Human Recources Database Project

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Project Overview

The Human Resources Management Database centralizes all employee-related information to support HR operations such as employee records, recruitment, training, attendance, payroll, and benefits. It enhances data accuracy, compliance, and decision-making by providing a unified, well-structured system. The database is designed in Third Normal Form (3NF) to eliminate redundancy and maintain data integrity. The document includes the Entity-Relationship Diagram (ERD), entity and relationship details, normalization proof, design rationale, and sample queries for HR reporting.

Incorporation of TA's Feedback

Based on TA feedback, we refined our ERD to better normalize the recruiting flow, reduce redundancies, and explicitly recognize missing entities and cross-table governance rules.

Department manager constraint. We retain the FK Department.ManagerEmployeeID → Employee.EmployeeID to ensure the manager exists. In addition, we document a governance rule that the department manager must belong to the same department, derived via Employee.JobPositionID → JobPosition.DepartmentID = Department.DepartmentID. Because this rule spans multiple tables, it is defined at the governance/application layer.

Multiple applications per candidate. We clarify that a candidate may apply to multiple positions, addressing the TA's question by making the intent explicit in our model.

Recognition of Additional Entities

A new entity, CandidateApplication, was introduced to represent each candidate's application for a specific job position. This entity serves as the anchor for application-specific attributes such as application date, status, source, and notes. It also becomes the reference point for interviews, ensuring that the recruitment funnel is modeled explicitly and efficiently.

Normalization of ERD

Application-specific attributes (PositionApplied, ApplicationDate, Status) were migrated from RecruitmentCandidate to CandidateApplication to eliminate repeating groups and ensure compliance with 3NF. The Interview entity now references CandidateApplication (one-to-many), allowing multiple interview rounds per application without introducing redundancy or data anomalies.

Reduction of Redundant Data (Data Governance)

Lightweight governance rules were defined and documented within the ERD to improve data quality, consistency, and control. These include:

- RecruitmentCandidate.Email is unique (prevents duplicate candidate profiles).
- Attendance is unique per (Employee, Date) (one record per day).
- Payroll is 1:1 with Employee (single active payroll record).
- Leave disallows self-approval (Approver ≠ Requester).
- Status-like fields use controlled vocabularies / lookup tables (e.g., EmploymentStatus, LeaveType, InterviewType/Result, TrainingStatus).

• Business rule: No duplicate applications per (Candidate, Position) to keep the funnel unambiguous.

Visual Comparison: Before vs Final ERD

Figure A - Before ERD (Initial Design).

No CandidateApplication; Interview linked directly to RecruitmentCandidate; RecruitmentCandidate contained PositionApplied / ApplicationDate / Status.

