CS310
DBMS
GROUP ASSIGNMENT

VEHICLE INSURANCE COMPANY

BY

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PART-B:-LOGICAL DATA MODEL

Introduction

Part B of this report includes design of logical data model (LDM) for vehicle insurance company XYZ Ltd.

First we had to make some changes and improvements to the conceptual data model which are explained and presented in the last part of this report. Then we identify all the attributes in old and new entities and assign them the primary (PK) and foreign keys (FK) and make relationships with them in Erwin to make a full LDM. We identified each variable and the data types

that this LDM could be used to design the database in Access or Oracle database management systems.

Introduction of terms used for constructing LDM

Elements

Elements in the data model are named entities. This is any distinguishable object that presents part of the database. It can be related to any object in the real world such as: a car, a customer (person), a policy, a company, etc. with respective attributes that are relevant to the software system. Properties of entities can have values:

- Name
- Description of the meaning and significance.
- Weather entity is dependent or non-dependent.
- List of attributes (Car entity: year, manufacturer, model, mileage, owner, licence, book of maintenance) with properties (data type, size, is it required or not).
- The attributes (or attribute) are used to precisely identify an entity (primary key – PK, foreigner key – FK, ...).
- Constraints of individual or combined attributes values (e.g. date of issue of new policy can’t be prior to renewal date of policy).
- Rules to grant permission to users or user groups to access the entity.
- Expected number of entity instances and expected growth rate.

Or additional:
- List of attributes to be indexed to optimize access time.

- List of attributes to be encrypted or compressed.
- Weather entity should become a database view or a table.
- Weather entity should become a materialized view.
- List of database triggers to be implemented for that entity.

Relations

Relationship - Designates logical association between entities, with cardinality of the participant

entities: one-to-one, one-to-many, or many-to-many relationships. Relationships can be identifying or non-identifying (identifying A-B; existence of B depends on existence of A).
Generalization/specialization – Indicates an “is a” relationship between entities. For example ,department entity is a generalization of different types of departments; at the same time vehicle Insurance department or travel insurance department is specialization of department entity.

Aggregation - is an abstraction that turns relationship between entities into an aggregate entity, rarely used. Example: “customer-insurance advisor -date” can be an aggregate entity called Appointment.

Constraints

The database normalization technique is used to impose restrictions on data model that is based on dependencies between entities and their attributes. Normalization is used with the goal objective to avoid duplication of information in order to safe guard the consistency (integrity) of the data.

Data types

When we assign attributes to entities with primary keys and foreign keys do the normalization, we identify each attribute with data type for each data management system – Access as seen in example Table 6, below.

Table 6: Example of data types in Access and DMS

Entity type	Attributes	Data type
T4_CUSTOMER	T4_FIRST_NAME	Varchar(10)
	T4_LAST_NAME	Varchar(10)
	T4_DATE_OF_BIRTH	Date

Business Rules, Attributes, Data types and Primary/Foreign Keys

This section of the report identifies all of the attributes, data types and primary and foreign keys for our system LDM. For better overview we present the table number to the corresponding entity type, followed by the business rule of what we wish the entity type to capture, posted below in Table 7.

Table 7: Table number entity type

Table Number	Entity Type	Business Rules
1	T4_CUSTOMER	Records all the personal details about the customer
2	T4_APPLICATION	Records details of the insurance cover requested by the customer.

3	T4_QUOTE	Records details of customer potential cost of the insurance product.
4	T4_INSURANCE_POLICY	Records details of Insurance agreement.

5	T4_PREMIUM_PAYMENT	Records details of customer cost of payments.
6	T4_VEHICLE	Records details of Vehicle model, cost and registration.
7	T4_CLAIM	Records details of customer claims in case of an incident.
8	T4_CLAIM SETTLEMENT	Records details of settlement made on claims
9	T4_STAFF	Records details of employees
10	T4_DEPARTMENT	Records details of the various departments
11	T4_OFFICE	Records details of different office locations
12	T4_MEMBERSHIP	Records details of customer membership, clubs, societies.
13	T4_VEHICLE_SERVICE	Records details of different vehicle services offered
14	T4_NOK	Records details of the next of kin
15	T4_INSURANCE_COM PA NY	Details of the Insurance organization giving the insurance cover
16	T4_POLICY_RENEWABLE	Records details of due date of insurance policy
17	T4_INCIDENT	Records details of the accident, theft, fire, etc.
18	T4_INCIDENT_REPORT	Records details of the individual incident

19	T4_COVERAGE	Records all terms and conditions in regard to the policy
20	T4_PRODUCT	Records details of the products offered by insurance company
21	T4_RECEIPT	Details of premium payments to customer
22	T4_INSURANCE_POLICY _COVERAGE	It shows agreement and coverage details

Table 8: Abbreviation table of attributes manes used in LDM.

