

Databases I, Winter 2025

Milestone 1

Submission: 9/10/2025 (11:59 PM)

In this milestone, you are required to draw the EERD according to the project description and translate the EERD designed to its corresponding relational schema.

You are required to submit a zip file containing the following documents:

- a) A PDF file containing an image of your Enhanced Entity Relationship Diagram (EERD) of the database of the required application.
- b) A PDF file containing the Database Schema of your application.
- c) An Excel file containing:
 - Team name
 - Team leader name and tutorial.
 - Team members' names.
 - Team members' application numbers.
 - Team members' tutorial groups.

Note that:

The Milestone description is subject to minor changes that would be announced on CMS. Do check the CMS periodically.

The EERD has to be drawn using graph editing software, **screenshots or handwritten EERDs will not be accepted**

Examples of software:

- yEd: <https://www.yworks.com/products/yed>, online/offline tool
- draw.io: <https://www.draw.io/>, online tool

Submission guidelines:

- a) You have to stick to the conventions of the EERD discussed in the tutorials.
- b) The deadline of submission for this milestone is **Thursday 9th of October at 11:59 PM. This is a hard deadline with no extensions. Plan your work on the milestone as a team accordingly.**
- c) Only one copy of the documents will be submitted via a team member, other submissions will not be considered. The zip file submitted has to be named after the team number which will be announced after registration e.g. Team_10.
- d) Submission will be via the submission link available on the course CMS.
- e) **Make sure that the team leader submits a printed A3 hard copy to the project assigned TA that should be announced on a document uploaded on CMS.**

Important Note:

- No **late** submissions will be accepted.
- **The submission will be through the submission link ONLY, which will be announced on CMS. NO mail submissions would be accepted.**
- Cheating cases will be graded by ZERO in the whole Milestone.
- It is your responsibility to make sure that the files **are not corrupt** and were uploaded successfully to the submission link

Milestone 1: Project Description

University Human Resources Management System

1. Project Overview

The goal of this project is to design and develop a Human Resources (HR) management system specifically for our university. The system will cover all aspects of employee management, including personal information, contracts, attendance, payroll, performance evaluations, and leave requests.

By centralizing this information, the system will make it easier for HR administrators, employees, and department managers to access accurate data and make informed decisions. It will store detailed information such as employee profiles, departmental structures, job roles, attendance logs, payroll records, deductions, leave balances, performance reviews, and related official documents.

The university has a structured hierarchy of employees. Each department includes many employees, and employees can hold different positions such as teaching assistant (TA), lecturer, vice-dean, dean, vice-president, president, or medical doctor. Some employees may also serve as HR representatives for their departments, while HR managers are responsible for approving certain types of leave. More details on approvals are explained in section 2.8.

This system will ensure data consistency, reduce duplication, and support reliable payroll generation, leave approvals, and performance monitoring. Employees and administrators will benefit from quick access to HR-related information and automated workflows.

Overall, the system ensures consistency, simplifies payroll processing, enables transparent leave approvals, and supports automated workflows for HR operations.

2. System Hierarchy

The university HR system follows a structured employee hierarchy that defines roles, departments, and approval responsibilities. Each employee belongs to one department and can hold one or more roles. The hierarchy ensures clear reporting lines, decision-making authority,

and approval responsibilities, especially for processes such as payroll, leave requests, and performance evaluations.

At the base of the hierarchy are **Teaching Assistants (TAs)**. TAs belong only to academic departments (such as MET or IET) and cannot be assigned to the HR or Medical departments. They usually support lecturers and department staff but have no approval authority.

Above the TAs are **Lecturers**, who are responsible for teaching and research activities. In addition to their academic department, they could be assigned as **vice-deans** or **Deans**.

The next levels in the academic hierarchy are the **Vice-Deans** and **Deans**, who oversee academic departments. Vice-deans assist deans with daily operations, while deans carry the primary responsibility for their department's academic and administrative activities. Both roles belong to their academic department and to the Upper Board department, and they are lecturers.

At the university-wide level, the **Vice-President** is positioned above the deans. They supervise large areas such as academic affairs, student affairs, or research. Vice president also belong to the Upper Board department.

At the top of the hierarchy is the **President**, who serves as the head of the entire university. The president is ranked as the highest authority and is also a manager of the Upper Board department.

Separate from the academic structure are the **Medical Staff** and the **HR Department**. Medical staff, including university medical doctors, are responsible for employee health matters such as medical leave approvals. The HR Department includes HR representatives and HR managers. HR representatives handle employee records and process basic HR tasks, while HR managers hold authority for approving certain leave types and overseeing HR policy enforcement.

The table below outlines the system hierarchy, presenting the available roles, their respective departments, and associated ranks.

Role	Belongs to department	Rank
President	Upper Board	1
Vice President	Upper Board	2
Dean	General Departments such as MET, IET, etc	3
HR Manager	HR Department	3
Vice Dean	General Departments such as MET, IET, etc	4

HR Representative	HR Department	4
Lecturer	General Departments such as MET, IET, etc	5
Teaching Assistant (TA)	General Departments such as MET, IET, etc	6
Medical Doctor	Medical Department	-

3. System Requirements

3.1 Employee

An employee represents a university staff member and is uniquely identified by their employee ID. Each employee has personal details such as first and last name, email, address, gender, official day off, years of experience (including previous work outside the university), and one or more phone numbers. Employees also have a national ID stored in the system, but this is not used as their unique identifier.

