

# **PB007: Banking system**

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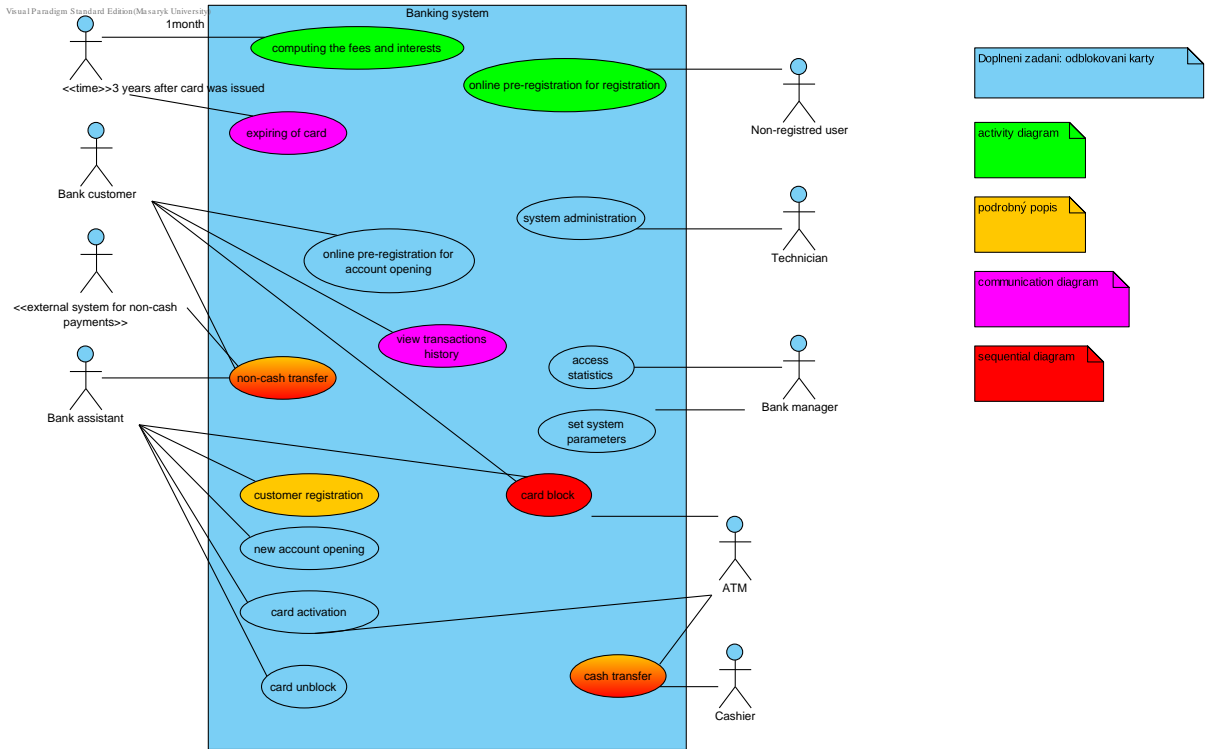
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Use Case Diagram

# Use Case Diagram



## Summary

Name	Documentation
<<time>>	
Bank assistant	
Bank customer	
<<external system for non-cash payments>>	
ATM	
Cashier	
Non-registered user	
Technician	
Bank manager	
N/A	sequential diagram
N/A	communication diagram
N/A	podrobný popis
N/A	activity diagram
card unblock	
system administration	

 N/A	Doplňeni zadání: odblokování karty
 cash transfer	
 view transactions history	
 set system parameters	
 access statistics	
 expiring of card	
 computing the fees and interests	
 card activation	
 new account opening	
 customer registration	
 card block	
 non-cash transfer	
 online pre-registration for account opening	
 online pre-registration for registration	
 Banking system	

## Documentation

### Functional Requirements (F)

1. Bank customer
  - 1.1. Online pre-registration for account opening
  - 1.2. Money transfer
    - 1.2.1. Authorization
      - The authorization code can be entered at most three times (each time within 5 minutes from its delivery). If the code is entered three times unsuccessfully (wrong code or entered late), the whole transaction is canceled and the reserved money (for the transaction) is unblocked.
  - 1.3. See transactions history
  - 1.4. Card block
2. Bank manager
  - 2.1. Statistics (including future predictions)
  - 2.2. Set system parameters
    - 2.2.1. interest rates of savings accounts
    - 2.2.2. fees
3. Bank assistant
  - 3.1. Customer registration
  - 3.2. New account opening
    - 3.2.1. Checking account or savings account
    - 3.2.2. CZK or EUR
  - 3.3. Money transfer
  - 3.4. Card activation
  - 3.5. Card block
  - 3.6. Card unblock
4. Cashier
  - 4.1. Money deposit
  - 4.2. Money withdrawal

- 5. External system for non-cash payments
  - 5.1. Non-cash payment notification
- 6. Time
  - 6.1. Computing the fees and interests
    - The computation is based on the priority of the customer, which is derived from how long the customer has been with the bank, and what has been the balance on his/her accounts in the past year.
  - 6.2. Discarding of card
- 7. ATM
  - 7.1. Card activation
  - 7.2. Money withdrawal
  - 7.3. Card block
- 8. Technician
  - 8.1. system maintenance
  - 8.2. change the access rights of other users
- 9. Non-registered user
  - 9.1. Online pre-registration for registration

#### Non-functional Requirements (N)

- 1. Java platform
- 2. reliability
  - 2.1. backup of all actions (1 year)
  - 2.2. backup of all transactions (10 years)
  - 2.3. accessibility of online banking system 24/7 (99.5% a year)
  - 2.4. accessibility of ATMs 24/7 (98% a year)
- 3. performance of the online banking system (scalable)
- 4. security
  - 4.1. authorization via SMS
  - 4.2. use HTTPS for online banking

## Details

---

 <<time>>

 Bank assistant

 Bank customer

 <<external system for non-cash payments>>

 ATM

 Cashier

 Non-registered user

 **Technician**

 **Bank manager**

 **N/A**

 **N/A**

 **N/A**

 **N/A**

 **card unblock**

### Use Case Descriptions

Use Case ID	14
Brief Description	UC14 unblocks a blocked card
Primary Actors	Bank assistant
Secondary Actors	-
Preconditions	
Main Flow of Events	
Alternative Flows	
Post-conditions	

 **system administration**

### Use Case Descriptions

Use Case ID	6
Brief Description	UC6 enables to update system version, change access rights and view system logs
Primary Actors	Technician
Secondary Actors	-
Preconditions	
Main Flow of Events	
Alternative Flows	
Post-conditions	