LDM Attributes	Column Name Abbreviations
T4_CUST_ID	CUSTOMER_IDENTIFICATION
T4_CUST_FNAME	CUSTOMER_FNAME
T4_CUST_LNAME	CUSTOMER_LNAME
T4_CUST_DOB	CUSTOMER_DATEOFBIRTH
T4_CUST_PPS_NUMBER	CUSTOMER_PERSONALPUBLICNUMB ER
T4_STAFF_FNAME	STAFF_FNAME
T4_STAFF_LNAME	STAFF_LNAME
T4_STAFF_PPS_NUMBER	STAFF_PERSONALPUBLICNUMBER
T4_ADMIN_COST	ADMINISTRATION_COST
T4_NOK_ID	NEXTOFKIN_IDENTFICATION

Table-LDM 1: T4_CUSTOMER

Attributes	Data type	Primary Keys and Foreign keys

T4_CUST_ID	INT	PK
T4_CUST_FNAME	VARCHAR(10)	
T4_CUST_LNAME	VARCHAR(10)	
T4_CUST_DOB	DATE	
T4_CUST_GENDER	CHAR(2)	
T4_CUST_ADDRESS	VARCHAR(20)	
T4_CUST_MOB_NUMBER	VARCHAR(10)	
T4_CUST_EMAIL	VARCHAR(20)	
T4_CUST_PASSPORT_NUMBER	VARCHAR(20)	
T4_CUST_MARITAL_STATUS	CHAR(10)	
T4_CUST_PPS_NUMBER	INT	

EXPLANATION:-

The T4_ CUSTOMER attributes record all the essential personal details of the customer. The T4_CUST_ID is the unique primary key.

Table-LDM 2: T4_APPLICATION

Attributes	**Data type**	**Primary Keys and Foreign keys**
T4_APPLICATION_ID	VARCHAR(20)	PK
T4_CUST_ID	INT	FK
T4_VEHICLE_ID	INT	
T4_APPLICATION_STATUS	CHAR(8)	

T4_COVERAGE	VARCHAR(50)	

EXPLANATION:-

The T4_APPLICATION attributes record all the essential application details of the customer. The T4_ APPLICATION_ID is the unique primary key and the T4_CUST_ID is a foreign key linking the table back to the entity type T4_CUSTOMER.

Table-LDM 3: T4_QUOTE

Attributes	DATA TYPE	PRIMARY KEYS AND FOREIGN KEYS
T4_QUOTE_ID	VARCHAR(20)	PK
T4_APPLICATION_ID	VARCHAR(20)	FK
T4_CUST_ID	INT	FK
T4_ISSUE_DATE	DATE	
T4_VALID_FROM_DATE	DATE	
T4_VALID_TILL_DATE	DATE	
T4_DESCRIPTION	VARCHAR(100)	
T4_PRODUCT_ID	VARCHAR(20)	
T4_COVERAGE_LEVEL	VARCHAR(20)	

EXPLANATION:-

The T4_QUOTE attributes record all the essential quotation details of the customer. The T4_QUOTE_ID is the unique primary key and T4_APPLICATION_ID and T4_CUST_ID is a foreign key linking the table back to the respective entities

Table-LDM 4: T4_INSURANCE_POLICY

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_AGREEMENT_ID	VARCHAR(20)	PK
T4_APPLICATION_ID	VARCHAR(20)	FK
T4_CUST_ID	INT	FK
T4_DEPARTMENT_NAME	VARCHAR(20)	
T4_POLICY_NUMBER	VARCHAR(20)	
T4_START_DATE	DATE	
T4_EXPIRY_DATE	DATE	
T4_TERMS_CONDITION_DESCRIPTION	VARCHAR(100)	

EXPLANATION:-

The T4_INSURANCE POLICY attributes record all the essential policy details of the customer. The T4_AGREEMENT_ID is the unique primary key and the T4_CUST_ID, and T4_APPLICATION_ID are linked to the other corresponding entities through their foreign keys.

Table-LDM 5: T4_PREMIUM_PAYMENT

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_PREMIMUM_PAYMENT_ID	VARCHAR(20)	PK
T4_CUST_ID	INT	FK
T4_PREMIUM_PAYMENT_AMOUNT	INT	

T4_PREMIUM_PAYMENT_SCHED UL E	DATE	
T4_RECIEPT_ID	VARCHAR(20)	
T4_POLICY_NUMBER	VARCHAR(20)	

EXPLANATION:-

The T4_PREMIUM_PAYMENT attributes record all the essential policy premium payments details of the customer. The T4_PREMIUM_PAYMENT_ID is the unique primary key and the T4_CUST_ID is the Foreign key linking tables to T4_CUSTOMER entities.

