Shastri 3rd Semester

Computer Science

Unit 3

Overview of Visual Foxpro

- Visual FoxPro (VFP) is an object-oriented programming language and data management system developed by Microsoft.
- VFP was designed for creating database applications and it's known for its speed and ability to handle large amounts of data.
- VFP was first released in 1992 and the latest version was 9.0 which was released in 2007.
- VFP is a powerful tool for creating standalone applications, as well as client-server and web-based systems.
- VFP allows to create of forms, reports, and other visual elements with the included form and report designer.
- VFP features a SQL-based query language, which allows for efficient data retrieval from tables and queries.
- VFP allows to create of user-defined functions, procedures, and classes toof encapsulate complex logic and reuse code.
- VFP allows to the creation and maintains indexes and relationships between tables to improve performance and data integrity.
- VFP has support for various data types such as strings, numbers, dates, and logical data.
- VFP supports the use of object-oriented programming techniques, such as inheritance, polymorphism, and encapsulation.
- VFP has a visual development environment, which includes a variety of tools and wizards to simplify the development process.
- Microsoft ended its support for VFP in 2015.
- Nowadays, most developers use other languages and platforms for development such as .NET, Java, Python, etc.

Characteristics of Visual Foxpro

- Object-Oriented: VFP is an object-oriented programming language, which allows for the creation of user-defined classes, objects, and methods.

- Data-Centric: VFP is designed to work with data and allows the creation and maintenance of tables, queries, and indexes.

- SQL-based: VFP includes a SQL-based query language that allows for efficient data retrieval from tables and queries.

- Rapid Application Development: VFP allows for rapid application development with the use of tools and wizards for creating forms, reports, and other visual elements.

- Visual Development Environment: VFP features a visual development environment that includes a variety of tools and wizards to simplify the development process.

- Support for Multiple Data Types: VFP supports various data types such as strings, numbers, dates, and logical data.

- Support for Object-Oriented Programming Techniques: VFP supports the use of object-oriented programming techniques, such as inheritance, polymorphism, and encapsulation.

- Support for User-Defined Functions: VFP allows the creation of user-defined functions, procedures, and classes to encapsulate complex logic and reuse code.

- Support for Data Integrity and Referential Integrity: VFP allows for the enforcement of data integrity constraints such as primary key, foreign key, and check constraints.

- Support for Data Relationships: VFP allows for the creation of complex relationships between tables through the use of primary keys and foreign keys.

- Support for Data Security: VFP provides a wide range of security features such as user authentication and access control.

- Support for Data Consistency: VFP ensures that the data in the database is consistent by maintaining referential integrity.

- Support for Scalability: VFP allows for easy scaling of the database by adding more tables, fields, and indexes.

- Not supported anymore: Microsoft ended its support for VFP in 2015.

DBMS is a basic system for storing and retrieving data, an RDBMS is a more advanced system that allows for the creation of complex relationships between tables and the enforcement of data integrity through the use of constraints and indexes.

Visual Foxpro 6.0: Concept of relational databases

Visual FoxPro 6.0 is a relational database management system (RDBMS) that uses the FoxPro programming language. A relational database is a type of database that organizes data into one or more tables, with each table consisting of a set of rows (or records) and columns (or fields). The tables are related to each other through the use of keys, which are fields that are used to link the tables together.

In Visual FoxPro 6.0, tables can be related to each other through the use of primary keys and foreign keys. A primary key is a field or set of fields in a table that uniquely identifies each record in the table. A foreign key is a field or set of fields in one table that is used to link it to the primary key of another table. This creates a relationship between the two tables, allowing data to be retrieved from one table based on values in the other table.

Visual FoxPro 6.0 also allows for the creation of indexes, which are used to speed up the process of searching and sorting data within a table. It also provides support for SQL (Structured Query Language) which is the standard language for managing and manipulating relational databases.

Visual FoxPro 6.0 provides a powerful and flexible tool for working with relational databases and allows for the creation of complex, data-driven applications.

Importance of RDBMS

RDBMS (Relational Database Management System) is an important type of software system that is used to create, manage, and maintain relational databases. Some of the key advantages of using RDBMS include:

- **Data Integrity:** RDBMS allows for the enforcement of data integrity constraints such as primary key, foreign key, and check constraints. This ensures that the data in the database is accurate and consistent.

- **Data Relationships:** RDBMS allows for the creation of complex relationships between tables through the use of primary keys and foreign keys. This allows for data to be related in a logical and meaningful way.

- **Data Security:** RDBMS provides a wide range of security features such as user authentication and access control. This ensures that only authorized users can access the data in the database.

