Employee Management System (EMS)

End-to-End Data Analysis Project Report

1. Project Overview

The **Employee Management System (EMS)** was designed to manage and analyze employee records, job roles, departmental structures, payroll, and performance-related information. This project consists of **two major phases**:

1. **SQL Phase** – Designing the database, inserting data, applying constraints, and running analytical queries.

2. **Excel Phase** – Exporting SQL tables to Excel, performing lookup transformations, and building pivot table dashboards.

This report combines both phases into a unified documentation suitable for a **portfolio project, interview presentation, or academic submission**.

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2. SQL Phase – Database Design & Analysis

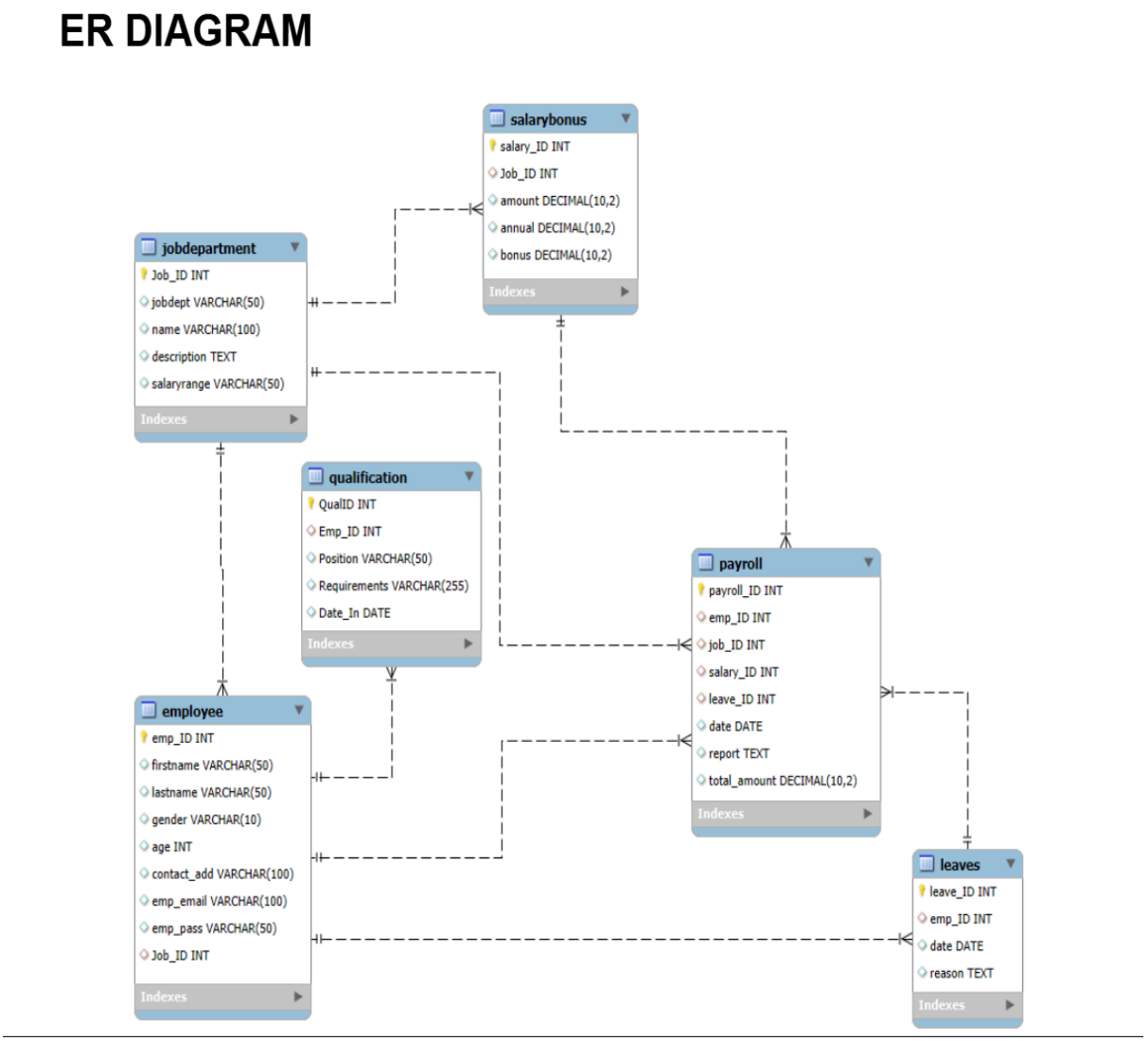
2.1 Database Schema & ER Diagram

The EMS consists of **six relational tables**:

- JobDepartment
- SalaryBonus
- Employee
- Qualification
- Leaves
- Payroll

Each table is connected through **Primary Keys** and **Foreign Keys** with cascading rules.

