Badr University in Assuit

Nursery_system

Prepared by :Menna Akram Mahmoud

Student ID:2023023052

Supervised by:

DR. mohamed El Sayed

Eng. Mahmoud Khiry

Introduction

This report presents the design and implementation of a relational database system for a nursery school management system. The goal of this project is to create a structured, efficient, and realistic database that handles core operations such as tracking children's attendance, class enrollment, activities, and feedback.

The design was based on an Entity-Relationship Diagram (ERD) which clearly identifies the main entities involved, such as Child, Classroom, Attendance, Activity, and Feedback. These entities were carefully mapped into relational tables using MySQL.

The data used throughout this project is realistic and includes Egyptian children's names, structured class names like "Class 1/1", and typical preschool activities. The system supports storing and querying information related to children's daily attendance, participation in activities, and receiving feedback from teachers.
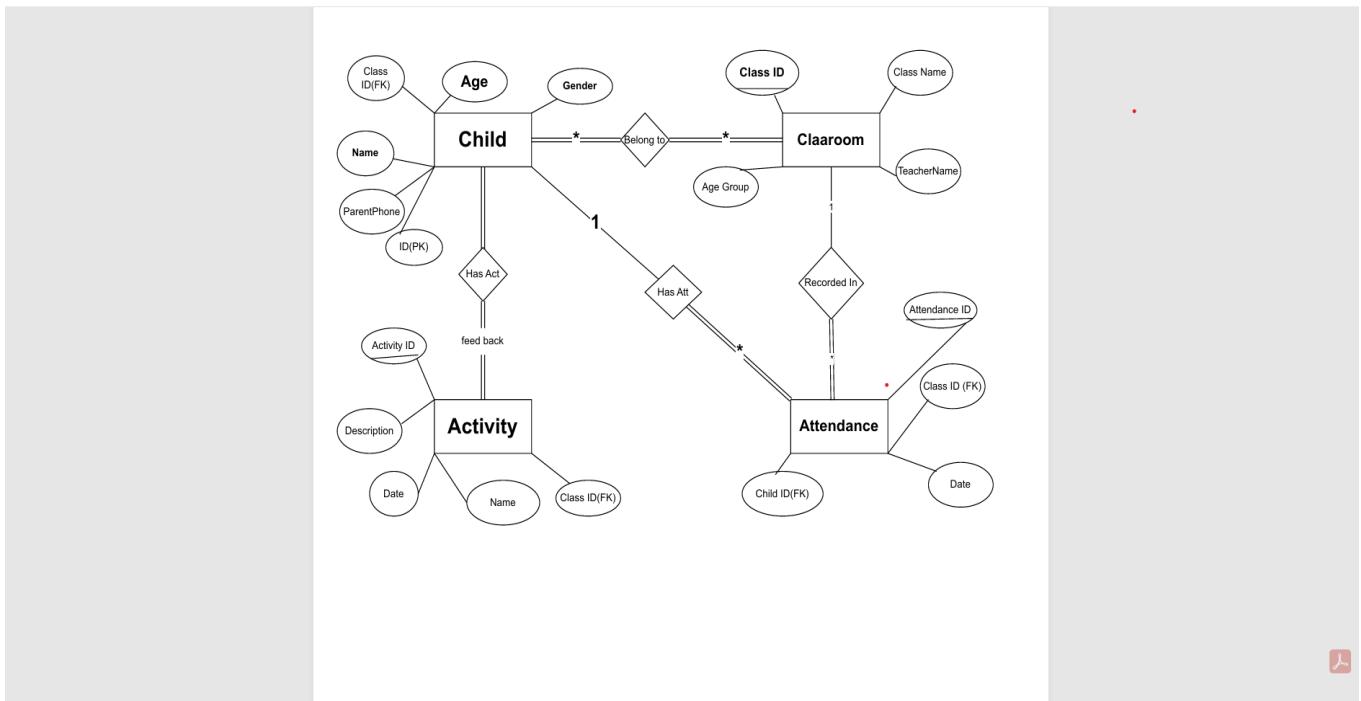
This report includes the mapping diagram, SQL schema, sample data entries, and a set of queries that demonstrate how the database supports essential nursery operations.

