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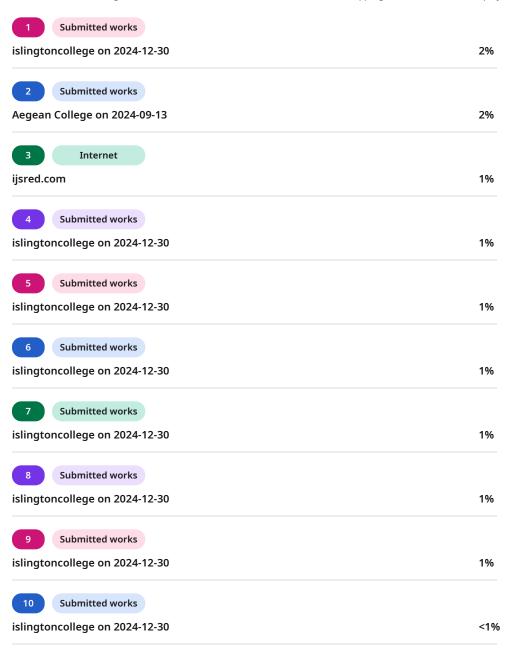
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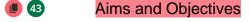
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Introduction

This project focuses on the design and development of a web-based project management system for LS Corporation, aimed at resolving their challenges in handling multiple projects efficiently. Being a mid-sized technology company, LS Corporation struggles with disconnected systems, poor communication, and ineffective task tracking. To address these issues, a centralized system has been developed that manages all project-related activities, including task assignment, progress monitoring, resource allocation, and communication among team members. The system prototype was created using Oracle SQL Developer Data Modeler for designing the database

and ASP.NET with C# for building a scalable and robust web application.



Aim:

To design and develop a web-based database application that enhances project management, task tracking, resource management, and communication within LS Corporation, thereby improving project efficiency and visibility.

Objectives:

Analyze the provided case study to identify core entities, relationships, and system requirements.





- Design database tables fully normalized up to the Third Normal Form (3NF) to ensure data consistency and eliminate redundancy.
- © Create an Entity-Relationship Diagram (ERD) using Oracle SQL Developer Data
 Modeler to visually represent the system structure and relationships.
- Generate and implement the database schema (DDL) and populate it with sample data using Oracle SQL Developer.
- Develop user-friendly web forms with ASP.NET and C# to manage users, projects, tasks, subtasks, and milestones, supporting complete CRUD operations.

Build advanced web forms for tracking user progress, visualizing project milestones, and identifying top performers based on task completion.

Document the system design, development process, and testing outcomes with relevant screenshots and detailed explanations.

Prepare a user manual to assist end-users in effectively operating the system.

Reflect on the overall development journey, emphasizing the tools, techniques, and knowledge gained throughout the project.

2. Textual Analysis

A single user can be part of multiple Projects.

Figure 1: Single user can be part of multiple Projects.





Each Project can have multiple Users

Figure 2: Project can have multiple Users

A project can have multiple tasks

Figure 3: project can have multiple tasks

Each Task of can belong to only one Project

Figure 4: Each Task of can belong to only one Project

A single user can be assigned to multiple Tasks.

Figure 5: single user can be assigned to multiple Tasks.

Each Task can have a multiple Users.

Figure 6: Task can have a multiple Users.

A single Task can have multiple sub-tasks

Figure 7: Single Task can have multiple sub-tasks

Each Sub-Task is linked to a single Task.

Figure 8: Sub-Task is linked to a single Task.





A user can create multiple comments

Figure 9: User can create multiple comments

On comment is associated with one Task

Figure 10: Comment is associated with one Task

A single task can have multiple comments

Figure 11: Single task can have multiple comments

A single task can require multiple resources.

Figure 12: Single task can require multiple resources.

A project is divided into multiple milestones.

Figure 13: Project is divided into multiple milestones.

A single milestone has a single Due date.





Figure 14: single milestone has a single Due date.