The ER diagram from the PDF (page 1) clearly visualizes these relationships.



2.2 Key Features of SQL Implementation

- Enforced **referential integrity** through FK constraints.
- Used **ON DELETE CASCADE** and **ON UPDATE CASCADE** for automatic sync.
- Prevented duplicates using **UNIQUE(emp_email)**.
- Stored all dates in **YYYY-MM-DD** format.

2.3 SQL Analysis Summary

Using the SQL queries (Pages 2–26 in the PDF), we generated insights such as:

Employee Insights

- Total Employees → **60**
- Department with the most employees → **Finance & IT (9 each)**
- Highest average salary → **Legal ($84,600)**
- Total salary expenditure → **$4.32M per month**

Job & Department Insights

- Most job roles → **Finance (9 roles)**
- Highest-paying job roles → **Directors across departments ($140k–$170k)**
- Highest total salary allocation → **Finance ($651k)**

Qualification Insights

- All 60 employees have at least 1 qualification.
- Each qualification appears uniquely (no duplicates recorded).

Leave Insights

- Year with most leaves → **2024 (all 60 employees)**
- Average leave per employee → **1 day**
- Total leave days → **60**

Payroll Insights

- Total monthly net payroll → **$2.778M**
- Highest average bonus → **Legal ($13,300)**

- Average net pay after leave → **$46,300**

All SQL outputs are fully referenced from the uploaded PDF (pages 2–26). fileciteturn1file0

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3. Excel Phase – Data Transformation & Dashboarding

After SQL analysis, all six tables were exported into Excel.

3.1 Data Preparation Steps

1. Exported tables from MySQL Workbench to CSV.
2. Loaded all CSV files into Excel.
3. Cleaned column headers and removed table formatting issues.
4. Created a unified sheet: **Master_Data**.

3.2 Data Enrichment via Excel Lookups

In **Master_Data**, we added new fields using lookup formulas:

Department Lookup
=VLOOKUP(I2, jobdepartment!$A:$B, 2, FALSE)

- Mapped Job_ID → Department

Salary Lookup
=VLOOKUP(I2, salarybonus!$B:$C, 2, FALSE)

- Fetched Base Salary

Bonus Lookup
=VLOOKUP(I2, salarybonus!$B:$E, 4, FALSE)

- Added bonus corresponding to Job_ID

Payroll Lookup

=VLOOKUP(A2, payroll!$B:$H, 7, FALSE)

- Pulled Total Payroll Amount per employee

All lookup fields were successfully populated.

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4. Excel Visualizations & Pivot Tables

We built **three pivot tables** to summarize organizational insights.

4.1 Pivot Table 1 – Department Headcount

Field Setup:

- Rows → Department
- Values → Count of Emp_ID

Insight:
Matches SQL results — Finance & IT have the highest headcount.

4.2 Pivot Table 2 – Gender Distribution by Department

Field Setup:

- Rows → Department
- Columns → Gender
- Values → Count of Emp_ID

Insight:
Balanced male/female ratios across most departments.

4.3 Pivot Table 3 – Payroll Summary Dashboard

Field Setup:

- Rows → Department & Emp_ID
- Values → Sum of Salary, Bonus, Payroll

Insight:
Consistent with SQL:

- Highest total salary → Finance
- Highest bonuses → Legal (avg) & Finance (total)

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5. Final Insights & Business Interpretation

This EMS project successfully demonstrates:

✔ Strong SQL Database Design

- Proper normalization
- Robust constraint management
- Complex JOIN queries

✔ Clean Data Transformation Using Excel

- Removed corrupted characters
- Eliminated table formatting
- Applied accurate VLOOKUP/XLOOKUP mapping

✔ Professional Dashboard Creation

- HR headcount analysis
- Department-wise payroll summary
- Bonus & salary structures

✔ Business Impact

The combined SQL + Excel approach gives HR management:

- Clear hiring trends

- Transparent compensation structure
- Accurate payroll budgeting
- Department performance indicators

Overall, the EMS ensures efficient data handling, insightful reporting, and strong integration between database systems and analytical tools.

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6. Conclusion

The project demonstrates end-to-end expertise across:

- **SQL Development**
- **Data Modeling**
- **ETL (Extract–Transform–Load)** operations
- **Excel Automation & Analytics**
- **Dashboarding & Reporting**