

group 3 - project 2

# **EMPLOYEE MANAGER**

*information*

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# MEMBER

group 3

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- 2 Database Normalization & ERD
- 3 CRUD
- 4 Queries
- 5 Dashboard
- 6 Search & Filter
- 7 Limitations & Future Work

# PROBLEM & MOTIVATION

## ***Real-world Problem***

- Companies use spreadsheets → data redundancy
- Mixed personal + project data in one table
- Update anomalies, inconsistent reporting

## ***Our Solution***

- Normalized 3NF database
- Python GUI with CRUD operations
- Queries and Dashboard analytics

# **DATABASE NORMALIZATION**

1. Unnormalized Form (UNF)

2. First Normal Form (UNF → 1NF)

3. Second Normal Form (1NF → 2NF)

4. Third Normal Form (2NF → 3NF)

# UNNORMALIZED FORM (UNF)

## UNF Issues & Normalization Need

- **Initial UNF Table:**

EmployeeID, Name, DOB, Department, Project, Manager, Role, Salary

- **Problems:**

- Data duplication (same employee in multiple rows)
- Update anomalies (change manager → update multiple rows)
- Insertion/deletion issues

- **Functional Dependencies:**

- $\text{EmployeeID} \rightarrow \{\text{Name}, \text{DateOfBirth}, \text{Department}\}$
- $\{\text{EmployeeID}, \text{Project}\} \rightarrow \{\text{Role}, \text{Salary}\}$
- $\text{Project} \rightarrow \text{Manager}$

# FIRST NORMAL FORM (1NF)

Conversion to 1NF:

Each row contains a single atomic value for one Project–Role–Salary assignment.

Resulting table structure:

AssignmentID | EmployeeID | EmployeeRole | ProjectID | Salary

Primary Key (PK): AssignmentID

Foreign Keys (FK): EmployeeID → Employees(EmployeeID), ProjectID → Projects(ProjectID)

# SECOND NORMAL FORM (2NF)

2NF Rule: A table in 1NF with a composite key must not have partial dependencies (attributes depending on only part of the key).

Using (EmployeeID, ProjectID) as a composite PK:

Salary depends only on EmployeeID (employee salary), not on the full key.

Solution: Split tables into:

- Employees
- Projects
- Assignments (linking Employee–Project with Role & Salary)

Assignments Table (2NF):

AssignmentID | EmployeeID | ProjectID | EmployeeRole | Salary

- PK: AssignmentID
- FKS: EmployeeID → Employees(EmployeeID), ProjectID → Projects(ProjectID)

