Entity Relationship Diagram for TaskFlow Pro

The Entity Relationship Diagram (ERD) for TaskFlow Pro outlines the data model through various entities, their attributes, and relationships. Key entities include User, Task, Project, Team, Comment, Report, File, Notification, and Permission. Each entity has specific attributes, such as primary keys and foreign keys linking related entities. The diagram captures relationships like Many-to-One (User-to-Task), One-to-Many (Task-to-Comment), and Many-to-Many (User-to-Permission), defining how these entities interact. The ERD provides a comprehensive view of the system's structure, showcasing entities, their attributes, and the connections that manage tasks, projects, and user interactions effectively.

Entities and Attributes

1. User Entity

- **Entity:** Represented by a rectangle labeled "User."

- **Attributes:**
  - Ovals connected to the "User" rectangle.
  - Attributes include "UserID" (underlined as the primary key), "Username," "Email," "Role," "Password," "CreatedAt," and "UpdatedAt."

2. Task Entity

- **Entity:** Represented by a rectangle labeled "Task."

- **Attributes:**
  - Ovals connected to the "Task" rectangle.
  - Attributes include "TaskID" (underlined), "Title," "Description," "Priority," "DueDate," "Status," "AssignedTo" (foreign key to User), "CreatedAt," and "UpdatedAt."

- **Relationship:**

  - **User-to-Task (Many-to-One):**

    - A user can be assigned multiple tasks, but each task is assigned to only one user.
    - Represented by a diamond labeled "Assigns" connecting the "User" rectangle to the "Task" rectangle.
    - The "AssignedTo" oval in the "Task" entity connects to the "User" entity with a dashed line indicating the foreign key relationship.

3. Project Entity

- **Entity:** Represented by a rectangle labeled "Project."

- **Attributes:**
  - Ovals connected to the "Project" rectangle.
  - Attributes include "ProjectID" (underlined), "ProjectName," "StartDate," "EndDate," "Status," "CreatedAt," and "UpdatedAt."

- **Relationship:**

  - **Task-to-Project (Many-to-One):**

    - A project can have multiple tasks, but each task belongs to only one project.
    - Represented by a diamond labeled "BelongsTo" connecting the "Task" rectangle to the "Project" rectangle.
    - The "ProjectID" oval in the "Task" entity connects to the "Project" entity with a dashed line indicating the foreign key relationship.

4. Team Entity

- **Entity:** Represented by a rectangle labeled "Team."

- **Attributes:**
  - Ovals connected to the "Team" rectangle.
  - Attributes include "TeamID" (underlined), "TeamName," "CreatedAt," and "UpdatedAt."

- **Relationships:**

  - **User-to-Team (Many-to-One):**

    - Multiple users can be members of one team, but each user belongs to only one team.
    - Represented by a diamond labeled "MemberOf" connecting the "User" rectangle to the "Team" rectangle.
    - The "TeamID" oval in the "User" entity connects to the "Team" entity with a dashed line indicating the foreign key relationship.

  - **Team-to-Project (One-to-Many):**
    - A team can manage multiple projects, but each project is managed by only one team.
    - Represented by a diamond labeled "ManagedBy" connecting the "Team" rectangle to the "Project" rectangle.
    - The "TeamID" oval in the "Project" entity connects to the "Team" entity with a dashed line indicating the foreign key relationship.

5. Comment Entity

- **Entity:** Represented by a rectangle labeled "Comment."

- **Attributes:**
  - Ovals connected to the "Comment" rectangle.
  - Attributes include "CommentID" (underlined), "Content," "CreatedAt," "UpdatedAt," "TaskID" (foreign key to Task), and "UserID" (foreign key to User).

- **Relationships:**

  - **Task-to-Comment (One-to-Many):**
    - A task can have multiple comments, but each comment is associated with only one task.
    - Represented by a diamond labeled "HasComment" connecting the "Task" rectangle to the "Comment" rectangle.
    - The "TaskID" oval in the "Comment" entity connects to the "Task" entity with a dashed line indicating the foreign key relationship.

  - **User-to-Comment (Many-to-One):**
    - Multiple comments can be written by one user, but each comment is written by only one user.
    - Represented by a diamond labeled "Writes" connecting the "User" rectangle to the "Comment" rectangle.
    - The "UserID" oval in the "Comment" entity connects to the "User" entity with a dashed line indicating the foreign key relationship.

6. Report Entity

- **Entity:** Represented by a rectangle labeled "Report."

- **Attributes:**

  - Ovals connected to the "Report" rectangle.
  - Attributes include "ReportID" (underlined), "ReportType," "GeneratedAt," and "ProjectID" (foreign key to Project).

- **Relationship:**

  - **Project-to-Report (One-to-Many):**
    - A project can generate multiple reports, but each report is associated with only one project.
    - Represented by a diamond labeled "Generates" connecting the "Project" rectangle to the "Report" rectangle.
    - The "ProjectID" oval in the "Report" entity connects to the "Project" entity with a dashed line indicating the foreign key relationship.

7. File Entity

- **Entity:** Represented by a rectangle labeled "File."

- **Attributes:**
    - Ovals connected to the "File" rectangle.
    - Attributes include "FileID" (underlined), "FileName," "FileType," "UploadedBy" (foreign key to User), and "CreatedAt."

- **Relationship:**

    - **Task-to-File (One-to-Many):**
        - A task can have multiple files attached, but each file is associated with only one task.
        - Represented by a diamond labeled "HasFile" connecting the "Task" rectangle to the "File" rectangle.
        - The "TaskID" oval in the "File" entity connects to the "Task" entity with a dashed line indicating the foreign key relationship.