Project Objectives

The primary objectives of this project are:

- To design a well-structured relational database system for managing a nursery school.
- To clearly define the relationships between core entities such as Child, Classroom, Attendance, Activity, and Feedback.
- To implement the database using MySQL, applying best practices for normalization and data integrity.
- To insert realistic data that reflects real-world scenarios in nursery operations.
- To create SQL queries that allow easy retrieval and analysis of attendance records, class enrollments, activities, and feedback.

Entity-Relationship Diagram (ERD)

The following Entity-Relationship Diagram (ERD) illustrates the structure of the nursery management database. It shows the main entities in the system — such as Child, Classroom, Attendance, Activity, and Feedback — and the relationships between them.

Each child belongs to one classroom, and each classroom can have multiple children. The Attendance table records when each child attends class on a specific date. The Activity table stores various activities performed by children, and each activity is linked to both the child and the class. Feedback is linked to either an activity or attendance, depending on its purpose.

This ERD helped guide the creation of relational tables in MySQL while maintaining referential integrity and proper normalization.
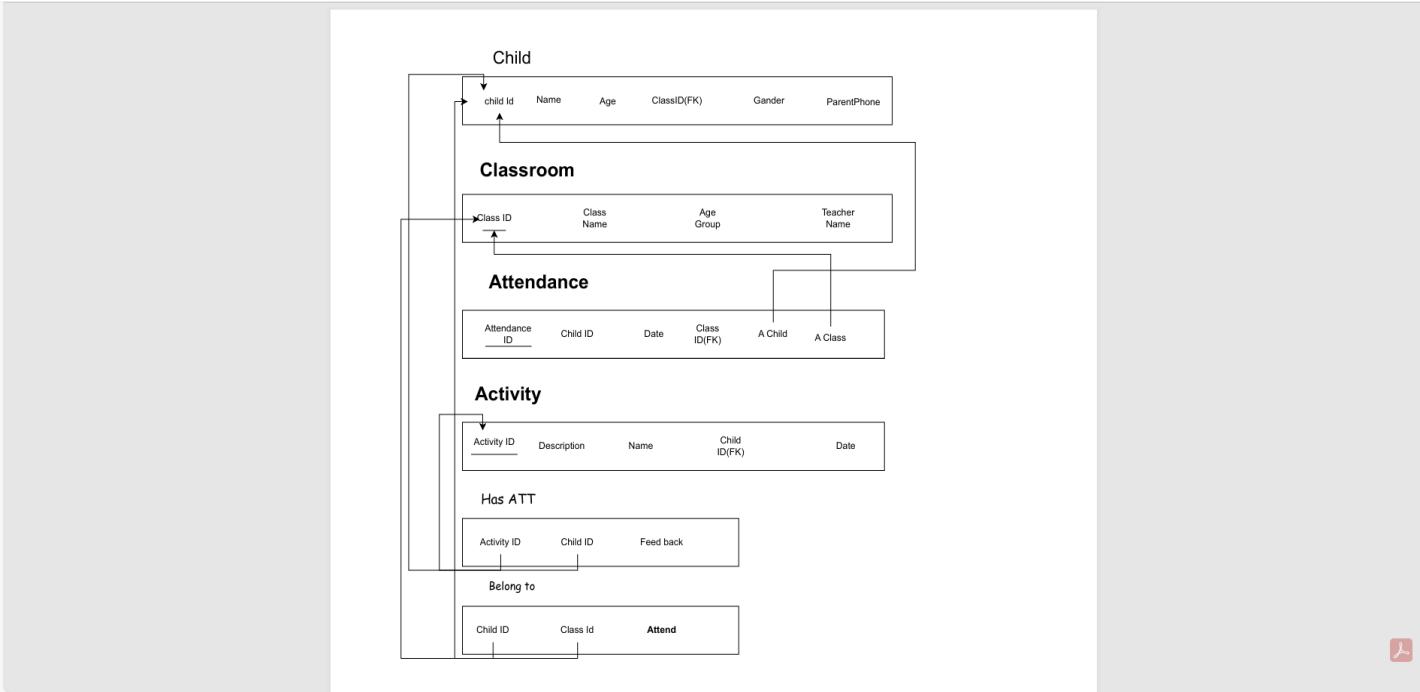
Mapping Design

The mapping design process involves converting each entity and relationship in the ERD into corresponding relational tables in the database.