Table-LDM 6: T4_VEHICLE

ATTRIBUTES	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_VEHICLE_ID	INT	PK
T4_CUST_ID	INT	FK
T4_POLICY_ID	VARCHAR(20)	
T4_DEPENDENT_NOK_ID	VARCHAR(20)	
T4_VEHICLE_REGISTRATION_NUMBER	VARCHAR(20)	
T4_VEHICLE_VALUE	INT	
T4_VEHICLE_TYPE	VARCHAR(20)	
T4_VEHICLE_SIZE	INT	
T4_VEHICLE_NUMBER_OF_SEAT	INT	
T4_VEHICLE_MANUFACTURER	VARCHAR(20)	
T4_VEHICLE_ENGINE_NUMBER	INT	

T4_VEHICLE_CHASIS_NUMBER	INT	
T4_VEHICLE_NUMBER	VARCHAR(20)	
T4_VEHICLE_MODEL_NUMBER	VARCHAR(20)	

EXPLANATION:-

The T4_VEHICLE attributes record all the essential T4_VEHICLE details belonging to the customer. The T4_VEHICLE_ID is the unique primary key and the T4_CUST_ID is the foreign key linking table to T4_CUSTOMER entity.

Table-LDM 7: T4_CLAIM

ATTRIBUTES	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_CLAIM_ID	INT	PK
T4_CUST_ID	INT	FK
T4_AGREEMENT_ID	VARCHAR(20)	
T4_CLAIM_AMOUNT	INT	
T4_INCIDENT_ID	VARCHAR(20)	
T4_DAMAGE_TYPE	VARCHAR(20)	
T4_DATE_OF CLAIM	DATE	
T4_CLAIM_STATUS	CHAR(10)	

EXPLANATION:-

The T4_CLAIM attributes record all the essential T4_CLAIM details of the customer in case of an incident. The T4_CLAIM_ID is the unique primary key and the T4_CUST_ID is foreign key linking table to T4_CUSTOMER entity.

Table-LDM 8: T4_CLAIM_SETTLEMENT

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_CLAIM_SETTLEMENT_ID	INT	PK
T4_CUST_ID	INT	FK
T4_VEHICLE_ID	INT	
T4_DATE_SETTLED	DATE	
T4_AMOUNT_PAID	INT	
T4_COVERAGE_ID	VARCHAR(20)	
T4_CLAIM_ID	INT	FK

EXPLANATION:-

The T4_CLAIM_SETTLEMENT attributes record all the essential claim settlement details of the customer after an incident. The T4_CLAIM_SETTLEMENT_ID is the unique primary key and the T4_CUST_ID and T4_CLAIM_ID are the foreign keys that link the table to the corresponding entity.

Table-LDM 9: T4_STAFF

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_STAFF_ID	VARCHAR(20)	PK
T4_COMPANY_NAME	VARCHAR(20)	FK
T4_STAFF_FNAME	VARCHAR(10)	
T4_STAFF_LNAME	VARCHAR(10)	

T4_STAFF_ADDRESS	VARCHAR(20)	
T4_STAFF_CONTACY	VARCHAR(10)	
T4_STAFF_GENDER	CHAR(2)	
T4_STAFF_MARITAL_STATUS	CHAR(10)	
T4_STAFF_NATIONALITY	CHAR(15)	
T4_STAFF_QUALIFIACATION	VARCHAR(20)	
T4_STAFF_ALLOWANCE	INT	
T4_STAFF_PPS_NUMBER	INT	

EXPLANATION:-

The T4_STAFF attributes record all the essential staff details working in the insurance company. The T4_STAFF_ID is the unique primary key and the T4_COMPANY_NAME is a foreign key linking the table back to the entity type T4_COMPANY.

Table-LDM 10: T4_DEPARTMENT

Attributes	**Data type**	**PRIMARY KEYS AND FOREIGN KEYS**
T4_DEPARTMENT_NAME	VARCHAR(20)	FK , PK
T4_COMPANY_NAME	VARCHAR(20)	FK
T4_OFFICE	VARCHAR(18)	
T4_CONTACT_INFORMATION	VARCHAR(30)	
T4_DEPARTMENT_STAFF	VARCHAR(18)	
T4_DEPARTMENT_LEADER	VARCHAR(18)	

EXPLANATION:-

The T4_DEPARTMENT attributes record all the essential company department details within the insurance company. The T4_DEPARTMENT_NAME is the unique primary key and Foreign key and the T4_COMPANY_NAME is a foreign key linking the table back to the entity type COMPANY.

