UNIVERSITY OF LIVERPOOL
COMPUTER SCIENCE AND ELECTRONIC ENGINEERING

Coursework1

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Course: *Software Engineering I (Comp201)* – Professor: *Dr. T. Carroll*
Due date: *12 noon, Friday 8th November 2019*

Question 1

Produce UML Use-Case Diagrams and Use-Case descriptions for the described system. You shall consider only human actors for this task. You can split your answer into multiple diagrams, if needed.

Answer. The use case diagram for the saving account is as follows (Figure 3).

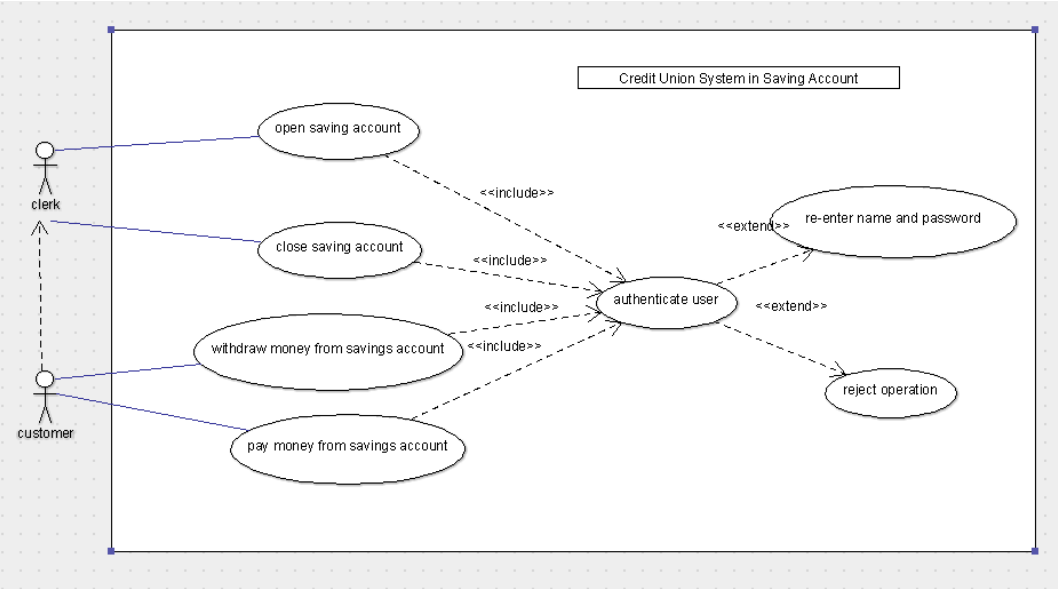

Figure 1: Use case diagram for saving account

The use case diagram for the loan account is as follows (Figure 2).

