CISC 327 Course Project

Assignment #5

Back end: unit testing

1. **White box test for account creation transactions**
   - Code section
   - Test cases
   - List of actual test inputs
2. **White box test for withdraw transactions**
   - Code section
   - Test cases
   - List of actual test inputs
3. **Test Results and findings**

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White box test for account creation transactions

- **Code section**

TEST CASE CT1 LINES 130-203

```
130     @SuppressWarnings("resource")
131     public void mergeSummaryFile(String startFileName) throws Exception{
132
133         try{
134             File dir = new File(".");
135             File [] summaryPathList = dir.listFiles(new FilenameFilter() {
136                 @Override
137                 public boolean accept(File dir, String name) {
138                     return name.startsWith(startFileName);
139                 }
140             });
141
142             for(File summaryPath: summaryPathList) {
143                 BufferedReader br = new BufferedReader(new InputStreamReader(new FileInputStream(summaryPath)));
144                 //data will be each line of a summary transaction file
145                 String data = null;
146                 data = br.readLine();
147                 String dataList[] = new String[5];
148
149                 String command = null;
150
151                 int number = 0;
152
153                 int balance = 0;
154
155                 int number2 = 0;
156
157                 String name = null;
158
159                 while(data != null){
160                     // DataList will split each line of command into different part, CCC AAAA MMM BBBB NNNN
161                     dataList = data.split(" ");
162                     command = dataList[0];
163                     number = Integer.parseInt(dataList[1]);
164                     balance = Integer.parseInt(dataList[2]);
165                     number2 = Integer.parseInt(dataList[3]);
166                     name = dataList[4];
167
168                     if (this.accountName.containsKey(number)) {
169
170                         if (this.accountBalance.get(number) < 0) {
171                             throw new Exception("Illegal Balance!");
172                         }
173
174                     }
175
176                     if (this.accountName.containsKey(number2)) {
177
178                         if (this.accountBalance.get(number2) < 0) {
179                             throw new Exception("Illegal Balance!");
180                         }
181                     }
182
183                     if (command.equalsIgnoreCase("DEP")){
184
185                         balance += this.accountBalance.get(number).intValue();
186                         this.accountBalance.put(number,balance);
187                     }
188
```

```
189                 else if (command.equalsIgnoreCase("WDR")){
190                     int curMoney = this.accountBalance.get(number).intValue();
191                     if (curMoney < balance) {
192                         throw new Exception("Illegal Balance!");
193                     }
194                     balance = curMoney - balance;
195                     this.accountBalance.put(number,balance);
196 
197                 }
198 
199                 else if (command.equalsIgnoreCase("NEW")){
200 
201                     if(this.accountName.containsKey(number)) {
202                         throw new Exception("Illegal new account! Account is being used!");
203                     }
204 
205                     this.accountBalance.put(number,balance);
206                     this.accountName.put(number,name);
207                 }
208 
209                 else if (command.equalsIgnoreCase("DEL")){
210 
211                     if (this.accountBalance.get(number) != 0) {
212                         throw new Exception("Illegal Balance for delete account!");
213                     }
214 
215                     if (!(name.equalsIgnoreCase(this.accountName.get(number)))) {
216                         throw new Exception("Illegal delete account! Account name is not matched!");
217                     }
218 
219 
220                     this.accountBalance.remove(number);
221                     this.accountName.remove(number);
222                 }
223 
224                 else if (command.equalsIgnoreCase("XFR")){
225 
226 
227                     int pre = this.accountBalance.get(number2);
228 
229                     if(pre < balance) {
230                         throw new Exception("Illegal Balance for transfer!");
231                     }
232 
233                     this.accountBalance.put(number2,pre - balance);
234 
235                     pre = this.accountBalance.get(number);
236                     this.accountBalance.put(number,pre + balance);
237 
238 
239                 }
240 
241                 data = br.readLine();
242             }
243             br.close();
244             summaryPath.delete();
245 
246         }
247     }catch(IOException e){
248         throw new IOException("Illegal IO summary transaction file!");
249     }
250 
251 }
```

TEST CASE CT2 LINES 205-207

TEST CASE CT3 LINES 209-251

- Test cases

The table below shows the test cases we designed based on the code section to cover the white box statement testing for creation transaction.