3. Initial Entity Relationship Diagram

Figure 15: Initial Entity Relationship Diagram





4. Normalization

redundancy and guarantee logical data organization. Data redundancy in a database signifies the occurrence of identical data in several places. Removing redundancy is essential since it can cause irregularities, complicating database management for administrators (Babbar, 2024)

Normalization involves organizing a database's data and attributes to reduce

4.1 UNF (Unnormalized Form)

- Eliminating repeating group by creating separate row for each project and introducing a primary key for uniquely identifying columns
- User_ID, User_Name, User_Email, User_Contact {Project_ID, Project_Name, Project_StartDate, Project_DueDate, Project_Status {Task_ID, Task_Name, TaskStart_Date, TaskDueDate, TaskStatus}}

4.2 1NF (First Normal Form)

- Separating the repeating groups into individual tables, ensuring that each cell contains only a single value.
 - Break down Step by Step 1NF(First Normal Form)
- User 1 User_ID, User_Name, User_Email, User_Contact
 UserProject 1 Project_ID, User_ID*, Project_Name, Project_StartDate,
 Project_DueDate, Project_Status





[Composite Primary Key: (Project_ID, User_ID)]

In UserProject both Project_ID nor User_ID alone can uniquely identify a row in this table.

A project (Project_ID) might have multiple projects.

A user (User_ID) might work on multiple projects.

- UserProjectTask 1 Task_ID, Project_ID*, User_ID*, Task_Name, TaskStart_Date,
 TaskDueDate, TaskStatus
- In UserProjectTask : Composite Primary Key: (Task_ID, Project_ID, User_ID)
- A user can work on multiple tasks for the same project.
- A project can have multiple tasks.

A task can be assigned to multiple users.

In UserProject task: One user can be part of multiple tasks for the same project and

- one task of single project can be assigned to multiple users.
- 4.3 2NF (Second Normal Form)

Removing Partial dependency

Tables in 1NF:

User 1 - User_ID, User_Name, User_Email, User_Contact

UserProject 1 - Project_ID, User_ID*, Project_Name, Project_StartDate,

Project_DueDate, Project_Status

UserProjectTask 1 – Task_ID, Project_ID*, User_ID*, Task_Name, TaskStart_Date,

TaskDueDate, TaskStatus

Converting into 2NF: In 2NF, all non-prime attributes (attributes not part of the primary





key) must depend on the whole composite primary key, but just part of it.

From 1NF UserProject table Project_Name, Project_StartDate and Project_Status depend on Project_Id which creates a partial dependency

In order to remove Partial dependency, the table is break downed into two Project table and UserProject table

Now Again in UserProjectTable Task_Name, TaskStart_Date and TaskStatus depend on Task_ID which creates partial dependency.

In order to remove Partial dependency, the table is break downed into two Task table and UserProjectTask table.

4.3.1 Final 2NF(Second Normal Form)

User 2 – User_ID, User_Name, User_Email, User_Contact

Project 2 – Project_ID, Project_Name, Project_StartDate, Project_DueDate,

Project_Status

UserProject 2 – Project_ID*, User_ID*

Task 2 – Task_ID, Task_Name, TaskStart_Date, TaskDueDate, TaskStatus
UserProjectTask 2 – Task_ID*, Project_ID*, User_ID*

4.4 3NF (Third Normal Form)

Removing Transitive Dependency

Tables in 2NF:

User 2 – User_ID, User_Name, User_Email, User_Contact

Project 2 – Project_ID, Project_Name, Project_StartDate, Project_DueDate,





- Project_Status
 - UserProject 2 Project_ID*, User_ID*
 - Task 2 Task_ID*, Task_Name, TaskStart_Date, TaskDueDate, TaskStatus
- UserProjectTask 2 Task_ID*, Project_ID*, User_ID*
- In User table User_Name, User_Email, and User_Contact depends directly on the primary key User_ID so there is no transitive dependency
- In Project Table Project_Name, Project_StartDate, Project_DueDate and

 Project_Status depend directly on Project_ID so there is no transitive dependency
- In UserProject table it only contains Project_ID and User_ID
 In Task_Name TaskStart_ Date, TaskDueDate and TaskStatus depend directly on Task_ID so there is no transitive dependency.
- So, there are no partial dependencies in 2NF table so 3NF table will be as it is.
- Final 3NF(Third Normal Form)
 - User 3 User_ID, User_Name, User_Email, User_Contact
 - Project 3 Project_ID, Project_Name, Project_StartDate, Project_DueDate,
 - Project_Status
 - UserProject 3 Project_ID*, User_ID*
 - Task 3 Task_ID, Task_Name, TaskStart_Date, TaskDueDate, TaskStatus
- UserProjectTask 3 Task_ID*, Project_ID*, User_ID*





5. Integration and Assumptions

A single user can be part of multiple Projects

Each Project can have multiple Users

A project can have multiple tasks

Each Task of can belong to only one Project

A single user can be assigned to multiple Tasks.