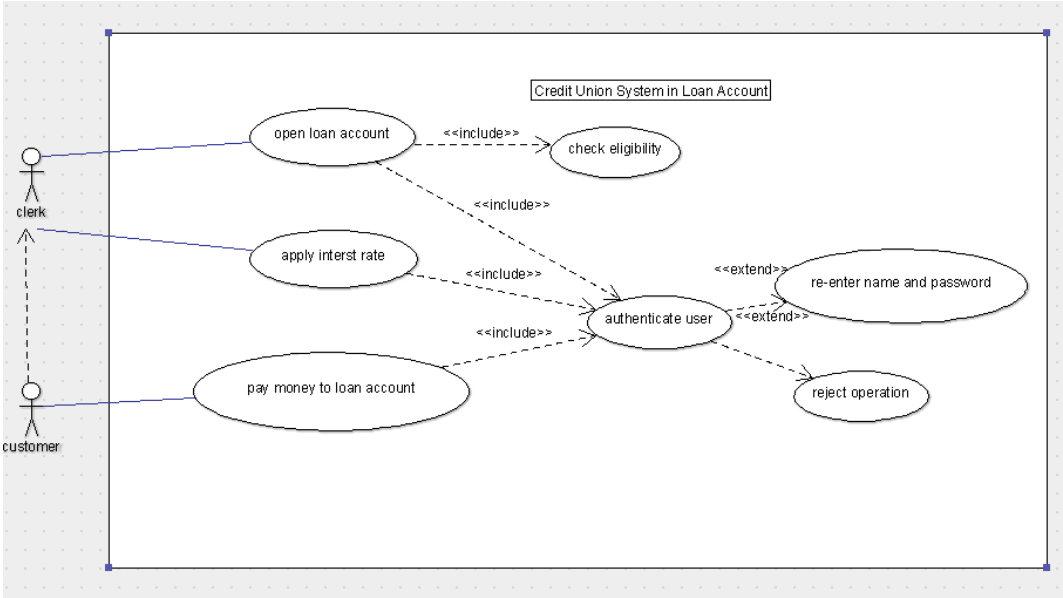

Figure 2: Use case diagram for loan account

The use case description for the first diagram is as follows.

ID	UC1
Name	Open Saving Account
Description	The customer open the saving account in credit union
Pre-condition	Credit Union in service
Event flow	1. Include Use case " Authenticate user" 2. Set the username for saving account 3. Set the password for saving account 4. Set the initial deposit value 5. If initially deposited, pay the cash to the clerk 6. Choose receipt option 7. Finish
Extension points	not the residents of a particular community, or members of a particular profession
Triggers	customer choose "open saving account"
Post-condition	The saving account is set up

Table 1: Use case 1 description for diagram 1

ID	UC2
Name	Close Saving Account
Description	close a saving account, giving the customer their balance in cash
Pre-condition	Credit Union in serviceThe customer has a saving account
Event flow	1. Include Use case " Authenticate user" 2. Close the account 3. Give customer cash and receipt 4. Finish
Extension points	customer happens to changes mind
Triggers	customer choose "close saving account"
Post-condition	The saving account is closed

Table 2: Use case 2 description for diagram 1

ID	UC3
Name	Withdraw money from saving account
Description	Customer withdraw money from saving account
Pre-condition	Credit Union in service The customer has a saving account The customer has positive balance
Event flow	1. Include Use case " Authenticate user" 2. Input the withdraw amount 3. Check if new balance larger than 0 4. Update balance 5. Finish
Extension points	The new balance is minus
Triggers	customer choose "withdraw money from saving account"
Post-condition	The current balance is updated

Table 3: Use case 3 description for diagram 1

ID	UC4
Name	Pay money to saving account
Description	Customer pay money to saving account
Pre-condition	Credit Union in service The customer has a saving account
Event flow	1. Include Use case " Authenticate user" 2. Input the pay amount 3. Update balance 4. Finish
Extension points	The customer abort transaction
Triggers	customer choose "pay money from saving account"
Post-condition	The current balance is added with new amount

Table 4: Use case 4 description for diagram 1

ID	UC5
Name	Authenticate user
Description	Authenticate whether a user is a valid user
Pre-condition	Credit Union in service
Event flow	1. Input user name 2. Input user password 3. Check if the password match 4. If so, authenticated 5. else re-enter name and password
Extension points	re-enter name and password reject operation
Triggers	The user start any operations
Post-condition	The user is authenticated

Table 5: Use case 5 description for diagram 1

ID	UC6
Name	re-enter name and password
Description	Let customers re-enter name and password
Pre-condition	Credit Union in service Customer input wrong name and password
Event flow	1. Input user name 2. Input user password 3. Check if the password match 4. If so, authenticated 5. else re-enter name and password
Extension points	System failure
Triggers	The user input unmatched password
Post-condition	Back to username and password page

Table 6: Use case 6 description for diagram 1

ID	UC7
Name	Reject operation
Description	Reject the user operation
Pre-condition	Credit Union in service The user input wrong password too many
Event flow	1. check if the threshold of wrong is met 2. if so abort system 3. else go to re-enter name and password 4. increase the numOfEnter by 1
Extension points	System failure
Triggers	The user input more than threshold passwords
Post-condition	Abort system

Table 7: Use case 7 description for diagram 1

The use case description for the first diagram is as follows.