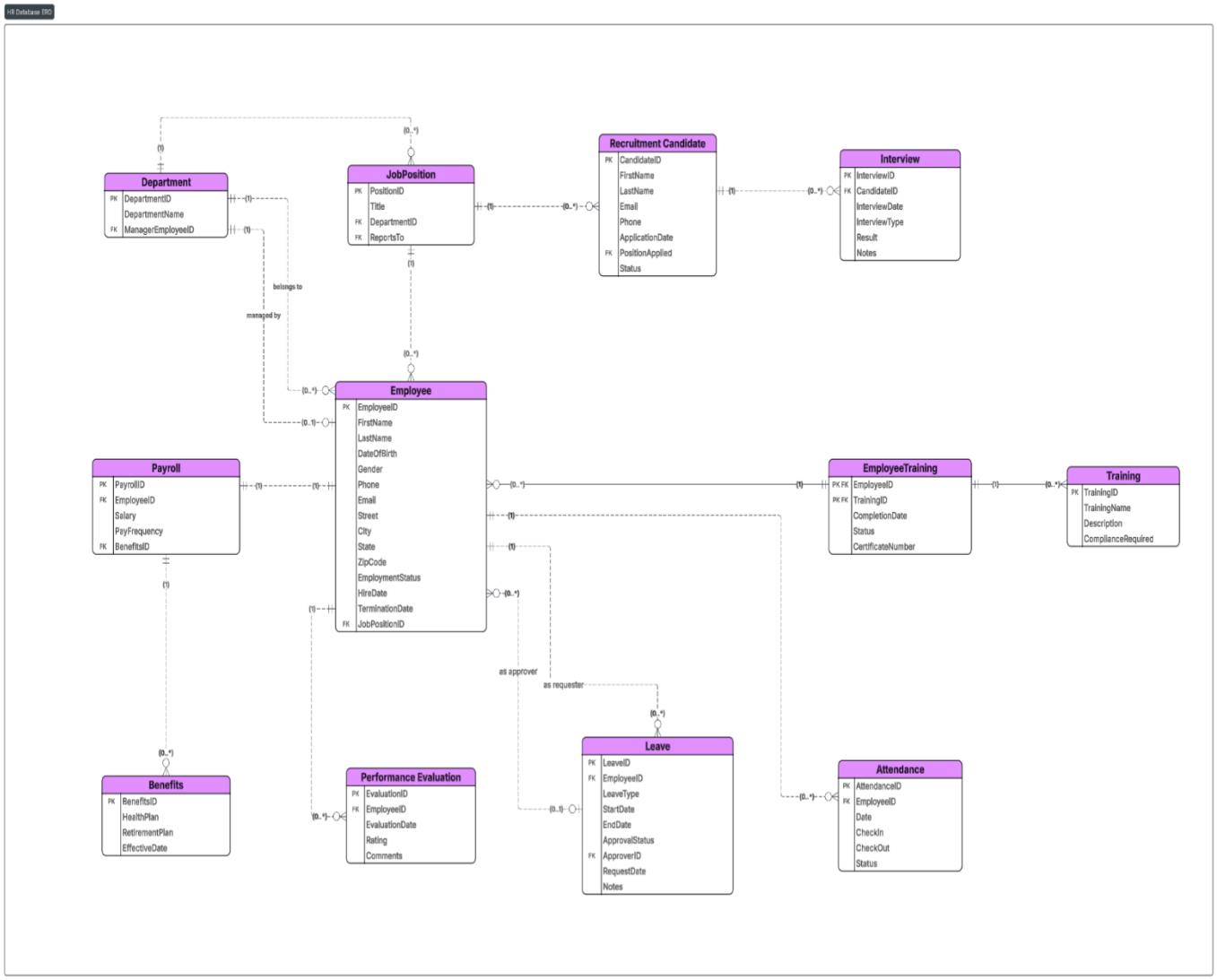
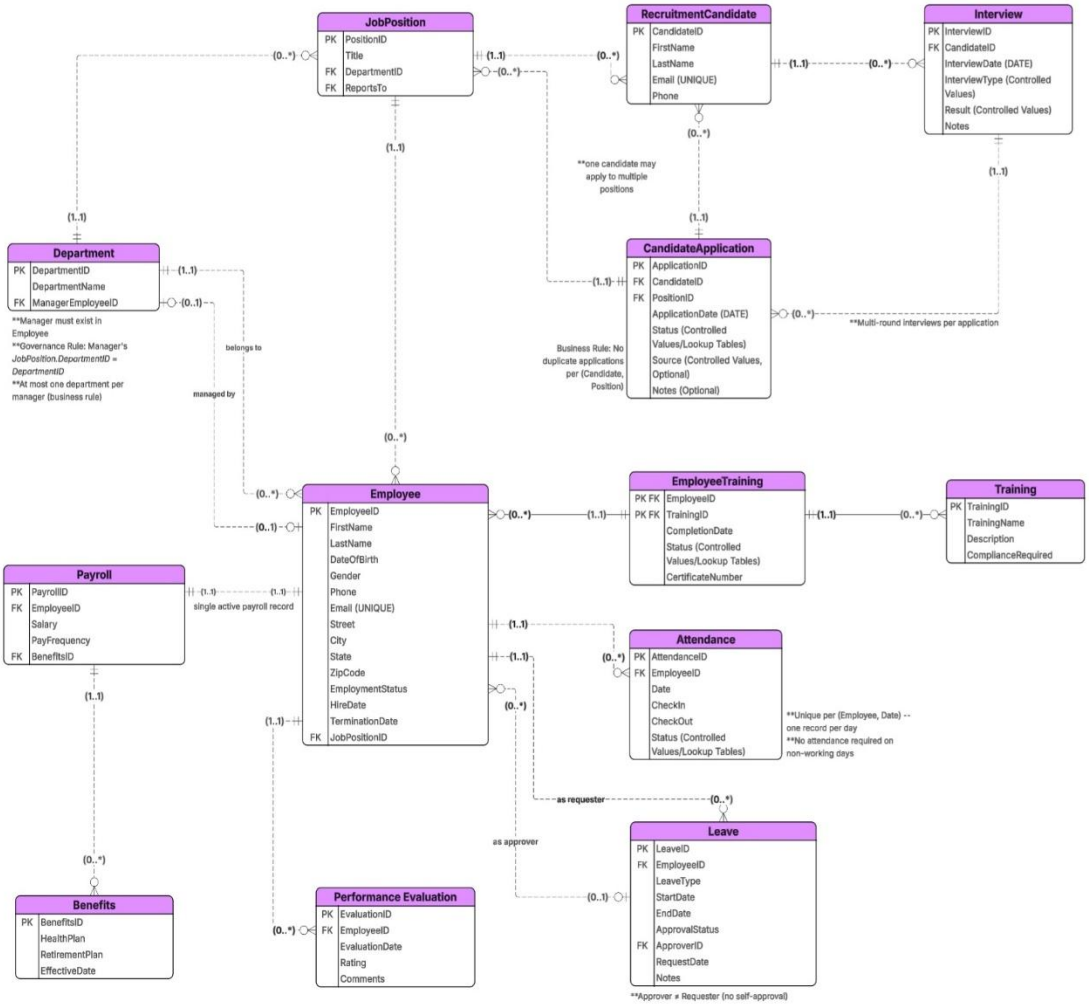