The method *mergeSummaryFile(String startFileName)* is the code section that we need to test use white box testing. It reads and merges all summary transaction file, and also checks every transaction. Other functions in the back office class such as *readMasterFile()* and *writeMasterFile(String accountFile)* methods will also involve while running the back office.

The listing of actual test inputs (transactions from the Merged Transaction Summary File) to cover each test case will also be attached below.

Transaction			Account creation transactions	
White box method			Statement	
Statement (lines)	**Test Case No.**	**Test case description**	**Input files**	**Output files**
130-203	CT1	When an account number is created more than once in one session, the program should throw an exception and stop because of this error.	Merged transaction summary file (createAccount_testfile1) Master Account File	None
205-207	CT2	The create transaction is successfully recorded without any crash. The new account is set with name, number and balance correctly.	Merged transaction summary file (createAccount_testfile2) Master Account File	New Master Account File with the new account New Valid Account List File with the new account
209-251	CT3	The master account file is read successfully, but the transaction summary file does not exist	Transaction summary file does not exist Master Account File	None

- List of actual test inputs

Test Case No CT1:

File Name: createAccount_testfile1:
NEW 1234567 000 0000000 valid123
EOS 0000000 000 0000000 ***

File Name: MasterFile:
8765432 0 jing
7654321 5000 Jax
1234567 931000 Jack
1000000 0 wang

Test Case No CT2:

File Name: createAccount_testfile2:
NEW 1111111 000 0000000 valid123
EOS 0000000 000 0000000 ***

File Name: MasterFile:
8765432 0 jing
7654321 5000 Jax
1234567 931000 Jack
1000000 0 wang

Test Case No CT3:

None exist transaction summary file

File Name: MasterFile:
8765432 0 jing
7654321 5000 Jax
1234567 931000 Jack
1000000 0 wang

White box test for withdraw transactions

- Code section

TEST CASE WT1 BLOCK 131-251

```
130     @SuppressWarnings("resource")
131     public void mergeSummaryFile(String startFileName) throws Exception{
132
133         try{
134             File dir = new File(".");
135             File [] summaryPathList = dir.listFiles(new FilenameFilter() {
136                 @Override
137                 public boolean accept(File dir, String name) {
138                     return name.startsWith(startFileName);
139                 }
140             });
141
142             for(File summaryPath: summaryPathList) {
143                 BufferedReader br = new BufferedReader(new InputStreamReader(new FileInputStream(summaryPath)));
144                 //data will be each line of a summary transaction file
145                 String data = null;
146                 data = br.readLine();
147                 String dataList[] = new String[5];
148
149                 String command = null;
150
151                 int number = 0;
152
153                 int balance = 0;
154
155                 int number2 = 0;
156
157                 String name = null;
158
159                 while(data != null){
160                     // DataList will split each line of command into different part, CCC AAAA MMMM BBBB NNNN
161                     dataList = data.split(" ");
162                     command = dataList[0];
163                     number = Integer.parseInt(dataList[1]);
164                     balance = Integer.parseInt(dataList[2]);
165                     number2 = Integer.parseInt(dataList[3]);
166                     name = dataList[4];
167
168                     if (this.accountName.containsKey(number)) {
169
170                         if (this.accountBalance.get(number) < 0) {
171                             throw new Exception("Illegal Balance!");
172                         }
173
174                     }
175
176                     if (this.accountName.containsKey(number2)) {
177
178                         if (this.accountBalance.get(number2) < 0) {
179                             throw new Exception("Illegal Balance!");
180                         }
181                     }
182
183                     if (command.equalsIgnoreCase("DEP")){
184
185                         balance += this.accountBalance.get(number).intValue();
186                         this.accountBalance.put(number,balance);
187                     }
188
```