ID	UC1
Name	Open loan account
Description	Open a loan on behalf of a customer
Pre-condition	Credit Union in service
Event flow	1. Include Authenticate user 2. Include Check eligibility 3. Input the user name 4. Input user password 5. Loan account set
Extension points	System failure
Triggers	The customer choose "open loan account"
Post-condition	Clerks give the customer the cash.

Table 8: Use case 1 description for diagram 2

ID	UC2
Name	Apply interest rate
Description	Apply a weekly interest rate of 0.01% on all outstanding loan balances in the credit union.
Pre-condition	Credit Union in service
Event flow	1. Include Authenticate user 2. Get the loan balance for each loan account 3. Calculate (0.01%+1)*balance as new balance 4. Finish
Extension points	System abort
Triggers	The clerk choose to apply weekly interest rate
Post-condition	The loan balance is updated

Table 9: Use case 2 description in diagram 2

ID	UC3
Name	Pay money to loan account
Description	Pay money towards the outstanding balance on their loan account
Pre-condition	Credit Union in service
Event flow	1. Include Authenticate user 2. Input the amount 3. Input transaction PIN 4. Take receipt 5. Finish
Extension points	System abort
Triggers	Customer choose to pay to loan
Post-condition	The loan balance is updated

Table 10: Use case 3 description for diagram 2

ID	UC4
Name	Check eligibility for loan
Description	The clerk check the eligibility of the loan account
Pre-condition	Credit Union in service Amount is no more than £5000 Amount no more than5% of total capital held by the credit union Credit union has enough capital to loan themoney.
Event flow	1. Include Authenticate user 2. Check if the amount is more than £5000, if so abort 3. Check if the amount is more than 5% of total capital held by the credit union, if so abort 4. Check if the credit union has enough capital to loan the money if so, pass. 5. Eligibility pass
Extension points	System abort
Triggers	The clerk choose to check eligibility for loan
Post-condition	The eligibility is checked

Table 11: Use case 4 description for diagram 2

Question 2

Identify 5 functional requirements of the described system.

Answer.

(*a*) All users will access the system using a user id and a password

(*b*) The customer can start a loan account and loan money from credit union if met criteria

(*c*) The customer can put money into saving and loan account in the credit union.

(*d*) The clerk can close a saving account

(*e*) The clerk can check whether a customer met the criteria for a loan account

(*f*) The clerk can apply a weekly interest rate of 0.01 % on all outstanding loan balances in the credit union.

Question 3

Identify 5 non-functional requirements of the described system, using the description of the scenario. You shall propose a mechanism and criteria that make these non-functional requirements verifiable, i.e. Describe a technique that can objectively test them.

Answer.

(*a*) The system shall conform with the Data Protection Act in UK, which can be verified through whether the information which in the system can be accessed from outside system.

(*b*) The system should be programmed in Java programming language (Organisaional requirements) and this requirment can be identified through verification whether the suffix of the file name is ".java"

(*c*) The currency in the transaction should be specified as pound, which can be verified through the currency symbol

(*d*) The system should be run on a single laptop computer, which can be verified whether there are concurrency management techniques used.

(*e*) The loan account should have balance less than zero and the savings account should have balance larger than zero, and this can be verified through the if else statements and try catch exceptions.

Question 5

Create a UML Sequence Diagram for the application and opening of a Loan. Use your knowledge of the system obtained over this assignment to correctly identify the objects you must consider.

Answer. The UML sequence diagram is as follows.