# THIRD NORMAL FORM (3NF)

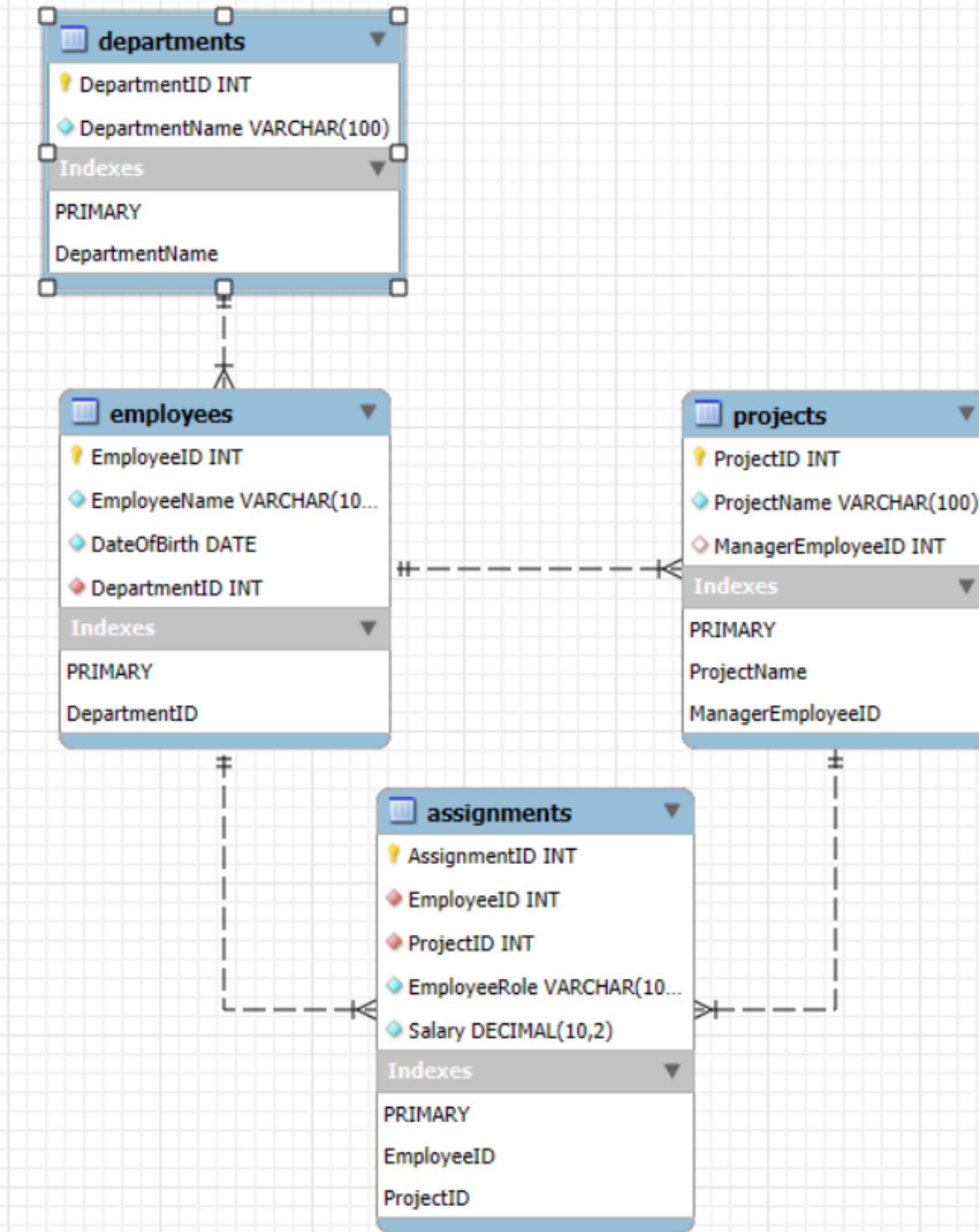
3NF Rule: Eliminate transitive dependencies.

- Example: Project → Manager → EmployeeID
- Storing Manager in Assignments introduces transitive dependency.
- Solution: Store Manager in the Projects table:

Project | ProjectID (PK) | ProjectName | ManagerEmployeeID (FK → Employees.EmployeeID)

- Assignments only records the relationship between employees and projects.