Each entity in the ERD was mapped to a table, and the relationships were implemented using foreign keys. Composite relationships such as "BelongTo" and "HasActivity" were implemented as separate tables to maintain data integrity and support many-to-many relationships where necessary.

The table below summarizes the mapping:

mapping

MYSQL

Creating the Database in MySQL and Inserting Data

1. Creating the Database and Tables:
 After designing the ERD, completing the mapping, and applying normalization, I created the database and tables in MySQL based on the defined schema.
 The tables were designed to reflect the relationships between the entities (Child, Classroom, Attendance, Activity, Feedback, BelongTo).

2. Inserting Data:
 I inserted 10 realistic records into each table to populate the database with sample data. This was done to simulate real-world nursery operations and test the structure of the database and the SQL queries.

3. SQL Script:
 The script for creating the database schema and inserting data is available in the attached file.

Important Queries

Query 1: Retrieve all children in a specific classroom (e.g., Class 1/2).
 This query is used to fetch the list of children who are enrolled in a given classroom.

Query 2: Get attendance records of a specific child (e.g., Ahmed Ali).
 This query returns the full attendance history of a selected child.

Query 3: Get the activities each child has participated in.
 This query displays a list of all activities linked to each child.

Query 4: Count the number of children in each classroom.
 This query shows the distribution of children across classrooms.

Query 5: Retrieve all feedback linked to activities.
 This query lists feedback entries, associated activity names, and the children involved.

These queries were executed to retrieve and analyze specific data from the nursery system database, such as classroom organization, activity participation, and attendance tracking.

