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Introduction

LS Corporation, a growing mid-sized tech company, faced significant challenges due to disconnected project management tools, resulting in inefficient workflows, miscommunication between teams, and unclear project timelines. These issues delayed deliverables and strained client relationships. To address this, the company implemented an integrated project management platform to centralize data, simplify task assignments and enable real-time progress tracking, a strategic decision aimed at fostering collaboration, reducing operational bottlenecks and ensuring timely, successful project outcomes.

The system streamlines complexity through intuitive tools. Managers deconstruct projects into manageable tasks and milestones, assign responsibilities aligned with team capacity, and monitor progress in real-time. The primary objective of this project is to design and develop a web-based project management and team collaboration. By incorporating centralized milestone tracking and tools to manage tasks with dependencies and subtasks, the system provides a structural framework for organizing workflows. A dashboard serves as an overview hub, into all tasks, project, user and subtasks. This ensures seamless project oversight, eliminating inefficiencies and replacing complexity with transparency and actionable insights for informed decision-making.

This project serves as a transformative solution for LS Corporation, addressing inefficiencies project management providing a structure, intuitive and collaborative platform. By integrating centralized task allocation, milestone tracking, and real-time progress monitoring the system enhances visibility and ensures seamless coordination

among team members. The dashboard acts as a comprehensive hub, offering instant access to project details, user details and subtasks, thereby eliminating ambiguity and improving decision-making with automated tracking and streamlined workflows. This implementation not only fosters transparency and accountability but also empowers teams to work more efficiently, ensuring that projects are completed on schedule and with optimal outcomes.

Textual Analysis

Figure 1: Figure showing Textual Analysis of Project and Milestone.

Description: One project can have multiple milestone or none. A milestone must belong to a single project.

Figure 2: Figure showing Textual Analysis of Task and Comment.

Description: A Task can have multiple comments or none. A comment must be linked to a single Task.

Figure 3: Figure showing Textual Analysis of Project and Task.

Description: A project is broken down to one or more tasks. A task must belong to one or more project.

Figure 4: Figure showing Textual Analysis of Task and Resource.

Description: A task may require multiple Resources or none. A resource can be utilized in multiple Tasks or none.

Figure 5: Figure showing Textual Analysis of Task and Sub Task.

10 Description: A task can have multiple Subtasks or none. A subtask must be linked to a single task.

8 Figure 6: Figure showing Textual Analysis of User and Comment.

Description: A user can comment on multiple Taks or none. A comment must be made by a single user.

16 Figure 7: Figure showing Textual Analysis of User and Project.

Description: A user can be part of multiple Projects or none. A project must consist of at least one single user.

Figure 8: Figure showing Textual Analysis of User and Task.

9 Description: A user can be assigned to multiple Tasks or none. A task must have at least one user assigned.

Figure 9: Figure showing Textual Analysis of User and Subtask.

9 Description: A user can be assigned to multiple Subtasks or none. A Subtask must have at least one user assigned.

ERD From Case Study

Figure 10: Figure showing ERD from case study.

This Entity-Relationship Diagram (ERD) REPRESENTS A project Management System where a Project consists of multiple Task, each of which may have Subtasks and be associated with milestones to track progress. Users participate in projects through UserProejctDetails and work on tasks via UserTaskDetails, ensuring role-based assignment. Users can post Comments on tasks for better communication. Additionally, Tasks may require multiples Resources, managed through TaskResourceDetails. This ERD provides a structured framework fir efficiently managing users, tasks, resources and project execution.

Normalization

Integration and Assumption

Integration of entities

The Final ERD organizes and normalizes the project management system ensuring data consisyency and eliminating redundancy. The Project entity serves as the primary unit, with multiple associated components:

Project contains multiple Tasks and Milestones.

Tasks may have Subtasks and can require Resources.

Users participate in projects via ProjectDetails and work on tasks through UserProjectTask.

Users can also post Comments on tasks.

Resources are assigned to tasks via ResourceDetails.

Many-to-many relationships are normalized using bridging tables:

ProjecctDetails links Users to Projects.

UserProjectTask links Users to Tasks.

ResourceDetails links Tasks to Resources.

Assumption of Integration

A project must contain at least one Task.

A Task must belong to a single or more Project.

A User may participate in multiple Projects but may also be unassigned.

A Milestone may be linked to a Project or Task.

A Task may have multiple Subtasks or none.

A Task may or may not require Resources.