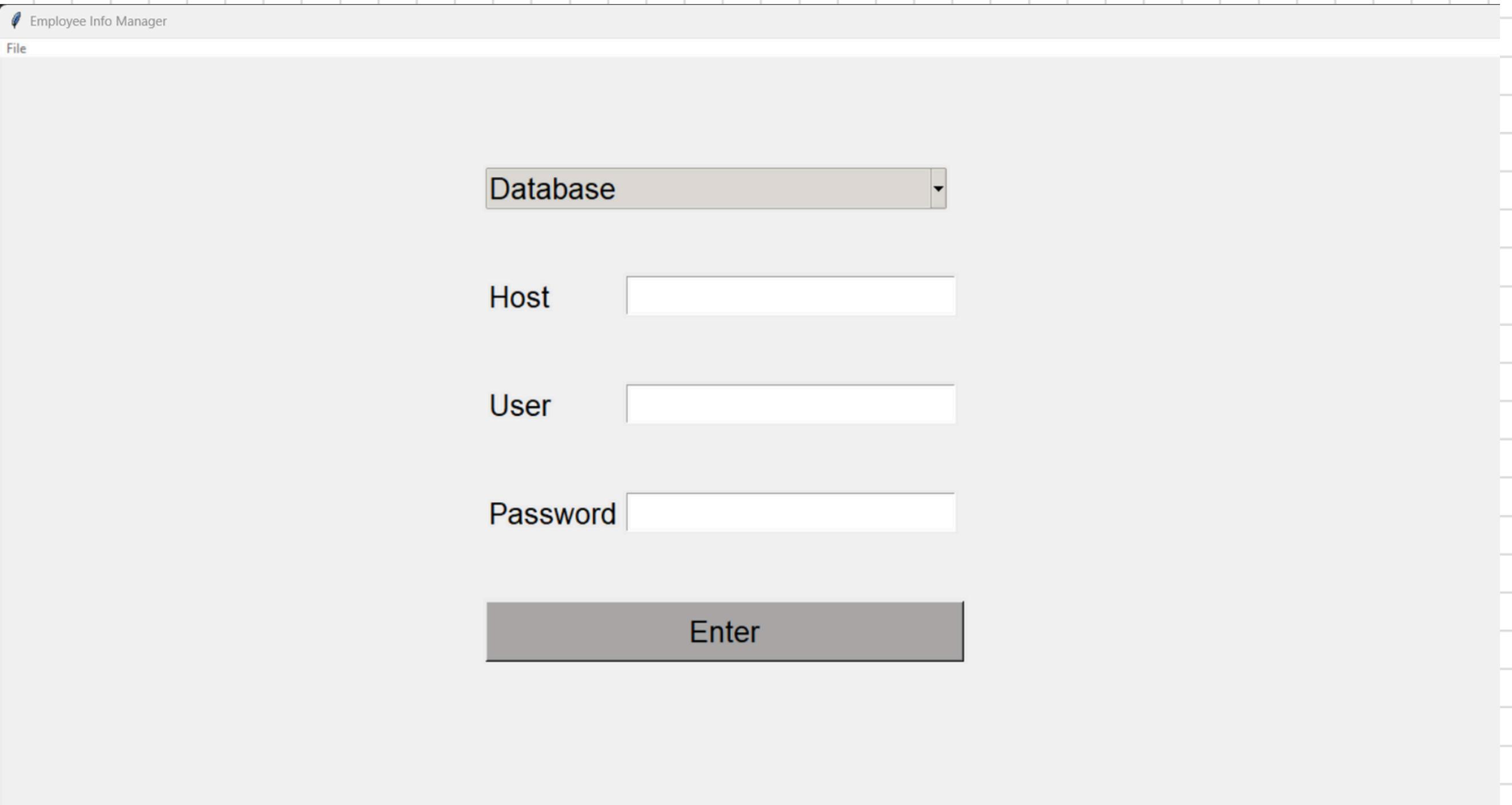
# ENTITY RELATIONSHIP DIAGRAM (ERD)



# REALISTIC SAMPLE DATA

	EmployeeID	EmployeeName	DateOfBirth	DepartmentName	ProjectName	EmployeeRole	Salary
▶	1	Vũ Thị Nhung	1990-04-23	Sales	Urban Development Research	Coordinator	12500000.00
	1	Vũ Thị Nhung	1990-04-23	Sales	Academic Administration Management	Developer	12500000.00
▶	2	Bùi Minh Quân	1982-08-19	Finance	Economic Policy Research 2024	Manager	18000000.00
	2	Bùi Minh Quân	1982-08-19	Finance	MBA Program Improvement	Team Lead	18000000.00
▶	3	Ngô Thị Lan	1985-12-02	Human Resources	Employee Engagement Program	HR Specialist	14200000.00
	3	Ngô Thị Lan	1985-12-02	Human Resources	Talent Development Plan	Recruiter	14200000.00
▶	4	Hoàng Văn Nam	1981-01-14	Data Science	Data Analytics Platform	Data Scientist	21500000.00
	4	Hoàng Văn Nam	1981-01-14	Data Science	AI Research Initiative	ML Engineer	21500000.00
▶	5	Trần Thị Thanh	1983-05-27	Engineering	Predictive Maintenance System	QA Engineer	16500000.00
	5	Trần Thị Thanh	1983-05-27	Engineering	Product Design Revamp	Designer	16500000.00
▶	6	Lê Văn Hùng	1979-09-09	Data Science	Data Analytics Platform	Senior Data ...	24500000.00
	6	Lê Văn Hùng	1979-09-09	Data Science	AI Research Initiative	Research Lead	24500000.00
▶	7	Phạm Thị Ngọc	1986-03-05	Finance	Economic Policy Research 2024	Financial Ana...	15800000.00
	7	Phạm Thị Ngọc	1986-03-05	Finance	Financial Market Analysis	Accountant	15800000.00
▶	8	Trương Minh Hải	1984-07-16	Human Resources	Employee Engagement Program	HR Manager	15200000.00
	8	Trương Minh Hải	1984-07-16	Human Resources	Talent Development Plan	Training Coor...	15200000.00
▶	9	Đinh Thị Lan	1987-12-29	Legal Affairs	Legal Compliance Audit	Legal Advisor	16800000.00
	9	Đinh Thị Lan	1987-12-29	Legal Affairs	Contract Management System	Compliance ...	16800000.00
▶	10	Nguyễn Văn Sơn	1979-10-11	Marketing	Market Expansion Strategy	Marketing Sp...	14800000.00
	10	Nguyễn Văn Sơn	1979-10-11	Marketing	Brand Awareness Campaign	Brand Manager	14800000.00
▶	11	Vũ Thị Hương	1990-02-08	Sales	Sales Optimization Program	Sales Executive	13500000.00
	11	Vũ Thị Hương	1990-02-08	Sales	Customer Relationship Management	Account Man...	13500000.00
▶	12	Bùi Văn Tiến	1985-06-23	Finance	Financial Reporting System	Financial Con...	17200000.00