- **Data Consistency:** RDBMS ensures that the data in the database is consistent by maintaining referential integrity. This prevents data inconsistencies from arising due to changes in the data.

- **Data Accessibility:** RDBMS allows for easy and efficient data retrieval through the use of SQL (Structured Query Language). This makes it easy to access and manipulate data in the database.

- **Scalability:** RDBMS allows for easy scaling of the database by adding more tables, fields, and indexes. This allows the system to adapt to changing needs and growth.

RDBMS is an important tool for managing and maintaining large and complex databases in an efficient, organize,d and, secure way.

Difference between DBMS and RDBMS in a table

A DBMS (Database Management System) and an RDBMS (Relational Database Management System) are both types of software systems that are used to create, manage, and maintain databases. However, there are some key differences between the two:

DBMS	RDBMS
DBMS is a database management system that is designed to manage a database.	RDBMS is a relational database management system that is designed to manage a relational database.
DBMS stores data in a flat file system, where all the data is stored in a single file.	RDBMS stores data in a tabular format, where data is stored in multiple tables that are related to each other through a common field.
DBMS does not support relationships between tables.	RDBMS supports relationships between tables through the use of a primary key and foreign key.
DBMS does not support data integrity and referential integrity.	RDBMS supports data integrity and referential integrity through the use of constraints and indexes.
DBMS does not support SQL (Structured Query Language).	RDBMS supports SQL, which is used to retrieve, insert, update and delete data in the database.

Datatypes

In Visual FoxPro 6.0, data types are used to define the type of data that a variable or field can hold. The most commonly used data types in Visual FoxPro 6.0 include:

- **Character:** A character is a sequence of characters used to store text data. It is denoted by the "C" in the field definition.
- **Numeric:** A numeric data type is used to store numeric values. It is denoted by the "N" in the field definition.
- **Date:** A date data type is used to store date and time values. It is denoted by the "D" in the field definition.
- **Logical:** A logical data type is used to store Boolean values (True or False). It is denoted by the "L" in the field definition.

- **Currency:** A currency data type is used to store monetary values. It is denoted by the "Y" in the field definition.
- **Memo:** A memo data type is used to store large amounts of text data. It is denoted by the "M" in the field definition.
- **Integer:** An integer data type is used to store whole numbers. It is denoted by the "I" in the field definition.

It's important to choose the appropriate data type when creating variables and fields in your FoxPro program in order to ensure that the data is stored and used correctly.

Visual FoxPro 6.0, operators

In Visual FoxPro 6.0, operators are used to performing various operations on data and variables. Some of the most commonly used operators in Visual FoxPro 6.0 include:

- **Arithmetic operators:** These operators perform basic arithmetic calculations such as addition (+), subtraction (-), multiplication (*), and division (/).
- **Comparison operators:** These operators compare two values and return a logical value based on the comparison. They include equal to (==), not equal to (<>), greater than (>), less than (<), greater than or equal to (>=), and less than or equal to (<=).
- **Logical operators:** These operators perform logical operations such as AND, OR and NOT. They are used to combine multiple comparisons or conditions.
- **Concatenation operator:** This operator is used to join two or more strings together. The operator is the ampersand symbol (&).
- **Conditional operator:** This operator is used to assign a value based on a condition. The operator is the question mark (?).
- **Membership operator:** This operator is used to test for the presence of a value within a range or a set of values. The operator is the IN keyword.
- **Like operator:** This operator is used to match a string against a pattern. It uses the wildcard characters * and ?. The operator is the LIKE keyword.

It's important to use the correct operator for the operation you're trying to perform, in order to avoid errors in your code and to get the desired result.

Components of Visual Foxpro Database

A Visual FoxPro database is made up of several components that work together to store, manage, and retrieve data. These components include:

- **Tables:** Tables are the basic building blocks of a Visual FoxPro database and are used to store data in a tabular format. Each table has a set of fields (columns) that define the types of data that can be stored in the table, and a set of records (rows) that contain the actual data.
- **Fields:** Fields are the individual columns within a table that define the types of data that can be stored in the table. Each field has a name and a data type, such as string, number, date, or logical.
- **Indexes:** Indexes are used to speed up the retrieval of data from tables. They are like a "road map" that helps Visual FoxPro quickly find specific records in a table. Indexes can be created on one or more fields in a table and can be either ascending or descending.
- **Queries:** Queries are used to retrieve specific data from one or more tables based on a set of conditions. They are created using SQL (Structured Query Language) and can be used to filter, sort, and join data from multiple tables.
- **Forms:** Forms are used to create user interfaces for data entry and editing. They allow users to interact with the data in a table by displaying the fields in a visually pleasing way, and providing features such as data validation, navigation, and data entry.
- **Reports:** Reports are used to present data in a formatted, easy-to-read way. They can be created using the Report Designer, which allows users to customize the layout, font, and other formatting options.
- **Procedures:** Procedures are blocks of code that can be called by other code to perform specific tasks. They can be used to encapsulate complex logic, reduce code duplication, and improve the maintainability of a program.
- **Classes:** Classes are used to define the properties and methods of objects. They can be used to create a blueprint for objects, and to encapsulate data and behavior.