Table-LDM 11: T4_OFFICE

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_OFFICE_NAME	VARCHAR(20)	PK
T4_DEPARTMENT_NAME	VARCHAR(20)	FK
T4_COMPANY_NAME	VARCHAR(20)	FK
T4_OFFICE_LEADER	VARCHAR(20)	
T4_CONTACT_INFORMAT ION	VARCHAR(20)	
T4_ADDRESS	VARCHAR(20)	
T4_ADMIN_COST	INT	
T4_STAFF	VARCHAR(50)	

EXPLANATION:-

The T4_OFFICE attributes record all the essential office details within the insurance company. The T4_OFFICE_NAME is the unique primary key and the T4_DEPARTMENT_NAME and T4_COMPANY_NAME are foreign keys linking the table back to the respective entity types.

Table-LDM 12: T4_MEMBERSHIP

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_MEMBERSHIP_ID	VARCHAR(20)	PK
T4_CUST_ID	INT	FK
T4_MEMBERSHIP_TYPE	CHAR(15)	
T4_ORGANISTAION_CONTAC T	VARCHAR(20)	

EXPLANATION:-

The T4_MEMBERSHIP attributes record all the essential membership details available for insured customers. The T4_MEMBERSHIP_ID is the unique primary key and the T4_CUST_ID is a foreign key linking the table back to the entity type T4_CUSTOMER.

Table-LDM 13: T4_VEHICLE_SERVICE

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_VEHICLE_SERVICE	VARCHAR(30)	PK
T4_VEHICLE_ID	INT	FK
T4_CUST_ID	INT	FK
T4_VEHICLE_SERVICE_ADDRESS	VARCHAR(20)	
T4_VEHICLE_SERVICE_CONTACT	VARCHAR(20)	
T4_VEHICLE_SERVICE_	VARCHAR(20)	
T4_VEHICLE_SERVICE_INCHARGE	VARCHAR(20)	
T4_VEHICLE_SERVICE_TYPE	VARCHAR(20)	

T4_COMPANY_NAME	VARCHAR(20)	

EXPLANATION:-

The T4_VEHICLE_SERVICE attributes record all the essential vehicle services offered to insured customer details. The T4_VEHICLE_SERVICE is the unique primary key and the T4_CUST_ID and T4_VEHICLE_ID are linked to the other corresponding entities.

Table-LDM 14: T4_NOK

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_NOK_ID	VARCHAR(20)	PK
T4_AGREEMENT_ID	VARCHAR(20)	FK
T4_APPLICTAION_ID	VARCHAR(20)	FK
T4_CUST_ID	INT	FK
T4_NOK_NAME	VARCHAR(20)	
T4_NOK_ADRESS	VARCHAR(20)	
T4_NOK_PHONE_NUMBER	VARCHAR(10)	
T4_NOK_GENDER	CHAR(2)	
T4_NOK_MARITAL_STATUS	CHAR(10)	

EXPLANATION:-

The T4_NOK attributes record information on the next of kin details. T4_NOK_ID is the unique primary key here.T4_ AGREEMENT_ID, T4_APPLICATION_ID, and T4_CUST_ID are foreign keys linking back

information to their respective entities.

Table-LDM 15: T4_INSURANCE_COMPANY

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_COMPANY_NAME	VARCHAR(20)	PK
T4_COMAPNY_DEPARTMENT_NAME	VARCHAR(20)	PK
T4_COMPANY_ADRESS	VARCHAR(20)	
T4_COMPANY_CONTACT_NUMBER	VARCHAR(10)	
T4_COMPANY_FAX	INT	
T4_COMPANY_EMAIL	VARCHAR(20)	
T4_COMPANY_WEBSITE	VARCHAR(20)	
T4_COMPANY_LOCTAION	VARCHAR(20)	
T4_COMPANY_OFFICE_NAME	VARCHAR(20)	

EXPLANATION:-

The T4_INSURANCE COMPANY attributes record all the essential company details of the customer. The T4_COMPANY_NAME and T4_COMPANY_DEPARTMENT_NAME are the primary keys.