 **N/A**

 **cash transfer**

### Use Case Descriptions

<b>Use Case ID</b>	14
<b>Brief Description</b>	UC14 enables to withdraw or deposit cash
<b>Primary Actors</b>	Cashier, ATM
<b>Secondary Actors</b>	bank customer
<b>Preconditions</b>	-
<b>Main Flow of Events</b>	<ol style="list-style-type: none"> <li>1. UC begins when cashier or ATM requests new cash transfer.</li> <li>2. IF (actor is ATM): <ol style="list-style-type: none"> <li>2.1. Actor inputs authentication details (card number and PIN)</li> <li>2.2. IF (authentication details are not valid): <ol style="list-style-type: none"> <li>2.2.1. System dismisses the transfer.</li> </ol> </li> </ol> </li> <li>3. IF (actor is cashier): <ol style="list-style-type: none"> <li>3.1. System shows form for bank customer verification.</li> <li>3.2. Actor verifies bank customer by card number and personal ID.</li> <li>3.3. System shows form for cash transfer.</li> </ol> </li> <li>4. Actor inputs cash transfer details (amount, which can be both positive (money deposit) or negative (money withdrawal)).</li> <li>5. Actor chooses optional printing of receipt.</li> <li>6. IF (required amount can not be allocated or is not present in cash): <ol style="list-style-type: none"> <li>6.1. Dismiss the transfer.</li> </ol> </li> <li>7. System updates customer's account balance.</li> </ol>
<b>Alternative Flows</b>	
<b>Post-conditions</b>	Customer's account balance is updated.

## view transactions history

### Use Case Descriptions

<b>Use Case ID</b>	4
<b>Brief Description</b>	UC4 Show history of transactions of the given bank customer
<b>Primary Actors</b>	Bank customer
<b>Secondary Actors</b>	-
<b>Preconditions</b>	
<b>Main Flow of Events</b>	
<b>Alternative Flows</b>	
<b>Post-conditions</b>	

## set system parameters

### Use Case Descriptions

<b>Use Case ID</b>	9
<b>Brief Description</b>	UC9 enables to set various parameters of the system



<b>Primary Actors</b>	Bank manager
<b>Secondary Actors</b>	-
<b>Preconditions</b>	
<b>Main Flow of Events</b>	
<b>Alternative Flows</b>	
<b>Post-conditions</b>	

## access statistics

### Use Case Descriptions

<b>Use Case ID</b>	8
<b>Brief Description</b>	UC8 enables to access statistics of the system for better overview of the system
<b>Primary Actors</b>	Bank manager
<b>Secondary Actors</b>	-
<b>Preconditions</b>	
<b>Main Flow of Events</b>	
<b>Alternative Flows</b>	
<b>Post-conditions</b>	

## expiring of card

### Use Case Descriptions

Main	
<b>Use Case ID</b>	5
<b>Brief Description</b>	UC5 disables card after expiration date
<b>Primary Actors</b>	<<time>>
<b>Secondary Actors</b>	-
<b>Preconditions</b>	
<b>Main Flow of Events</b>	
<b>Alternative Flows</b>	
<b>Post-conditions</b>	

## computing the fees and interests

### Use Case Descriptions

Main	
<b>Use Case ID</b>	1
<b>Brief Description</b>	UC1 Computing the fees and interest rates
<b>Primary Actors</b>	<<time>>

Secondary Actors	-
Preconditions	
Main Flow of Events	
Alternative Flows	
Post-conditions	

## card activation

### Use Case Descriptions

Use Case ID	13
Brief Description	UC13 activates new card
Primary Actors	Bank assistant, ATM
Secondary Actors	-
Preconditions	
Main Flow of Events	
Alternative Flows	
Post-conditions	

## new account opening

### Use Case Descriptions

Use Case ID	12
Brief Description	UC12 opens new account
Primary Actors	Bank assistant
Secondary Actors	-
Preconditions	
Main Flow of Events	
Alternative Flows	
Post-conditions	

## customer registration

### Use Case Descriptions

Use Case ID	11
Brief Description	UC11 registers new bank customer
Primary Actors	Bank assistant
Secondary Actors	-
Preconditions	-

<b>Main Flow of Events</b>	<ol style="list-style-type: none"> <li>1. UC begins when bank assistant selects "Customer registration"</li> <li>2. System shows two options: "with pre-registration" and "without pre-registration"</li> <li>3. IF (bank assistant selects "with pre-registration"): <ol style="list-style-type: none"> <li>3.1 Bank assistant fills email address</li> <li>3.2 IF (pre-registration form with this email address does not exists): <ol style="list-style-type: none"> <li>3.2.1 Dismiss registration</li> </ol> </li> <li>3.3 Retrieve filled personal details from the form</li> </ol> </li> <li>4. ELSE: <ol style="list-style-type: none"> <li>4.1 Bank assistant fills contender's personal details</li> </ol> </li> <li>5. Bank assistant fills authentication details (ID, signature pattern)</li> <li>6. Create new customer account</li> </ol>
<b>Alternative Flows</b>	Interruptions of the process of customer registration because the person has already has an customer account or problem during providing details about the person.
<b>Post-conditions</b>	New customer account created.

## card block

### Use Case Descriptions

<b>Use Case ID</b>	10
<b>Brief Description</b>	UC10 blocks card and notifies customer about this event
<b>Primary Actors</b>	Bank customer, Bank assistant, ATM
<b>Secondary Actors</b>	Bank customer
<b>Preconditions</b>	
<b>Main Flow of Events</b>	
<b>Alternative Flows</b>	
<b>Post-conditions</b>	

## non-cash transfer

### Use Case Descriptions

<b>Use Case ID</b>	7
<b>Brief Description</b>	UC7 enables to execute non-cash transfer
<b>Primary Actors</b>	Bank customer, Bank assistant, <<external system for non-cash payments>>
<b>Secondary Actors</b>	-
<b>Preconditions</b>	-
<b>Main Flow of Events</b>	<ol style="list-style-type: none"> <li>1. UC begins when Bank customer or assistant selects "Non-cash payment" or external system requests non-cash payment.</li> <li>2. Actor inputs non-cash transfer details (amount, receiver's account number) <ol style="list-style-type: none"> <li>2. IF (actor is bank customer): <ol style="list-style-type: none"> <li>2.1. System shows prompt to input SMS verification code.</li> </ol> </li> </ol> </li> </ol>

	2.2. System sends SMS verification code and starts time countdown (5 minutes). 2.3. Bank customer inputs the code and clicks "Submit the transfer" button. 2.4. IF (the inputted code is not valid OR timeout expired): 2.4.1. Dismiss the transfer. 3. IF (actor is external system): 3.1. Actor inputs authentication details (card number and PIN) 3.2. IF (authentication details are not valid): 3.2.1. Dismiss the transfer. 4. IF (required amount can not be allocated): 4.1 Dismiss the transfer 5. System executes the transfer.
<b>Alternative Flows</b>	Bank customer may log out of the system anytime.
<b>Post-conditions</b>	Sender's and receiver's account balance is updated.

