Data Fundamentals:
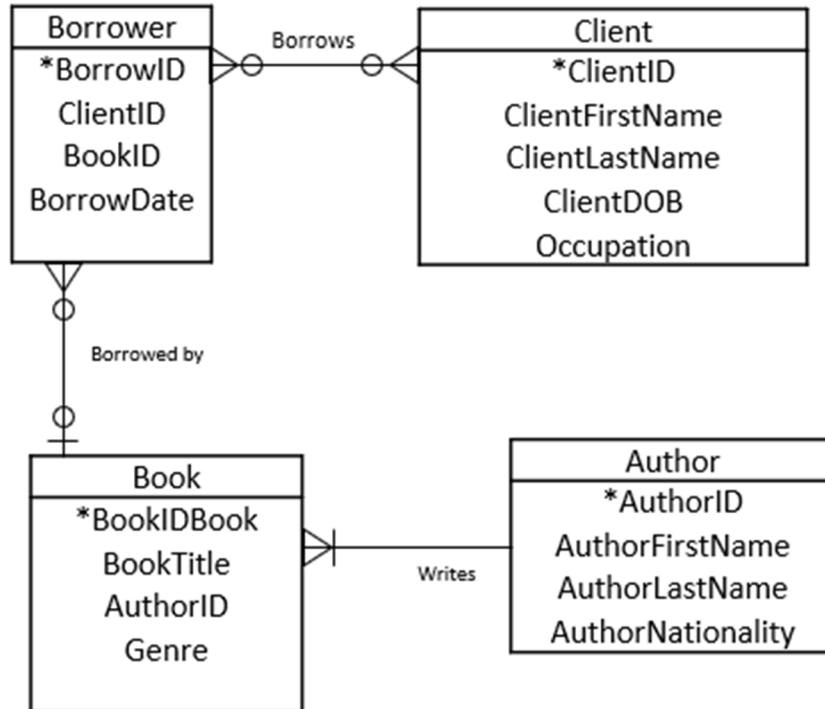
Database Evaluation Essay

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Part 1 – Retrieving Data from a Database

SQL Statements

- Select all borrowers:
  SELECT *
  FROM Borrower;

- Select all books borrowed by borrowers, order by borrow date:
  SELECT *
  FROM Book
  WHERE Borrower.BookID = Book.BookIDBook
  ORDER BY Borrower.BorrowDate ASC;

- Select all books and include the author first and last name:
  SELECT *
          (
          INSERT INTO Book (AuthorFirstName, AuthorLastName)
          SELECT AuthorFirstName, AuthorLastName
          FROM Author
)
  FROM Book;

- Insert a new client with an occupation of pilot:
  INSERT INTO Client (Occupation)

VALUES ('pilot');

Part 2 – Database Normalization

Existing Dependencies in the current database

Table Strucutre for Produce

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
Foreign Key	SUPPLIERID	CHAR (10)	No
	PLUCODE	CHAR (4,2)	No
	PRODUCENAME	CHAR (15)	No
	TYPE	CHAR (10)	No
	STOCKQTY	NUMBER (4,2)	No
	NXTDELIVERY	DATE	No

Table Structure for Animal Products

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
Foreign Key	SUPPLIERID	CHAR (10)	No
	ANPRDNAME	CHAR (15)	No
	TYPE	CHAR (10)	No
	STOCKQTY	NUMBER(4,2)	No
	NXTDELIVERY	DATE	Yes

Table Structure for Grains

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
Foreign Key	SUPPLIERID	CHAR (10)	No
	GRAINNAME	CHAR (15)	No
	TYPE	CHAR (10)	No
	STOCKQTY	NUMBER(4,2)	No
	NXTDELIVERY	DATE	Yes

Table Structure of Suppliers

	COLUMN_NAME	DATA_TYPE	NULLABLE
Primary Key	SUPPLIERID	CHAR (10)	No
	LASTDELIVERY	DATE	Yes
	SPECIALTY	CHAR (15)	Yes
	ACTIVE	CHAR (1)	No

Table Structure of Purchases

	COLUMN_NAME	DATA_TYPE	NULLABLE
Primary Key	ITEMID	CHAR (5)	No
	TOTALBOUGHT	NUMBER (8,2)	Yes
	TOTALSOLD	NUMBER(8,2)	Yes
	TOTALREV	NUMBER(10,2	Yes
	MARGIN	NUMBER(10,2	Yes

Based on the above Entity Relationship Diagram made from Microsoft Excel with given miniature database tables, it is notable that ITEMIDs are highlighted in yellow and SUPPLIERIDs are highlighted in green.

