Databases & SQL

Krystin Corby

Computer Tutors, USA

What is a Database?

- **Data**: text, numbers, dates, etc.
- **Table**: where data are stored
- **Fields**: columns, discrete units of information
- **Records**: rows, collection of one or more fields representing one unique item
- **Database**: one or more tables of information stored together in a logical way

Table Examples

TABLE 1

	Field1	Field2	Field3
Record1	abc	123	10
Record2	def	456	20
…	…	…	…
RecordX	xyz	890	100

People

	First Name	Last Name	Age
Record1	Mickey	Mouse	90
Record2	Minnie	Mouse	90
Record3	Donald	Duck	84

Garbage In = Garbage Out

Not Great Table

Name	Address	Phone
John Doe	123 Main St. Tallahassee FL 32312	Wk. (850) 555-1234 Cell (850) 555-4567

Much better

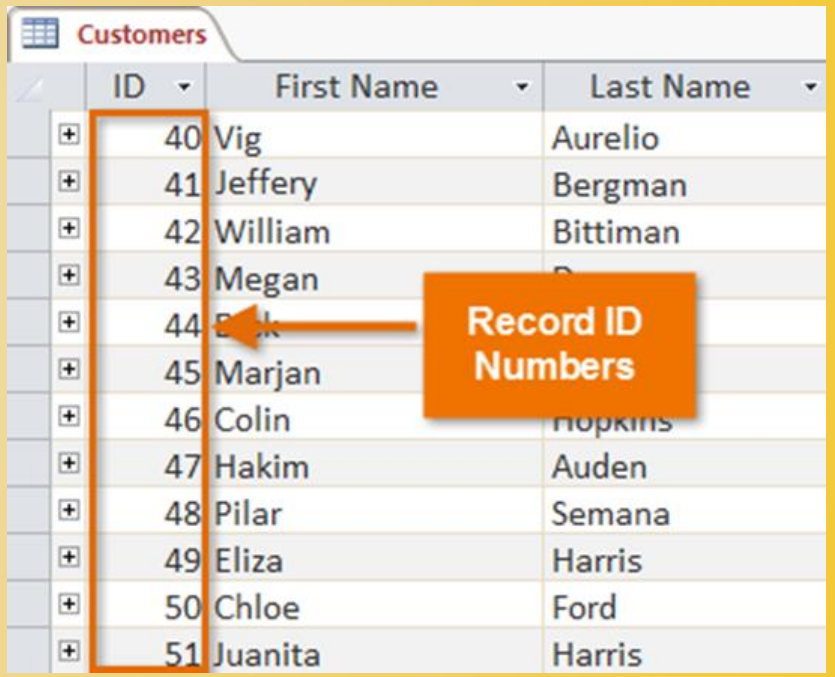
First Name	Last Name	M.I.	Street Address	City	State	Zip	Work Phone	Cell Phone
John	Doe	S.	123 Main	Tallahassee	FL	32312	(850) 555-1234	(850) 555-4567

Keeping Records Unique

Primary Key	First Name	Order Number	Cookies Ordered
1	Bob	1	Oatmeal
2	Alice	2	Chocolate Chip
?	Alice	3	Sugar
?	Bob	4	Oatmeal
	Carl	5	Sugar
	Danielle	6	Cinnamon
	Earl	7	Oreo
	Danielle	8	Chocolate Chip

Primary Key or Unique Identifier

- A special column (or combination of columns) designated to uniquely identify all table records
- MUST:
  - Contain a value for each row of data
  - Contain a unique value
- Can be generated by database or by user



Not completely separate pieces of data - they're *related*

People Table
Alice
Bob
Carl
Danielle
Earl

Cookies Table
Chocolate
Oatmeal
Sugar
Cinnamon
Oreo

Orders Table	
People	Cookies
Carl	Sugar

Using Keys

People Table	
Primary Key	Name
1	Alice
2	Bob
3	Carl
4	Danielle
5	Earl

Cookies Table	
Primary Key	Cookies
1	Chocolate
2	Oatmeal
3	Sugar
4	Cinnamon
5	Oreo

Orders Table		
Primary Key	People Table Key	Cookies Table Key
1	3 (Carl)	3 (Sugar)
2	1 (Alice)	4 (Cinnamon)

Foreign Keys

A tale of two properties

Entity Integrity: Primary Key

- Doesn't allow operations like INSERT or UPDATE to produce an invalid key
- The primary key for each row is unique, no repeats!
- No part of the primary key can be null

Referential Integrity: Foreign Key

- Foreign key must reference a valid primary key in the parent table
  - Can't enter a cookie recipe into an order if it doesn't exist on the cookies table
- Can't delete a cookie recipe if there are orders referencing that recipe's key

SQL

- Pronounced “Sequel” or S-Q-L
- Structured Query Language
- Programming language
- Used to access, manage and modify database objects and data

American National Standards Institute

ANSI

- Sets standard SQL
- Different versions named after year released
  - I.E. 92 or 99
  - “Mostly ANSI-92” or “Fully ANSI-99” compliant…

Major SQL commands

- SELECT
- UPDATE
- DELETE
- INSERT
- WHERE

Other Platforms

- ANSI SQL is limited to querying and updating
  - NOT considered a true programming language
- Every engine has its own “Flavor”
  - considered full-fledged programming languages
  - T-SQL (MSSQL)
  - plSQL (Oracle)
  - Jet SQL (MS Access)
  - MySQL

Categories of SQL statements

DML

- Data Manipulation Language
- Works with the data in tables
- INSERT INTO, UPDATE, DELETE, SELECT

DDL

- Data Definition Language
- Build and modify the structure of the database
- Takes effect immediately when executed
  - CREATE, ALTER, DROP

Log into SQL Server Mgmt. Studio

- Ensure Server VM is running (SQL Server)
- Start MS SQL Server Management Studio
- Server Name: SQLServer
- Authentication: SQL Server
- Login: STUDENT##(two numbers required)
- Password: Pa$$w0rd
- Click connect

Syntax

- A set of rules in a language
- Uses reserved words (fixed meaning, cannot be altered)
- SQL is NOT case sensitive, but best practice:
  - Use good form i.e. CamelCase
  - Match case defined in database
  - EmployeeId is not written as employeeid
  - SQL commands and keywords in uppercase: SELECT, FROM, WHERE
- Table and field names that contain spaces are enclosed in brackets
  - Customer Number is written as [Customer Number]

Select

SELECT ColumnName, ColumnName

FROM TableName