## online pre-registration for account opening

### Use Case Descriptions

<b>Use Case ID</b>	3
<b>Brief Description</b>	UC3 Enables to fill online pre-registration form for account opening
<b>Primary Actors</b>	Bank customer
<b>Secondary Actors</b>	-
<b>Preconditions</b>	
<b>Main Flow of Events</b>	
<b>Alternative Flows</b>	
<b>Post-conditions</b>	
















## online pre-registration for registration

### Use Case Descriptions

Main	
<b>Use Case ID</b>	2
<b>Brief Description</b>	UC2 Enables to fill online pre-registration form for registration
<b>Primary Actors</b>	Non-registered user
<b>Secondary Actors</b>	-
<b>Preconditions</b>	
<b>Main Flow of Events</b>	
<b>Alternative Flows</b>	
<b>Post-conditions</b>	

## Banking system

## Children

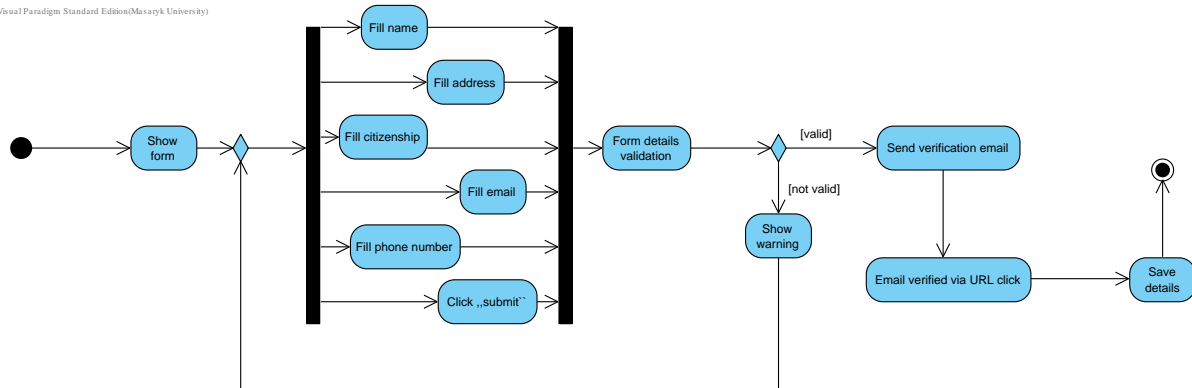
Name	Documentation
 online pre-registration for registration	
 online pre-registration for account opening	
 non-cash transfer	
 card block	
 customer registration	
 new account opening	
 card activation	
 computing the fees and interests	
 expiring of card	
 access statistics	
 set system parameters	
 view transactions history	
 cash transfer	
 system administration	
 card unblock	



## Activity Diagram

## Online pre-registration for registration

Visual Paradigm Standard Edition(Masaryk University)



## Summary

Name	Documentation
Show form	
Fill name	
Fill address	
Fill citizenship	
Fill email	
Fill phone number	
Click „submit“	
Form details validation	
Send verification email	
Email verified via URL click	
Save details	
Show warning	

## Details

● N/A

Show form

N/A

N/A

Fill name

Fill address

 **Fill citizenship**

 **Fill email**

 **Fill phone number**

 **Click „submit“**

 **N/A**

 **Form details validation**

 **N/A**

 **Send verification email**

 **Email verified via URL click**

 **Save details**

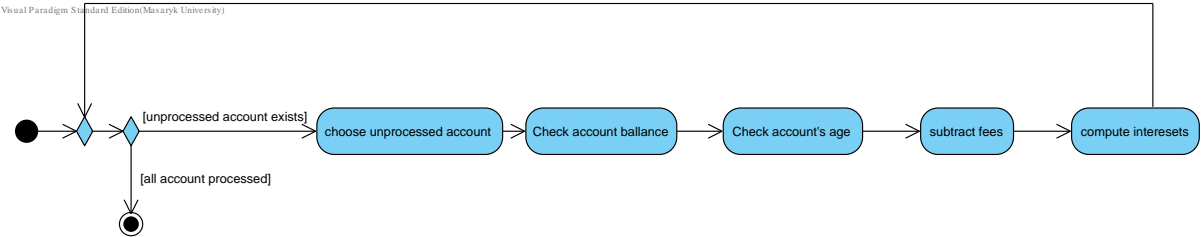
 **N/A**

 **Show warning**








Activity Diagram










# Computing interest rates and fees



## Summary

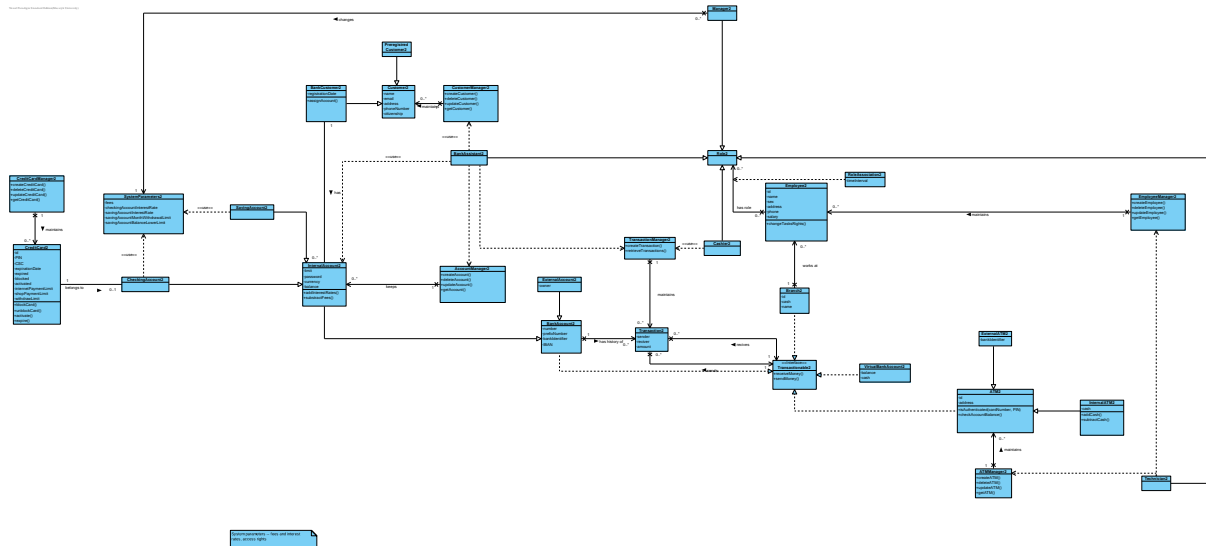
Name	Documentation
 choose unprocessed account	
 Check account ballance	
 Check account's age	
 subtract fees	
 compute interesets	

