

University of Canterbury

COSC265 assignment 2018

Goal: After completing this assignment you should be able to design EER schemas.

Assessment: worth 25%

Due Date: This assignment is due on 24 August, 2018, no later than 5:00 pm

Late assignments: Will only be accepted for one week after the due date, with a penalty for late submission of 15%. At one week after the due date (31 August, 2018, at 5:00 PM), no submissions will be accepted and 0 marks will be given to any student not having submitted the assignment by that date/time.

Assignment Submission: Submit your solution (EER diagram and the report) as well as the completed Plagiarism declaration form via Learn.

- **Both your report and diagram must include your first name, last name and student number.**
- **The report must be submitted in .PDF format, and the diagram must be submitted in .PNG format. Other file formats will not be marked.**
 - o To print your diagram to a .PNG file in EER-Tutor, click the Print Diagram button to create a print page, then Right-Click on that print page, and choose Save Image As, then give your image file a name but make sure the file type is .PNG, which is the default.

Assignment Guidelines: This assignment must be done individually using EER tutor. You should be aware of the University of Canterbury Academic Integrity Policy:

<http://www.canterbury.ac.nz/about/governance/ucpolicy/student/academic-integrity-guidance-for-staff-and-students/>

The task

You are chosen to design a database for a bank. Below is a description of the data that needs to be recorded, maintained and accessed. Your submission must include the EER schema created with EER-Tutor, and a short written report. The report should clearly state any assumptions you make. You may also explain any complex components of your solution. You may also discuss any difficulties you faced in developing your EER schema. The report should not be longer than 500 words.

The requirements

You need to design a database that will support the operation of a bank. The bank is organized into branches. In a city, there might be several branches. Each branch has a unique name, unique number and address. The bank monitors the assets of each branch. There is only one central branch.

Bank customers are identified by their customer ids, which are unique. The bank stores each customer's name, address (street name, street number and city), birth date, gender, IRD number, home phone number, and business phone number (if available). Customers may have accounts and can take out loans. A customer may be associated with a personal banker. A customer can have at most one account of each type with the bank. An account may be shared by customers, and a customer can have several accounts. There are several types of accounts: savings, checking, credit and loan accounts. Each account has a unique number. The bank maintains a record of each account's opening day, type, balance and also information about all transactions. For each customer associated with an account, the database should also store the user name for internet access and the chosen password (if appropriate). For each transaction (such as withdrawal or deposit), the database should store the date and time, the amount and the type of transaction. Withdrawals are available from checking and savings accounts, but not from credit cards or loans. For each withdrawal, it is necessary to store the manner in which the withdrawal was made (e.g. teller, ATM machine, or electronic transaction). Each ATM machine has a unique id and location. A deposit can be made via a teller (by cash or cheque) or electronically. If a customer has deposited a cheque, the database should store information about the cheque (unique cheque number, the bank that issued the cheque, the name on the cheque, date and amount).

A customer is issued a **bank card**, which covers all savings/checking/loan accounts for that customer. Each bank card has a **unique number**, the **date of issue**, **expiry date** and a **PIN**. There is a **daily maximum** for each bank card, which is determined by the bank based on the customer's history. For each account, a **statement** is issued every month, showing all **transactions** processed for that account since the previous report. Each report has a **report number** (within the current year), and shows the **names** of all customers associated with the account.

There are several types of **savings accounts**, with different **interest rates**. Each type of savings account has a **unique name**, the **maximal age** of the customer (when appropriate), **monthly fee**, the **minimum amount of funds** that the account must contain (optionally), the number of free **staff-assisted transactions per month**, the number of free **internet transactions per month**, **service fee** (for using ATM by other banks), **overdraft debit interest rate**, and a **transaction fee**.

At any time, there will be a number of **blank cheques (i.e. a cheque book)** issued for each checking account, and the database should store the **numbers of issued cheques**. A cheque number consists of the **account number**, plus a **cheque number** which is unique for that account. When processing a cheque, the database should store the **date**, the **amount** and the **recipient**.

A **loan account** has a **unique loan number**. The bank keeps track of the **loan amount** and the **loan repayments**. The **frequency** of repayments is known (monthly, weekly or bi-weekly), as well as the **minimum amount** for repayments. The customer may specify another account (**savings or checking**) for the loan to be repaid from. Each loan may have a **fixed interest**, or a **floating (variable) interest**. The **date** and **amount** are recorded for each payment. Interest rates for loans are published weekly by the bank.

Bank employees are identified by their **staff numbers**, which are also unique. The bank administration stores the **name (first and last)**, **home and office phone numbers** of each employee, as well as the **IRD number**, **gender**, **birth date**, **full address**, **position held** and the **current salary**. The **start date** of the employment is also stored. Every employee works for a single branch. Each branch has a **manager**, who has overall responsibility for the management of the branch. Each bank employee is also an account holder, as his/her salary would be deposited into an account. The starting date for the manager is known.

Customers may also have **credit cards** with the bank. The bank issues **VISA or MASTER** cards. Each card has a **unique number**, the **date of issue** and the **expiry date**. For each credit account, there is a **limit** (i.e. the maximum amount the customer is allowed to charge to the card), and a **maximum amount per transaction**. Customers having credit cards get **rewards** for the total amount spent, which is a certain percentage of the sum of all payments made by the card. Each customer sharing the credit card is charged a **yearly fee**.

Each customer authorized for **internet banking** can perform the following operations on their accounts: check account balances, move funds between accounts, view and print transactions for a specified time period, and pay bills online. For paying bills online, it is necessary to specify the **bank** and **account number** for the receiver, the **name** of the person or the name of the company the payment is made to, the **amount**, the **date** when the payment is to be made (which might be in the future) and a **comment** to be sent to the receiver (such as invoice number). The database also contains information about **registered companies** (such as Spark NZ) which payments can be made to. In that case, the customer can simply select one of the registered companies from the list, and only specify the date, amount and the comment to be sent.

A few notes on marking

Your solution will be marked on several aspects:

- Appropriateness of constructs you use. In EER diagrams, often there are several ways of representing the same collection of data. However, some of these ways would be more appropriate than others, due to various factors, such as the semantics of the domain, the space required to store the data, the typical kinds of operations that will be performed on the database etc. Make sure you analyze the requirements properly.
- Make sure you use the correct EER notation and naming guidelines.
- You are allowed to introduce additional assumptions. However, not every assumption is reasonable. Think carefully about any assumption you would like to add. You are welcome to discuss your assumptions with the lecturer/tutors.