SQL

SP

soumyajitpal@sxccal.edu

Introduction

- What is a program?
- What is a language?
- What is a programming language?
- Do computers understand the language spoken by humans?
  - Need for computer programming languages

Hierarchy of things!

- Database (modeling an entire organization)
  - Table(s) (one table, one aspect)
    - Rows (one row, one entity)
    - Columns (one column, one property)
- Flipkart Database (models entire organization)
  - Employee, Product, Order, Customer, …
    - 1 row in Employee table = complete information about one employee
    - Every column in Employee table represents one property of an employee (Ename represents employee name)

Terminologies

- **Row** – horizontal collection of all the column values of an entity in a table
  - –Record, Tuple
- **Column** – vertical collection of values for a given property of all entities in a table
  - –Feature, Field, Attribute
- Total number of rows in a table: **Cardinality**
- Total number of columns in a table: **Degree**

Example

Eid	Ename	Salary	Age	Address	Contact
E1	ABC	1000	25	Happy C	1234
E2	DEF	1200	21	Happy S	1123
E3	DEF	1001	27	Small Town	1543
E4	ABC	1100	26	My World	1989
E5	GHI	1500	28	My World	2419
E6	XYZ	1300	23	Small Town	3761
E7	PQR	1600	23	Happy C	6651

Can we guess the terms?

More terms!

- Key
- Candidate keys
- Primary key
- Foreign key
- Schema
- Instance

SQL

- Language for programming databases
- Originally known as SEQUEL
  - **S**tructured **E**nglish **QUE**ry **L**anguage
- Shortened to SQL
  - **S**tructured **Q**uery **L**anguage
- Procedural v/s Non-procedural
- What about SQL?

Components of SQL

- DDL (Data Definition Language)
- DML (Data Manipulation Language)
- DCL (Data Control Language)
- TCL (Transaction Control Language)

First Example

- Create a table ElectrifyElectronics having the following details:

(Pid: data type = text, primary key, Pname: data type = text, Price: data type = integer)

- Which command is used?
- What is the type of the command being used?

First Example (cont.)

- Insert the following 5 records into the table ElectrifyElectronics:
  - (‘P1’, ‘Earphone’, 500)
  - (‘P2’, ‘Mobile’, 12000)
  - (‘P3’, ‘USB disk storage’, 400)
  - (‘P4’, ‘Airpods’, 2500)
  - (‘P5’, ‘Smart watch’, 4500)
- Which command is used?
- What is the type of the command being used?

First Example (cont.)

- Display the contents of the entire table
- Display the names of all the electronics goods
- Display the names of the goods and their corresponding price
- Display the product id and the product name of all the goods
  - Which command is used?
  - What is the type of the command being used?

First Example (cont.)

- Display the names of the products having price greater than 1000
- Display the names of the products having price less than 1000
- Display the names of the products having price between 2000 and 4000
- Display the names of the products which cost at least 3000
- Display the names of the products which cost at most 5000

Constraints in SQL

- Domain constraint
- Entity integrity constraint
- Referential integrity constraint
- Semantic constraint
- NOT NULL constraint
- UNIQUE constraint
- DEFAULT constraint

Constraints in SQL

- Can be defined at column level and table level
  - NOT NULL at column level
  - Composite key at table level
- Primary key v/s Foreign key
  - NULL constraint (Ex: newly appointed employee)
  - 1 v/s multiple
  - Unique v/s duplicate
- Primary key v/s UNIQUE

Second Example

- Create an Employee table with the following properties:
  - Eid (data type = text, primary key)
  - Ename (data type = text, should not be unknown)
  - Salary (data type = integer, at least 25000)
  - DOB (data type = date, should not be unknown)
  - Did (data type = text, foreign key)
  - SuperNum (data type = integer, foreign key)

Second Example (cont.)

- Create a Department table with the following properties:
  - Did (data type = text, primary key)
  - Dname (data type = text, should not be unknown)
    - Development, Analytics, R&D, Tech Support
  - Dloc (data type = text, should not be unknown)
  - DateOfSetup (data type = date, should not be unknown)

Second Example (cont.)

- Insert the following 6 records into the Department table
  - ('D1', 'Analytics', 'Kolkata', '23-JUN-2020');
  - ('D2', 'Analytics', 'Chennai', '22-JUN-2020');
  - ('D3', 'Development', 'Bengaluru', '19-DEC-2020');
  - ('D4', 'R&D', 'Mumbai', '15-NOV-2020');
  - ('D5', 'Tech Support', 'Silchar', '1-DEC-2021');
  - ('D6', 'Tech Support', 'Noida', '03-APR-2021');

Second Example (cont.)

- Insert the following 10 records into the Employee table
  - (‘E1', ‘ABC', 25000, 23rd June 1991, ‘D1’)
  - (‘E2', ‘DEF', 52000, 4th January 1993, ‘D1’, ‘E1’)
  - (‘E3', ‘GHI', 45000, 7th September 1991, ‘D6’, ‘E1’)
  - (‘E4', ‘JKL', 65000, 1st April 1992, ‘D4’, ‘E1’)
  - (‘E5', ‘JKL', 62000, 23rd August 1995, ‘D4’, ‘E1’)

Second Example (cont.)

- Continuation…

–(‘E6', ‘ABC', 35000, 3rd June 1990, ‘D2’)

–(‘E7', ‘PQR', 52000, 13th February 1996, ‘D3’, ‘E6’)

–(‘E8', ‘PQR', 45000, 12th Nov 1993, ‘D4’, ‘E6’)

–(‘E9', ‘XYZ', 56000, 10th June 1993, ‘D1’, ‘E6’)

–(‘E10', ‘DEF', 42000, 30th July 1994, ‘D5’, ‘E6’)

Second Example (cont.)

- Verify schema and instance of both tables
- Display the locations of Analytics departments
- List the location and date of establishment of technical support department
- List the departments established in 2020
- List the departments established in first quarter of 2020
- List the departments established in Dec. 2021