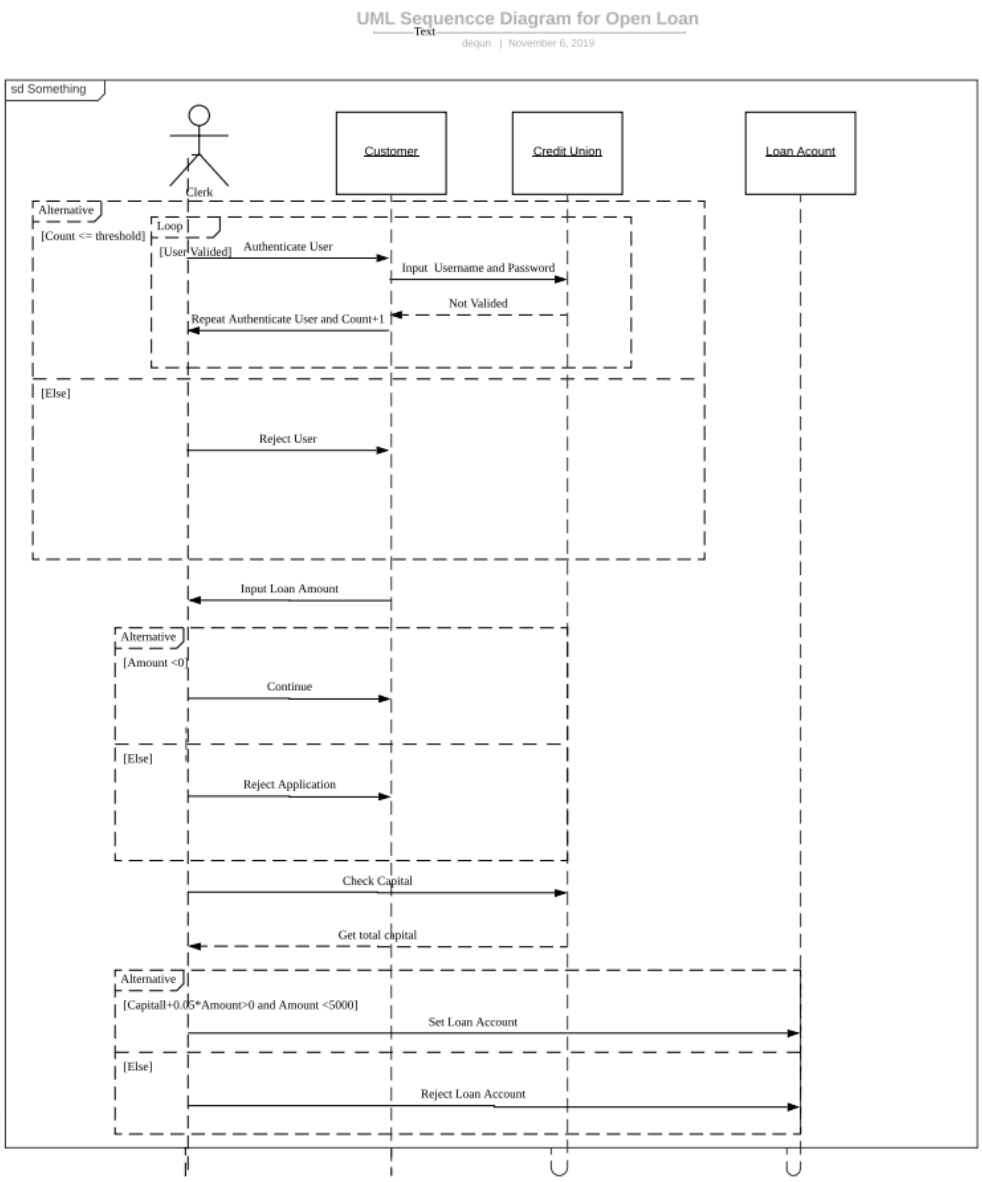

Figure 3: The UML sequence diagram