A User may or may not post comments on Task.

Final Erd

Figure 11: Figure showing Final Erd.

This ERD represents a project management system that organizes Projects, Tasks,

Users, Milestones, Resources, Subtasks and Comments efficiently. A project consists

of multiple Tasks, which can have Subtasks and Milestones to track progress. Users

participate in projects through ProjectDetails and work on tasks via UserProjectTask.

Task may require Resources which are managed through ResourceDetails Additionally

users can post Comments on tasks for better communication. This structure proper

role-based task assignment, collaboration and streamlined workflow management

within the system.

Data Dictionary

Data Dictionary for Useraccount



Column Name

Data Type

Size

Constraint

Reference Table

Reference Column

Description

Example Data

UserId

Varchar

55

Primary Key

To uniquely identify each user

1

UserName

Varchar

55



Not Null

To store the user's full name

Prabhas Shrestha

UserEmail

Varchar

55

Unique



To store the user's unique email address

P@gmail.com

UserContact

Integer



Not Null

To store the user's contact number

9841142545

UserRole

Varchar

50



Not Null



To store the user's role

Admin

Table 1: Table showing Data Dictionary for Useraccount.



Data Dictionary for Project

Column Name

Data Type

Size

Constraint

Reference Table

Reference Column

Description

Example Data

ProjectId

Varchar

55

Primary Key

To uniquely identify each project

P1

ProjectName

Varchar

55

Not Null

To store the projects name

Website Redesign

ProjectStartDate

Date

Not Null

To store the project's start date

2024-11-14

ProjectEndDate

Date

7

Not Null

To store the project's end date

2025-12-17

ProjectStatus

Varchar

55

Not Null

To indicate the projects current status

Completed

Table 2: Table showing Data Dictionary for Project.

Data Dictionary for Task

1

Column Name

Data Type

Size

Constraint

Reference Table

Reference Column

Description

Example Data

TaskId

Varchar

55

Primary Key

To uniquely identify each task

T1

TaskName

Varchar

55

Not Null

To store the tasks name

Client presentation

TaskStartDate

Date

Not Null

To store the task's start date

2024-11-14

TaskEndDate

Date

Not Null

To store the task's end date

2025-12-17

TaskStatus

Varchar

55

Not Null

To indicate the tasks current status

Completed

Table 3: Table showing Data Dictionary for Task.

Data Dictionary for Subtask

Column Name

Data Type

Size

Constraint

1

Reference Table

Reference Column

Description

Example Data

SubtaskId

Varchar

50

Primary Key

To uniquely identify each subtask

S30

SubtaskName

Varchar

50

4

Not Null

To store the subtasks name

AI Model Performance Tuning

SubtaskStartDate

7

Date



Not Null

To store the subtask's start date

2024-11-14

SubtaskEndDate



Date

Not Null

To store the subtask's end date

2025-12-17

SubtaskStatus

Varchar

50

Not Null

To indicate the subtasks current status

Completed

TaskId

Varchar

50

Foreign Key

Task

TaskId

To store the task to which this subtask belongs

T1

UserId

Varchar

50

Foreign Key

Useraccount

UserId

To the user assigned to the subtask

1

Table 4: Table showing Data Dictionary for Subtask.

Data Dictionary for Milestone

Column Name

Data Type



Size

Constraint

Reference Table

Reference Column

Description

Example Data

MilestoneId

Varchar

50

Primary Key

To uniquely identify each milestone

MO30

MilestoneName

Varchar

50



Not Null

To store the milestones name

Data Warehouse Full Implementation

MilestoneDueDate

Date

Not Null

To store the milestone's due date

2024-11-14

MilestoneStatus

Varchar

50

Not Null

To indicate the milestones current status

Completed

ProjectId

Varchar

50

Foreign Key

Project

ProjectId

To store the project to which this record belongs.

P1

6

Table 5: Table showing Data Dictionary for Milestone.

Data Dictionary for ResourceCatalog

1

Column Name

Data Type

Size

Constraint

Reference Table

Reference Column

Description

Example Data

ResourceId

Varchar

55

Primary Key

To uniquely identify each Resource

R012

ResourceName

Varchar

50

Not Null

To store the Resources name

Video Conferencing Software

ResourceType

Varchar

50

Not Null

To store the Resources type

Software

Table 6: Table showing Data Dictionary for ResourceCatalog.

