



Term: Fall 2025 **Subject:** Computer Science & Engineering (CSE) **Number:** 412

Course Title: Database Management (CSE 412)

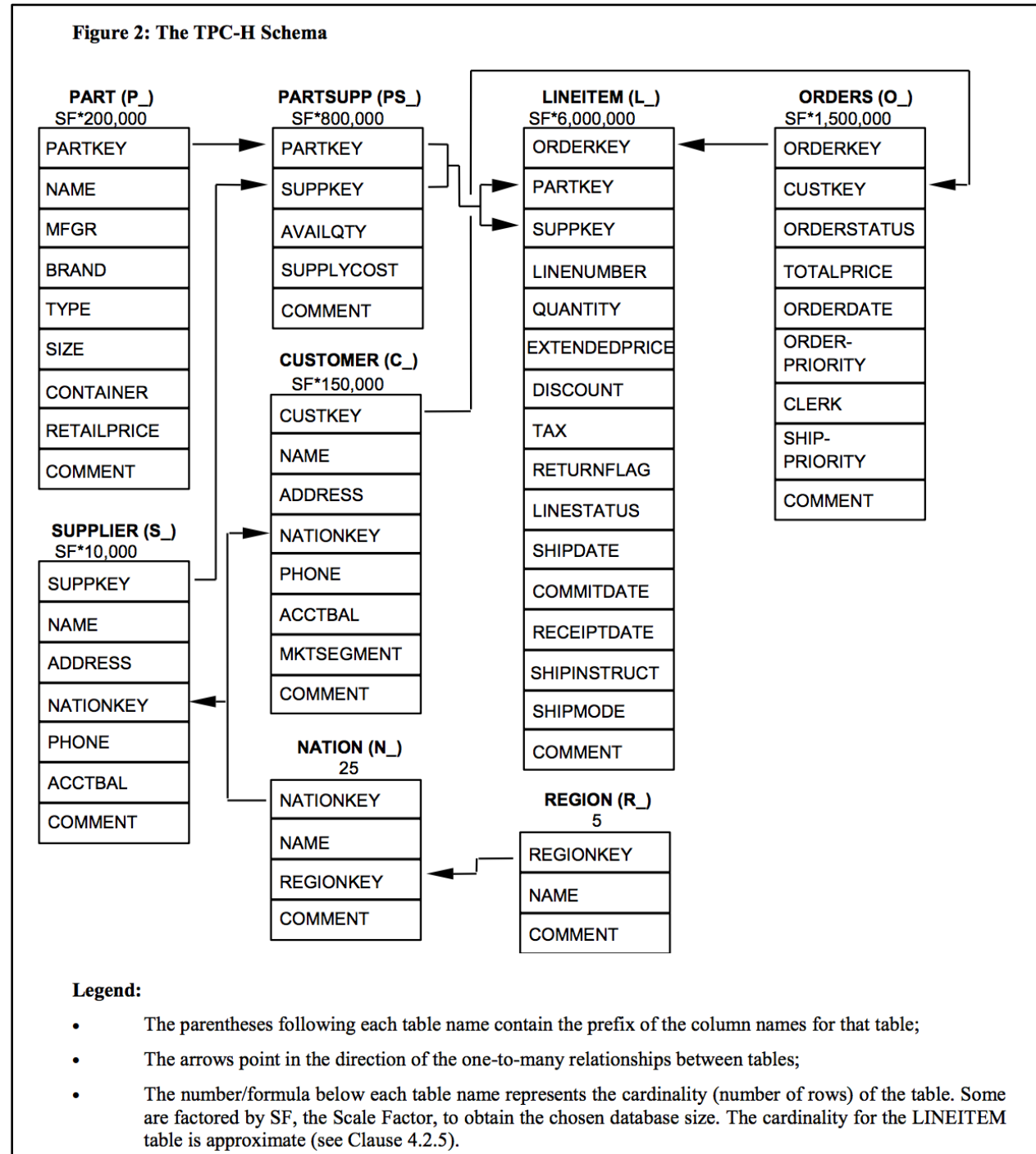
Assignment 02 – 30 Points
Relational Algebra and SQL

Instruction:

- Your assignment should be typed.
- Submit a single PDF document that includes your report in the following guidelines and format below to the canvas.

Tasks:

Consider the TPC-H database used in assignments 0 and 1.



