**Write an application to implement the basic functions for the Online Banking Application (Use**

**synchronized)**

**Show deposit and withdraw functionality for the Online Banking Application (Using**

**synchronized). Also compare your output without using synchronized.**

**Program:**

**Using synchronized keyword:**

ThreadExercise.java

import java.util.logging.Level;

import java.util.logging.Logger;

public class ThreadExercise extends Thread implements Runnable {

private Person person;

public ThreadExercise(Person p) {

this.person = p;

}

public static void main(String[] args) {

ThreadExercise ts1 = new ThreadExercise(new Person("Account Holder 1"));

ts1.start();

ThreadExercise ts2 = new ThreadExercise(new Person("Account Holder 2"));

ts2.start();

}

@Override

public void run() {

for (int i = 0; i < 3; i++) {

try {

Account acc = Account.getAccount(person);

acc.withdraw(100);

try {

Thread.sleep(200);

} catch (InterruptedException ex) {

Logger.getLogger(ThreadExercise.class.getName()).log(Level.SEVERE, null, ex);

}

if (Account.getBal() < 0) {

System.out.println("account is overdrawn!");

}

acc.deposit(200);

} catch (Exception e) {

e.printStackTrace();

}

}

System.out.println("Final balance: Rs." + Account.getBal());

}

}

**Account.java**

**public** **class** Account {

**public** **static** Account *account*;

**private** **static** **int** *balance* = 0;

**private** **static** Person *person*;

**private** Account() {

}

**public** **static** Account getAccount(Person p) {

**if** (*account* == **null**) {

*account* = **new** Account();

}

Account.*person* = p;

**return** *account*;

}

**public** **static** **int** getBal() {

**return** *balance*;

}

**public** **static** **void** getAccountBal() {

System.***out***.println("============================");

System.***out***.println("Account balance : " + *balance*);

System.***out***.println("============================");

}

**public** **synchronized** **void** withdraw(**int** bal) {

// public void withdraw(int bal) {

System.***out***.println(*person*.getName());

System.***out***.println("------------");

System.***out***.println("Withdrawing Rs. " +bal);

**if** (*balance* >= bal) {

*balance* = *balance* - bal;

System.***out***.println("Withdraw completed");

*getAccountBal*();

} **else** {

System.***out***.println("Withdraw incomplete.No sufficient balance \n ");

*getAccountBal*();

}

}

**public** **synchronized** **void** deposit(**int** bal) {

//public void deposit(int bal) {

**try** {

System.***out***.println(*person*.getName());

System.***out***.println("--------------");

System.***out***.println("Depositing Rs. " +bal +"\n");

**try** {

Thread.*sleep*(100);

} **catch** (Exception e) {

e.printStackTrace();

}

*balance* = *balance* + bal;

System.***out***.println ("Deposit successful");

*getAccountBal*();

// } else {

//System.out.println(person.getName() + " " + "doesn't have enough money for deposit");

//System.out.println("Deposit completed.");

} **catch** (Exception e) {

e.printStackTrace();

}

}}

Person.java

**public** **class** Person {

**private** String name;

**public** Person(String name) {

**this**.name = name;

}

**public** String getName() {

**return** name;

}

**public** **void** setName(String name) {

**this**.name = name;

}

@Override

**public** String toString() {

**return** name;

}}

**OUTPUT:**

Account Holder 1

Account Holder 1

------------

------------

Withdrawing Rs. 100

Withdrawing Rs. 100

Withdraw incomplete.No sufficient balance

Withdraw incomplete.No sufficient balance

============================

Account balance : 0

============================

============================

Account balance : 0

============================

Account Holder 1

Account Holder 1

--------------

--------------

Depositing Rs. 200

Depositing Rs. 200

Deposit successful

============================

Account balance : 200

============================

Deposit successful

============================

Account balance : 400

============================

Account Holder 1

------------

Withdrawing Rs. 100

Withdraw completed

============================

Account balance : 300

============================

Account Holder 1

------------

Withdrawing Rs. 100

Withdraw completed

============================

Account balance : 200

============================

Account Holder 1

--------------

Depositing Rs. 200

Deposit successful

============================

Account balance : 400

============================

Account Holder 1

------------

Withdrawing Rs. 100

Withdraw completed

============================

Account balance : 300

============================

Account Holder 1

--------------

Depositing Rs. 200

Deposit successful

============================

Account balance : 500

============================

Account Holder 2

------------

Withdrawing Rs. 100

Withdraw completed

============================

Account balance : 400

============================

Account Holder 2

--------------

Depositing Rs. 200

Deposit successful

============================

Account balance : 600

============================

Final balance: Rs.600

Account Holder 2

--------------

Depositing Rs. 200

Deposit successful

============================

Account balance : 800

============================

Final balance: Rs.800

**Without using synchronized keyword:**

**OUTPUT:**

Account Holder 1

Account Holder 1

------------

------------

Withdrawing Rs. 100

Withdrawing Rs. 100

Withdraw incomplete.No sufficient balance

============================

Account balance : 0

============================

Withdraw incomplete.No sufficient balance

============================

Account balance : 0

============================

Account Holder 1

Account Holder 1

--------------

--------------

Depositing Rs. 200

Depositing Rs. 200

Deposit successful

============================

Account balance : 200

============================

Account Holder 1

------------

Withdrawing Rs. 100

Withdraw completed

============================

Account balance : 100

============================

Deposit successful

============================

Account balance : 300

============================

Account Holder 2

------------

Withdrawing Rs. 100

Withdraw completed

============================

Account balance : 200

============================

Account Holder 2

--------------

Depositing Rs. 200

Account Holder 2

--------------

Depositing Rs. 200

Deposit successful

============================

Account balance : 400

============================

Account Holder 1

------------

Withdrawing Rs. 100

Withdraw completed

============================

Account balance : 300

============================

Deposit successful

============================

Account balance : 500

============================

Account Holder 2

------------

Withdrawing Rs. 100

Withdraw completed

============================

Account balance : 400

============================

Account Holder 2

--------------

Depositing Rs. 200

Account Holder 2

--------------

Depositing Rs. 200

Deposit successful

============================

Account balance : 600

============================

Final balance: Rs.600

Deposit successful

============================

Account balance : 800

============================

Final balance: Rs.800