**Defect Tracker- Project Requirements**

**1. User Management**

**Objective**: Manage users and assign roles with associated privileges.

* **Users**:
  + Manage users including **Testers**, **Developers**, **Project Managers**, and **Admins**.
  + Users should have a **username**, **password**, **email**, **first name**, **last name**, and **role**.
* **Roles**:
  + Roles include **Admin**, **Project Manager**, **Tester**, **Developer**, and **Full Stack Developer**.
  + **Admin** manages roles and user assignments, while **Project Managers** assign tasks to other users.
* **Privileges**:
  + Users inherit privileges based on their role (e.g., **View Test Cases**, **Assign Tasks**, **View Defects**).
  + Project Managers can assign additional custom privileges to users.

**2. Role-Based Access Control (RBAC)**

**Objective**: Ensure that users have access to relevant functionalities based on their role.

* **Roles and Privileges**:
  + **Admin**: Full access to manage users, roles, and projects.
  + **Project Manager**: Can assign employees to projects and modules, assign test cases, and set up releases.
  + **Tester**: Responsible for executing test cases and reporting defects.
  + **Developer**: Responsible for fixing defects assigned to them.

**3. Project Management**

**Objective**: Track projects and assign users to specific tasks.

* **Projects**:
  + **Project Manager** creates and manages **projects**.
  + Each **project** has a **name**, **start date**, **end date**, **status**, and is linked to a **project manager** (user).
* **Modules and Submodules**:
  + Each project is divided into **modules**, and modules can be further divided into **submodules**.
  + **Modules** and **Submodules** are linked to **projects** and **employees** working on them.

**4. Employee Assignment**

**Objective**: Assign employees to specific projects, modules, and submodules.

* **Bench Table**:
  + **Project Managers** assign employees who are on the **bench** (available employees) to **projects** based on their **availability hours** and **skills**.
  + **Employees** have an **availability percentage** to ensure they are not overloaded.
* **Employee Assignment**:
  + Employees are assigned to **projects**, **modules**, and **submodules** via separate assignment tables.
  + Employees can work on multiple modules or submodules within a project.

**5. Test Case Management**

**Objective**: Manage test cases, track execution, and link defects.

* **Test Case Details**:
  + Each **test case** has a **name**, **description**, **test steps**, **expected result**, **actual result**, **status**, **severity**, **priority**, **assigned tester**, and **defect ID**.
  + The **status** can be **Pass** or **Fail**. If the test case fails, it generates a defect, which is linked to the **Defect ID**.
  + **Test Cases** are associated with **modules**, **submodules**, and **projects**.
* **Test Case Execution**:
  + Each test case has a **test date** and is linked to a **tester** (user).
  + **Test cases** can be **reopened** if the same defect persists in subsequent releases.

**6. Defect Tracking**

**Objective**: Track defects associated with failed test cases.

* **Defect Details**:
  + **Defects** have a **title**, **description**, **severity**, **priority**, **status**, **assigned developer**, **reported by**, **resolution**, **environment**, **release number**, **comments**, and **attachments**.
  + **Defects** are linked to **test cases** and tracked across **modules** and **submodules**.
  + The **status** of the defect can be **Open**, **In Progress**, **Fixed**, **Closed**, or **Reopened**.
  + **Severity** and **priority** define the urgency of fixing the defect.
* **Notifications**:
  + **Users** (e.g., **Testers**, **Developers**) are notified about defects through the **Notifications** table when defects are assigned to them or their status changes.

**7. Release Management**

**Objective**: Track and manage different versions (releases) of the software.

* **Release Table**:
  + **Release** tracks the **release number**, **release date**, and **status** (e.g., In Progress, Completed).
  + **Test cases** are associated with a **release**.
* **Release Test Cases**:
  + **Test Cases** are assigned to specific **releases** for execution.
  + The test case status is updated for each release, and if a test fails, a defect is logged.

**8. Notifications**

**Objective**: Notify relevant users about defect assignments and updates.

* **Notifications Table**:
  + Users are notified when a defect is **assigned**, **resolved**, or **reopened**.
  + Notifications include details such as **defect title**, **assigned user**, and **status change**.

**9. Database Schema & Relationships**

Here are the key relationships between tables in your system:

* **Users and Roles**:
  + **Users** are assigned **Roles** (Admin, Project Manager, Tester, Developer).
* **Users and User\_Privileges**:
  + **User\_Privileges** connects **Users** with **Privileges** (permissions assigned based on the role).
* **Roles and Role\_Privileges**:
  + **Role\_Privileges** connects **Roles** and **Privileges** (permissions specific to roles).
* **Projects and Users**:
  + **Projects** are managed by **Project Managers** (users).
* **Modules and Projects**:
  + **Modules** are linked to **Projects**.
* **Submodules and Modules**:
  + **Submodules** are linked to **Modules**.
* **Employee\_Project\_Assignment**:
  + **Employees** are assigned to **Projects**.
* **Employee\_Module\_Assignment**:
  + **Employees** are assigned to **Modules**.
* **Employee\_Submodule\_Assignment**:
  + **Employees** are assigned to **Submodules**.
* **TestCases and Users**:
  + **TestCases** are assigned to **Users** (testers).
* **TestCases and Defects**:
  + **TestCases** are linked to **Defects**. If a test case fails, a defect is created and linked.
* **TestCases and Modules/Submodules**:
  + **TestCases** are linked to **Modules** and **Submodules**.
* **Defects and TestCases**:
  + **Defects** are linked to **TestCases** and track test case failures.
* **Defects and Users**:
  + **Defects** are assigned to **Users** (developers) for resolution.
* **Release and TestCases**:
  + **TestCases** are linked to **Releases** for execution.
* **Notifications and Defects/Users**:
  + **Notifications** are sent to users about **Defects** they need to address.
* **Bench and Employees**:
  + **Employees** on the **bench** are tracked in the **Bench** table and can be assigned to projects.