Each Task can have a multiple Users

A single Task can have multiple sub-tasks

Each Sub-Task is linked to a single Task.

A user can create multiple comments

On comment is associated with one Task

A single task can have multiple comments

A single task can require multiple resources.

A project is divided into multiple milestones.

A single milestone has a single Due date.





6. Final Entity Relationship

Figure 16: Final Entity Relationship





7. Data Dictionary

7.1 User Table

Field Name







Data Type

Constraints

Description

userid

NUMBER

PRIMARY KEY

Unique identifier for each user.

username

VARCHAR2(200)

NOT NULL





Name of the user.

useremail

VARCHAR2(200)

Email Address of the user

usercontact

NUMBER





Contact number of the user

Table 1: User Table

7.2 Project Table





Field Name

Data Type

Constraints

Description

projectid

NUMBER

PRIMARY KEY

Unique identifier for each project.

projectname

VARCHAR2(100)

NOT NULL

Name of the project.





projectstartdate

DATE

-



Start date of the project.

projectduedate

VARCHAR2(200)

-

Due date of the project

projectstatus

VARCHAR2(200)

-



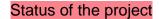


Table 2: Project Table



7.3 Task Table







Field Name

Data Type

Constraints

Description

taskid

VARCHAR2(200)

PRIMARY KEY

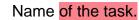
Unique identifier for each task

taskname

VARCHAR2(200)

-





taskstartdate

DATE





Start date of the task.

taskduedate

DATE

Due date of the task.

taskstatus

VARCHAR2(100)

Status of the task

Table 3: Task Table

7.4 Comment Table





Field Name





Data Type

Constraints

Description

commentid

VARCHAR2(100)

PRIMARY KEY

Unique identifier for

Each comment.

taskid

VARCHAR2(20)

FOREIGN KEY atask(taskid)

Task associated with the comment

userid





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	u	 ш	"	ı		ı

FOREIGN KEY à User(userid)

User who wrote the comment.

text

VARCHAR2 (300)

Text of the comment

Table 4: Comment Table





7.5 Milestone Table

Field Name

Data Type







Constraints

Description

milestoneid

VARCHAR2(100)





PRIMARY KEY

Unique identifier for

Each comment.

projectid

NUMBER

FOREIGN KEY atask(taskid)

Task associated with the comment

milestonename

NUMBER

FOREIGN KEY à User(userid)

User who wrote the comment.





duedate

VARCHAR2 (300)

-

Text of the comment

Table 5: Milestone Table

7.6 Subtask Table

Field Name



Data Type

Constraints

Description

subtaskid

VARCHAR2(100)





PRIMARY KEY Unique identifier for
Each subtask.
taskid
VARCHAR2(20)
FOREIGN KEY àtask(taskid) Task associated with the subtask.
subtaskname
VARCHAR2(100)





Name of the subtask.

taskduedate

DATE





_

Due date of the subtask.

Table 6: Subtask table

7.7 Resource Table

Field Name





Constraints

Description

resourceid

VARCHAR2(100)

PRIMARY KEY





Unique	identifier	for	each	resource.

resourcename

VARCHAR2(100)

Name of the resource.

resourcetype

VARCHAR2(100)

Type/category of the resource.

quantity

NUMBER





Quantity of the resource.

tasked

VARCHAR2(20)

FOREIGN KEY à task(taskid)

Task associated with the resource

Table 7: Resource Table







7.8 User Project Table

Field Name

Data Type

Constraints

Description

projectid

NUMBER

PRIMARY KEY, FOREIGN KEY àproject(projectid)

Project ID.

userid

VARCHAR2(100)





12

PRIMARY KEY, FOREIGN KEY à User(userid)

User ID associated with the project.

