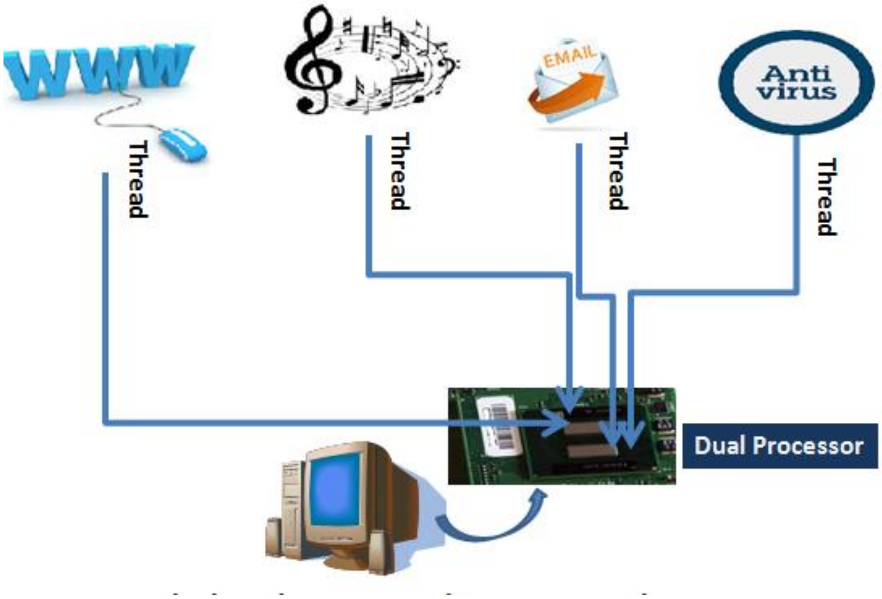
Content

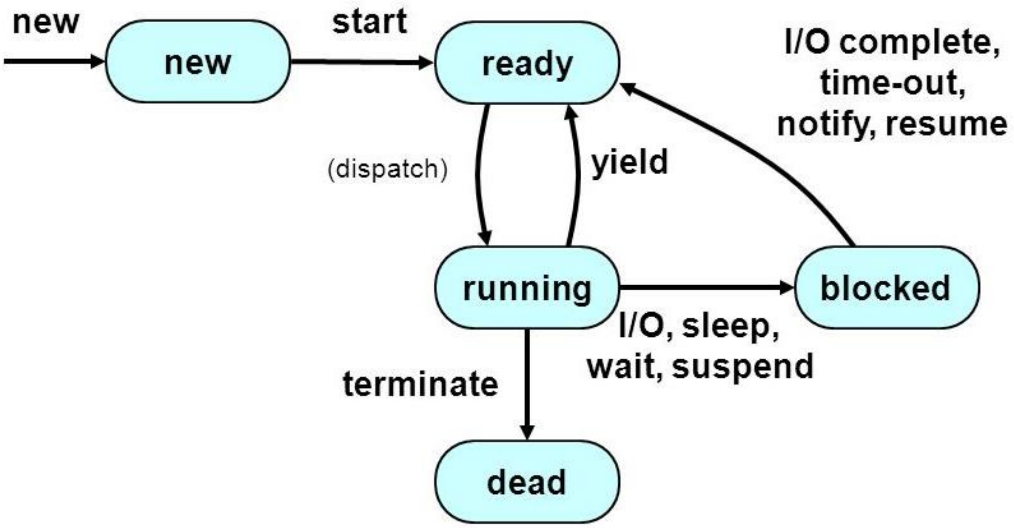
- Use of Multithread programming
- Life Cycle of Thread
- Thread class
- Runnable interface
- Thread priority
- Thread synchronization
- Thread communication
- Deadlock

Use of Multithread programming

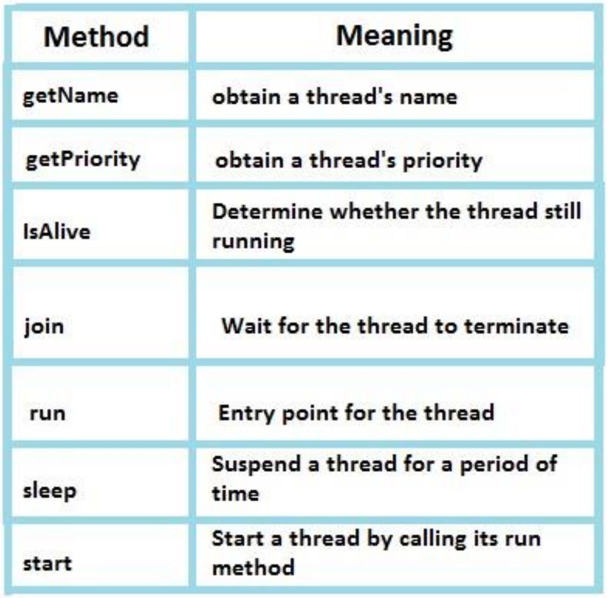
- Improve Through put
- Multi Tasking
- Efficiently use resources
- Time Reducing



