SQL: the standard query language

- Purpose and importance of SQL
- Creating a database and updating the data

Objectives of SQL

a database language should allow the user to:

- create database and relation structures;
- perform insertion, modification, deletion of data from relations;
- perform simple and complex queries.
- perform these tasks with minimal user effort and command structure/syntax must be easy to learn.

And it must be portable.

Objectives of SQL

- SQL is a transform-oriented language with 2 major components:
  - A DDL for defining database structure.
  - A DML for retrieving and updating data.
- Until SQL3, SQL did not contain flow of control commands. These had to be implemented using a programming or job-control language, or interactively by the decisions of user.

Objectives of SQL

- SQL is easy to learn:
  - it is non-procedural - you specify *what* information you require, rather than *how* to get it;
  - it is essentially free-format and semi-natural
- Can be used by range of users including DBAs, management, application developers, and other types of end users.
- An ISO standard exists for SQL, making it both the formal and de facto standard language for relational databases.

History of SQL

- In late 70s, ORACLE appeared and was probably first commercial RDBMS based on SQL.
- In 1987, ANSI and ISO published an initial standard for SQL.
- In 1989, ISO published an addendum that defined an 'Integrity Enhancement Feature'.
- In 1992, first major revision to ISO standard occurred, referred to as SQL2 or SQL/92.
- In 1999, SQL3 was released with support for object-oriented data management.

Importance of SQL

- SQL has become part of application architectures such as IBM's Systems Application Architecture.
- It is strategic choice of many large and influential organizations (e.g. X/OPEN).
- SQL is Federal Information Processing Standard (FIPS) to which conformance is required for all sales of databases to American Government.
- SQL is used in other standards eg:
  - ISO's Information Resource Directory System (IRDS) Standard

How to create a database with SQL

- Create a new database called 'human resources':
  CREATE DATABASE human resources;

- make it the current database in use:
  USE human resources;

- define a table to hold data:
  CREATE TABLE staff (staffNo VARCHAR(4), fName VARCHAR(20), lName VARCHAR(20), position VARCHAR(20), sex VARCHAR(1), DOB VARCHAR (15), salary DECIMAL (5,2), branchNoVARCHAR(4));

Creating a database

- now Load some data from a text file:

  LOAD DATA LOCAL INFILE "staff.txt" INTO TABLE staff;

staffNo	fName	lName	position	sex	DOB	salary	branchNo
SL21	John	White	Manager	M	1-Oct-45	30000.00	B005
SG37	Ann	Beech	Assistant	F	10-Nov-60	12000.00	B003
SG14	David	Ford	Supervisor	M	24-Mar-58	18000.00	B003
SA9	Mary	Howe	Assistant	F	19-Feb-70	9000.00	B007
SG5	Susan	Brand	Manager	F	3-Jun-40	24000.00	B003
SL41	Julie	Lee	Assistant	F	13-Jun-65	9000.00	B005

SQL's INSERT statement: inserting a new record

the general SQL form is:

INSERT INTO TableName [(columnList)]
VALUES (dataValueList)

- columnList is optional; if omitted, SQL assumes a list of all columns in their original CREATE TABLE order.

INSERT

- dataValueList must match columnList as follows:
  - number of items in each list must be same;
  - must be direct correspondence in position of items in two lists;
  - data type of each item in dataValueList must be compatible with data type of corresponding column.

Example of inserting a record

Insert a new row into 'Staff' table supplying data for all columns.

```
INSERT INTO Staff
    VALUES ('SG16', 'Alan', 'Brown', 'Assistant',
      'M', Date'1957-05-25', 8300, 'B003');
```

Updating tables with SQL

The general form is:

```
UPDATE TableName
SET columnName1 = dataValue1
    [, columnName2 = dataValue2...]
[WHERE searchCondition]
```

- TableName can be name of a base table or an updatable view.
- SET clause specifies names of one or more columns that are to be updated.

UPDATE

- the WHERE clause is optional:
  - if omitted, named columns are updated for all rows in table;
  - if specified, only those rows that satisfy searchCondition are updated.
- New dataValue(s) must be compatible with data type for corresponding column.

Examples of updating tables

- Give all staff a 3% pay increase.

```
UPDATE Staff
SET salary = salary*1.03;
```

- Give all Managers a 5% pay increase.

```
UPDATE Staff
SET salary = salary*1.05
WHERE position = 'Manager';
```

DELETE

the general SQL form is:

- DELETE FROM TableName
- [WHERE searchCondition]

- TableName can be name of a base table or an updatable view.
- searchCondition is optional; if omitted, all rows are deleted from table. This does not delete table. If search_condition is specified, only those rows that satisfy condition are deleted.