

# **SNS COLLEGE OF TECHNOLOGY**



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# **SQL Fundamentals**

**COURSE** : 23CAT- Database Management System

- **UNITI** : Introduction
- CLASS : I Semester / I MCA

SQL Basics /DBMS / Dr.S.Sundararajan/ MCA/ SNSCT





- 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 (language name became Y2K compliant!)
  - **G** SQL:2003
- 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





#### • Data Definition Language

- Data Manipulation Language
- Embedded and Dynamic SQL
- Triggers
- Transaction Management

• Security

• Client server Execution and remote database access





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
- □ And as we will see later, also other information such as
  - The set of indices to be maintained for each relations.
  - Security and authorization information for each relation.
  - The physical storage structure of each relation on disk.





- **char(n)** Fixed length character string, with user-specified length n
- □ varchar(n) Variable length character strings, with maximum length n
- □ Int Integer (a finite subset of the integers that is machine-dependent)
- □ Smallint Small integer (a machine-dependent)
- **numeric(p,d)** Fixed point number
- □ Real double precision
- float(n) Floating point number, with user-specified precision of at least n digits.





□ An SQL relation is defined using the create table command:

```
create table r (A1 D1, A2 D2, ..., An Dn,
(integrity-constraint 1), ...,
(integrity-constraint k))
```

□ R-> name of the relation, Ai an attribute name in the schema of relation r

Di is the data type of values in the domain of attribute Ai

Example:

create table instructor ( ID char(5), name varchar(20), dept\_name varchar(20), salary numeric(8,2)



- not null
- primary key (A1, ..., An )
- foreign key (Am, ..., An ) references r

Example:

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);

primary key declaration on an attribute automatically ensures not null





create table student ( ID varchar(5), name varchar(20) not null, dept\_name varchar(20), tot\_cred numeric(3,0), primary key (ID), foreign key (dept\_name) references department);

create table takes (		
ID	varchar(5),	
course_id	varchar(8),	
sec_id	varchar(8),	
semester	varchar(6),	
year	numeric(4,0),	
grade	varchar(2),	
primary key (ID, course_id, sec_id,		
semester, year) ,		
foreign key (ID) references student,		
foreign key (course_id, sec_id, semester,		
year) references section);		





#### Insert

insert into instructor values ('10211', 'Smith', 'Biology', 66000);

- **Delete** 
  - Remove all tuples from the student relation

delete from student

Drop Table

drop table r

## Alter

#### alter table r add A D

- where A is the name of the attribute to be added in r and D is the domain of A.
- All exiting tuples in the relation are assigned null as the value for the new attribute. *alter table r drop A*
- where A is the name of an attribute of relation r
- Dropping of attributes not supported by many databases.









#### □ Basic Query Structure

select *A*<sub>1</sub>, *A*<sub>2</sub>, ..., *A*<sub>n</sub> from *r*<sub>1</sub>, *r*<sub>2</sub>, ..., *r*<sub>m</sub> where *P* 

 $A_i$  represents an attribute  $R_i$  represents a relation P is a predicate.

- □ The result of an SQL query is a relation
- □ select clause lists the attributes desired in the result of a query
- □ To force the elimination of duplicates, insert the keyword **distinct** after select
- □ The keyword **all** specifies that duplicates should not be removed

An asterisk in the select clause denotes "all attributes"

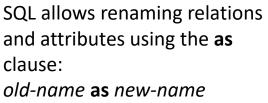
- where clause specifies conditions
- Conditions can be combined • using the logical connectives and, or, and not

**Basic Query** 





- select clause can contain arithmetic expressions
- Rename expression using . the **as** clause
- from clause lists the relations









select distinct dept\_name from instructor

select all dept\_name from instructor

select name, course\_id
from instructor , teaches
where instructor.ID = teaches.ID

select name, course\_id from instructor , teaches
where instructor.ID = teaches.ID and instructor.
dept\_name = 'Art'

select name from instructor where salary **between** 90000 **and** 100000 select name, course\_id from instructor, teaches where (instructor.ID, dept\_name) = (teaches.ID, 'Biology');





- □ string-matching operator for comparisons on character strings
- operator like uses patterns that are described using two special characters:

percent (%). The % character matches any substring underscore (\_). The \_ character matches any character

Example

select name from instructor
where name like '%dar%'

- Intro%' matches any string beginning with "Intro"
- '\_\_\_' matches any string of exactly three characters.
- '\_\_\_%' matches any string of at least three characters
- concatenation (using "||")







□ List in alphabetic order the names of all instructors

select distinct name from instructor order by name

□ We may specify *desc* for descending order or *asc* for ascending order, for each attribute; ascending order is the default.

Example: order by name desc

Can sort on multiple attributes

Example: order by dept\_name, name





#### Find courses that ran in Fall 2009 or in Spring 2010

```
(select course_id from section where sem = 'Fall' and year = 2009)
union
(select course id from section where sem = 'Spring' and year = 2010)
```

Find courses that ran in Fall 2009 and in Spring 2010

(select course\_id from section where sem = 'Fall' and year = 2009)
intersect
(select course\_id from section where sem = 'Spring' and year = 2010)

Find courses that ran in Fall 2009 but not in Spring 2010

(select course\_id from section where sem = 'Fall' and year = 2009) except

(select course\_id from section where sem = 'Spring' and year = 2010)





avg: average value
min: minimum value
max: maximum value
sum: sum of values
count: number of values
group by: group items

select avg (salary) from instructor
where dept\_name= 'Comp. Sci.';c

select count (distinct ID) from teaches
where semester = 'Spring' and year = 2010

select count (\*) from course;

select dept\_name, avg (salary) as avg\_salary
from instructor group by dept\_name







create table student ( ID varchar(5), name varchar(20) not null, dept\_name varchar(20), tot\_cred numeric(3,0), primary key (ID), foreign key (dept\_name) references department);

create table takes (		
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# **Architectural Design Challenges**





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