

5.2 Bank account

Imagine a bank account and two people: One person is always adding money to the account (deposit), while the other person is always trying to take money out of the account (withdraw). They work concurrently (at the same time). The person trying to take money out of the account (the Withdrawer) can only take out money if the balance of the account is equal to or greater than the amount that the withdrawer wishes to withdraw.

Create a console application that consists of three classes: Account, Withdrawer and Depositor. The Account class should have an initial balance and it should implement the following methods:

```
class Account {
    void deposit(int amount); // put money into the account

    // take money out of the account if there is enough money on
    the account
    // returns true if the withdrawal was successful otherwise
    returns false.

    boolean withdraw(int amount);
    int getBalance(); // get the current balance of the account
}
```

The Withdrawer and the Depositor should both be threads that continues to withdraw and deposit money, respectively, until they are interrupted. The amounts withdrawn or deposited should be a random number between 1 and 10. Both the Withdrawer and the Depositor should keep track of how much money they have withdrawn and deposited, respectively.

The static void main(String[] args) should do the following:

1. Create an account with an initial balance of 1000
2. Create a depositor and a withdrawer
3. Start the depositor and the withdrawer threads
4. Sleep for 10 seconds
5. Interrupt the depositor and the withdrawer
6. Make sure that both the depositor and the withdrawer threads have stopped.
7. Print out the initial balance, the total amount deposited, the total amount withdrawn.
8. Check that the balance of the account is consistent. That is, check that "the initial balance + total amount deposited - total amount withdrawn" is equal to what the account says that its balance is.

Make sure that only one thread can adjust the balance of the account at any one time in order to ensure that the balance of the account is consistent.

When you have finished the first part above, extend you application in the following way:

1. Create a simple graphical user interface that allows you to start and stop the Withdrawer and the Depositor and that shows the balance in real-time.
2. Add two buttons that when pressed, add a new Withdrawer and a new Depositor, respectively so that the same account can have multiple Withdrawers and depositors at the same time.