Figure B - Final ERD (Refined Design).

Adds CandidateApplication; rewires Interview → CandidateApplication (0..N); moves the three application attributes into CandidateApplication; retains Department.ManagerEmployeeID → Employee.EmployeeID with a note that the manager belongs to the same department (governance).



Updated ERD - Lucid link for your reference: https://lucid.app/lucidchart/6e13dfb9-fc73-4a2a-9137b185258b7dc0/edit?viewport_loc=1723%2C992%2C4980%2C2460%2C0_0&invitationId=inv_8cc0c981-e70a-456d-bf91-fcad8afb995b

Change bullets (Before → After)

- Added CandidateApplication (bridge between RecruitmentCandidate and JobPosition).
- Rewired Interview to reference CandidateApplication (supports multi-round interviews per application).
- Moved PositionApplied / ApplicationDate / Status from RecruitmentCandidate to CandidateApplication.
- Documented governance:
    - Manager's JobPosition.DepartmentID = Department.DepartmentID
    - Unique RecruitmentCandidate.Email
    - Attendance unique per (Employee, Date)
    - Payroll one-to-one with Employee
    - Leave no self-approval
    - Controlled vocabularies for status fields
    - No duplicate (Candidate, Position) entries

Conclusion

The final design of the Human Resources Management Database demonstrates substantial improvements in both structural and functional integrity, addressing prior design limitations and integrating critical feedback from the TA. Through normalization to Third Normal Form (3NF) and the introduction of the CandidateApplication entity, the database now offers a more accurate, efficient, and flexible representation of the HR lifecycle: from

recruitment and onboarding to employee development, attendance, payroll, and leave management.

By enforcing governance rules and maintaining strong referential integrity, the system ensures data remains consistent, unique, and accurate, thereby minimizing anomalies such as duplicate entries, inconsistent relationships, and update irregularities. These design choices not only improve data reliability but also promote transparency and accountability across HR processes.

Beyond technical refinements, the enhanced schema provides a foundation for clearer analytics and more insightful reporting. HR personnel and management can now extract meaningful trends and metrics from well-structured data, improving decision-making in areas such as workforce planning, performance evaluation, and compliance monitoring. Ultimately, this database design not only streamlines day-to-day HR operations but also establishes a scalable, future-ready framework capable of adapting to evolving business and data requirements with precision and clarity.