Both have Primary and Foreign Keys labeled next to the COLUMN_NAME based on few assumptions. When the purchases are made from suppliers, ITEMID are recorded with new purchases. The new and existing inventories are recorded in the SUPPLIERID. Therefore, two tables are linked through the Produce, Animal Products, and Grain Tables with their respective Primary Keys (ITEMID & SUPPLIERID). As new items are delivered, each field is updated accordingly (Study.com, 2022). ITEMID has 1:Many relationship with items that populate the Produce, Animal Products, and Grain Tables. Therefore, ITEMID serves as a Foreign Key for all three tables. SUPPLIERID has 1:Many relationship with items that populate the Produce, Animal Products, and Grain Tables. Therefore, SUPPLIERID serves as a Foreign Key for all three tables (Study.com, 2022).

Based on the above Entity Relationship Diagram (ERD), there are two primary keys and several foreign keys in the database. The ITEMID serves as a Foreign Key in the Produce, Animal Products, and Grain Tables (Study.com, 2022) since each of these IDs is referencing to Primary Key record in the

Purchases table. Which is unique record of the table. SUPPLIERID serves as a Foreign Key in the Produce,

Animal Products, and Grain Tables (Study.com, 2022) since each other these IDs is referencing to

Primary key record in the Suppliers table. Both Suppliers and Purchases tables can be join using the

common keys in Produce, Animal Products, and Grain Tables since both have SUPPLIERID and ITEMID for

line items or rows (Study.com, 2022). The database can change its structure by adding a purchase ID as

primary and making the ITEMID as foreign and adding purchase ID as foreign keys to three other tables

(Produce, Animal Products, and Grain).

Normalization - Steps to 3NF

First Normal Form (1NF) calls for each column being a single value, not multiple values. Each

column or field should have a unique name. Next, all values in a column or field should have the same

data type. Lastly, no two records or rows are identical (Study.com, 2022). Two Primary Key holder tables

(Suppliers and Purchases) meet these requirements. Other three tables meet these requirements

implicitly by implying that the last requirement, unique records, is met given the assumption of ITEMID

and SUPPLIERID are unique across the tables. Therefore, all five tables meet the 1NF requirements.

Second Normal Form (2NF) calls for no partial dependencies of any columns on the Primary Key

for the subject table along with 1NF conditions are met (Study.com, 2022). Product, Animal Products,

Grains have partial dependencies on the PLUCODE, PRODUCENAME, ANPRDNAME, and GRAINNAME to

ITEMID. SPECIALTY column in the Suppliers table is depended on the SUPPLIERID. Only Purchases table

meet 2NF. All the other tables can meet the requirements by moving the dependent attributes to a new

table using ITEMID as a Foreign Key.

Third Normal Form (3NF) requires no transitive dependency in the tables (Study.com, 2022).

Purchases table has transitive dependency because TOTALREV are derived from TOTALBOUGHT minus

TOTALSOLD. Also, MARGIN has transitive dependency with TOTALREV divided by ITEMID counts.

Purchases tables can be divided into three parts to achieve the 3NF.

Part 3 – Developing ERD
Entity Relationship Diagram

Produce_Inv

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
Foreign Key	SUPPLIERID	CHAR (10)	No
	STOCKQTY	NUMBER (4,2)	No
	NXTDELIVERY	DATE	No

Produce_NM

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
	PLUCODE	CHAR (4,2)	No
	PRODUCENAME	CHAR (15)	No
	TYPE	CHAR (10)	No

Animal Products_Inv

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
Foreign Key	SUPPLIERID	CHAR (10)	No
	STOCKQTY	NUMBER(4,2)	No
	NXTDELIVERY	DATE	Yes

Animal Products_NM

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
	ANPRDNAME	CHAR (15)	No
	TYPE	CHAR (10)	No

Suppliers_Delivery

	COLUMN_NAME	DATA_TYPE	NULLABLE
Primary Key	SUPPLIERID	CHAR (10)	No
	LASTDELIVERY	DATE	Yes

Suppliers_Status

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	SUPPLIERID	CHAR (10)	No
	SPECIALTY	CHAR (15)	Yes
	ACTIVE	CHAR (1)	No

Grains_Inv

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
Foreign Key	SUPPLIERID	CHAR (10)	No
	STOCKQTY	NUMBER(4,2)	No
	NXTDELIVERY	DATE	Yes

Grains_NM

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
	GRAINNAME	CHAR (15)	No
	TYPE	CHAR (10)	No

Purchases_Gross

	COLUMN_NAME	DATA_TYPE	NULLABLE
Primary Key	ITEMID	CHAR (5)	No
	TOTALBOUGHT	NUMBER (8,2)	Yes
	TOTALSOLD	NUMBER(8,2)	Yes

Purchases_Rev

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
	TOTALREV	NUMBER(10,2)	Yes

Purchases_Margin

	COLUMN_NAME	DATA_TYPE	NULLABLE
Foreign Key	ITEMID	CHAR (5)	No
	MARGIN	NUMBER(10,2)	Yes

Reference:

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   (2022). Study.Com. https://study.com/academy/lesson/database-fundamentals-designing-

   a-simple-database.html