Data Dictionary for Resource Details

Column Name

Data Type

Size

1 Constraint

Reference Table

Reference Column

Description

Example Data

TaskResource_Id

Varchar

255

Primary Key

To uniquely identify each TaskResource

TR12

ResourceId

Varchar

50

Not Null

ResourceCatalog

ResourceId

To Store the resource allocated to the task

R012

TaskId

Varchar

50

Not Null

Task

TaskId

To Store the task allocated to this resource

T1

Table 7: Table showing Data Dictionary for Task Details.

Data Dictionary for CommentLog

Column Name

Data Type

Size

Constraint

Reference Table

Reference Column

Description

Example Data

CommentId

Varchar

50

Primary Key

To uniquely identify each Comment

C15

CommentDesc

Varchar

100

Not Null

To store the Comments description

Database setup completed, moving to next phase.

CommentDate

Date

Not Null

To store the Comment's date

2024-11-14

TaskId

Varchar

50

Foreign Key

Task

TaskId

To store the task to which this comment belongs

T1

UserId

Varchar

50

Foreign Key

Useraccount

UserId

To store the user who posted the comment

1

Table 8: Table showing Data Dictionary for CommentLog.

Data Dictionary for UserProjectTask

Column Name



Data Type

Size

Constraint

Reference Table

Reference Column

Description

Example Data

UserProjectTaskId

Varchar

255

Primary Key

To uniquely identify each userprojecttask

UPT1

TaskId

Varchar

255

Foreign Key

Task

TaskId

To store the task assigned to the user in the project.

T1

UserProject_Id

Varchar

255

Foreign Key

UserProject



UserProject_Id

To store the users project participation linked to the task

UP32

  6 Table 9: Table showing Data Dictionary for UserProjectTask.

Data Dictionary for ProjectDetails

  1 Column Name

Data Type

Size

Constraint

Reference Table

Reference Column

Description

Example Data

UserProject_Id

Varchar

255

Foreign Key

UserProject

UserProject_Id

To uniquely identify each userproject

UP32

UserId

Varchar

50

Foreign Key

Useraccount

UserId

To store the user who is assigned to the project

1

ProjectId

Varchar

50

Foreign Key

Project

ProjectId

To store the project to which this user is assigned

P1

Table 10: Table showing Data Dictionary for ProjectDetails

Script

Figure 12: Figure showing user Connection.

Figure 13: Figure showing the use of DDL Script in SQL developer (1).

Figure 14: Figure showing the use of DDL Script in SQL developer (2).

Figure 15: Figure showing the use of DDL Script in SQL developer (3).

Figure 16: Figure showing the use of DDL Script in SQL developer (4).

Figure 17: Figures showing the database creation.

Insert Statement

Useraccount Table

Figure 18: Figure showing the process of inserting values into the UserAccount table.

Project Table

Figure 19: Figure showing the process of inserting values into the Project table.

Task Table

Figure 20: Figure showing the process of inserting values into the Task table.

SubTask Table

Figure 21: Figure showing the process of inserting values into the SubTask table.

Milestone Table



Figure 22: Figure showing the process of inserting values into the Milestone table.

ResourceCatalog Table



Figure 23: Figure showing the process of inserting values into the ResourceCatalog table.

ResourceDetails Table



Figure 24: Figure showing the process of inserting values into the TaskDetails table.

CommentLog Table



Figure 25: Figure showing the process of inserting values into the CommentLog table.

UserProjectTask Table



Figure 26: Figure showing the process of inserting values into the UserProjectTask table.

ProjectDetails Table



Figure 27: Figure showing the process of inserting values into the ProjectDetails table.

Select Statement



Useraccount Table



Figure 28: Figure showing the displayed values of UserAccount table.



Project Table

Figure 29: Figure showing the displayed values of Project table.



Task Table

Figure 30: Figure showing the displayed values of Task table.



SubTask Table

Figure 31: Figure showing the displayed values of SubTask table.



Milestone Table

Figure 32: Figure showing the displayed values of Milestone table.



ResourceCatalog Table

Figure 33: Figure showing the displayed values of ResourceCatalog table.



ResourceDetails Table



Figure 34: Figure showing the displayed values of TaskDetails table.



CommentLog Table

Figure 35: Figure showing the displayed values of CommentLog table.



UserProjectTask Table

Figure 36: Figure showing the displayed values of UserProjectTask table.



ProjectDetails Table

Figure 37: Figure showing the displayed values of ProjectDetails table.

