COS 221 Practical Assignment 1

- Date Issued: **2nd March 2022**
- Date Due: **9th March 2022** before **11:00 (in the morning)**
- Submission Procedure: **Upload to ClickUP**
- This assignment consists of **7 tasks** for a total of **45 marks**.

1 Introduction

The University of Pretoria executive committee has decided to deliver better value to its students, staff and alumni. They will be opening and operating the UPBank through the Enterprises@UP initiative. The University of Pretoria has requested that you, as a young Computer Science undergraduate student to **design the conceptual data model for UPBank**. You have requested more information from them and were provided with the information below.

The UPBank will operate only within the South African borders, and as such will need to comply with all regulatory and legal requirements. As part of the global fight against money laundering, the South African government has introduced the Financial Intelligence Center Act, 38 of 2001, often referred to as "FICA". FICA provides a legal framework to prevent criminals from introducing their illicit gains into our bank system. Section 21 and 22 of FICA requires that all banks ensure they have correct details of their customers, by way of a process know as Know-Your-Customer, abbreviated KYC. As part of its vision to offer enhanced value to its students, staff and members, all clients of UPBank will be identified by their u-number. Even though the University of Pretoria has your details, they are prohibited under the new POPIA law to share your personal details with the bank. Thus, the bank would require each new member to provide their name, a postal and physical address, in addition to various contact methods, such as SMS, Email and telephone numbers. However for compliance reasons UPBank would require their customers yearly to resubmit KYC information which would include proof of their ID number and physical address. It is critical for compliance to ensure a full history of KYC validations are kept. However unlike KYC, validation of UP membership will only be conducted once, of which record must be kept.

Initially the bank will only offer three banking products, namely a cheque account, savings account and 32-day notice deposit account. For a member to open an account they would be required to visit a UPBank branch which will remain the owner of that account on the banking platform. Each branch will be identified by a unique branch code. To allow users of the UPBank easy access to locate and phone a branch, UPBank would like to store additional information on each branch such as address, operating hours and contact details. Each branch will be responsible for administering various ATM's across Pretoria. The bank would like to know at all times how much cash is available at each ATM as well as the date and time of the last filling of the ATM. UPBank has contracts with multiple Cash-In-Transit (CIT) companies responsible for filling up the ATM. For each of these contracts it is required to store the start and end date of the contract. To ensure cash is always available, an ATM is allowed to be filled up by various CIT contracts.

After successful completion of this assignment you should be able to:

- identify entities from a given description;

- determine attributes for each of the entities from the description using the set notation;

- identify relationships between the entities along with their respective cardinalities and participations;

- translate what you have determined and identifies into a conceptual model using Chen's notation; and

- draw the corresponding ER-diagram.

2 Constraints

1. You must complete this assignment individually or in pairs.

2. You may ask the Teaching Assistants for help but they will not be able to give you the solutions.

3. This is a *paper and pen* exercise and therefore you will need to find a tool to help you to draw the ER-diagram.

3   Submission Instructions

You are required to upload a single PDF that includes the answers to all the task. Make sure you upload your PDF to ClickUP in good time. No late submissions will be accepted, so make sure you upload in good time.

4   Online resources

The following resources will help with creating a conceptual model using Chen's Notation.

Visual Paradigm Online: `http://online.visual-paradigm.com`

draw.io: `http://diagrams.net`

5   Rubric for marking

Identify the Entites	7
Identify the Attributes	7
Expand Complex Attributes	7
Identify Derived Attributes	2
NULL values	2
Conceptual Model Review	
Sharia-compliant	2
Introduction of USD$	2
Provision for handles	2
KYC regulatory requirements	2
Final ER-diagram	
Entities	4
Attributes	4
Relationships	
- participation	2
- cardinality	2
Total	**45**

6   Assignment Instructions

Task 1: Identify the Entities ....(7 marks)
Identify the various entities from the provided text.

Task 2: Identify the Attributes ....(7 marks)
For each of the previously identified entities, identify all attributes for **EACH** entity. Note: You may advise the client if you believe that certain attributes are lacking from the provided brief. Provide the entity name and attributes using the set notation: ENTITY_NAME(Attribute1, ... , Composite_Attribute(CA1, ..., CAm), {MV1, ... , MVp})

Task 3: Expand Complex Attributes ....(7 marks)
For each of the previously identified attributes, expand all complex attributes.

Task 4: Identify Derived Attributes ....(2 marks)
For each of the previously identified attributes, list which attributes are derived and provide the entity to which they belong.

Task 5: NULL Values ....(2 marks)
Does your conceptual design require the use of NULL values for certain attributes. If so, list and explain why the identified attributes would require NULL values.

Task 6: Conceptual Data Model Review ....(8 marks)
After you designed your conceptual model, you present your model to the executive committee of the University of Pretoria.

6.1   Does your conceptual model allow for the introduction of a Sharia-compliant 32-day savings account   (2)
      in future? **Explain** why it does, or how your model would need to be amended to allow for these
      requirements.

6.2   Does your conceptual model allow for the introduction of a USD$ (United States of American Dollar)   (2)
      denominated account? **Explain** why it does, or how your model would need to be amended to allow for
      these requirements.

6.3   In the future the bank would like to add additional contact methods such as an Instagram handle,   (2)
      Facebook handle or Session Initiation Protocol Uniform Resource Identifier (SIP URI) to allow them to
      contact the user over VOIP (`https://en.wikipedia.org/wiki/SIP_URI_scheme`). Does your conceptual
      model cater for these additional contact methods. **Explain** why it does, or how your model would need
      to be amended to allow for these requirements.

6.4   In future KYC regulatory requirements may change, and require the bank to verify other types of infor-   (2)
      mation about a client, e.g. telephone number, email address, Instagram handle. Does your conceptual
      model cater for these additional validation types. **Explain** why it does, or how your model would need
      to be amended to allow for these requirements.

Task 7: Final ER-diagram ....(12 marks)
Draw the final ER-diagram of your conceptual model that takes all the previous tasks into account.

IMPORTANT NOTE: Please refer to the rubric for the detailed allocation of marks.