SQL CMD

```
Type 'help;' or '\h' for help. Type '\c' to clear the current input statement.

mysql> use nursery_system;
Database changed
mysql> SELECT Child.Name, Attendance.Date, Classroom.ClassName
    -> FROM Attendance
    -> JOIN Child ON Attendance.ChildID = Child.ChildID
    -> JOIN Classroom ON Attendance.ClassID = Classroom.ClassID
    -> WHERE Child.Name = 'Ahmed Ali';
+-----------+------------+-----------+
| Name      | Date       | ClassName |
+-----------+------------+-----------+
| Ahmed Ali | 2025-05-08 | Class 1/2 |
| Ahmed Ali | 2025-05-09 | Class 1/2 |
+-----------+------------+-----------+
2 rows in set (0.154 sec)

mysql> SELECT Child.Name, Activity.Name AS ActivityName, Activity.Description, Activity.Date
    -> FROM Activity
    -> JOIN Child ON Activity.ChildID = Child.ChildID
    -> WHERE Child.Name = 'Mariam Hassan';
+---------------+--------------+-------------------------+------------+
| Name          | ActivityName | Description             | Date       |
+---------------+--------------+-------------------------+------------+
| Mariam Hassan | Story Time   | Listening to a short story | 2025-05-08 |
+---------------+--------------+-------------------------+------------+
1 row in set (0.053 sec)

mysql>
```

```
1 row in set (0.053 sec)

mysql> SELECT Feedback.Comment, Feedback.Date, Activity.Name AS ActivityName, Child.Name AS ChildName
    -> FROM Feedback
    -> JOIN Activity ON Feedback.ActivityID = Activity.ActivityID
    -> JOIN Child ON Activity.ChildID = Child.ChildID;
+----------------------------------------------+------------+--------------+---------------+
| Comment                                      | Date       | ActivityName | ChildName     |
+----------------------------------------------+------------+--------------+---------------+
| Very creative work!                          | 2025-05-08 | Coloring     | Ahmed Ali     |
| Good listening skills.                       | 2025-05-08 | Story Time   | Mariam Hassan |
| Excellent building skills!                   | 2025-05-09 | Lego Play    | Youssef Adel  |
| Ahmed was very focused during coloring.      | 2025-05-08 | Coloring     | Ahmed Ali     |
| Mariam enjoyed the story and asked questions.| 2025-05-08 | Story Time   | Mariam Hassan |
| Youssef showed creativity with Lego.         | 2025-05-09 | Lego Play    | Youssef Adel  |
| Omar participated well in the music session. | 2025-05-09 | Music        | Omar Khaled   |
| Laila was quick in counting and very attentive.| 2025-05-10 | Counting   | Laila Ahmed   |
+----------------------------------------------+------------+--------------+---------------+
8 rows in set (0.072 sec)

mysql>
```

```
| Ahmed was very focused during coloring.        | 2025-05-08 | Coloring    | Ahmed Ali     |
| Mariam enjoyed the story and asked questions.   | 2025-05-08 | Story Time  | Mariam Hassan |
| Youssef showed creativity with Lego.            | 2025-05-09 | Lego Play   | Youssef Adel  |
| Omar participated well in the music session.    | 2025-05-09 | Music       | Omar Khaled   |
| Laila was quick in counting and very attentive. | 2025-05-10 | Counting    | Laila Ahmed   |
+-------------------------------------------------+------------+-------------+---------------+
8 rows in set (0.072 sec)

mysql> SELECT
    ->      Child.Name AS ChildName,
    ->      Classroom.ClassName,
    ->      Classroom.TeacherName
    -> FROM BelongTo
    -> JOIN Child ON BelongTo.ChildID = Child.ChildID
    -> JOIN Classroom ON BelongTo.ClassID = Classroom.ClassID;
+----------------+-----------+-------------+
| ChildName      | ClassName | TeacherName |
+----------------+-----------+-------------+
| Mariam Hassan  | Class 1/1 | Miss Sara   |
| Ziad Mahmoud   | Class 1/1 | Miss Sara   |
| Ahmed Ali      | Class 1/2 | Miss Mona   |
| Youssef Adel   | Class 1/2 | Miss Mona   |
| Farida Mohamed | Class 1/2 | Miss Mona   |
| Laila Ahmed    | Class 1/2 | Miss Mona   |
| Salma Tarek    | Class 1/1 | Miss Sara   |
| Nourhan Hany   | Class 1/1 | Miss Sara   |
| Omar Khaled    | Class 1/2 | Miss Mona   |
| Kareem Amr     | Class 1/2 | Miss Mona   |
+----------------+-----------+-------------+
10 rows in set (0.113 sec)

mysql>
```

```
mysql> SELECT
    ->      (SELECT COUNT(*) FROM Child) AS TotalChildren,
    ->      (SELECT COUNT(*) FROM Classroom) AS TotalClasses,
    ->      (SELECT COUNT(*) FROM Activity) AS TotalActivities,
    ->      (SELECT COUNT(*) FROM Feedback) AS TotalFeedbacks;
+---------------+--------------+-----------------+----------------+
| TotalChildren | TotalClasses | TotalActivities | TotalFeedbacks |
+---------------+--------------+-----------------+----------------+
|            20 |            6 |              10 |             11 |
+---------------+--------------+-----------------+----------------+
1 row in set (0.465 sec)

mysql>
```

```
mysql> SELECT
    ->     Feedback.Comment,
    ->     Feedback.Date,
    ->     Child.Name AS ChildName,
    ->     Classroom.ClassName,
    ->     Attendance.Date AS AttendanceDate
    -> FROM Feedback
    -> JOIN Attendance ON Feedback.AttendanceID = Attendance.AttendanceID
    -> JOIN Child ON Attendance.ChildID = Child.ChildID
    -> JOIN Classroom ON Attendance.ClassID = Classroom.ClassID;
+------------------------------------------+------------+--------------+-----------+----------------+
| Comment                                  | Date       | ChildName    | ClassName | AttendanceDate |
+------------------------------------------+------------+--------------+-----------+----------------+
| Ahmed arrived early and participated well. | 2025-05-08 | Ahmed Ali    | Class 1/2 | 2025-05-08     |
| Salma was a bit shy but attentive.       | 2025-05-08 | Salma Tarek  | Class 1/1 | 2025-05-08     |
| Ziad was cheerful and played nicely.     | 2025-05-10 | Ziad Mahmoud | Class 1/1 | 2025-05-10     |
+------------------------------------------+------------+--------------+-----------+----------------+
3 rows in set (0.016 sec)

mysql> SELECT
    ->     Activity.Date,
    ->     COUNT(*) AS TotalActivities
    -> FROM Activity
    -> GROUP BY Activity.Date
    -> ORDER BY Activity.Date;
+------------+-----------------+
| Date       | TotalActivities |
+------------+-----------------+
| 2025-05-08 |               2 |
| 2025-05-09 |               3 |
| 2025-05-10 |               5 |
+------------+-----------------+
```

```
mysql> SELECT
    ->     c.ChildID,
    ->     c.Name AS ChildName,
    ->     c.Age,
    ->     c.Gender,
    ->     c.ParentPhone,
    ->     cl.ClassName,
    ->     cl.TeacherName,
    ->     a.Date AS AttendanceDate,
    ->     act.Name AS ActivityName,
    ->     act.Description AS ActivityDescription,
    ->     act.Date AS ActivityDate,
    ->     f.Comment AS FeedbackComment,
    ->     f.Date AS FeedbackDate,
    ->     f.TeacherName AS FeedbackTeacher
    -> FROM Child c
    -> LEFT JOIN BelongTo b ON c.ChildID = b.ChildID
    -> LEFT JOIN Classroom cl ON b.ClassID = cl.ClassID
    -> LEFT JOIN Attendance a ON c.ChildID = a.ChildID
    -> LEFT JOIN Activity act ON c.ChildID = act.ChildID
    -> LEFT JOIN Feedback f ON (f.ActivityID = act.ActivityID OR f.AttendanceID = a.AttendanceID)
    -> WHERE c.Name = 'Ahmed Ali';
```