Table 8: UserProject Table



7.9 User Project Task Table

Field Name

Data Type

Constraints

Description

taskid

VARCHAR2(20)

PRIMARY KEY, FOREIGN KEY -> task(taskid)





Task ID. projectid **NUMBER** PRIMARY KEY, FOREIGN KEY aproject(projectid) Project ID associated with task and user. userid **NUMBER**



PRIMARY KEY, FOREIGN KEY à User(userid)

User ID associated with the project.

Table 9: User Project Task Table



8. Script
8.1 Create Statements
8.1.1 Creating User Table:
Figure 17: Creating User Table
8.1.2 Project Table:
Figure 18: Project Table
8.1.3 UserProject Table:
Figure 19: UserProject Table
8.1.4 Task Table:



Figure 20: Task Table





Figure 21: UserProject Task Table

8.1.6 Comment Table:

Figure 22: Comment Table

8.1.7 Milestone table:

Figure 23: Milestone table:

8.1.8 Resource Table:

Figure 24:Resource Table:





8.1.9 Subtask Table:

Figure 25: Subtask Table



Foreign Key Constraints

Figure 26: Altering Foreign Key Constraints

Figure 27: Altering Foreign Key Constraints

8.2 Insert Statements and Select Statements







8.2.1 Inserting Data into User Table:

Figure 28: Insert Data in User table





8.2.2 Inserting Data into Project Table:

Figure 29: Inserting and Selecting Data in Project Table.







8.2.3 Inserting into Task table:

Figure 30: Inserting and selecting Data in Task Table





8.2.4 Inserting into User Project Table:





Figure 31: Inserting into User Project Table

Figure 32 Selecting The user project Data

8.2.5 Inserting into User Project Task:

Figure 33: UserProjectTask data insert

Figure 34:Select UserProjectTask data insertion





8.2.6 Inserting data into comments:





Figure 35: Inserting data into comments

Figure 36: Inserting from Comment Table

Figure 37: Selecting from Comment Table

8.2.7 Inserting Data into milestone:

Figure 38: Insert to milestone

Figure 39: Select from Milestone



8.2.8 Inserting Data into resource:

Figure 40: Inserting Data into resource





Figure 41: Selecting from Resources Table

8.2.9 Inserting Data into Sub task:

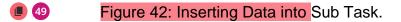


Figure 43: Selecting from Subtask table.







- 9. Forms
- 9.1 Home Page

- Figure 44: Home Page Dashboard (1)
- Figure 45: Home Page Dashboard(2)
- 9.2 Basic Forms
 - Figure 46: Basic Form: Oracle Database connection
 - Figure 47: Basic Form: Making a web form (Project.aspx)





Figure 48: Basic Webform: SQL Data source and grid view (Project)

Figure 49: Basic Webform: Configuring Data Source (Project)

Figure 50: Basic Webform: Connection String (Project)

Figure 51: Basic Webform: Configuring Select Statement (Project)

Figure 52: Basic Webform: Testing the Query(Project)

Figure 53: Basic Webform: Choosing the Data Source in Grid view (Project)

Figure 54: Basic Webform: Displaying Data in web (Project)

Figure 55: Basic Webform: Generating Insert Update and Delete (Project)

Figure 56: Enabling editing, deleting and selection (Project)





Figure 57: Displaying after the enabling (Project)

Figure 58: Basic Webform: Inserting new data (Project)

Figure 59: Basic Webform: Result after Insertion (Project)

Figure 60: Basic Webform: Configuring Data Source (User)

Figure 61: Basic Webform: Testing Query (User)

Figure 62: Basic Webform: Displaying SQL Data Source and grid view (User)

Figure 63: Basic Webform: Generating Insert Update and Delete (User)

Figure 64: Basic Webform: Enabling the edit delete selection

Figure 65 Basic Webform: Updating data (User)

Figure 66: Basic Webform; Update data (User)

Figure 67: Basic Webform: Insertion design view (User)





Figure 68: Basic Webform: Inserting new data (User)