## Details

-  N/A
-  N/A
-  N/A
-  choose unprocessed account
-  Check account ballance
-  Check account's age
-  subtract fees
-  compute interesets
-  N/A











## Class Diagram

## Analytic Class Diagram




























## Summary

Name	Documentation
Manager2	
PreregistredCustomer2	
BankCustomer2	
Customer2	
CustomerManager2	
BankAssistant2	
Role2	
RoleAssociation2	
CreditCardManager2	
Employee2	
SystemParameters2	
EmployeeManager2	
SavingAccount2	
TransactionManager2	
Cashier2	
CreditCard2	
InternalAccount2	
AccountManager2	
CheckingAccount2	
ExternalAccount2	
Branch2	

 BankAccount2	
 Transaction2	
 ExternalATM2	
 Transactionable2	
 VirtualBankAccount2	
 ATM2	
 InternalATM2	
 ATMManager2	
 Technician2	
 N/A	System parameters -- fees and interest rates, access rights

## Details

-  **Manager2**
-  **PreregistredCustomer2**
-  **BankCustomer2**
-  **Customer2**
-  **CustomerManager2**
-  **BankAssistant2**
-  **Role2**
-  **RoleAssociation2**
-  **CreditCardManager2**
-  **Employee2**
-  **SystemParameters2**
-  **EmployeeManager2**
-  **SavingAccount2**
-  **TransactionManager2**
-  **Cashier2**
-  **CreditCard2**

-  **InternalAccount2**
-  **AccountManager2**
-  **CheckingAccount2**
-  **ExternalAccount2**
-  **Branch2**
-  **BankAccount2**
-  **Transaction2**
-  **ExternalATM2**
-  **Transactionable2**

 **VirtualBankAccount2**

 **ATM2**

 **InternalATM2**

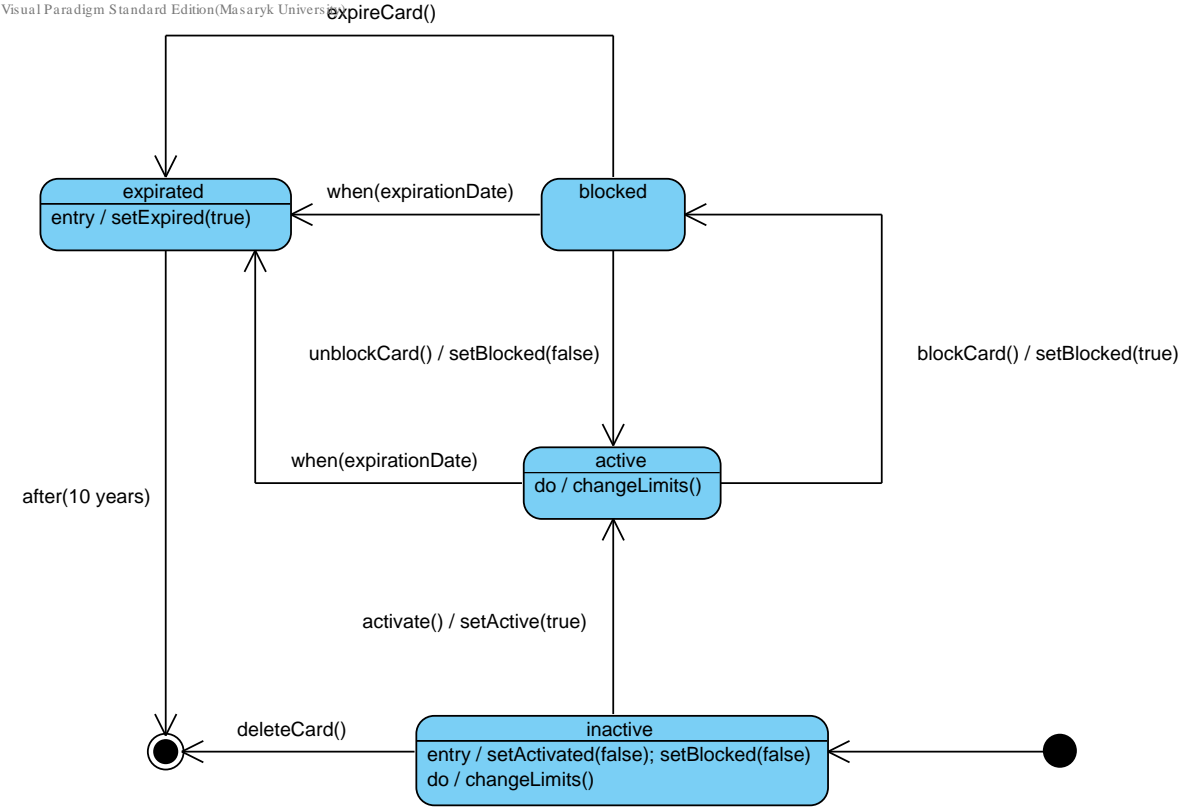
 **ATMManager2**

 **Technician2**

 **N/A**

State Machine Diagram

Card State Machine Diagram







Summary

Name	Documentation
inactive	
active	
blocked	
expired	

Details

- N/A
- inactive

## Regions

Name	Documentation
 setActivated(false)	
 setBlocked(false)	
 setActivated(false); setBlocked(false)	
 changeLimits()	

## active

### Regions

Name	Documentation
 changeLimits()	

## blocked

## expired

### Regions

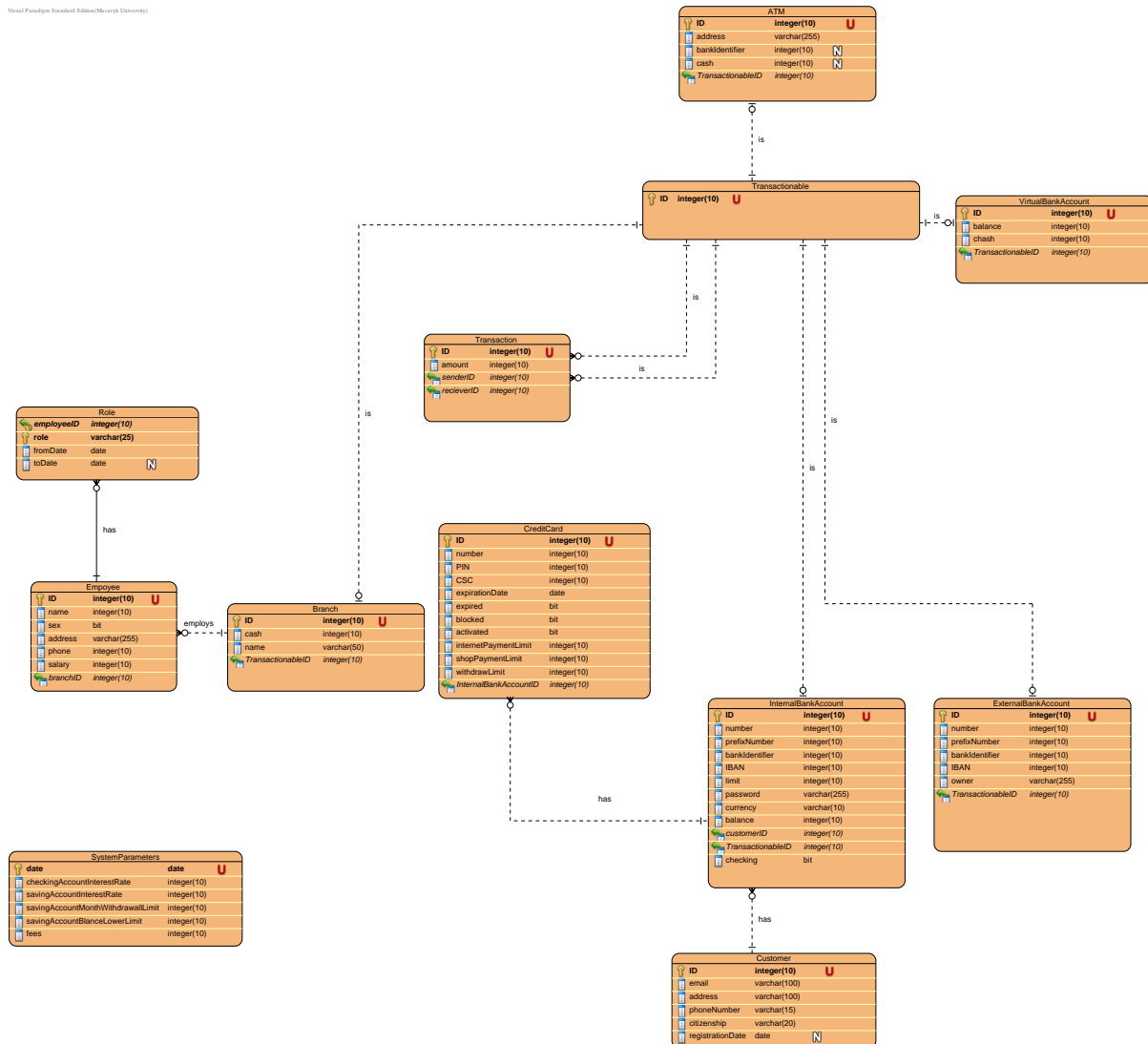
Name	Documentation
 setExpired(true)	

## N/A

# Entity Relationship Diagram

## ERD


Visual Paradigm Standard Edition (Microsoft University)



## Summary













Name	Documentation
ATM	
Transactionable	
VirtualBankAccount	
Transaction	
Role	
CreditCard	
Employee	
Branch	



