Writing a deadlock and resolving in java

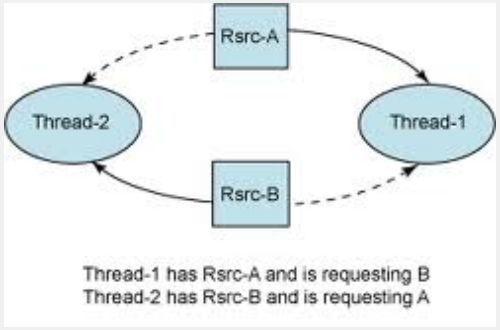
OCTOBER 16, 2012 LOKESH 5 COMMENTS

In this post, I will write a piece of code which will create a deadlock situation and then i will discuss that way to resolve this scenario.

In my previous post, i written about *Auto reload of configuration when any change happen*, i discussed about refreshing your application configuration using a thread. As configurations are shared resources and when accessing via Threads, there is always chance of writing incorrect code and caught in deadlock situation.

In java, a deadlock is a situation where minimum two threads are holding lock on some different resource, and both are waiting for other's resource to complete its task. And, none is

able to leave the lock on resource it is holding. (See image below)



In above case, Thread- has A but need B to complete processing and Similarly Thread-2 has resource B but need A first.

Let write above scenario in java code:

```
1  package thread;
2
3  public class ResolveDeadLockTest {
4
5      public static void main(String[] args) {
6          ResolveDeadLockTest test = new ResolveDeadLockTest();
7
8          final A a = test.new A();
9          final B b = test.new B();
10
11         // Thread-1
12         Runnable block1 = new Runnable() {
13             public void run() {
14                 synchronized (a) {
15                     try {
16                         // Adding delay so that both threads can start trying
17                         // lock resources
18                         Thread.sleep(100);
19                     } catch (InterruptedException e) {
20                         e.printStackTrace();
21                     }
22                     // Thread-1 have A but need B also
23                     synchronized (b) {
24                         System.out.println("In block 1");
25                     }
26                 }
27             }
28         };
```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```
29
30          // Thread-2
31          Runnable block2 = new Runnable() {
32              public void run() {
33                  synchronized (b) {
34                      // Thread-2 have B but need A also
35                      synchronized (a) {
36                          System.out.println("In block 2");
37                      }
38                  }
39              }
40          };
41
42          new Thread(block1).start();
43          new Thread(block2).start();
44      }
45
46      // Resource A
47      private class A {
48          private int i = 10;
49
50          public int getI() {
51              return i;
52          }
53
54          public void setI(int i) {
55              this.i = i;
56          }
57      }
58
59      // Resource B
60      private class B {
61          private int i = 20;
62
63          public int getI() {
64              return i;
65          }
66
67          public void setI(int i) {
68              this.i = i;
69          }
70      }
71  }
```

Running above code will result in deadlock for very obvious reasons (explained above). Now we have to solve this issue.

I believe, solution to any problem lies in identifying the root of problem. In our case, it is the pattern of accessing A and B, is main issue. So, to solve it, we will simply re-order the

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statements where code is accessing shared resources.

After rewriting the code, it will look like this ::

```
    // Thread-1
Runnable block1 = new Runnable() {
    public void run() {
        synchronized (b) {
            try {
                // Adding delay so that both threads can start trying to
                // lock resources
                Thread.sleep(100);
            } catch (InterruptedException e) {
                e.printStackTrace();
            }
            // Thread-1 have A but need B also
            synchronized (a) {
                System.out.println("In block 1");
            }
        }
    }
};

// Thread-2
Runnable block2 = new Runnable() {
    public void run() {
        synchronized (b) {
            // Thread-2 have B but need A also
            synchronized (a) {
                System.out.println("In block 2");
            }
        }
    }
};
```

Run again above class, and you will not see any deadlock kind of situation. I hope, it will help you in avoiding deadlocks, and if encountered, in resolving them.
Happy Learning !!

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simhachalam

OCTOBER 2, 2014 AT 10:14 PM

hi LOKESH,
can i do the deadlock by using synchronized methods(not synchronized blocks).

REPLY

Ram

FEBRUARY 6, 2014 AT 6:42 AM

Hi Lokesh,
i m getting same output in both case please do need fully.

REPLY

★ Lokesh

FEBRUARY 6, 2014 AT 7:43 AM

It's not the output that matters, it's deadlock concept in discussion. Output may/or may not differ, both are perfectly fine.

REPLY

Mudassir Shahzad

JANUARY 9, 2014 AT 10:22 AM

Loved your approach of getting to the root problem by first understanding the pattern. Youd rocked it!

REPLY

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