Forms



Home Page

Figure 38: Figure showing the systems homepage.

Complex Form and Queries


SQL Queries

User Project




Figure 39: Figure showing the query of user project table.

Project Milestone


 Figure 40: Figure showing the query of project milestone table.

Top Performer


 Figure 41: Figure showing the query of top performer for each project.

Complex Form

User Project Form

Figure 42: Figure showing the complex form of user project table.

Project Milestone Form

Figure 43: Figure showing the complex form of project milestone table.

Top Performer Form

Figure 44: Figure showing the complex form of top performer for each project.

Simple Form

UserAccount

Figure 45: Figure showing simple web forms of useraccount.

Project

Figure 46: Figure showing simple web forms of project.

Tasks

Figure 47: Figure showing simple web forms of task.

SubTask

Figure 48: Figure showing simple web forms of Subtask.

Milestone

Figure 49: Figure showing simple web forms of Milestone.

ResourceCatalog

Figure 50: Figure showing simple web forms of ResourceCatalog.

TaskDetails

Figure 51: Figure showing simple web forms of TaskDetails.

CommentLog

Figure 52: Figure showing simple web forms of CommentLog.

UserProjectTask

Figure 53: Figure showing simple web forms of UserProjectTask.

ProjectDetails

Figure 54: Figure showing simple web forms of ProjectDetails.

User manual

Figure 55: Figure showing user Manual for homepage.

Figure 56: Figure showing user Manual for project page.

Figure 57: Figure showing user Manual for task page.

Figure 58: Figure showing user Manual for subtask page.

Figure 59: Figure showing user Manual for milestone page.

Figure 60: Figure showing user Manual for Users page.

Figure 61: Figure showing user Manual for Top 3 user page.

Figure 62: Figure showing user Manual for project milestone page.

Testing

13.1 Simple Forms

Useraccount

Editing

Figure 63: Figure showing useraccount form before editing.

Figure 64: Figure showing useraccount form during editing.

Figure 65: Figure showing useraccount form after editing.

Inserting New Value

Figure 66: Figure showing useraccount form before insterting new value.

Figure 67: Figure showing useraccount form during insterting new value.

Figure 68: Figure showing useraccount form after insterting new value.

Deleting

Figure 69: Figure showing useraccount form before deleting.

Figure 70: Figure showing useraccount form during deleting.

Figure 71: Figure showing useraccount form after deleting.

Project

Editing

Figure 72: Figure showing project form before editing.

Figure 73: Figure showing project form during editing.

Figure 74: Figure showing project form after editing.

Inserting

Figure 75: Figure showing project form before insterting new value.

Figure 76: Figure showing project form during insterting new value.

Figure 77: Figure showing project form after insterting new value.

Deleting

Figure 78: Figure showing project form before deleting.

Figure 79: Figure showing project form during deleting.

Figure 80: Figure showing project form after deleting.

Task

Editing

Figure 81: Figure showing task form before editing.

Figure 82: Figure showing task form during editing.

Figure 83: Figure showing task form after editing.

Inserting

Figure 84: Figure showing task form before inserting.

Figure 85: Figure showing task form during inserting.

Figure 86: Figure showing task form after inserting.

Deleting

Figure 87: Figure showing task form before deleting.

Figure 88: Figure showing task form during deleting.

Figure 89: Figure showing task form after deleting.

SubTask

Editing

Figure 90: Figure showing subtask form before editing.

Figure 91: Figure showing subtask form during editing.

Figure 92: Figure showing subtask form after editing.

Inserting

Figure 93: Figure showing subtask form before inserting.

Figure 94: Figure showing subtask form during inserting.

Figure 95: Figure showing subtask form after inserting.

Deleting

Figure 96: Figure showing subtask form before deleting.

Figure 97: Figure showing subtask form during deleting.

Figure 98: Figure showing subtask form after deleting.

Milestone

Editing

Figure 99: Figure showing milestone form before editing.

Figure 100: Figure showing milestone form during editing.

Figure 101: Figure showing milestone form after editing.

Inserting

Figure 102: Figure showing milestone form before inserting.

Figure 103: Figure showing milestone form during inserting.

Figure 104: Figure showing milestone form after inserting.

Deleting

Figure 105: Figure showing milestone form before deleting.

Figure 106: Figure showing milestone form during deleting.

Figure 107: Figure showing milestone form after deleting.