TEST CASE WT2 BLOCK 189-197

```
189                 else if (command.equalsIgnoreCase("WDR")){
190                     int curMoney = this.accountBalance.get(number).intValue();
191                     if (curMoney < balance) {
192                         throw new Exception("Illegal Balance!");
193                     }
194                     balance = curMoney - balance;
195                     this.accountBalance.put(number,balance);
196 
197                 }
198 
199                 else if (command.equalsIgnoreCase("NEW")){
200 
201                     if(this.accountName.containsKey(number)) {
202                         throw new Exception("Illegal new account! Account is being used!");
203                     }
204 
205                     this.accountBalance.put(number,balance);
206                     this.accountName.put(number,name);
207                 }
208 
209                 else if (command.equalsIgnoreCase("DEL")){
210 
211                     if (this.accountBalance.get(number) != 0) {
212                         throw new Exception("Illegal Balance for delete account!");
213                     }
214 
215                     if (!(name.equalsIgnoreCase(this.accountName.get(number)))) {
216                         throw new Exception("Illegal delete account! Account name is not matched!");
217                     }
218 
219 
220                     this.accountBalance.remove(number);
221                     this.accountName.remove(number);
222                 }
223 
224                 else if (command.equalsIgnoreCase("XFR")){
225 
226 
227                     int pre = this.accountBalance.get(number2);
228 
229                     if(pre < balance) {
230                         throw new Exception("Illegal Balance for transfer!");
231                     }
232 
233                     this.accountBalance.put(number2,pre - balance);
234 
235                     pre = this.accountBalance.get(number);
236                     this.accountBalance.put(number,pre + balance);
237 
238 
239                 }
240 
241                 data = br.readLine();
242             }
243             br.close();
244             summaryPath.delete();
245 
246         }
247     }catch(IOException e){
248         throw new IOException("Illegal IO summary transaction file!");
249     }
250 
251 }
```

TEST CASE WT3 BLOCK 191-193

- Test cases

The table below shows the test cases we designed based on the code section to cover the white box statement testing for creation transaction.

The method *mergeSummaryFile(String startFileName)* is the code section that we need to test use white box testing. It reads and merges all summary transaction file, and also checks every transaction. Other functions in the back office class such as *readMasterFile()* and *writeMasterFile(String accountFile)* methods will also involve while running the back office.

The listing of actual test inputs (transactions from the Merged Transaction Summary File) to cover each test case will also be attached below.

Transaction			Withdraw transactions	
White box method			Block	
Block (lines)	**Test Case No.**	**Test case description**	**Input files**	**Output files**
131-251	WT1	The master account file is read successfully, but the transaction summary file does not exist	Merged transaction summary file (withdraw_testfile1) Master Account File	None
189-197	WT2	The withdraw transaction is successfully recorded without any crash. The new account balance is set.	Merged transaction summary file (withdraw_testfile2) Master Account File	New Master Account File with the update balance New Valid Account List File
191-193	WT3	When the users withdraw more than they have, the program will recognize the negative balance and stop with an exception because of this error	Transaction summary file does not exist Master Account File	None

- List of actual test inputs

Test Case No WT1:

File Name: withdraw_testfile1:
WDR 1234567 1000 0000000 Jack
EOS 0000000 000 0000000 ***

File Name: MasterFile:
8765432 0 jing
7654321 5000 Jax
1234567 931000 Jack
1000000 0 wang

Test Case No WT2:

File Name: withdraw_testfile2:
WDR 7654321 10000 0000000 Jax
EOS 0000000 000 0000000 ***

File Name: MasterFile:
8765432 0 jing
7654321 5000 Jax
1234567 931000 Jack
1000000 0 wang