For Assignment 02, consider the three tables:

1. Part,
2. Supplier, and
3. PartSupp

as described below:

Part:

The Part relation has the following columns (attributes):

- 1) p_partkey is a unique identifier for each part (Primary Key)
- 2) p_name is the part name, variable text, size 55
- 3) p_mfgr is the manufacturer of the part, fixed text, size 25
- 4) p_brand is the brand of the part, fixed text, size 10
- 5) p_type is the type of the part, variable text, size 25
- 6) p_size is the size of the part, integer
- 7) p_container is the container of the part, fixed text, size 10
- 8) p_retailprice is the retail price of the part, decimal
- 9) p_comment is the comment of the part, variable text, size 23

Supplier:

The Supplier relation has the following columns (attributes):

- 1) s_suppkey is a unique identifier for each supplier (Primary Key)
- 2) s_name is the supplier name, fixed text, size 25
- 3) s_address is the address of the supplier, variable text, size 40
- 4) s_nationkey is the identifier of the supplier's nation
- 5) s_phone is the phone number of the supplier, fixed text, size 15
- 6) s_acctbal is the account balance of the supplier, decimal
- 7) s_comment is the comment of the supplier, variable text, size 101

PartSupp:

The PartSupp relation has the following columns (attributes):

- 1) ps_partkey is a unique identifier for a part
- 2) ps_supplier is a unique identifier for a supplier
- 3) ps_availqty is the available quantity of the part from this supplier, integer
- 4) ps_supplycost is the supply cost of this part from this supplier, Decimal
- 5) ps_comment is the comment of the part from this supplier, variable text, size 199

The Problems:

Solve the problems following the steps:

1. Write the appropriate relational algebra that maps to the given functionality. (some of the problems do not need this step, which will be specified in the problem description)
2. Write the SQL that maps to the given functionality.
3. Execute the SQL in the database, and attach the screenshot (Please limit the number of result rows to 10 by adding "limit 10" at the end of the query) in your doc.

Assignment: 02 Solution

Name:

Student ID:

Single Table Queries

Problem 1 (2 Point): Return the name, address, and phone number of all suppliers whose account balance is lower than 0.

(The results should be ordered by suppliers' account balance in ascending order)

Relation Algebra:

SQL Query:

Result / Snapshot:

Problem 2 (2 Point): Return the distinct nation keys of suppliers whose account balance is larger than 5000.

Relation Algebra:

SQL Query:

Result / Snapshot:

Problem 3 (2 Point): Return the number of distinct parts supplied by each supplier (groupBy). The results should be returned to the following two columns:

SupplierKey	NumParts

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot:

Problem 4 (2 Point): Return the total number of parts of which the retail price is higher than 2000 (count).

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot:

Problem 5 (2 Point): Return me the name of part(s), of which the retailing price is the highest (max).

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot:

Multi Table Queries

Problem 6 (2 Point): Return the addresses of all suppliers who supply a part named 'goldenrod lavender spring chocolate lace'.

Relation Algebra:

SQL Query:

Result / Snapshot:

Problem 7 (2 Point): Return the name of the nations belonging to the Region Asia.

Relation Algebra:

SQL Query:

Result / Snapshot:

Problem 8 (2 Point): Return the total number of parts supplied by each supplier whose account balance is below 0

The results should contain two columns: SupplierName (not the supplier key) and the number of distinct types of parts (i.e., distinct part keys) the supplier supplies (Each unique ps_partkey corresponds to one distinct part) :

SupplierName	NumParts

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot:

Problem 9 (2 Point): Return the total number of parts supplied from each different nation (each nation has a different s_nationkey). The output should contain the following two columns.

SupplierNationKey	NumParts

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot:

Problem 10 (2 Point): Return the total number of distinct types of parts (i.e., distinct partkeys) supplied by suppliers whose account balance is below 0 from each different nation (each nation has a different s_nationkey)

SupplierNationKey	NumParts

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot:

Complex Queries

Problem 11 (2 Point): Return the distinct names of suppliers, each of which has supplied at least two parts (*Use Join for Query and Relational Algebra*)

Relation Algebra:

SQL Query:

Result / Snapshot:

Problem 12 (2 Point): Return the distinct names of parts, each of which has been supplied by at least two nations (*Use Join for Query and Relational Algebra*)

Relation Algebra:

SQL Query:

Result / Snapshot:

Problem 13 (2 Point): Return names of all suppliers who supply the most number of parts
(*This is a nested query*)

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot:

Problem 14 (2 Point): Return the key of the nation, where the suppliers supply the highest total available quantity of the part named 'blush thistle blue yellow saddle'

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot:

Problem 15 (2 Point): Return the distinct names of all parts, which are supplied from both nations that have s_nationkey 6 and s_nationkey 12

(Relational Algebra is NOT REQUIRED)

SQL Query:

Result / Snapshot: