

SQL Data Manipulation Language

Outline

- SQL Data Definition and Data Types
- Specifying Constraints in SQL
- INSERT, DELETE, **and** UPDATE in SQL
- Queries in SQL
- Triggers
- Views
- Changing Schema using SQL

Retrieval Queries in SQL

- SQL has one basic statement for retrieving information FROM a database; the **SELECT** statement
 - This is *not the same as* the SELECT operation of the relational algebra
- Important distinction between SQL and the formal relational model:
 - SQL allows a table (relation) to have two or more tuples that are identical in all their attribute values
 - Hence, an SQL relation (table) is a **multi-set** (sometimes called a **bag**) of tuples; it is *not* a set of tuples
- SQL relations can be constrained to be sets by specifying PRIMARY KEY or UNIQUE attributes, or by using the DISTINCT option in a query

Retrieval Queries in SQL (contd.)

- A **bag** or **multi-set** is like a set, but an element may appear more than once.
 - Example: $\{A, B, C, A\}$ is a bag. $\{A, B, C\}$ is also a bag that also is a set.
 - Bags also resemble lists, but the order is irrelevant in a bag.
- Example:
 - $\{A, B, A\} = \{B, A, A\}$ as bags
 - However, $[A, B, A]$ is not equal to $[B, A, A]$ as lists

Retrieval Queries in SQL (contd.)

- Basic form of the SQL SELECT statement is called a *mapping* or a SELECT-FROM-WHERE *block*

SELECT	<attribute list>
FROM	<table list>
WHERE	<condition>

- <attribute list> is a list of attribute names whose values are to be retrieved by the query
- <table list> is a list of the relation names required to process the query
- <condition> is a conditional (Boolean) expression that identifies the tuples to be retrieved by the query

Retrieval Queries in SQL (contd.)

- A query in SQL can consist of up to six clauses, but only the first two, SELECT and FROM, are **mandatory**. The clauses are specified in the following order:

SELECT	<attribute list>	<i>(* for all attributes)</i>
FROM	<table list>	<i>(can also be a query)</i>
[WHERE	<condition>]	
[GROUP BY	<grouping attribute(s)>]	
[HAVING	<group condition>]	
[ORDER BY	<attribute list>]	

- A query is evaluated by first applying the WHERE-clause, then GROUP BY and HAVING, and finally the SELECT-clause

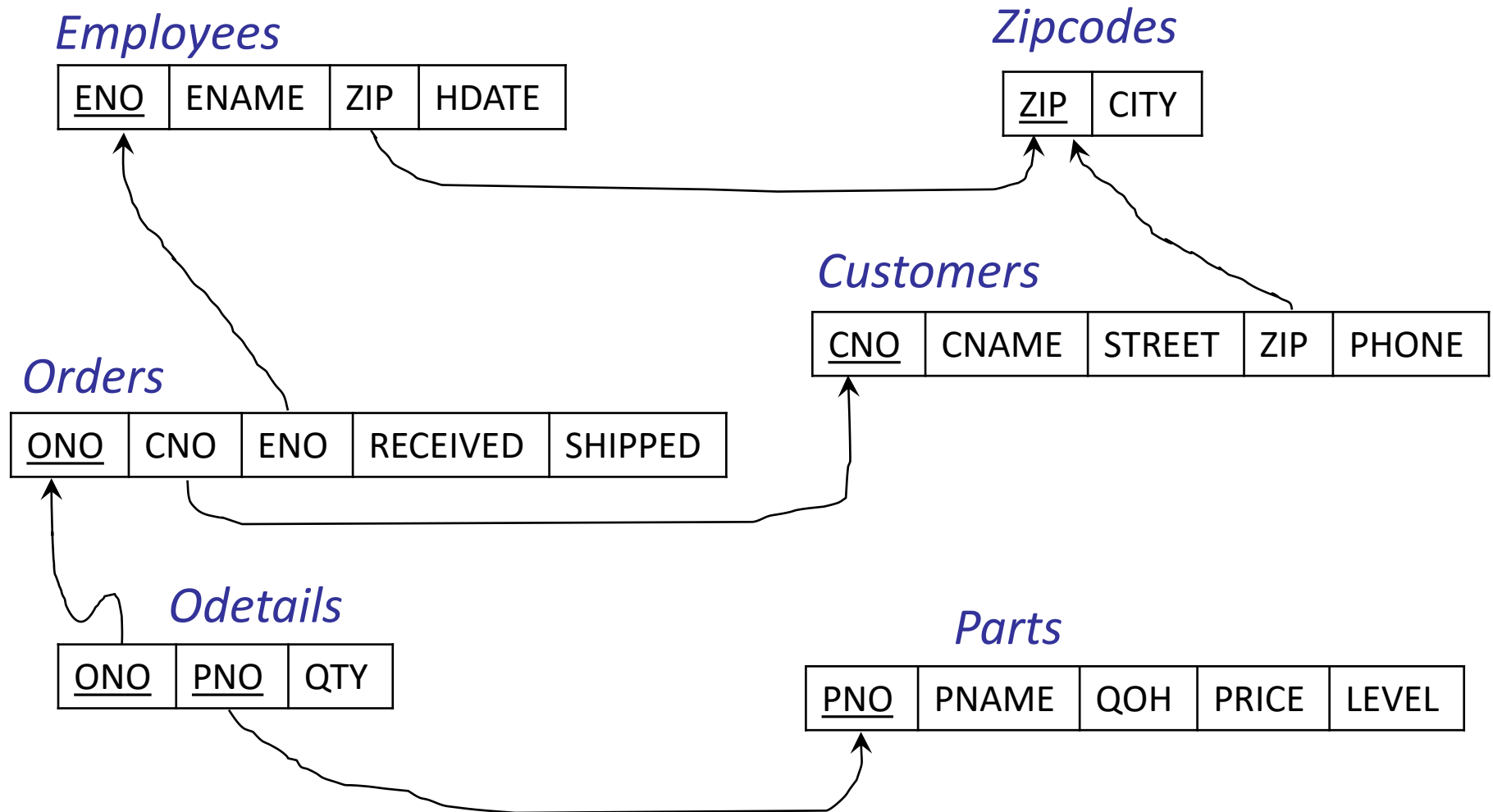
Retrieval Queries in SQL (contd.)

- The SELECT-clause lists the attributes or functions to be retrieved
- The FROM-clause specifies all relations (or aliases) needed in the query but not those needed in nested queries
- The WHERE-clause specifies the conditions for selection and join of tuples FROM the relations specified in the FROM-clause
- GROUP BY specifies grouping attributes
- HAVING specifies a condition for selection of groups
- ORDER BY specifies an order for displaying the result of a query
- A query is evaluated by first applying the WHERE-clause, then GROUP BY and HAVING, and finally the SELECT-clause



Example - Mail-order Database

(Rajshekhar Sunderraman , Oracle 10G book)



CAUTION!

- There is no one way to write queries to obtain the required results

Conceptual Order of SELECT Statement

1. The product of all tables in the FROM clause is formed
2. The WHERE clause is then evaluated to eliminate rows that don't satisfy the search_condition
3. The rows are grouped using the columns in the GROUP BY clause
4. Groups that do not satisfy the condition in the having clause are eliminated
5. The expressions in the SELECT clause target list are evaluated
6. If the distinct keyword is present in the SELECT clause, duplicate rows are now eliminated
7. The UNION is taken after each sub-select is evaluated
8. The resulting rows are sorted according to the columns specified in the order by clause

<http://docs.oracle.com>

SQL Retrieval Queries

- See the SQL script provided



Summary of SQL Queries (contd.)

- The SELECT-clause lists the attributes or functions to be retrieved
- The FROM-clause specifies all relations (or aliases) needed in the query but not those needed in nested queries
- The WHERE-clause specifies the conditions for selection and join of tuples FROM the relations specified in the FROM-clause
- GROUP BY specifies grouping attributes
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- A query is evaluated by first applying the WHERE-clause, then GROUP BY and HAVING, and finally the SELECT-clause

Recap of SQL Queries

- A query in SQL can consist of up to six clauses, but only the first two, **SELECT** and **FROM**, are mandatory. The clauses are specified in the following order:

SELECT	<attribute list>
FROM	<table list>
[WHERE	<condition>]
[GROUP BY	<grouping attribute(s)>]
[HAVING	<group condition>]
[ORDER BY	<attribute list>]

- There are three SQL commands to modify the database: **INSERT**, **DELETE**, and **UPDATE**

Others SQL *Plus commands/report

- show all
- help commands
 - help column
- set pause on
- set autocommit on
- set echo on
- spool filename
- spool off
- start comm.sql
- @comm.sql
- change /acb/abc
- list ---show the last query
- clear buffer
- append ,columnName
- edit
- set line size 79
- set pagesize 50
- set newpage 0
- ttitle 'a!b!c'
- btitle ''
- break
- compute