Table-LDM 16: T4_POLICY_RENEWABLE

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_POLICY_RENEWABLE_ID	VARCHAR(20)	PK

T4_AGREEMENT_ID	VARCHAR(20)	FK
T4_APPLICATION_ID	VARCHAR(20)	FK
T4_CUST_ID	INT	FK
T4_DATE_OF_RENEWAL	DATE	
T4_TYPE_OF_RENEWAL	CHAR(15)	

EXPLANATION:-

The T4_POLICY RENEWABLE attributes record all the essential policy renewal details of the insured customer. The T4_POLICY_RENEWABLE_ID is the unique primary key and the T4_AGREEMENT_ID, T4_APPLICATION_ID and T4_CUST_ID are foreign keys linking the table back to the respective entities.

Table-LDM 17: T4_INCIDENT

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
INCIDENT_ID	VARCHAR(20)	PK
INCIDENT_TYPE	VARCHAR(30)	
INCIDENT_DATE	DATE	
DESCRIPTION	VARCHAR(100)	

EXPLANATION:-

The T4_INCIDENT attributes record all the essential incident details such as Accident and theft on the insured customer vehicle. The T4_INCIDENT_ID is the unique primary key.

Table-LDM 18: T4_INCIDENT_REPORT

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_INCIDENT_REPORT_ID	VARCHAR(20)	PK
T4_INCIDENT_ID	VARCHAR(20)	FK
T4_CUST_ID	INT	FK
T4_INCIDENT_TYEP	CHAR(10)	
T4_INCIDENT_INSPECTOR	VARCHAR(20)	
T4_INCIDENT_COST	INT	
T4_INCIDENT_REPORT_DESCRIPTION	VARCHAR(100)	

EXPLANATION:-

The T4_ INCIDENT_REPORT_ID attributes record all the essential incident occurrences on the customer vehicle. The T4_INCIDENT_REPORT_ID is the unique primary key and the T4_CUST_ID, AND T4_INCIDENT_ID are foreign keys linking the table back to their respective entity types.

Table-LDM 19: T4_COVERAGE

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_COVERAGE_ID	VARCHAR(20)	PK
T4_COMPANY_NAME	VARCHAR(20)	FK
T4_COVERAGE_AMOUNT	INT	
T4_COVERAGE_TYPE	CHAR(15)	
T4_COVERAGE_LEVEL	CHAR(10)	

T4_PRODUCT_ID	VARCHAR(20)	
T4_COVERAGE_DESCRIPTION	VARCHAR(100)	
T4_COVERAGE_TERMS	VARCHAR(50)	

EXPLANATION:-

The T4_COVERAGE attributes record all the essential coverage details of the insurance policy to the customer. The T4_COVERAGE_ID is the unique primary key and the T4_COMPANY_NAME is a foreign key linking the table back to the entity type T4_COMPANY.

Table-LDM 20: T4_PRODUCT

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_PRODUCT_NUMB ER	VARCHAR(20)	PK
T4_COMPANY_NAME	VARCHAR(20)	FK
T4_PRODUCT_TYPE	CHAR(15)	
T4_PRODUCT_PRICE	INT	

EXPLANATION:-

The T4_PRODUCT attributes record all the essential company products details offered by the Insurance company. The T4_PRODUCT_NUMBER is the unique primary key and T4_COMPANY_NAME is the foreign key linking table to T4_COMPANY entities.

Table-LDM 21: T4_RECEIPT

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_RECIEPT_ID	VARCHAR(20)	PK
T4_PREMIUM_PAYMENT_ID	VARCHAR(20)	FK
T4_CUST_ID	INT	FK
T4_TIME	DATE	
T4_COST	INT	

EXPLANATION:-

The T4_RECEIPT attributes record all the essential payments done by T4_CUSTOMERS to the Insurance company. The T4_RECEIPT_ID is the unique primary key and T4_PREMIUM_PAYMENT_ID and T4_CUST_ID are Foreign keys linking tables to their respective entities.

Table-LDM 22: T4_INSURANCE_POLICY_COVERAGE

Attributes	Data type	PRIMARY KEYS AND FOREIGN KEYS
T4_AGREEMENT_ID	VARCHAR(20)	PK
T4_COVERAGE_ID	VARCHAR(20)	FK

EXPLANATION:-

The T4_INSURANCE_POLICY_COVERAGE records details of the Vehicle policy that entails Terms Conditions of the Contract. T4_AGREEMENT_ID is the unique primary key and T4_COVERAGE_ID is the Foreign key linking this table to T4_COVERAGE Entity.

Graphical presentation of LDM

The Logical Data Model (LDM) that we have designed for this part of report in graphical Figure-LDM 1. It has all the entity types, attributes and relationships that are valid and pertinent in designing our online vehicle insurance database system.

Figure-LDM 1: Logical data model of Vehicle insurance for AVIVA Ltd.