



CSE-4508

Relational Database Management System

Lab 5

Lab Group: 1A

Thursday, 25th December, 2025

Task 1

In a project, multiple tasks need to be completed in a specific order. Some tasks can only start after other tasks are finished. For example:

- **Setup Environment** must be done before **Design Database**.
- **Design Database** must be done before **Develop Backend** and **Develop Frontend**.
- **Final Testing** depends on the completion of integration tasks.

Objective

Your task is to generate the full list (Table 2 shows a sample result for your reference) of all task and prerequisite task pairs, including both direct and indirect dependencies.

Task_ID	Task_Name	Depends_On	Duration (days)
T1	Setup Environment	NULL	2
T2	Design Database	T1	3
T3	Develop Backend	T2	5
T4	Develop Frontend	T2	4
T5	Integrate Backend	T3	2
T6	Integrate Frontend	T4	2
T7	Final Testing	T5	3
T7	Final Testing	T6	3

Table 1: Input Table: PROJECT_TASKS

Input Table Description

- **Task_ID**: Unique identifier for each task.
- **Task_Name**: Name of the task being performed.
- **Depends_On**: Task ID of the task that must be completed before this one. NULL indicates no dependency.
- **Duration (days)**: Estimated time in days to complete this task.

Sample Result

Task_ID	Depends_On
T5	T3
T5	T2
T5	T1

Table 2: Recursive Task Dependencies

Task 2

In a large company, the HR department wants to rank employees within each department based on their salary. This helps identify top earners and analyze pay distribution. Employees with the same salary should have the same rank.

Objective:

Rank employees within each department by salary, handling salary ties correctly.

Input Table: EMPLOYEE

Emp_ID	Name	Department	Salary
1	Hasan	IT	80000
2	Tania	IT	75000
3	Riad	HR	60000
4	Mitu	HR	60000

Expected Output: Department-wise Ranking

Emp_ID	Name	Department	Salary	Dept_Rank
1	Hasan	IT	80000	1
2	Tania	IT	75000	2
3	Riad	HR	60000	1
4	Mitu	HR	60000	1

Task 3

HR wants to analyze salary differences between employees to identify pay gaps. Comparing consecutive salaries helps detect inconsistencies or deviations within a department.

Objective:

Find the difference between an employee's salary and the previous employee's salary (ordered by salary within the department).

Emp_ID	Name	Salary
1	Ayan	40000
2	Bithi	45000
3	Chayan	43000
4	Danish	47000
5	Elina	42000
6	Farhan	48000
7	Gita	46000
8	Hasan	44000
9	Iqbal	41000
10	Joya	45000

Table 3: Input Table: EMPLOYEE

Emp_ID	Name	Salary	Salary_Difference
1	Ayan	40000	NULL
9	Iqbal	41000	1000
5	Elina	42000	1000
3	Chayan	43000	1000
8	Hasan	44000	1000
2	Bithi	45000	1000
10	Joya	45000	0
7	Gita	46000	1000
4	Danish	47000	1000
6	Farhan	48000	1000

Table 4: Expected Output: Salary Difference

Task 4

In a large organization, employees are arranged in a hierarchy. Each employee reports to a manager, except for senior employees such as the CEO or department heads, who do not report to anyone. These senior employees form the top level of the organization. A manager can have several employees reporting to them, and those employees may also manage others, creating multiple levels in the structure.

Objective

To analyze the organizational hierarchy by starting from top-level employees and recursively identifying reporting relationships. From this analysis, determine each employee's hierarchical rank, construct the complete reporting chain, and calculate the total number of subordinates under each manager.

Emp_ID	Emp_Name	Manager_ID	Department
1	Rahim	NULL	Admin
2	Karim	1	IT
3	Salma	1	Finance
4	Anika	2	IT
5	Fahim	2	IT
6	Rafi	3	Finance
7	Nusrat	NULL	HR
8	Imran	7	HR
9	Tithi	8	HR

Table 5: EMPLOYEE

Input Table Description

- **Emp_ID:** A unique identifier assigned to each employee.
- **Emp_Name:** The full name of the employee.
- **Manager_ID:** The employee ID of the immediate manager. A NULL value indicates a top-level employee.
- **Department:** The department in which the employee works.

Emp_ID	Emp_Name	Manager_ID	Level	Total Subordinates
1	Rahim	NULL	1	5
2	Karim	1	2	2
3	Salma	1	2	1
4	Anika	2	3	0
5	Fahim	2	3	0
6	Rafi	3	3	0
7	Nusrat	NULL	1	2
8	Imran	7	2	1
9	Tithi	8	3	0

Table 6: Employee Hierarchy Output

Output Attributes Description

- **Emp_ID:** Unique identifier of the employee.
- **Emp_Name:** Name of the employee.
- **Manager_ID:** Direct manager of the employee.
- **Level:** The hierarchical rank of the employee, based on depth in the organization. Top-level employees have Rank 1. All employees at the same depth share the same rank.
- **Total_Subordinates:** Total number of employees reporting under this employee, including both direct and indirect subordinates.