# CONNECTING



# CRUD

## HOW DOES IT WORK

**01**  
**CREATE**

Add new records  
to the database

**02**  
**READ**

Display and search  
existing data ( By ID )

**03**  
**UPDATE**

Modify existing  
records

**04**  
**DELETE**

Remove records  
permanently

The system provides full CRUD support for all core entities:

**EMPLOYEES**

**DEPARTMENTS**

**PROJECTS**

**ASSIGNMENTS**

# CREATE

# SCREENSHOTS OF CRUD UI

The screenshot displays the Employee Information Manager application interface. On the left, a sidebar lists navigation options: Create, Read, Update, Delete, Global Columns, Search and Filter, Queries, and Dashboard. The main area is titled "Employee Information Manager" and contains four tabs: Assignments, Departments, Employees, and Projects. The Employees tab is active, showing a table with columns for Employee ID, Employee Name, Date Of Birth, and Department ID. The table lists 29 employees with various details.

Employee ID	Employee Name	Date Of Birth	Department ID
1	Vũ Thị Nhung	1990-04-23	7
2	Bùi Minh Quân	1982-08-19	3
3	Ngô Thị Lan	1985-12-02	4
4	Hoàng Văn Nam	1981-01-14	1
5	Trần Thị Thanh	1983-05-27	2
6	Lê Văn Hùng	1979-09-09	1
7	Phạm Thị Ngọc	1986-03-05	3
8	Trương Minh Hải	1984-07-16	4
9	Đinh Thị Lan	1987-12-29	5
10	Nguyễn Văn Sơn	1979-10-11	6
11	Vũ Thị Hương	1990-02-08	7
12	Bùi Văn Tiến	1985-06-23	3
13	Ngô Thị Bích	1989-09-30	4
14	Hoàng Quang Huy	1982-03-12	1
15	Nguyễn Thị Lan	1984-11-05	2
16	Trần Văn Kiên	1978-04-28	1
17	Lê Thị Hồng	1986-08-14	3
18	Phạm Văn Cường	1981-12-07	4
19	Đặng Thị Thanh	1987-05-21	5
20	Nguyễn Văn Hòa	1980-01-19	6
21	Vũ Thị Thanh	1990-07-03	7
22	Bùi Minh Hùng	1982-09-22	3
23	Ngô Thị Mai	1985-02-17	4
24	Hoàng Văn Quang	1981-06-29	1
25	Trần Thị Phương	1983-03-11	2
26	Lê Văn Tài	1979-08-05	1
27	Phạm Thị Hạnh	1986-12-19	3
28	Trương Minh Tuấn	1984-05-01	4
29	Đinh Thị Nhung	1987-09-26	5

# READ

# SCREENSHOTS OF CRUD UI

The screenshot shows the 'Employee Information Manager' application interface. On the left, a sidebar menu lists various actions: Create, Read, Update, Delete, Global Columns, Search and Filter, Queries, and Dashboard. The 'Read' option is selected. In the center, there is a search form with a label 'Employee ID' and a text input field containing the placeholder 'Enter'. To the right is a large table titled 'Employee Information Manager' with four tabs at the top: Assignments, Departments, Employees, and Projects. The 'Employees' tab is active, displaying a list of 30 employees with columns for Employee ID, Employee Name, Date Of Birth, and Department ID. The data is as follows:

Employee ID	Employee Name	Date Of Birth	Department ID
1	Vũ Thị Nhung	1990-04-23	7
2	Bùi Minh Quân	1982-08-19	3
3	Ngô Thị Lan	1985-12-02	4
4	Hoàng Văn Nam	1981-01-14	1
5	Trần Thị Thanh	1983-05-27	2
6	Lê Văn Hùng	1979-09-09	1
7	Phạm Thị Ngọc	1986-03-05	3
8	Trương Minh Hải	1984-07-16	4
9	Đinh Thị Lan	1987-12-29	5
10	Nguyễn Văn Sơn	1979-10-11	6
11	Vũ Thị Hương	1990-02-08	7
12	Bùi Văn Tiến	1985-06-23	3
13	Ngô Thị Bích	1989-09-30	4
14	Hoàng Quang Huy	1982-03-12	1
15	Nguyễn Thị Lan	1984-11-05	2
16	Trần Văn Kiên	1978-04-28	1
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19	Đặng Thị Thanh	1987-05-21	5
20	Nguyễn Văn Hòa	1980-01-19	6
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23	Ngô Thị Mai	1985-02-17	4
24	Hoàng Văn Quang	1981-06-29	1
25	Trần Thị Phương	1983-03-11	2
26	Lê Văn Tài	1979-08-05	1
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28	Trương Minh Tuấn	1984-05-01	4
29	Đinh Thị Nhung	1987-09-26	5

# UPDATE

# SCREENSHOTS OF CRUD UI

Employee Info Manager

File

## Employee Information Manager

Assignments	Departments	Employees	Projects
Employee ID	Employee Name	Date Of Birth	Department ID
1	Vũ Thị Nhung	1990-04-23	7
2	Bùi Minh Quân	1982-08-19	3
3	Ngô Thị Lan	1985-12-02	4
4	Hoàng Văn Nam	1981-01-14	1
5	Trần Thị Thanh	1983-05-27	2
6	Lê Văn Hùng	1979-09-09	1
7	Phạm Thị Ngọc	1986-03-05	3
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11	Vũ Thị Hương	1990-02-08	7
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13	Ngô Thị Bích	1989-09-30	4
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23	Ngô Thị Mai	1985-02-17	4
24	Hoàng Văn Quang	1981-06-29	1
25	Trần Thị Phương	1983-03-11	2
26	Lê Văn Tài	1979-08-05	1
27	Phạm Thị Hạnh	1986-12-19	3
28	Trương Minh Tuấn	1984-05-01	4
29	Đinh Thị Nhung	1987-09-26	5

Create

Employee ID

Read

Update

Delete

Global Columns

Search and Filter

Queries

Dashboard

Save

# DELETE

# SCREENSHOTS OF CRUD UI

Employee Info Manager

File

## Employee Information Manager

Assignments		Departments		Employees		Projects	
Employee ID	Employee Name	Date Of Birth	Department ID				
1	Vũ Thị Nhung	1990-04-23	7				
2	Bùi Minh Quân	1982-08-19	3				
3	Ngô Thị Lan	1985-12-02	4				
4	Hoàng Văn Nam	1981-01-14	1				
5	Trần Thị Thanh	1983-05-27	2				
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27	Phạm Thị Hạnh	1986-12-19	3				
28	Trương Minh Tuấn	1984-05-01	4				
29	Đinh Thị Nhung	1987-09-26	5				

Employee ID:

Delete

# GLOBAL COLUMNS

01

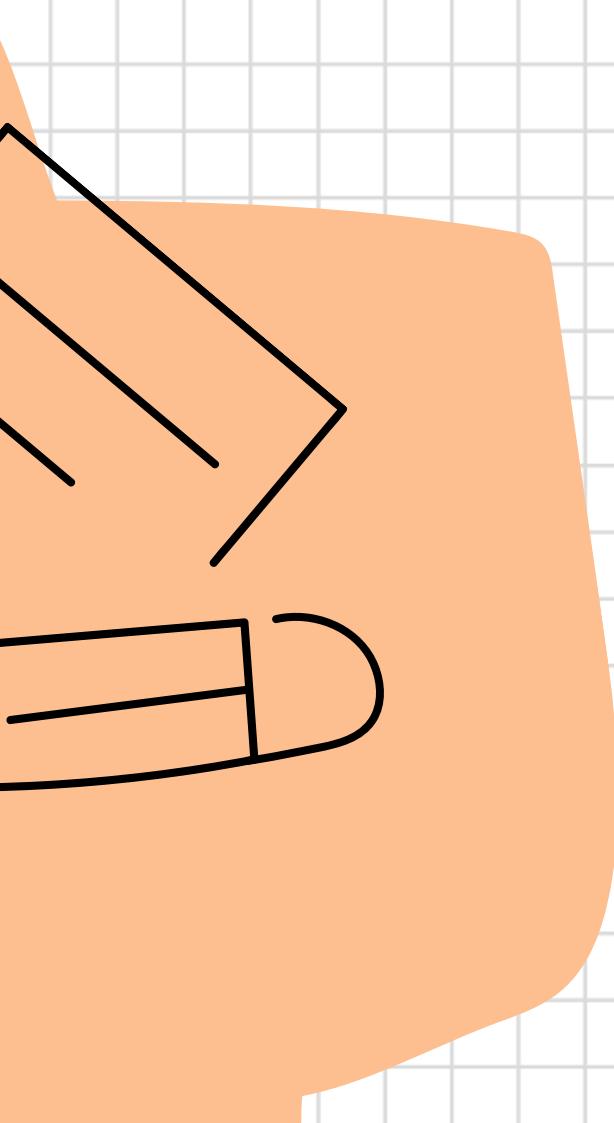
PURPOSE

03

CONCLUSION

02

HOW IT WORKS



## 01 PURPOSE

The idea behind this feature is simple:

- Different users may need to view different types of information
- Instead of showing every column every time, we let users choose the specific fields they want
- This makes the results cleaner, more readable, and more relevant for each task

02

## HOW IT WORKS

- The interface is divided into four groups that match our database design: Assignments, Employees, Projects, and Departments
- Each group contains checkboxes for all available columns
- Users can tick any combination of columns—such as Employee Name, Project Name, Role, Salary, or Manager ID—and the system will build a SELECT query dynamically based on their choices

03

## CONCLUSIONS

- This feature makes our application more user-friendly, especially for HR and project managers who often need customized reports
- It also showcases dynamic SQL generation, mapping user interface inputs directly into the SELECT statement.”
- Overall, the Global Column Selection gives users full control over what they want to see, making the data far more meaningful and efficient to use.

# GLOBAL SEARCH & FILTERING SYSTEM

- Employee Name
- Department
- Project
- Role
- Salary Range (Min/Max)
- Manager

Powered by a MySQL stored procedure (GlobalSearch) to combine filters dynamically.

# GLOBAL SEARCH & FILTERING SYSTEM

- Provide a fast and intuitive way for users to locate employee information across multiple tables.
- Reduce navigation time by allowing users to search globally and filter by multiple criteria at once.
- Support HR and project managers in retrieving data for decision-making.

# RESULT - SEARCH & FILTER

Employee Info Manager

File

## Employee Information Manager

Assignments		Departments		Employees		Projects	
Employee ID	Employee Name	Date Of Birth	Department ID				
1	Vũ Thị Nhung	1990-04-23	7				
2	Bùi Minh Quân	1982-08-19	3				
3	Ngô Thị Lan	1985-12-02	4				
4	Hoàng Văn Nam	1981-01-14	1				
5	Trần Thị Thanh	1983-05-27	2				
6	Lê Văn Hùng	1979-09-09	1				
7	Phạm Thị Ngọc	1986-03-05	3				
8	Trương Minh Hải	1984-07-16	4				
9	Đinh Thị Lan	1987-12-29	5				
10	Nguyễn Văn Sơn	1979-10-11	6				
11	Vũ Thị Hương	1990-02-08	7				
12	Bùi Văn Tiến	1985-06-23	3				
13	Ngô Thị Bích	1989-09-30	4				
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15	Nguyễn Thị Lan	1984-11-05	2				
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19	Đặng Thị Thanh	1987-05-21	5				
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23	Ngô Thị Mai	1985-02-17	4				
24	Hoàng Văn Quang	1981-06-29	1				
25	Trần Thị Phương	1983-03-11	2				
26	Lê Văn Tài	1979-08-05	1				
27	Phạm Thị Hanh	1986-12-19	3				
28	Trương Minh Tuấn	1984-05-01	4				
29	Đinh Thị Nhung	1987-09-26	5				

Create

Employee Name

Read

Department

Update

Project

Delete

Role

Global Columns

Salary from  to

Search and Filter

Enter

Queries

Dashboard

# REQUIRED QUERIES

Each query page includes:

- Read-only data table
- Pagination
- Sorting and search
- “Export to CSV” button

INNER JOIN

Employee + Role + Salary per project

LEFT JOIN

All employees including those without any project

Multi-table JOIN

JOIN — Employee → Project → Manager

Above Global Average Salary

Salary > average of all salaries

# REQUIRED QUERIES

Conclusion

1. Overall, the Queries module provides meaningful insights beyond simple CRUD operations
2. It demonstrates our understanding of SQL JOINs, aggregations, and multi-table relationships, while giving end-users powerful tools to analyze employee data effectively.