 InternalBankAccount	
 ExternalBankAccount	
 SystemParameters	
 Customer	

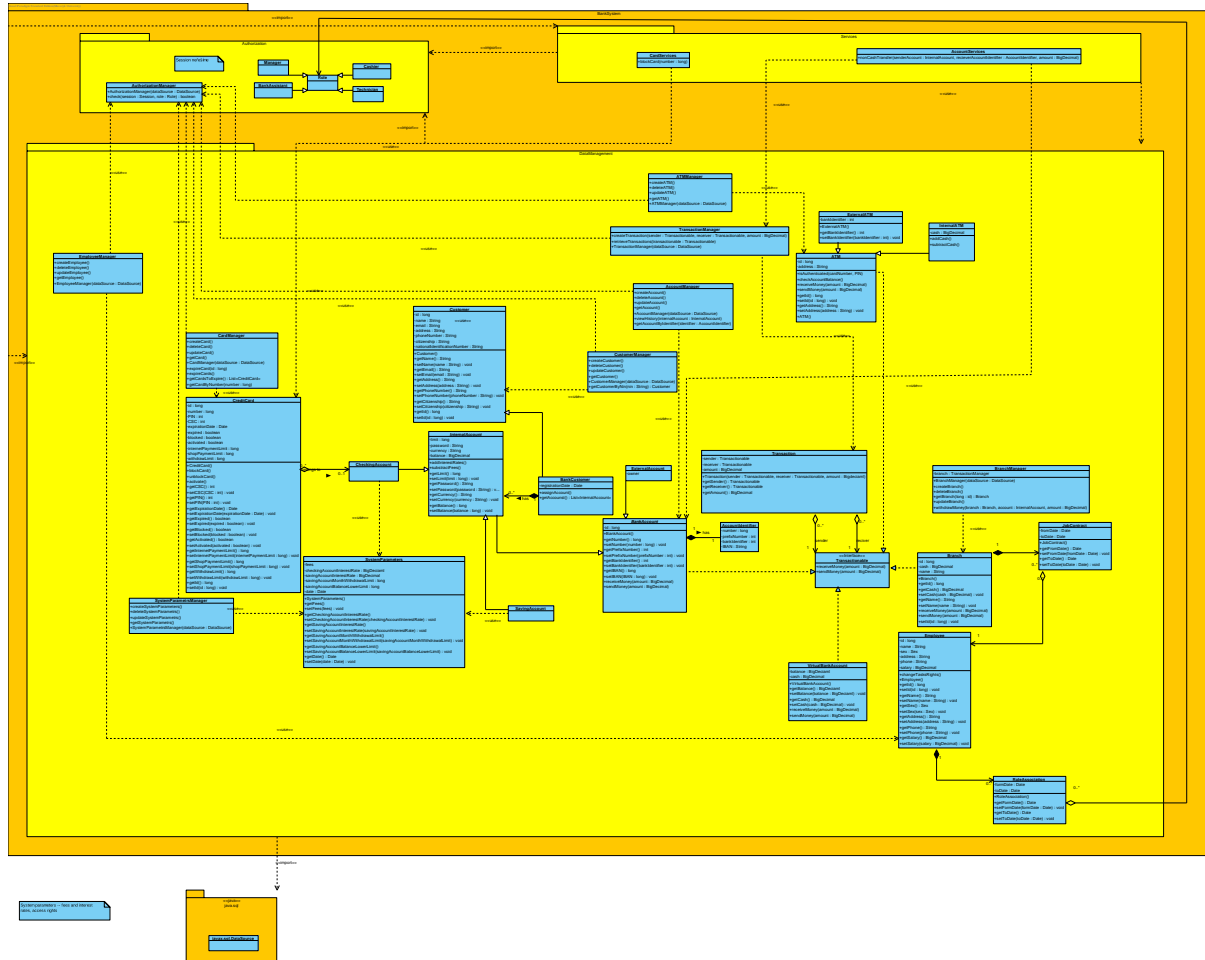
## Details

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-  **ATM**
-  **Transactionable**
-  **VirtualBankAccount**
-  **Transaction**
-  **Role**
-  **CreditCard**
-  **Empoyee**
-  **Branch**
-  **InternalBankAccount**
-  **ExternalBankAccount**
-  **SystemParameters**
-  **Customer**

## Class Diagram

## Design class diagram



## Summary







Name	Documentation
 BankSystem	
 Services	
 Authorization	
 AccountServices	
 CardServices	
 Manager	
 Cashier	
 Role	
 AuthorizationManager	
 BankAssistant	
 Technician	

 DataManagement	
 ATMMManager	
 ExternalATM	
 InternalATM	
 TransactionManager	
 EmployeeManager	
 ATM	
 AccountManager	
 Customer	
 CardManager	
 CustomerManager	
 CreditCard	
 InternalAccount	
 Transaction	
 CheckingAccount	
 ExternalAccount	
 BranchManager	
 BankCustomer	
 BankAccount	
 AccountIdentifier	
 JobContract	
 Transactionable	
 Branch	
 SystemParameters	
 SystemParametersManager	
 SavingAccount	
 Employee	
 VirtualBankAccount	
 RoleAssociation	
 java.sql	
 javax.sql.DataSource	
 N/A	Session neřešíme
 N/A	System parameters -- fees and interest rates, access rights

## Details

### BankSystem

## Children

Name	Documentation
 Services	
 Authorization	
 DataManagement	
 DataManagement2	
 Services2	
 Authorization2	

### Services

### Authorization

### AccountServices

### CardServices

### Manager

### Cashier
















### Role

### AuthorizationManager

### BankAssistant

### Technician

### DataManagement

-  **ATMManager**
-  **ExternalATM**
-  **InternalATM**
-  **TransactionManager**
-  **EmployeeManager**
-  **ATM**
-  **AccountManager**
-  **Customer**
-  **CardManager**
-  **CustomerManager**
-  **CreditCard**
-  **InternalAccount**
-  **Transaction**
-  **CheckingAccount**
-  **ExternalAccount**

 **BranchManager** **BankCustomer** **BankAccount** **AccountIdentifier** **JobContract** **Transactionable**

### Children

Name	Documentation
 Class4	

 **Branch** **SystemParameters** **SystemParametrManager** **SavingAccount** **Employee** **VirtualBankAccount** **RoleAssociation** **java.sql**

 **javax.sql.DataSource**

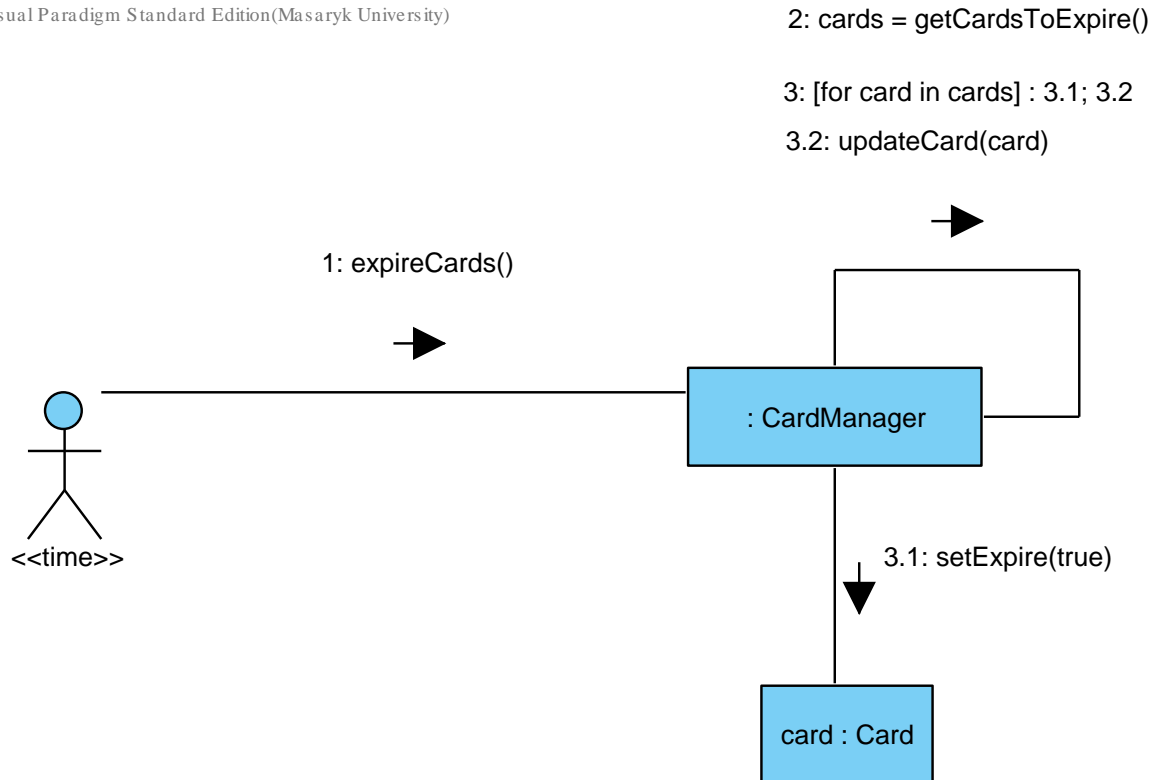
 **N/A**

 **N/A**

## Communication Diagram

## Expiration Card - communications

Visual Paradigm Standard Edition(Masaryk University)



## Summary

Name	Documentation
: CardManager	
setExpire(true)	
card : Card	
updateCard(card)	
<<time>>	
expireCards()	
cards = getCardsToExpire()	
[for card in cards] : 3.1; 3.2	

## Details

: CardManager

setExpire(true)