Figure 69: Basic Webform: Displaying new data(User)

Figure 70: Basic Webform: Configure Data Source (Task)

Figure 71: Basic Webform: Testing Query (Task)

Figure 72: Basic Webform: Displaying in grid view (Task)

Figure 73: Basic Webform: Enabling updating, deleting (Task)

Figure 74: Basic Webform: Insertion of Data (Task)

Figure 75: Basic Webform: Displaying Inserted Data (Task)





Figure 76: Basic Webform: Configuring Data source and Testing query (Subtask)

Figure 77: Basic Webform : Enabling editing, deleting (Subtask)

Figure 78: Basic Webform: Displaying the data (Subtask)

Figure 79: Basic Webform: Insertion of Data (Subtask)

Figure 80: Displaying Inserted Data (Subtask)

Figure 81: Basic Webform: Configure Data source and Testing query (Milestone)





Figure 82: Data displaying and enabling editing (Milestone)

Figure 83: Basic Webform : Data Insertion (Milestone)

Figure 84: Basic Webform: Displaying the inserted data (Milestone)

9.3 Complex Webform and Queries

Figure 85: Complex Forms: Configuring Data Source and specifying custom SQL query (UserProject)

Figure 86: Complex Form: Testing the custom query (UserProject)

Figure 87: Complex Form: Displaying the data (User Project)





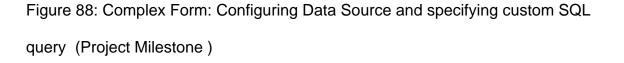


Figure 89: Complex Form : Testing the custom query (Project Milestone)

Figure 90:Complex Form: Displaying the data (Project Milestone)





10. User Manual

Step 1: Click The User section from dashboard.

Figure 91: (User Manual) Dashboard Selection

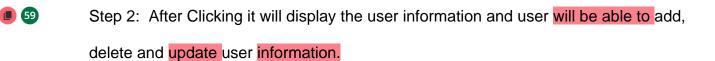


Figure 92: (User Manual) User Section

Step 3 : Adding A new user in the user information

Figure 93(User Manual) Adding a new user

Step 3: The results after adding the user information.





Figure 94: ((User Manual) Results	After A	Adding

Step 5: Click edit so user can update the inserted data

Figure 95: (User Manual) Updating the information

Step 6: Results after the update

Figure 96: (User Manual) Results after the update

Step 7: Click the delete button to delete the data inserted

Figure 97: (User Manual) Deleting the information

Step 8: Results after the deletion.

Figure 98: (User Manual) Results after the deletion





11. Testing

11.1 Testing: Basic Webforms

11.1.1 User Table

Figure 99 Basic Webform: Updating data (User)

Figure 100: Basic Webform; Update data (User)

Figure 101: Basic Webform: Inserting new data (User)

Figure 102: Basic Webform: Displaying new data(User)

11.2 Testing: Complex Webforms

Figure 103: Testing Complex Webforms (1)





Figure 104: Test Query for Complex Webforms (1)

Figure 105: Testing Complex Webforms (2)

Figure 106: Test Query for Complex Webforms (2)





- 12. Further Discussion
- 12.1 Tools and Technology used
- 1. Visual Studio

Visual Studio Code is a fast and versatile source code editor that works on Windows, macOS, and Linux. It offers built-in support for JavaScript, TypeScript, and Node.js, and provides a wide range of extensions for other programming languages and frameworks like C++, C#, Java, Python, PHP, Go, and .NET. (Studio, 2025)

- 2 Data Modeler
 - Oracle SQL Developer Data Modeler is a free visual tool designed to improve productivity and simplify data modeling processes. It allows users to create, view, and modify logical, relational, physical, multi-dimensional, and data type models. The tool offers both forward and reverse engineering features and supports team collaboration with built-in source code control. Additionally, it can be used in both traditional on-premises setups and cloud-based environments. (Oracle, 2025)





3. SQL Developer

Oracle SQL Developer** is a free, integrated development tool for managing and

developing Oracle Databases in both traditional and cloud environments. It supports

PL/SQL development, running queries, database administration, data modeling, and

migrating third-party databases to Oracle. (Oracle, Oracle.com, 2025)