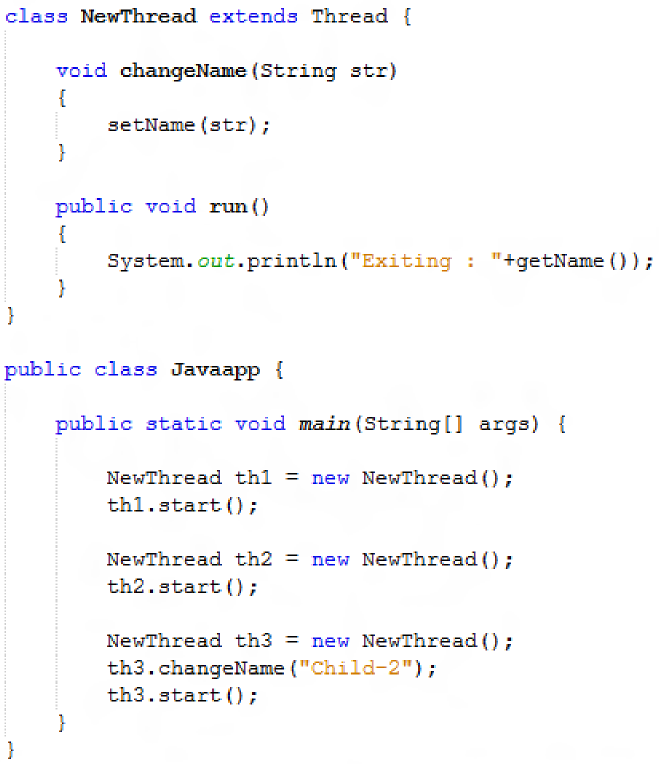
Life Cycle of a Thread



Thread class

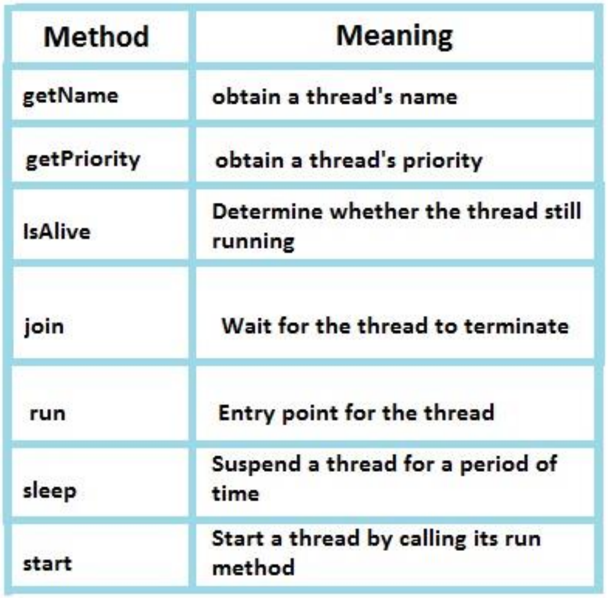


Method	Meaning
getName	obtain a thread's name
getPriority	obtain a thread's priority
IsAlive	Determine whether the thread still running
join	Wait for the thread to terminate
run	Entry point for the thread
sleep	Suspend a thread for a period of time
start	Start a thread by calling its run method



```
class NewThread extends Thread {

    void changeName(String str)
    {
        setName(str);
    }

    public void run()
    {
        System.out.println("Exiting : "+getName());
    }
}

public class Javaapp {

    public static void main(String[] args) {

        NewThread th1 = new NewThread();
        th1.start();

        NewThread th2 = new NewThread();
        th2.start();

        NewThread th3 = new NewThread();
        th3.changeName("Child-2");
        th3.start();
    }
}
```