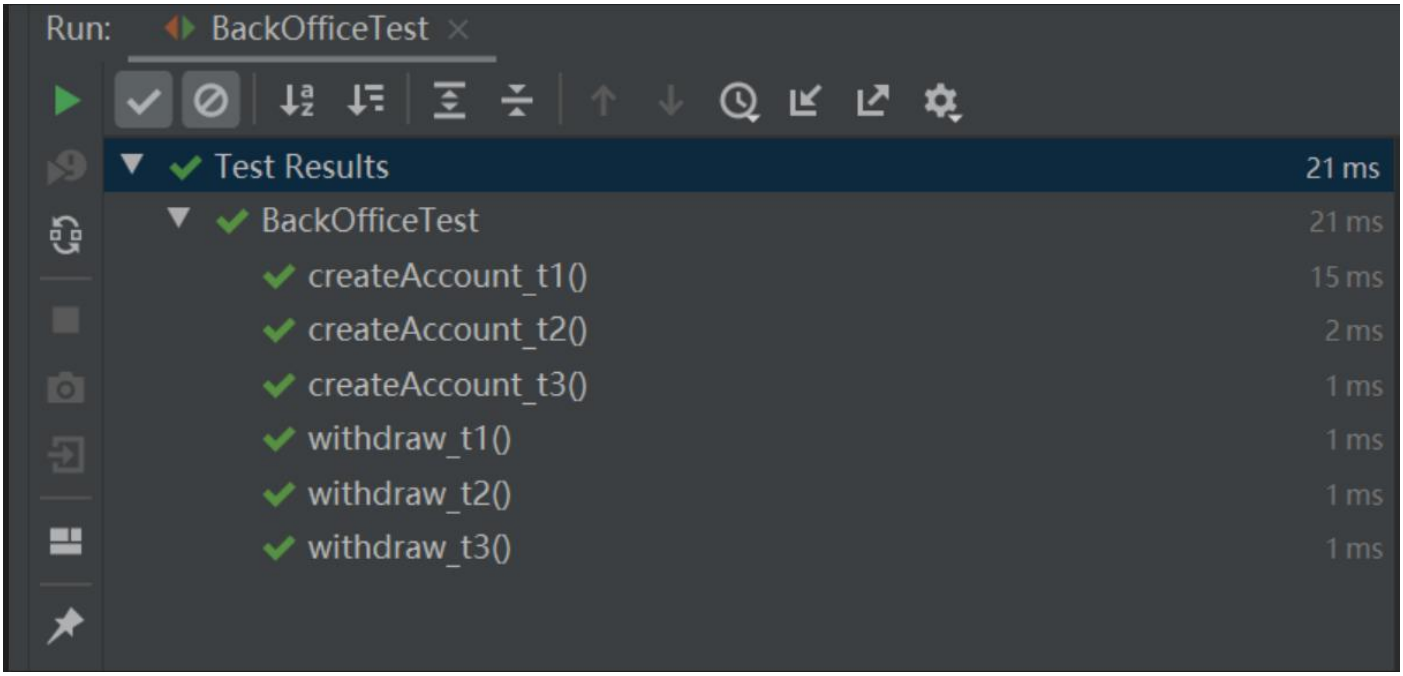
Test Case No WT3:

None exist transaction summary file

File Name: MasterFile:
8765432 0 jing
7654321 5000 Jax
1234567 931000 Jack
1000000 0 wang

- Test Results and findings

When we first test our cases, we find that the catch exception in the *mergeSummaryFile(String startFileName)* method does not catch the exception, thus the test case CT3 and the WT3 failed. After we solve the problem by changing the way of the exception, all of our test cases passed. Moreover, by comparing the master account file with the constraints, we realized that all information stored in that file should be descending order by account number instead of increasing order, we fixed this problem.



Console output

```
create account test case 1
Illegal new account! Account is being used!

create account test case 2
valid123
0

create account test case 3
Illegal IO summary transaction file!

withdraw test case 1
Illegal IO summary transaction file!

withdraw test case 2
930000

withdraw test case 3
Illegal Balance!

Process finished with exit code 0
```

Contribution

Yudong Zhou: program code and list all functionalities (20 hrs)

Yitong Liu: analysis and write the code of test cases (20 hrs)

Runze Yi: communication and work the code, check the code (20 hrs)

Tong Bu: Report writer and check report with others and also list white box test method (20 hrs)