Nursery Management Database

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Objectives

- **Comprehensive learning of database designing:**
  The primary objective of the project is to learn how to develop a database in SQL. This learning will serve as a guide in future applications of database concepts in several other kinds of larger projects.

- **Exploring Real-World Applications:**
  To apply knowledge of databases and SQL to nursery management. This includes understanding the specific data needs of a nursery and how a database can meet these needs by using DDL(Data Definition Language), DML(Data Manipulation Language) and PL/SQL commands.

- **Providing public service:**
  Any project should base on a principal criterion, that is to be in use of people. This project aims to serve the community concerned with the buying, selling and supply activities of nursery plants to make them easier to handle.

Introduction

Overview

The database system serves as the backbone of the project, providing efficient and reliable storage, retrieval, and manipulation of data related to plants, customers, orders, order details, suppliers, and supply.

The project involved the use of various SQL commands for Data Definition Language (DDL) and Data Manipulation Language (DML) operations. DDL operations were used to define and modify the structure of the database tables, while DML operations were used to insert, update, delete, and retrieve data within these tables. The tables designed for this project include Plants, Customers, Orders, OrderDetails, Suppliers, and Supply, each serving a unique role within the nursery management system.

In addition to DDL and DML operations, the project also involved the use of PL/SQL, Oracle's procedural extension for SQL, to create more complex and powerful database operations. This allowed for the creation of stored procedures and functions, conditional statements, and loops within the SQL environment, enhancing the functionality and efficiency of the database system.

Database Schema

The relations/tables of the database are built with several necessary attributes:

1. Plants: Contains plant IDs, their names, types, prices and stocks.
2. Customers: Records customers' IDs, their first and last names, email and phone numbers.
3. Orders: Comprised of order IDs, customer IDs and order dates.
4. OrderDetails: Stores order-detail IDs, order IDs, plant IDs, and quantity data.
5. Suppliers: Contains supplier IDs, suppliers' names, contact names, emails and phone numbers.
6. Supply: Records supply IDs, plant IDs, suppliers' IDs, supply date and quantity of supply.

Database Language and commands

All the database operations have been performed using SQL and PL/SQL commands.

DDL(Data Definition Language):

DDL, or Data Definition Language, is a subset of SQL (Structured Query Language) used to define and manage the structure of a database. It deals with the descriptions of the database schema and is used to create, modify, and delete the structure of database objects.

DDL commands used for the project:

CREATE: This command has been used to create new tables.

DROP: This command has been used to delete any existing tables, or other database objects.

ALTER: This command has been used to modify the structure of the existing database and tables.

RENAME: This command has been used to rename existing database objects(columns).

DML(Data Manipulation Language):

DML, or Data Manipulation Language, is a subset of SQL (Structured Query Language) used to manipulate the data stored in a database. DML commands are used to insert, update, delete, and retrieve data within database tables.

DML commands used for the project:

SELECT: This command has been used to retrieve data from one or more tables. It has been used to select specific columns, filter rows using conditions, group data, and more.

INSERT: This command has been used to add new rows of data to a table.

UPDATE: This command has been used to modify existing data in a table.

DELETE: This command has been used to remove existing rows of data from a table.

PL/SQL:

PL/SQL, which stands for Procedural Language extensions to SQL, is a procedural language developed by Oracle Corporation to enhance the capabilities of SQL. It allows developers to combine the power of SQL with procedural programming constructs.

PL/SQL commands used for the project:

Cursor: A cursor is a pointer to a memory area known as the context area that contains the result set of a SQL query.

Rowcount: SQL%ROWCOUNT is a cursor attribute that returns the number of rows affected by the most recent DML statement such as INSERT, UPDATE, or DELETE.

For Loop: A for loop is a control structure that allows repeated execution of a block of statements for a specific number of times. The loop index is incremented by one after each iteration.