8. Notification Entity

- **Entity:** Represented by a rectangle labeled "Notification."

- **Attributes:**
    - Ovals connected to the "Notification" rectangle.
    - Attributes include "NotificationID" (underlined), "Message," "SentTo" (foreign key to User), and "SentAt."

- **Relationship:**

    - **User-to-Notification (One-to-Many):**
        - A user can receive multiple notifications, but each notification is sent to only one user.
        - Represented by a diamond labeled "Receives" connecting the "User" rectangle to the "Notification" rectangle.
        - The "SentTo" oval in the "Notification" entity connects to the "User" entity with a dashed line indicating the foreign key relationship.

9. Permission Entity

- **Entity:** Represented by a rectangle labeled "Permission."

- **Attributes:**
    - Ovals connected to the "Permission" rectangle.
    - Attributes include "PermissionID" (underlined), "PermissionName," and "Description."

- **Relationship:**

    - **User-to-Permission (Many-to-Many):**

- A user can have multiple permissions, and a permission can be assigned to multiple users.
- Represented by a diamond labeled "HasPermission" connecting the "User" rectangle to the "Permission" rectangle.

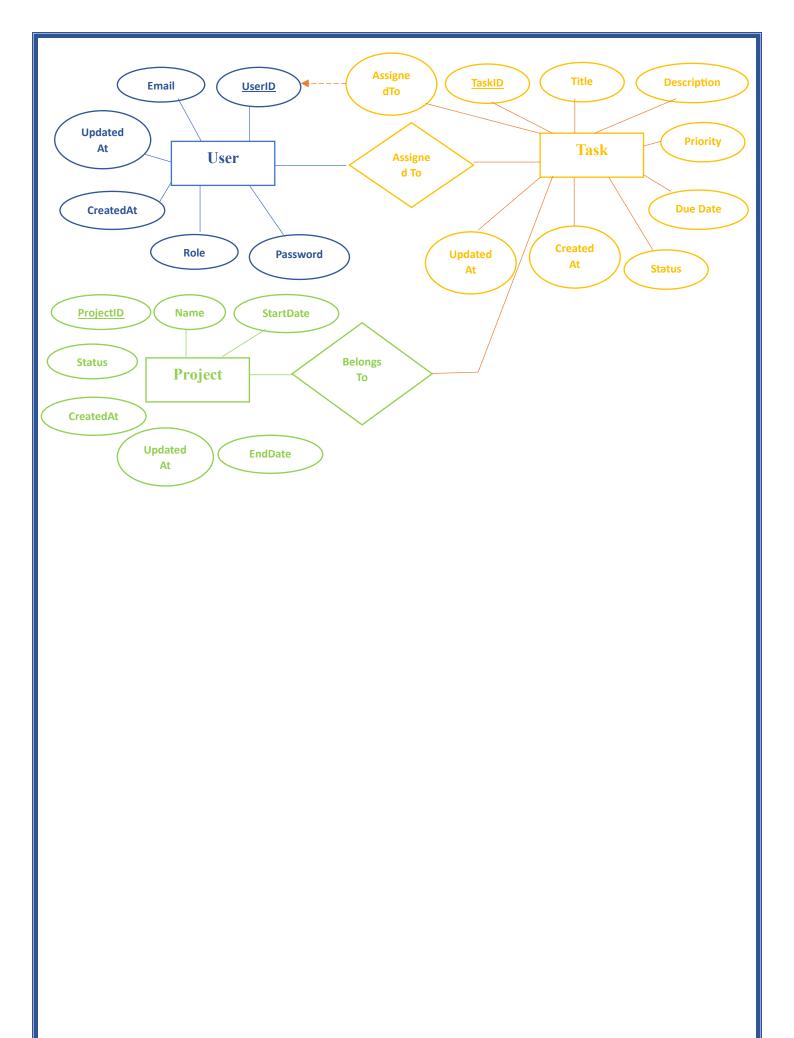**Summary of Relationships and Foreign Key Representations**

- User-to-Task: Many-to-One, represented by "Assigns."
- Task-to-Project: Many-to-One, represented by "BelongsTo."
- User-to-Team: Many-to-One, represented by "MemberOf."
- Team-to-Project: One-to-Many, represented by "ManagedBy."
- Task-to-Comment: One-to-Many, represented by "HasComment."
- User-to-Comment: Many-to-One, represented by "Writes."
- Project-to-Report: One-to-Many, represented by "Generates."
- Task-to-File: One-to-Many, represented by "HasFile."
- User-to-Notification: One-to-Many, represented by "Receives."
- User-to-Permission: Many-to-Many, represented by "HasPermission."

In the ER diagram:

- Entities are represented by rectangles.
- Attributes are represented by ovals connected to their respective entities.
- Primary Keys are underlined within their attribute ovals.
- Foreign Keys are indicated by dashed lines connecting the foreign key attribute to the corresponding primary key in the related entity.
- Relationships between entities are represented by diamonds connecting the relevant entities, labeled with the nature of the relationship.

This detailed description captures the full structure of the ER diagram, including all relevant entities, attributes, relationships, and key designations, providing a clear and organized representation of the data model for TaskFlow Pro.

The ER Diagram illustrating this data model is presented on the following page.

Entities and Attributes:

User
- Email
- UserID
- Updated At
- CreatedAt
- Role
- Password

Task
- AssignedTo
- TaskID
- Title
- Description
- Priority
- Due Date
- Status
- Created At
- Updated At

Project
- ProjectID
- Name
- StartDate
- Status
- CreatedAt
- Updated At
- EndDate

Relationships:
- Assigned To (User – Task)
- Belongs To (Project – Task)

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