ChildID	ChildName	Age	Gender	ParentPhone	ClassName	TeacherName	AttendanceDate	ActivityName	ActivityDescription	ActivityDate	FeedbackComment	FeedbackDate	FeedbackTeacher
1	Ahmed Ali	4	Male	01012345678	Class 1/2	Miss Mona	2025-05-08	Coloring	Coloring shapes with crayons	2025-05-08	Very creative work!	2025-05-08	Miss Mona
1	Ahmed Ali	4	Male	01012345678	Class 1/2	Miss Mona	2025-05-08	Coloring	Coloring shapes with crayons	2025-05-08	Ahmed was very focused during coloring.	2025-05-08	Miss Mona
1	Ahmed Ali	4	Male	01012345678	Class 1/2	Miss Mona	2025-05-08	Coloring	Coloring shapes with crayons	2025-05-08	Ahmed arrived early and participated well.	2025-05-08	Miss Mona
1	Ahmed Ali	4	Male	01012345678	Class 1/2	Miss Mona	2025-05-09	Coloring	Coloring shapes with crayons	2025-05-08	Very creative work!	2025-05-09	Miss Mona
1	Ahmed Ali	4	Male	01012345678	Class 1/2	Miss Mona	2025-05-09	Coloring	Coloring shapes with crayons	2025-05-08	Ahmed was very focused during coloring.	2025-05-09	Miss Mona
11	Ahmed Ali	4	Male	01012345678	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL

```
6 rows in set (0.098 sec)
```

Conclusion

This project successfully demonstrates the process of designing and implementing a relational database for a nursery school management system.

By analyzing the requirements and modeling the data through an ERD, we were able to identify the key entities and relationships. These were accurately mapped to a normalized MySQL database using appropriate constraints to ensure data integrity.

The system supports realistic scenarios such as tracking attendance, managing activities, linking feedback, and organizing children into classrooms. A variety of SQL queries were developed to retrieve and analyze the data effectively.

Overall, the project meets its objectives and provides a solid foundation for further development or integration into a real-world nursery environment.