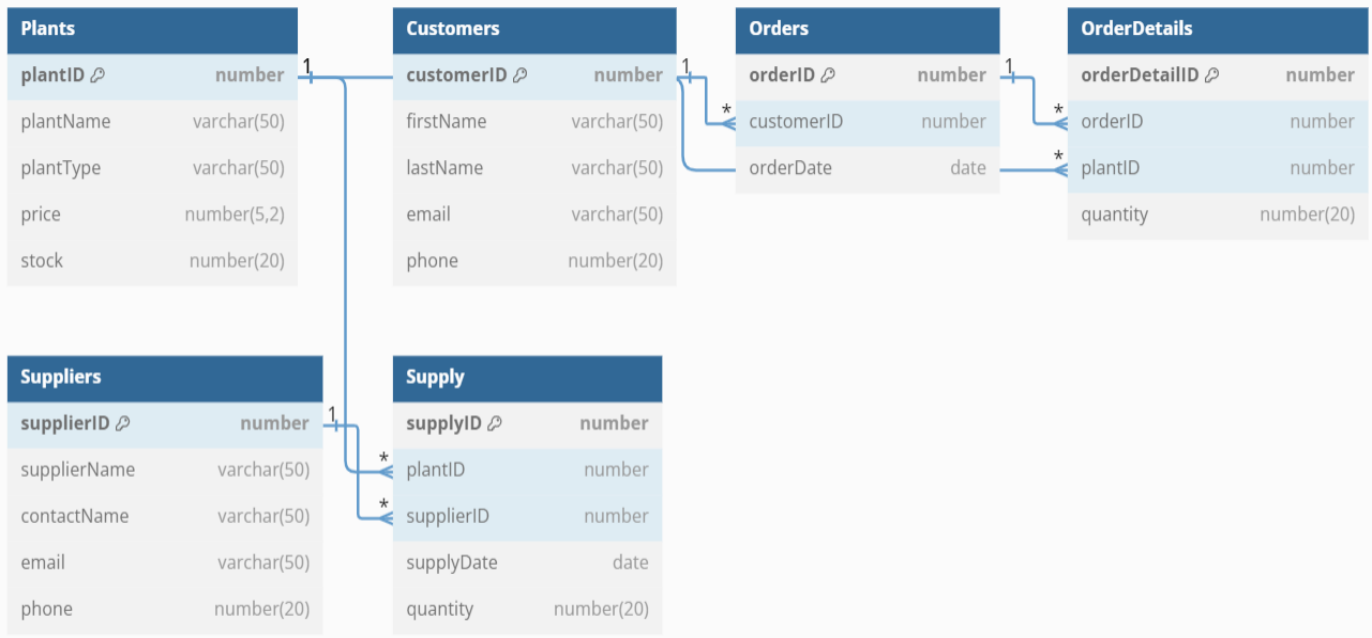
Array with Extend(): In PL/SQL, the EXTEND method is used to add elements to the end of a VARRAY or Nested Table. Before adding a new element to an empty VARRAY, it has to be extended.

Procedure: A PL/SQL procedure is a named, reusable program unit stored in the Oracle Database. It encapsulates a sequence of statements that perform a specific task.

Function: A PL/SQL function is similar to a procedure but it returns a value. It's a named, reusable program unit stored in Oracle Database.

Trigger: In PL/SQL, a trigger is a named block of code that is automatically executed in response to certain events such as changes to data in a table.

Entity-Relationship Diagram:



Application and Potential Users:

The database system is designed to manage various aspects of a nursery or plant store. It keeps track of the plants available (Plants table), the customers who purchase from the store (Customers table), the orders placed by customers (Orders and OrderDetails tables), and the suppliers who supply the plants (Suppliers and Supply tables). The system can handle tasks such as inventory management, order processing, customer management, and supplier management.

The potential users of this database system include:

Employees: Employees of the nursery or plant store would be primary users of this system. They would use it to manage inventory, process orders, and handle customer information.

Managers: Managers would use the system to oversee operations, track sales, manage suppliers, and make data-driven decisions to improve the business.

Suppliers: Suppliers might interact with the system to update supply information, track their orders, and maintain their relationship with the nursery or plant store.

Customers: In a more advanced system, customers could potentially interact with a front-end application connected to this database to place orders, track their order status, and manage their personal information.

Conclusion

The project has been successfully accomplished with achievement of objectives. Through the project, not only the knowledge of database management with SQL has been forged, but also it has been applied to solve a real-world problem concerning nursery management related data. Although the project has been a success, following challenges arose and were curved to overcome:

Null Values: Null values led to unexpected results in queries and calculations. Null values have been handled using 'NOT NULL' constraint.

Duplicate Entries: Duplicate entries led to data redundancy and inconsistencies. Unique constraints and primary keys have been used to prevent duplicate entries in the database.

Data Type Mismatches: Inserting or updating data with a data type that doesn't match the column's data type can led to errors or data loss. Data types, therefore, have been checked before performing insert or update operations.

Referential Integrity: Deleting a row with a primary key that is referenced by a foreign key in another table led to errors. These situations have been handled using appropriate referential action 'CASCADE'.

Date and Time Issues: Date and time data might lead to issues due to different formats, time zones, daylight saving time changes, leap years, etc. So date and

time data across the database has been stored in a consistent and unambiguous format.