All these components work together to store, manage, and retrieve data in a Visual FoxPro database.

create a database

To create a database in Visual FoxPro 6.0, you can follow these steps:
1. From the File menu, select New and then Database.
2. In the New Database dialog box, specify the location and name of the new database.
3. Select a data type for the database, such as dBase III, FoxPro 2.5, or Free Table.
4. Click OK to create the new database.
5. Once the new database is created, you can add tables to it by using the File > New > Table command, or by importing existing tables from other sources.
6. To add fields to a table, you can use the Design option in the File menu.
7. To add data to the table, you can use the Data option in the File menu.
8. To create relationships between tables, you can use the Relationships option in the File menu.

It's worth mentioning that Visual FoxPro 6.0 is an old version and is not supported anymore. If you are planning to work with databases, it's recommended to use a more recent version of Visual FoxPro or other database management systems that have more advanced features and support.

Creating a Database:
- To create a new database in Visual FoxPro 6.0, use the CREATE DATABASE command. The syntax for the command is: CREATE DATABASE databaseName
- For example: CREATE DATABASE MyDB

Adding new records:
- To add new records to a table in Visual FoxPro 6.0, use the APPEND command. The syntax for the command is: APPEND BLANK
- This will create a new blank record in the table. You can then use the REPLACE command to add data to the fields of the new record.

Editing a record:
- To edit a record in a table in Visual FoxPro 6.0, you can use the SEEK command to locate the record, and then use the REPLACE command to edit the fields of the record.
- The syntax for the SEEK command is: SEEK search Expression

- For example: SEEK "Ashok"
- Once you have located the record, you can use the REPLACE command to edit the fields. The syntax for the REPLACE command is: REPLACE fieldName WITH newValue
- For example: REPLACE Phone WITH "555-555-5555"

Renaming a field:
- To rename a field in a table in Visual FoxPro 6.0, you can use the MODIFY STRUCTURE command. The syntax for the command is: MODIFY STRUCTURE fieldName TO newFieldName
- For example: MODIFY STRUCTURE Phone TO Telephone

Displaying a database:
- To display the contents of a table in Visual FoxPro 6.0, you can use the BROWSE command. The syntax for the command is: BROWSE
- This will open a Browse window that displays the contents of the table. You can also use the SELECT command to display the contents of a specific table or query. The syntax for the SELECT command is: SELECT tableName
- For example SELECT Customers

Several Commands

Visual FoxPro 6.0 is a programming language and a database management system that includes a wide variety of commands for working with data and program flow. Some of the most commonly used commands in Visual FoxPro 6.0 include:
- SELECT: opens a table or a query and makes it the current table.
- USE: opens a table and makes it the current table.
- BROWSE: opens a table in a browsable window.
- CLOSE: closes a table or a query.
- COPY TO: creates a copy of a table.
- APPEND FROM: adds the data from one table to another table.
- DELETE: deletes the current record or a selected set of records.
- PACK: removes deleted records from a table.
- ZAP: deletes all records from a table and resets the table's structure.
- INDEX ON: creates an index on one or more fields of a table.

- SET ORDER TO: sets the order of the records in a table.
- GO TOP: moves to the first record of a table.
- GO BOTTOM: moves to the last record of a table.
- SKIP: moves a specified number of records forward or backward.
- SEEK: locates a record in a table based on a value in one of its fields.
- LOCATE: locates a set of records in a table based on a condition.
- FIND: locates the first occurrence of

Visual FoxPro 6.0 is a programming language and database management system that includes a wide variety of commands for working with data and program flow. Some of the most commonly used commands in Visual FoxPro 6.0 and their syntax include:

- SELECT: opens a table or a query and makes it the current table. Syntax: SELECT [table name]
- USE: opens a table and makes it the current table. Syntax: USE [table name]
- BROWSE: opens a table in a browsable window. Syntax: BROWSE [table name]
- CLOSE: closes a table or a query. Syntax: CLOSE [table name]
- COPY TO: creates a copy of a table. Syntax: COPY TO [new table name]
- APPEND FROM: adds the data from one table to another table. Syntax: APPEND FROM [table name]
- DELETE: deletes the current record or a selected set of records. Syntax: DELETE [condition]
- PACK: removes deleted records from a table. Syntax: PACK [table name]
- ZAP: deletes all records from a table and resets the table's structure. Syntax: ZAP [table name]
- INDEX ON: creates an index on one or more fields of a table. Syntax: INDEX ON [field name] TO [index name]
- SET ORDER TO: sets the order of the records in a
- INDEX ON <fields> TAG <index name>: creates an index on one or more fields of a table.
- SET ORDER TO <index name>: sets the order of the records in a table.
- GO TOP: moves to the first record of a table.
- GO BOTTOM: moves to the last record of a table.

- SKIP <number of records>: moves a specified number of records forward or backward.
- SEEK <value>

Visual Foxpro 6.0: Entering and Viewing data using the form Wizard

In Visual FoxPro 6.0, the Form Wizard is a tool that allows you to quickly create a form for entering and viewing data in a table. The Form Wizard guides you through the process of selecting the table, fields, and layout for your form, and it generates the necessary code to create the form and its controls.

To use the Form Wizard, you would first open a table in the Database Designer and then select the "Form Wizard" option from the "File" menu. The wizard will then prompt you to select the fields that you want to include on the form, as well as the layout and style of the form. Once you have made your selections, the wizard will generate the form and its controls, which you can then edit and customize as needed.

Once the form is created, you can use it to enter and view data in the table. The form will have textboxes, checkboxes, and other controls that correspond to the fields in the table. You can use these controls to enter and edit data, and you can also use the form's navigation buttons to move between records and view different data in the table.

Using the form Wizard can save a lot of time and effort when creating forms for data entry and view, it also can be useful for creating a prototype of the form before starting the full development process.

Visual Foxpro 6.0: Query Wizard to work with Relational databases

In Visual FoxPro 6.0, the Query Wizard is a tool that allows you to quickly create a query for working with relational databases. A query is a command that retrieves data from one or more tables based on specific criteria. The Query Wizard guides you through the process of selecting the tables and fields that you want to include in the query, as well as the criteria for retrieving data.

To use the Query Wizard, you would first open the Database Designer and then select the "Query Wizard" option from the "File" menu. The wizard will then prompt you to select the tables and fields that you want to include in the query, as well as

the criteria for retrieving data. Once you have made your selections, the wizard will generate the necessary SQL code to create the query.

The wizard will also create a grid that displays the results of the query, and it will also provide the ability to edit and modify the SQL statement. Once you have created the query, you can use it to retrieve specific data from the tables and use it in your application.

Using the Query Wizard can save a lot of time and effort when creating queries for relational databases, as it eliminates the need to manually write the SQL code. It also allows for the creation of complex queries that involve multiple tables and various conditions.

Visual Foxpro 6.0: Using one-to-many Report Wizard

In Visual FoxPro 6.0, the Report Wizard is a tool that allows you to quickly create a report that displays data from a one-to-many relationship between two tables. A one-to-many relationship is a type of relationship in which one record in a table is related to multiple records in another table. This can be useful for creating reports that display detailed information about a specific record, such as a list of products for a specific order in a sales database.

To use the Report Wizard to create a one-to-many report, you would first open the Database Designer and then select the "Report Wizard" option from the "File" menu. The wizard will then prompt you to select the tables and fields that you want to include in the report, as well as the criteria for retrieving data. Once you have made your selections, the wizard will generate the necessary code to create the report, including the layout and style of the report.

Once the report is created, you can use it to display the data from the tables in a meaningful way. The report will have fields that correspond to the selected fields in the tables, and it will also display the data in a way that makes it easy to understand the one-to-many relationship between the tables.

Using the Report Wizard can save a lot of time and effort when creating reports that display data from one-to-many relationships, it also allows for the creation of complex reports that involve multiple tables and various conditions. Additionally, it can help non-technical users to generate reports with minimal effort.

Visual Foxpro 6.0: Using the View Window, Using Queries, and SQL

Visual FoxPro 6.0 is a database management system and programming language that allows you to create and manipulate data in a variety of ways. The View Window is a feature in Visual FoxPro that allows you to view and edit data in a table or a query result set. Queries and SQL (Structured Query Language) are used to retrieve specific data from the database based on certain criteria. In Visual FoxPro, you can use the Query Builder or the SQL Select command to create and execute queries and retrieve the desired data. The results of a query can then be viewed in the View Window. You can also use the SQL Select statement to retrieve data from one or more tables, and join them together to create a new result set.

Visual Foxpro 6.0: The Query designer, working with multiple tables,

directing output, viewing SOL code, maximizing the table view

In Visual FoxPro 6.0, the Query Designer is a tool that allows you to create and edit queries in a graphical user interface. It allows you to add tables, fields, and set up relationships between them, as well as specify criteria for retrieving data.

When working with multiple tables in a query, you can use the Query Designer to set up relationships between them, such as specifying a primary key and a foreign key, which will help Visual FoxPro understand how to join the tables together. This will allow you to retrieve data from multiple tables in a single query.

In Visual FoxPro, you can direct the output of a query to a variety of different formats, such as a table, a cursor, or a text file. You can also use the SQL Select statement to retrieve data from one or more tables, and join them together to create a new result set.

You can view the SOL code of a query by selecting the "SQL" option in the Query Designer. This will show you the underlying SQL code that is used to retrieve the data.

The table view in Visual FoxPro can be maximized by clicking on the maximize button in the upper right corner of the table view window. This will make the table view take up the entire screen, making it easier to view and edit the data.

Visual Foxpro 6.0: running the Query, One-to-Many, and Many-to-one Queries

In Visual FoxPro 6.0, you can run a query by opening the Query Designer, selecting the query you want to run, and then clicking the "Run" button. The results of the query will be displayed in the View Window.

A one-to-many query is a query that retrieves data from two or more tables where one table has a primary key and the other table has a foreign key that references the primary key. This type of query is used to retrieve data from multiple tables where there is a relationship between the tables.

A many-to-one query is similar to a one-to-many query, but it retrieves data from multiple tables where multiple rows in one table are related to a single row in another table.

Both one-to-many and many-to-one queries can be created and executed in Visual FoxPro using the Query Designer and the SQL Select statement. The results of these queries can then be viewed in the View Window.

It's worth mentioning that you can also use the "JOIN" clause in the SQL Select statement to join tables, which is useful when you're working with multiple tables in a query and you want to retrieve data from all tables based on a related column.

Visual Foxpro 6.0: The SQL SELECT command, Other SOL commands

In Visual FoxPro 6.0, the SQL Select command is used to retrieve data from one or more tables in a database. The basic syntax of the SQL Select command is:

SELECT column1, column2, ... FROM table1 [JOIN table2 ON table1.column = table2.column] [WHERE condition] [GROUP BY column] [HAVING condition] [ORDER BY column [ASC|DESC]];

The SELECT clause is used to specify the columns that you want to retrieve, the FROM clause is used to specify the table(s) from which you want to retrieve data, and the JOIN clause is used to specify how the tables should be joined together. The WHERE clause is used to specify a condition for filtering the data, the GROUP BY clause is used to group the data by one or more columns, the HAVING clause is used to filter the grouped data based on a condition, and the ORDER BY clause is used to sort the data by one or more columns.

In addition to the SELECT command, Visual FoxPro 6.0 also supports other SQL commands such as:

- INSERT: used to insert new data into a table

- UPDATE: used to modify existing data in a table

- DELETE: used to delete data from a table

- CREATE: used to create new tables, views, and indexes

- ALTER: used to modify the structure of existing tables

- DROP: used to delete tables, views, and indexes

You can use these commands in a SQL script, or in the Command Window to interact with the database.

It's worth mentioning that Visual FoxPro 6.0 is an old version and it's not supported anymore. If you are planning to work with databases, it's recommended to use a more recent version or a different database management system.

Some Questions for practice

1.   What is Visual FoxPro 6.0?

2.   When was Visual FoxPro 6.0 released?

3.   Who developed Visual FoxPro 6.0?

4.   What type of applications can be developed using Visual FoxPro 6.0?

5.   What programming language is Visual FoxPro 6.0 based on?

6.   What are the main features of Visual FoxPro 6.0?

7.   How powerful is the data engine in Visual FoxPro 6.0?

8.   What type of development environment does Visual FoxPro 6.0 have?

9.   Does Visual FoxPro 6.0 support object-oriented programming?

10.   Is Visual FoxPro 6.0 still supported by Microsoft?

11.   How widely was Visual FoxPro 6.0 used for business software development?

12.   What are the advantages of using Visual FoxPro 6.0?

13.   Can Visual FoxPro 6.0 be used to create web applications?

14.   What are the limitations of Visual FoxPro 6.0?

15.   How does Visual FoxPro 6.0 compare to more recent programming languages and development environments?