CMSC424: Database Design
SQL

History

- IBM Sequel language developed as part of System R project at the IBM San Jose Research Laboratory
- Renamed Structured Query Language (SQL)
- ANSI and ISO standard SQL:
  - SQL-86, SQL-89, SQL-92
  - SQL:1999, SQL:2003, SQL:2008
- Commercial systems offer most, if not all, SQL-92 features, plus varying feature sets from later standards and special proprietary features.
  - Not all examples here may work on your particular system.

- Several alternative syntaxes to write the same queries

Different Types of Constructs

- **Data definition language** (DDL): Defining/modifying schemas
  - **Integrity constraints:** Specifying conditions the data must satisfy
  - **View definition:** Defining views over data
  - **Authorization:** Who can access what
- **Data-manipulation language** (DML): Insert/delete/update tuples, queries
- **Transaction control:**
- **Embedded SQL:** Calling SQL from within programming languages
- **Creating indexes, Query Optimization control…**

Data Definition Language

The SQL **data-definition language (DDL)** allows the specification of information about relations, including:

- The schema for each relation.
- The domain of values associated with each attribute.
- Integrity constraints
- Also: other information such as
  - The set of indices to be maintained for each relation.
  - Security and authorization information for each relation.
  - The physical storage structure of each relation on disk.

SQL Constructs: Data Definition Language

- CREATE TABLE <name> (<field> <domain>, …)

```
create table department
    (dept_name varchar(20),
     building varchar(15),
     budget numeric(12,2) check (budget > 0),
     primary key (dept_name)
    );
```

```
create table instructor (
     ID         char(5),
     name    varchar(20) not null,
     dept_name  varchar(20),
     salary    numeric(8,2),
     primary key (ID),
     foreign key (dept_name) references department
)
```

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    d_name    varchar(20),
    salary    numeric(8,2),
    foreign key (d_name) references department
)
```