

Assignment 1

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Assumptions

- Personal banker which is assigned to a customer is a bank employee.
- A customer cannot be an employee of the bank.
- Each banking statement can only contain information about one account at a time.
- A branch is assumed to only have one manager.
- Anyone who has an account under the bank must have a username/password for internet banking.
(Even employees since they must own accounts themselves thus making them similar to customers.)
-- *Otherwise we would need to make INTERNET_BANKING_SESSION a **weak entity**.*
- You cannot withdrawal cash electronically since you cannot possibly do so without interacting with a bank, although you can deposit electronically since this transfers directly to an account. A teller or authorised ATM machine is required to withdrawal cash.
- An account holder does not need to have a bank/credit card (e.g. If you are underaged then you should not have access to your accounts without your guardian being there to confirm the transfer).
- Because bank/credit cards change according to an account holders history and each have unique id's (e.g. The calculation of daily_maximum and rewards), there can only be one card of each type associated with an account holder; although there can be many cards linked to the same account since people can share accounts.
- An employee can only work in one branch.
- An account must have an account owner.
- Transactions are created by the account holder (via a teller or ATM) or an electronic banking session.
- A branch must have at least, one employee to function and a branch must look after at least one account otherwise it is not a functioning branch.
- A cashier must be an employee of the branch.
- An account holder can only have one account of each type under their name.
- Each check account may have a cheque book associated with it; which is made up of many cheques of varying types (deposit/withdrawal). A cheque book must have cheques stored in the cheque book otherwise it is an empty cheque book (which doesn't make much sense for our case).

Decisions

- The CHEQUE_BOOK can be made up of several cheques so the Cheque_Number is a **multi-valued attribute**.
- An ACCOUNT may have several transactions on it so there is a **multi-valued attribute** for the transactions called Transaction_Ids which contains a list of the transactions for the account.
- A STATEMENT can be made up from many names/transactions on one statement, so these are both **multi-valued attributes** (Names, Transactions).
- Daily_Maximum (under BANK_CARD) is calculated from the account holders history and therefore is a **derived attribute**.
- Rewards (under CREDIT_CARD) is calculated from the account holders history and therefore is a **derived attribute**.
- Intrest_Rate (under ACCOUNT-SAVINGS) is calculated from the type of savings account it is and therefore is a **derived attribute**.
- CREDIT_CARD:
 - o *Is a **weak entity** type as it relies on ACCOUNT-CREDIT being present.*
- BANK_CARD:
 - o *Is a **weak entity** type as it relies on ACCOUNT-SAVINGS/CHECK/LOAN (BANK_CARD_ACCESSIBLE) being present.*
- BANK_CARD_ACCESSIBLE:
 - o *Is a set of accounts (**category entity**) that the bank card is allowed to modify.*
 - o *We use the **overlap-specialisation** with the ACCOUNT-(sub-accounts) so that BANK_CARD_ACCESSIBLE may be acquainted with any of those three sub-accounts.*

- WITHDRAWAL_ACCESSIBLE:
 - *Is a set of accounts (**category entity**) that WITHDRAWAL is allowed to modify.*
 - *We use the **overlap-specialisation** with the ACCOUNT-(SAVINGS/CHECK) so that WITHDRAWAL_ACCESSIBLE may be acquainted with any of those three sub-accounts.*
- ACCOUNT HOLDER:
 - *Is a **category entity** which has the inherited attributes of either CUSTOMER or BANK_EMPLOYEE depending on the Is_Staff value. This allows for the accounts to have account holders which are a mix of types (customers & employees) because a customers account could be shared with an employee of the bank. So all actions on accounts needs to be able to work for both customers and employees.*
- ACCOUNT-(sub-classes):
 - *An account may be of four types: savings, check, credit and loan. So these are set as **sub-classes** for ACCOUNT.*
 - *This allows the database to access each sub-account individually. There is a **disjoint-specialisation** for these sub-classes because an account can only be one type of account (savings/ check/ credit/ loan) at a time.*
- TRANSACTION:
 - *Contains three **sub-classes** as you can either have a WITHDRAWAL, TRANSACTION or ELECTRONIC_TRANSFER.*
 - *The TRANSACTION entity does not have the ability to modify accounts, but the sub-classes can modify very specific accounts in accordance to their needs. Our sub-classes are joint with a **disjoint-specialisation** as the transaction should only be of one type at a time (deposit or withdrawal).*
- DEPOSIT:
 - *Is created from three **super-classes** (TRANSACTION, transaction type and TELLER).*
 - *The main super-class being TRANSACTION which inherits all the transaction details. The transaction type 'super-class' is the result of a **category-specialisation** so that a deposit has to either inherit the attributes from CHEQUE or CASH depending on the type of deposit we have. The TELLER super-class so we can inherit the details about the teller they processed the deposit with.*
- WITHDRAWAL:
 - *Is created from two **super-classes** (TRANSACTION and transaction type).*
 - *The main super-class being TRANSACTION which inherits all the transaction details to the withdrawal. The transaction type 'super-class' which is a result of a **category-specialisation** so that withdrawal must inherit attributes from the TELLER or ATM depending on the type of withdrawal they have created.*

Problems

- Whilst trying to create the bank schema I came across the problem that both customers and employees could have accounts and if this was true then they should be able to share their account with a person of the other type, so to fix this issue I had to categorise both an employee and customer into an account holder.
- Trying to figure out how to create the database for the transaction structuring was a challenge, having to figure out specifics on what withdrawals/deposits can directly change or the specifics they need to function and having electronic banking on top of all that created some interesting interactions.