

Thread

```
class xyz implements Runnable
{
    public void run( )
    {
        int i;
        for (i=0;i<5;i++)
        {
            System.out.print(i);
            try{ Thread.sleep(1000);}
            catch(Exception e){}
        }
    }
}

class kapil
{
    public static void main(String ar[]) throws Exception
    {
        xyz k;Thread a,b;
        k=new xyz( );a=new Thread(k);
        b=new Thread(k);
        a.start( );
        System.out.print("x");
    }
}
```

The possible outputs of above program are x01234, 0x1234.

When a.start() is replaced by a.run() then only one output (01234x) is possible.

[a.start() means initiate execution of 'a'. The next instruction may start execution even if 'a' is not over. a.run() means that the next instruction will start only when 'a' is over.]

a.start();b.start() then possible outputs are x0011223344, 0x011223344, or 00x11223344

a.run();b.start() outputs 01234x01234 or 012340x1234

a.start();b.run() outputs 0011223344x or 001122334x4 (last 4 by a, second last by b)

1. Write program to output 0123x4 [a.start; Thread.sleep(3500);print(x)]
Here print("x") is System.out.print("x");
2. Write program to output 010213243x4. [a.start,sleep,b.start,sleep]
3. Program to output 0x1x2x3xx4x a.start;for(i=1 to 6){sleep;print(x);} use print x once
4. Program to print (A)01x2x3xx4x (B)01x2x34x5x6x78x9xx (C)xx1x2xx3x4x5xx6x789
5. Write main program as following. After every 2.4 seconds a new thread is created.
for (i=1 to 10) { print("x"); k=new xyz(); a=new Thread(k); a.start(); sleep(2400); }
The output is x012x03142x03142x03142x....
When for loop in xyz is (i=0 to 9) then output is x012x03142x05316427x0538164927.....
6. Define another class pqr. It prints letters A..Z [Hint: System.out.print((char)i); sleep(200)].
Write main program: xyz k; pqr t; Thread a,b; k=new xyz(); t=new pqr();
a=new Thread(k); b=new Thread(t); a.start();sleep(700);b.run();print("ram");
Output: 0AB1CDEFG2HIJKL3MNOPQ4RSTUV5WXYZram6789
7. Modify above to print: 0ABCD1EF2GH3I4J5K6L7M8N9O..Z[sleep(100*(i-65)) in pqr]
8. Write a program, which creates threads in an infinite loop. After every 4999 milli seconds a new thread is created. Every thread prints sequence abcdef.... Time difference between consecutive letters is 1 second. The output looks as following:
a,b,c,d,e,af,bg,ch,di,ej,afk,bgl,ghm,din,ejo,afkp,bglq,ghmr,dins,ejot,afkpu (,) comma not printed.
9. Modify above so that (,) is also printed. [A thread prints (,) at t=500, 1500, 2500, ...]

10. Modify above to print (a)(b)(c)(d)(e)(af)(bg)(ch)(di)(ej)(afk)(bgl)(chm)(din)(ejo)(afkp)...
11. Modify above to print (a)(b)(c)(d)(e)(fa)(gb)(hc)(id)(je)(kfa)(lgb)(mhc)(nid)(oje)(pkfa)...
12. Modify it to print following: (A thread prints 1,2,3... at t=4700, 9700, 14700, 19700, ...)
a,b,c,d,e,1af,bg,ch,di,ej,2afk,bgl,chm,din,ejo,3afkp,bglq,chmr,dins,ejot,4afkpu
13. Modify it to print following: Create a thread at t=0, 5000, 10000, ... It prints 4(.)'s at t=900, 1900, 2900, 3900 after its creation.
a,b,c,d,e1af,bg,ch,di,ej2afk,bgl,chm,din,ejo3afkp,bglq,chmr,dins,ejot4afkpu
14. Modify above program. The time difference between i^{th} and $(i+1)^{\text{th}}$ thread is 999i ms.
output:(1)a(2)ab,bc(3)acd,bde,cef(4)adfg,begh,cfhi,dgij(5)aehjk,bfikl,cgjlm..(, not printed)
15. Write a program. It reads strings in an infinite loop. After reading a string (x) it creates a thread. The thread starts printing 1,2,3, ... The time difference between consecutive outputs is 1 second (1000 milli sec). Let input is ram, hari, anil, kapil. Assume that these inputs are given at time t=3, 5, 6, 7 then output is as following: 1,2,31,42,53,641,7521.
DataInputStream u=new DataInputStream(System.in); try{a=u.readLine();}catch(Exception e){ }
16. Write a program, which creates 2 threads. Both threads read number. The first thread outputs the double and the second thread outputs triple. Let input is 12, 5, 17 then output is (24 or 36) (10 or 15) (34 or 51). [Hint: if input 12 goes to first thread then output is 24 otherwise 36]