**card : Card**

→ **updateCard(card)**



**<<time>>**

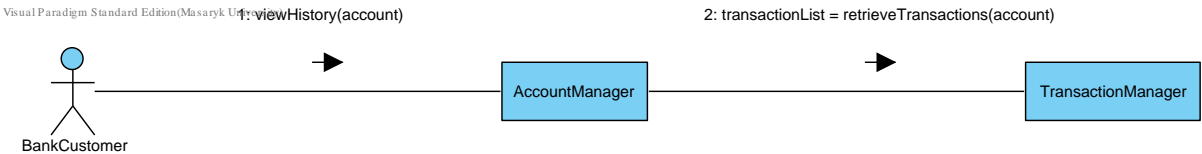
→ **expireCards()**

→ **cards = getCardsToExpire()**

→ **[for card in cards] : 3.1; 3.2**

Communication Diagram

# Transaction History - Communication



## Summary

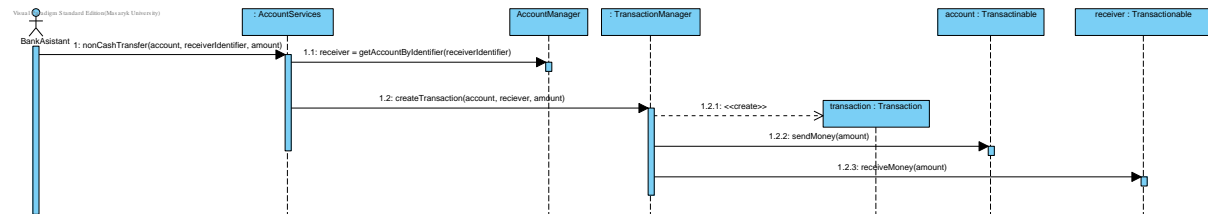
Name	Documentation
BankCustomer	
viewHistory(account)	
AccountManager	
transactionList = retrieveTransactions(account)	
TransactionManager	

## Details

- BankCustomer**
  - viewHistory(account)**
- AccountManager**
  - transactionList = retrieveTransactions(account)**
- TransactionManager**

## Sequence Diagram

## non-cashTransfer seq diagram



## Summary

Name	Documentation
BankAsistant	
: AccountServices	
AccountManager	
: TransactionManager	
transaction : Transaction	
account : Transactinable	
receiver : Transactionable	

## Details

**BankAsistant**

**: AccountServices**

**AccountManager**

**: TransactionManager**

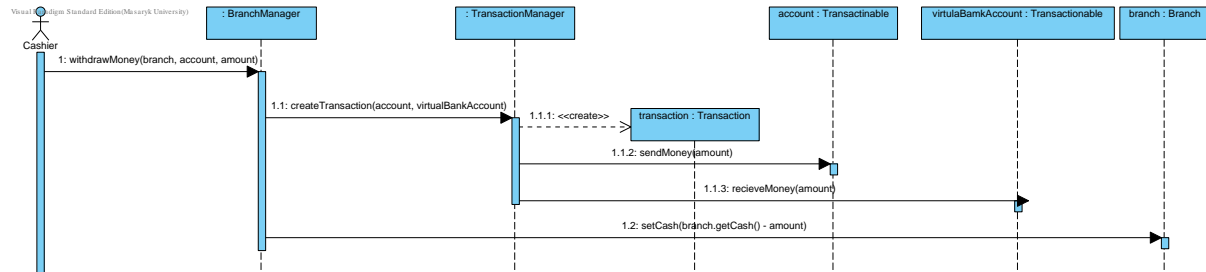
**transaction : Transaction**

**account : Transactinable**

**receiver : Transactionable**

## Sequence Diagram

## cashTransfer seq diagram



## Summary

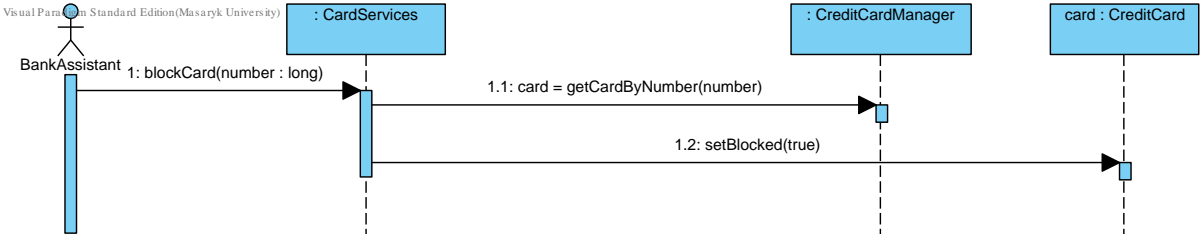
Name	Documentation
Cashier	
: BranchManager	
: TransactionManager	
transaction : Transaction	
account : Transactable	
virtulaBamkAccount : Transactionable	
branch : Branch	

## Details

**Cashier****: BranchManager****: TransactionManager****transaction : Transaction****account : Transactable****virtulaBamkAccount : Transactionable****branch : Branch**

Sequence Diagram

# cardBlock seq diagram



## Summary

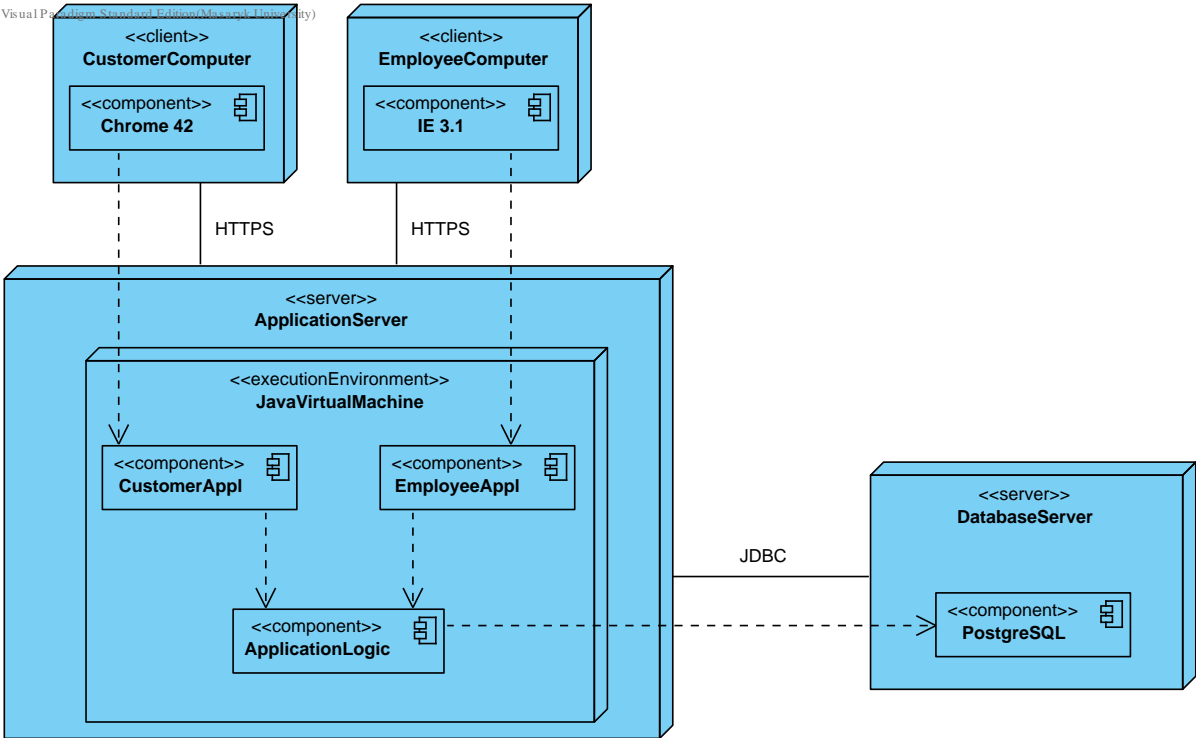
Name	Documentation
BankAssistant	
: CardServices	
: CreditCardManager	
card : CreditCard	

