# Technical interview

Welcome to the E\*TRADE Bank technical test. Aspects we want to cover in this test:

1. Writing a piece of Java software with associated unit tests.
2. Read a multi-tasking piece of code
3. Draw a database design and create a few queries based on it
4. Read a piece of shell code and see what it does

# Assignment 1: a program in Java with unit tests

Write a Java program that does the following: given an array of numbers, find the highest number in the array and print it to System.out.

Example of the array: int[] numbers = new int[]{5, 4, 14, 7, 2, 18, 11}

Also, please write a unit test that tests your Java program.

GK -> Program attached with junit test cases

# Assignment 2: Multi-threading

1. What is wrong with this code?

GK-> It’s lacking thread synchronization. Threads do check the balance but they sleep inside the if condition. If 2 threads enter the if condition they will deduct the balance.

1. How do you prevent the account from being overdrawn?

GK -> add synchronized block in makeWithdrawal() function. I am assuming sleep(500) simulates some code which also needs to be synchronized. If not move synchronized block further below just above makeWithdrawal() function call and check the balance before calling makeWithdrawal().. Please see the attached code.

public class MoneyWithdrawal implements Runnable {

private Account acct = new Account();  
 public static void main(String [] args) {  
 MoneyWithdrawal moneyWithdrawal = new MoneyWithdrawal();

Thread one = new Thread(moneyWithdrawal);  
 Thread two = new Thread(moneyWithdrawal);  
 one.setName("Tom");  
 two.setName("Hanks");  
 one.start();  
 two.start();

}

public void run() {

for(int x=0;x<5;x++) {  
 makeWithdrawal(10);  
 System.out.println("Account Balance: " + acct.getBalance()); }  
 }

private void makeWithdrawal(int amt) {  
 if (acct.getBalance() >= amt) {  
 System.out.println(Thread.currentThread().getName() + " is going to withdraw");  
 try {  
 Thread.sleep(500);  
 }  
 catch(InterruptedException exp) {  
 System.out.println(exp.getMessage());  
 }

acct.withdraw(amt);  
 System.out.println(Thread.currentThread().getName() + " complete with withdrawal");  
 }  
 }  
}

class Account {  
 private int balance = 50;

public int getBalance() {  
 return balance;  
 }

public void withdraw(int amount) {  
 balance = balance - amount;  
 }  
}

# Assignment 3: database design

### Create design

Could you please make a design of database structure for simple banking application (tables, relationships etc)

1. The bank offers several products - checking, saving, IRA accounts.

2.  The client may have multiple accounts opened.

3. Accounts can be joint (shared between two or more individuals)

GK – Please see the attached screen shot of table diagram.

### Write some queries

Write some simple queries to show all the client accounts, show the account with maximum amount, show the total amount on all accounts.

Query to show all the client accounts

Select Cust\_name, Acct\_Type\_Desc, Account\_Id, Balance

From Customer\_Account a, Account b, Customer c, Account\_Type d

Where a.Account\_id = b.Account\_id and a.cust\_id = c.cust\_id and b.Acct\_Type\_code = d.Acct\_Type\_code

Account with maximum amount

Select Account\_id from Account where balance = (select max(balance) from Account)

Total amount on all accounts

Select sum(balance) from Account

### Other questions

How would you create the layer for interaction with database, which technologies you would use and why?

GK -> There are various options available like SpringJDBC, Hibernate, SpringData JPA. I would use Hibernate as it’s flexible, removes lot of boiler plate code, has cache support, can work with any database by changing simple xml configuration, has easy integration with Spring

Which frameworks/technologies would you use if you're asked to develop simple banking web application similar to this one, how you would use them and why you selected these particular technologies/frameworks as opposed to other existing ones?

GK-> I would use Spring MVC, Hibernate and Jsp or Angular.js in front end, any relational DB. Development in this area is really fast, active community support. In spring it’s easy to leverage Transaction Mgmt support, security, webservice support for external applications.

### Assignment 4: read a piece of shell code

Please explain what the following code does.

#!/bin/ksh

#$Id: copy\_archive\_to\_reports\_archive.sh,v 1.7 2005/04/12 13:05:18 dschutzn Exp $

# need to move spool, logs to archive

. $ET\_SANCHEZ\_PROFILE\_ROOT/scripts/automation/bin/common.include

GK – This will source common.include file

GK – Check $ET\_ENVIRONMENT environment variable. If it’s not “prd” print the statements and exit from the script

if [[ $ET\_ENVIRONMENT != "prd" ]];then

echo "This script is only designed for production"

echo "It will exit cleanly so as to not mess up"

echo "controlm on test boxes"

exit 0

fi

GK – set REPORTSDIR to specified value

REPORTSDIR="/etrade/prd/sca/dbs/support/backarea/prd\_archive"

GK – I know head command.. not sure what header is

header

GK – Execute ssh command followed by various commands, then change dir to REPORTSDIR declared above, then find \*.aud files and gzip them and quit

etcmd ssh sca@scasupport1w8m3.etrade.com <<-ENDSFTP

prd

sca

dbs

support

cd ${REPORTSDIR}

find \*/\*.aud -mtime +31 -exec gzip {} \;

quit

ENDSFTP

GK – Check ERR code of previous command. If 0 then print first message else print second at the same time spit the output to $LOG

ERR=$?

case $ERR in

0) echo "\*.aud Files are zipped correctly"|tee -a $LOG ;;

\*) echo "Problems occured, investigate"|tee -a $LOG ;;

esac