Runnable interface



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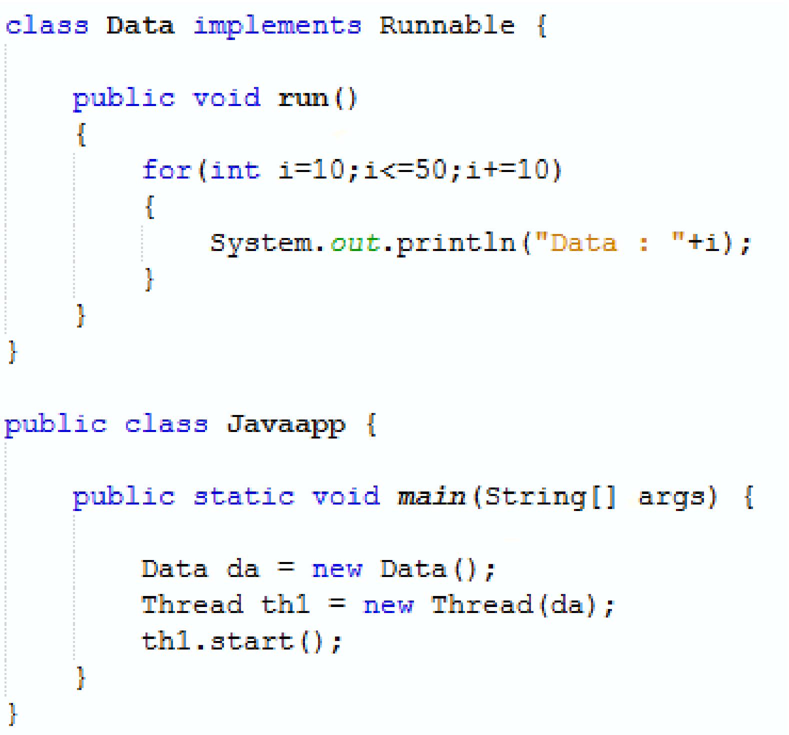


```
class Data implements Runnable {

    public void run()
    {
        for(int i=10;i<=50;i+=10)
        {
            System.out.println("Data : "+i);
        }
    }
}

public class Javaapp {

    public static void main(String[] args) {

        Data da = new Data();
        Thread th1 = new Thread(da);
        th1.start();
    }
}
```

Thread priority

- setPriority(int)
- getPriority(int)
- MIN_PRIORITY=1
- NOR_PRIORITY=5
- MAX_PRIORITY=10

Thread synchronization

- ➢ Why?
  - To prevent thread interference
  - To prevent consistency problem
- ➢ Types
  - a) Mutual Exclusive
    1. Synchronized method
    2. Synchronized block
    3. static synchronization
  - b) Cooperation (Inter-thread communication in java)

Method synchronization

```
synchronized void printTable(int n){
   for(int i=1;i<=5;i++){
     System.out.println(n*i);
     try{
      Thread.sleep(400);
     }catch(Exception e){System.out.println(e);}
   }

 }
```

Block synchronization

```
void printTable(int n){
   synchronized(this){
     for(int i=1;i<=5;i++){
      System.out.println(n*i);
      try{
       Thread.sleep(400);
      }catch(Exception e){System.out.println(e);}
     }
   }
}
```

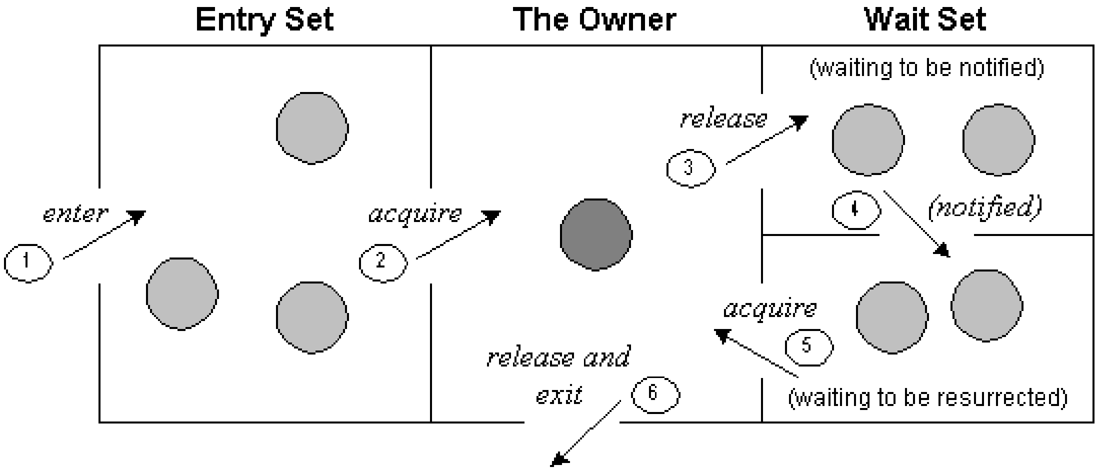
Static synchronization

```
synchronized static void printTable(int n){
   for(int i=1;i<=10;i++){
     System.out.println(n*i);
     try{
       Thread.sleep(400);
     }catch(Exception e){}
   }
 }
```

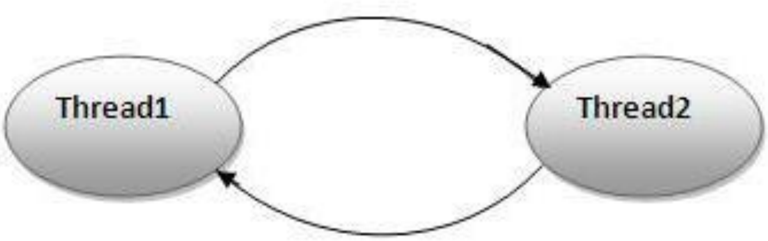
Thread Communication

Inter-thread communication method

- wait()
- notify()
- notifyAll()



Deadlock



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Questions/Comments

THANK
YOU