# DASHBOARD

An effective dashboard serves as a window into business operations:

- Visualizing Complex Data
- Real-Time KPI Tracking
- Data-Driven Decision Support
- Trend and Anomaly Detection

# EMPLOYEE MANAGEMENT OVERVIEW

Employee Dashboard

Export Current Tab

Export All Dashboard

Overview

Salary Distribution

Top Employees

Role Distribution

## Employee Management Overview - Database

### Key Performance Indicators

Total Employees	Departments	Unique Projects	Total Assignments	Avg Salary
160	7	38	320	18,285,625 VND

### Quick Statistics

#### Top Departments by Employee Count

Department	Employees
Finance	58
Human Resources	58
Data Science	56
Sales	38
Engineering	38
Legal Affairs	36
Marketing	36

### Salary Range Analysis

- Minimum Salary: 12,500,000 VND
- Maximum Salary: 24,800,000 VND
- Median Salary: 17,800,000 VND
- Average Salary: 18,285,625 VND
- Salary Std Dev: 2,912,816 VND
- Salary Range: 12,300,000 VND
- Assignments above average: 136
- Assignments below average: 184

### Database Information

- Database contains 160 unique employees
- Each employee has multiple project assignments (320 total assignments)
- Average projects per employee: 2.0
- Database includes comprehensive role information across 7 departments
- Each project has multiple team members with different roles
- Data shows real-world organizational structure with overlapping responsibilities

# SALARY DISTRIBUTION ANALYSIS

Employee Dashboard

Export Current Tab

Export All Dashboard

Overview    Salary Distribution    Top Employees    Role Distribution

## Salary Distribution Analysis



# TOP EMPLOYEES BY AVERAGE SALARY

## Employee Dashboard

[Export Current Tab](#)[Export All Dashboard](#)[Overview](#)[Salary Distribution](#)[Top Employees](#)[Role Distribution](#)

### Top Employees by Average Salary

Show Top: 15

Rank	ID	Name	Department	Projects	Avg Salary (VND)
157	157	Ngô Văn Quyết	Data Science	2	24,800,000
86	86	Lê Văn Nam	Data Science	2	24,600,000
150	150	Hoàng Thị Vui	Data Science	2	24,600,000
6	6	Lê Văn Hùng	Data Science	2	24,500,000
76	76	Trần Văn Phát	Data Science	2	24,400,000
143	143	Trần Văn Minh	Data Science	2	24,400,000
136	136	Lê Thị Ánh	Data Science	2	24,200,000
66	66	Lê Văn Hòa	Data Science	2	24,200,000
129	129	Phạm Văn Sang	Data Science	2	24,000,000
122	122	Nguyễn Thị Hà	Data Science	2	23,800,000
56	56	Trần Văn Hùng	Data Science	2	23,800,000
115	115	Vũ Văn Xuân	Data Science	2	23,600,000
26	26	Lê Văn Tài	Data Science	2	23,500,000
100	100	Danh Thị Oanh	Data Science	2	22,400,000