## Details

- BankAssistant**
- : CardServices**
- : CreditCardManager**
- card : CreditCard**

Deployment Diagram

Deployment Diagram



Summary

Name	Documentation
CustomerComputer	
EmployeeComputer	
Chrome 42	
IE 3.1	
ApplicationServer	
JavaVirtualMachine	
CustomerAppl	
EmployeeAppl	
DatabaseServer	
PostgreSQL	
ApplicationLogic	

Details

CustomerComputer

## Resident Components

Name	Documentation
 Chrome 42	

## EmployeeComputer

### Resident Components

Name	Documentation
 IE 3.1	

## Chrome 42

## IE 3.1




## ApplicationServer

### Nested Nodes

Name	Documentation
 JavaVirtualMachine	

## JavaVirtualMachine

### Resident Components

Name	Documentation
 CustomerAppl	
 EmployeeAppl	
 ApplicationLogic	

## CustomerAppl

## EmployeeAppl

## DatabaseServer

### Resident Components

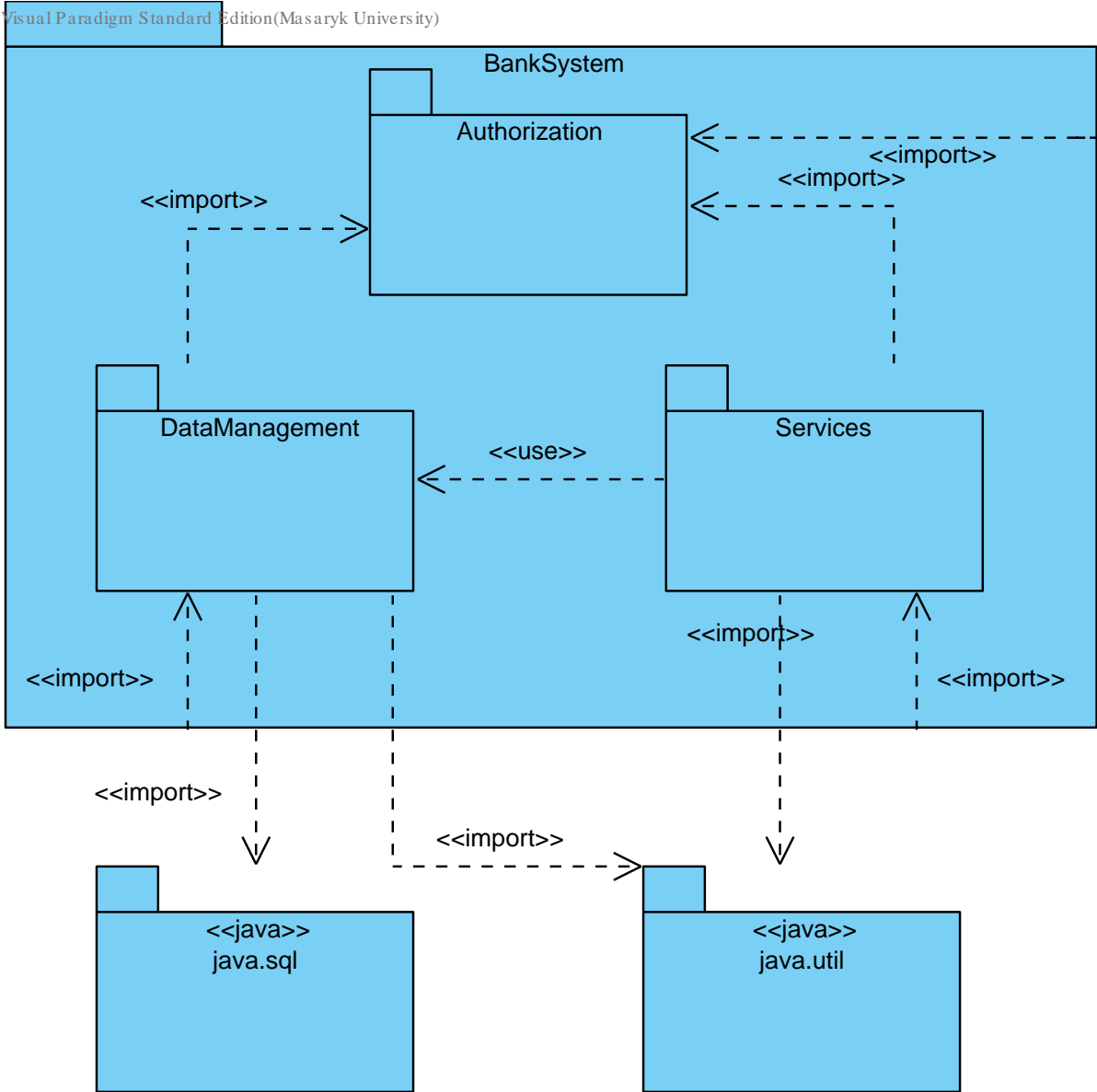
Name	Documentation
 PostgreSQL	

## PostgreSQL

## ApplicationLogic

Package Diagram

Package Diagram



Summary

Name	Documentation
BankSystem	
Authorization	
DataManagement	
Services	
java.sql	
java.util	









## Details

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### BankSystem

#### Children

Name	Documentation
 Authorization	
 DataManagement	
 Services	
 DataManagement2	
 Services2	
 Authorization2	

### Authorization

### DataManagement

### Services

### java.sql

### java.util