

NET3000

Database Concepts and SQL

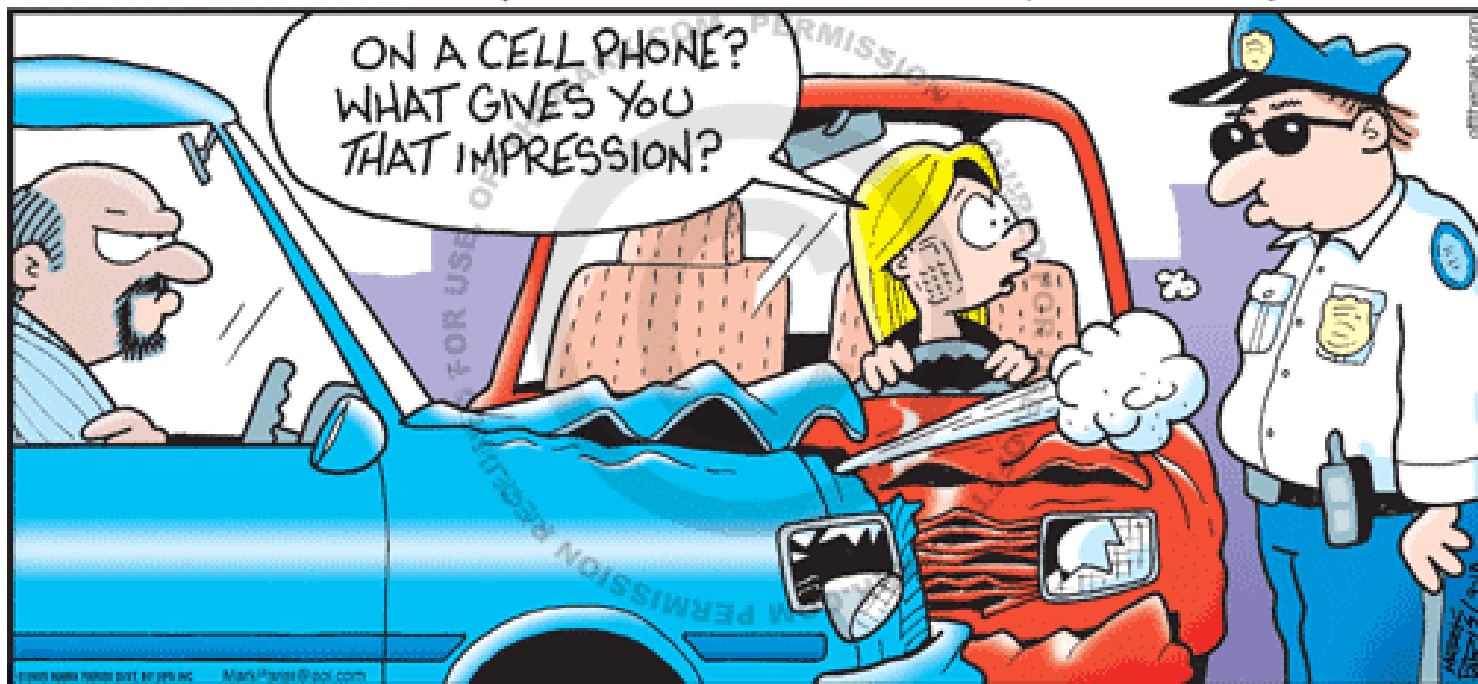
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Wednesday's Class Review

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Database Concepts and SQL

Section 1: Introducing SQL

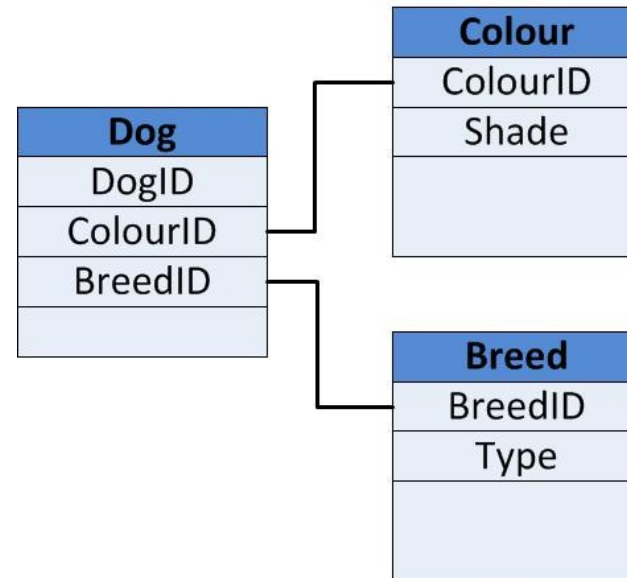
Databases

- Flat file
 - Small amounts of data
 - Human readable and editable
 - Common delimiter (e.g. semi-colon, space, tab etc.)
- Relational
 - MySQL, SQL Server, Oracle etc.
 - Logical data storage – linked to real world objects
 - E.g. Table DOG
 - ID (Name)
 - Fur type
 - Colour
 - Eye colour
 - Breed

Databases

■ Relational

- The “relational” aspect is that tables can be linked together
- Efficient design means that the data is not duplicated
- Less important than once was