# EMPLOYEE ROLE DISTRIBUTION ANALYSIS

Employee Dashboard

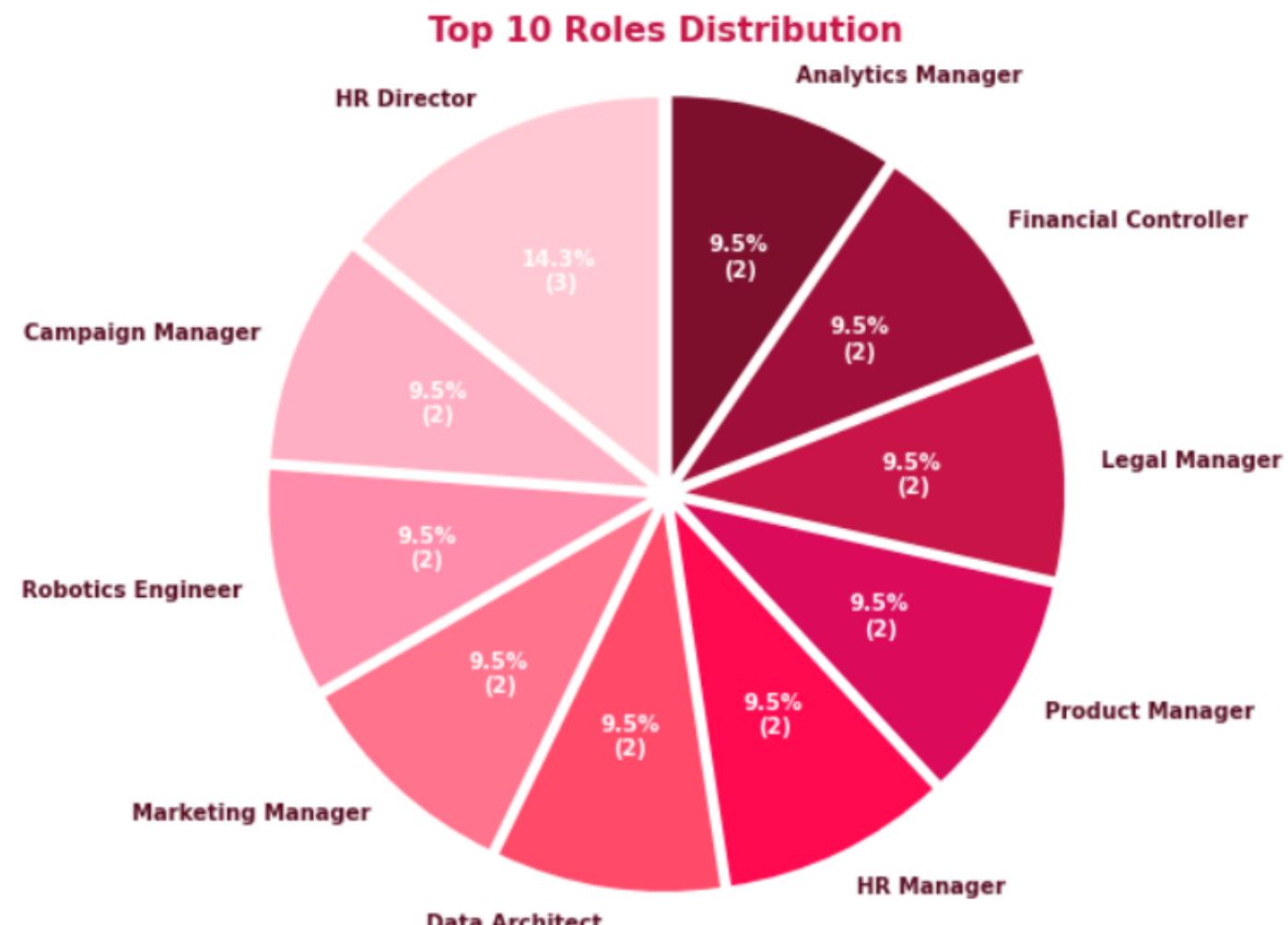
Export Current Tab

Export All Dashboard

Overview    Salary Distribution    Top Employees    Role Distribution

## Employee Role Distribution Analysis

Role Distribution Pie Chart



Role Statistics Table

Role	Count	Percentage	Avg Salary (VND)
HR Director	3	0.94%	16,266,667
Campaign Manager	2	0.62%	17,100,000
Robotics Engineer	2	0.62%	21,300,000
Marketing Manager	2	0.62%	17,000,000
Data Architect	2	0.62%	23,250,000
HR Manager	2	0.62%	16,400,000
Product Manager	2	0.62%	18,500,000
Legal Manager	2	0.62%	20,200,000
Financial Controller	2	0.62%	18,300,000
Analytics Manager	2	0.62%	23,450,000
Sales Manager	2	0.62%	14,900,000
Accountant	1	0.31%	15,800,000
Training Coordinator	1	0.31%	15,200,000
Legal Advisor	1	0.31%	16,800,000
Compliance Officer	1	0.31%	16,800,000
Marketing Specialist	1	0.31%	14,800,000

# LIMITATIONS & FUTURE WORK

## CURRENT LIMITATIONS

- No authentication
- This is desktop-only application
- No concurrent user handling

## FUTURE ENHANCEMENTS

- Upgrade to web version
- Have more role-based access control
- Create more advanced analytics (predictive modeling)
- Open mobile application

# Thanks for listening

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