Additional attributes include employment status (active or inactive), salary, type of contract (full-time or part-time), emergency contact details (name and phone number), and entitlement to annual and accidental leave balances. These leave balances are credited when an employee first joins the university and are updated yearly. Whenever a leave is approved, the corresponding balance is reduced. In some cases, employees can temporarily take over the responsibilities of colleagues who are on leave; meaning employees can replace other employees when required.

Employees also have a hire date, and if they resign, the system records their last working date.

3.2 Department

A department is an organizational unit that groups employees together, such as MET, IET, HR, Medical, or Upper Board. Each department has a unique name, and a building location. Employees belong to exactly one department.

Departments contain different types of roles, such as TA, lecturer, dean, and vice-dean. However, TAs can only be assigned to academic departments and cannot belong to the Medical or HR departments. Deans, vice-deans, vice-presidents, and the president are also members of the Upper Board department.

3.3 Role

A role represents the position assigned to an employee. It has a unique name, title, description, and rank, which indicates the position's place within the hierarchy (for example, the president has rank 1, the vice-president has rank 2, and so on).

Each role also includes details such as base salary, salary increase factors based on years of experience, overtime factors, and the initial balances of annual and accidental leave granted to new hires. An employee can hold multiple roles at the same time (for example, a lecturer may also serve as a vice-dean), and a role can be fulfilled by multiple employees (for example, multiple TAs may exist in the same department). Some roles may not be assigned to employees yet.

3.4 Document

A document refers to any file linked to an employee. Each document has a unique ID, type (such as contract, medical report, or national ID), description, filename, storage location, size, creation date, expiry date, and status.

3.5 Attendance

Attendance records store daily in/out logs for each employee. Each record includes the date, check-in and check-out times and total duration. An attendance record belongs to a single employee, but each employee will have many attendance logs over time. Legal issues can emerge after an employee leaves that may require references to their attendance records; hence, attendance records are not deleted after an employee leaves.

3.6 Payroll

Payroll represents the payment details of an employee for a specific time period (from/to date). Each payroll record includes the payment date, final salary amount, comments, bonuses amount, and deductions amount. Payroll is uniquely identified by an ID. Each employee has a payroll record for every month. Newly hired employees start without payroll records, which are then generated monthly. **Bonuses amount and deductions amount will be calculated in milestone 2, hence, they are not derived attributes.**

3.7 Deduction

A deduction represents the amount subtracted from an employee's payroll, if applicable. It includes an ID, date, amount, type (such as unpaid leave or missing attendance), and status.

Deductions are applied in the following cases:

- When attendance is missing for a day (both check-in and check-out are absent).
- When the employee doesn't fulfill the total working hours per month. **(This will be explained in more details in Milestone 2)**
- When an employee takes approved unpaid leave. If the unpaid leave spans multiple payroll periods, multiple deductions are created, one for each period.

When an employee resigns, the system will remove the employee's deductions history.

3.8 Leave

A leave request records time off requested by an employee. It includes the request ID, date of request, start and end dates, total number of days (calculated based on the start and end dates), and approval status. All leave requests must be reviewed and approved by authorized employees, depending on the hierarchy in section 2 and/or meeting certain conditions that will be discussed below. and type of leave.

The types of leave are as follows:

3.8.1 Annual Leave

Annual leave is a general time-off request that does not require a reason. Requests must be submitted in advance. Once approved, the requested days are deducted from the employee's annual leave balance. For approval, another employee must be available to take over the applicant's duties temporarily.

Annual leave requests from employees typically require approval from both the dean and the HR representative. However, if the request is submitted by a dean or vice-dean, approval must instead be obtained from members of the upper board holding a higher rank, in addition to the HR department. Lastly, if an annual leave request is submitted by an HR employee, it must be approved by HR personnel of a higher rank. Check section 2 for the ranking hierarchy.

When an employee applies for an annual leave, another employee must replace them.

3.8.2 Accidental Leave

Accidental leave is used in emergency situations. If the employee has enough accidental leave balance and submits the request within 48 hours, the HR representative can approve it.

3.8.3 Medical Leave

Medical leave is for health-related absences and can be categorized as sick leave or maternity leave. Employees must submit medical documents, and approval requires both a medical

doctor's confirmation and the HR representative's approval. Maternity leave is available only to female employees who have recently given birth. Additional information, such as insurance status and disability details, is also recorded in any medical leave.

3.8.4 Unpaid Leave

Unpaid leave can be requested when an employee has no annual leave balance remaining. The request must include a memo document, and it requires approval from a higher-ranking employee, the Upper Board department, and the HR representative as in section 2, . The maximum number of unpaid leave days allowed is 30.

3.8.5 Compensation Leave

Compensation leave is granted when an employee works on their official day off. In return, the employee is allowed to take another working day off within the same month. The request must include the reason and the date of the original extra workday.

Compensations are approved by the employee's HR representative.

When an employee applies for a compensation leave, another employee must replace them.

3.9 Performance

Performance evaluation is a periodic review of an employee's work, typically carried out once per semester. Each evaluation includes a unique ID, rating, and comments. Employees can accumulate multiple evaluations during their careers at the university.