Introduction to SQL

- Most relational databases use a common set-based language known as the Structured Query Language (SQL).
- Administrators and developers alike use this language in their daily efforts.
- International standards define SQL constructs and syntax. (ISO/IEC 9075-1:2011)
- The American National Standards Institute sponsored the creation of SQL and originally defined three levels of compliance.
 - Each vendor meets the entry-level criteria.
 - SQL Server's dialect: Transact-SQL (T-SQL)

Groups

- All implementations of SQL break the syntax into three groups:
 - **Data Control Language (DCL)** constructs
 - **Data Definition Language (DDL)** constructs
 - **Data Manipulation Language (DML)** constructs

DCL

- DCL statements provide access control to objects and consist of just three keywords:
 - GRANT to allow users access to an object
 - DENY to disallow user access to an object
 - REVOKE to remove a GRANT or a DENY. This is a state where control must come from another action such as from membership in a role.

DDL

- DDL statements create objects in your database and consist of just three keywords:
 - CREATE to initiate a new object
 - ALTER to change an existing object
 - DROP to eliminate an existing object

DML

- DML statements provide interaction with the data in your relational database management system (RDBMS) and consist of just four keywords:
 - SELECT to retrieve data
 - INSERT to add data
 - UPDATE to change data
 - DELETE to remove data

TCL

- Sometimes you will also see the term TCL: **Transaction Control Language** with three key terms:
 - COMMIT to record data
 - SAVE POINT to generate a reference
 - ROLLBACK to undo an action

CRUD

- Sometimes you will also see or hear the term CRUD or CRUD operations:
- Four key terms:
 - CREATE a new record data
 - READ record data
 - UPDATE existing data
 - DELETE (DISABLE) data

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Section 2: Introducing Basic Transact-SQL
Syntax

Introducing Transact-SQL Operators

- Arithmetic operators include: + (addition), - (subtraction), * (multiplication), / (division), and % (modulo).
- Example:

```
SELECT Cost + Markup AS Price
```
- Comparison operators include: > (greater than), < (less than), = (equals), <= (less than or equal to), >= (greater than or equal to), != (not equal to), <> (not equal to), !< (not less than) and !> (not greater than)
- Concatenation operators include: +
- Example:

```
SELECT LastName + ', ' + FirstName
```

Introducing T-SQL Functions

- Functions include:
 - Rowset, which returns objects that can be used as table references; (e.g. OPENROWSET)
 - Aggregate, which operates on a collection but returns a single value; (e.g. AVG, COUNT, SUM)
 - Ranking, which returns a scaled value for each row in a partition; (e.g. RANK, ROW_NUMBER)
 - Scalar, which operates on a single value and then returns a single value. (e.g. LEN, ROUND)
 - When you specify functions, understand the following rules and advice:
 - Scalar functions can be used wherever an express is valid.

Example

```
USE AdventureWorks;  
GO  
SELECT AVG(VacationHours) AS 'Average vacation hours',  
       SUM(SickLeaveHours) AS 'total sick leave hours'  
FROM HumanResources.Employee  
WHERE Title LIKE 'Vice President%';
```


Introducing T-SQL Variables

- A variable holds a single data value of a specific type.
- A variable must be declared prior to use.
- When specifying variables, understand the following rules and advice:
 - A variable must be defined with a defined data type.
 - When first declared, a variable is set to NULL.
 - To assign a value to a variable, use the SET command.
 - You can also assign a value by referencing the select list of a SELECT statement.
- Example:
 DECLARE @food varchar(20)
 SET @food = 'Orange Chicken'

Introducing T-SQL Expressions

- Use T-SQL expressions to evaluate symbols and operators into a single value.
- When specifying expressions, understand the following rules and advice:
 - Simple expressions can be a single constant, variable, column, or scalar function.
 - Operators can be used to join two or more simple expressions into a complex expression.
 - Expressions can be combined if at least one of these is true: The expressions have the same data type or the data type with the lower precedence can be converted to the data type with the higher precedence.
- Example:
 - `SELECT ProductID, Variable_N + 3`

Introducing Comments

- Comments are statements about the meaning of the script.
- When used, they are not executed.
- You have two ways to express yourself:
 - Use `/*` and `*/`. Here's the syntax:
`/* This is a comment that goes anywhere */`
 - Use a double dash. This will be ignored to the end of the current script line. Here's an example:
`CREATE TABLE Food --For storing recipe needs.`

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Database Concepts and SQL

Lab 1 Preparation

Lab 1

- **Installing Microsoft SQL Server**
- **Purpose**
 - to install and configure an operating system on a removable caddy with hard-drive
 - to install SQL Server
 - to configure SQL Server for Database Mail
 - to make appropriate entries within your lab manual
- **Estimated Time**
 - This lab is estimated to take 2 hours.
- **Summary of Tasks**
 - Acquire SQL Server.
 - Install SQL Server.
 - Configure SQL Server for Database Mail.

Lab 1

■ Assigned Readings

- From the textbook, read the following lessons:
- **Lesson 1 Introduction**
- **Lesson 2 Installing Microsoft SQL Server**
- **Lesson 3 Navigating SQL Server**