Complex Forms

Top Performer

Figure 108: Figure showing the result for no tasks and before filtering.

Figure 109: Figure showing user task during filtering.

Figure 110: Figure showing result of top 3 performers.

Project Milestone

Figure 111: Figure showing project milestone before filtering.

Figure 112: Figure showing project milestone during filtering.

Figure 113: Figure showing project milestone after filtering.

User Project

Figure 114: Figure showing user project details page before filtering.

Figure 115: Figure showing user project details page during filtering.

Figure 116: Figure showing user project details page after filtering.

Failure Test Case

Missing Data Source for Dropdown

The image shows a failure test case where an error occurs due to a missing data source for the dropdown while adding a milestone for project. As a result, the dropdown appears blank, preventing users from adding a milestone for the project.

Figure 117: Figure showing error when no data source was applied in the dropdown.

The image shows the configuration of data source to retrieve information for the dropdown menu. A SQL statement is defined to select projectId and projectName from the project table. This step ensures that the dropdown is properly populated with projects data, preventing the issue where the dropdown appears blank due to a

missing data source.

Figure 118: Figure showing onfiguration of the data source for the project dropdown.

Figure 119: Figure showing the error being sucessfully implemented.

SQL Query Error Due to Invalid Character

The image shows a failure test case when an error occurs while executing an SQL query during data source configuration. The error message indicated that the query contains an invalid character which is a semi colon, preventing successful execution. To resolve the issue, the images display the process of removing the semi colon present in the query

Figure 120: Figure showing SQL query execution error due to an invalid character.

Figure 121: Figure showing the presence of a semi colon.

Figure 122: Figure showing the process of removing the semi colon.

Figure 123: Figure showing the error being successfully resolved.

Further Discussion

The completion of this coursework provided valuable experience in data and web development, particularly in structuring and implementing a project management system. This project required the integration of multiple concepts, including entity-relationship modelling, normalization, SQL scripting and web form development. The systematic approach to designing and developing a web-based application facilitated a clear understanding of database management, query optimization and front-end development with the help of web forms.

Throughout this coursework, the following five key tools and techniques were learned and applied:

9 Entity-relationship Diagram (ERD) - The creation of an ERD helped visualize the relationships between different entities in the project management system. This tool allowed for efficient database design, ensuring that data was structured properly and minimizing redundancy.

19 Normalization - The normalization process was crucial in eliminating data anomalies and ensuring database efficiency. By following the normalization steps (1NF, 2NF AND 3NF), a well-structured database was designed that maintained data integrity and reduced redundancy.

Web Form Development – The implementation of web forms helped in connecting with the database. Both simple and complex forms were created to allow users to input and retrieve data efficiently, Complex forms, required integrating SQL queries to filter and display relevant information dynamically

Data Modeler for Script Generation – The use of data modeler was essential in creating the ERD and generating the database automatically. This helped to streamline the database design process ensuring consistency and reducing manual errors when defining relationships and constraints.

SQL Developer Usage – SQL Developer was utilized for executing queries, managing database connections, and debugging SQL scripts efficiently. This tool provided an intuitive interface for interacting with database, enabling structured testing and query optimization.

Conclusion

The completion of this project marks a significant step in understanding and implementing a structured approach to data and web development. The integrated project management system development for LS Corporation successfully addresses the inefficiencies in a task management, collaboration, and milestone tracking. By leveraging key concepts such as Entity-Relationship Diagrams (ERD), normalization, SQL scripting, and web form development, the system ensures streamlined workflows, improved data integrity and enhanced real-time project oversight.

The project demonstrated the importance of efficient database design through normalization techniques (1NF, 2NF AND 3NF), reducing redundancy and ensuring data consistency. Additionally, the use of SQL queries for data retrieval and modification provided valuable insights into query optimization and structured data handling. The implementation of simple and complex web forms further enhances user interaction with the system, enabling dynamic data entry and retrieval.

Through this coursework, practical skills in database modelling, script generation, and

debugging were refined, reinforcing the connection between theoretical knowledge and real-world application. The structured approach taken in designing, testing and implementing the system ensures that LS Corporation can now manage projects efficiently, improving coordination among team members and ensuring timely project completion.

Moving forward, this project can be expanded by integrating advanced features such as automated notifications, real-time analytics, and AI-driven project recommendations to further enhance the efficiency of project management. Overall, the successful execution of this system highlights the critical role of database-driven web applications.