**ERP Role-Based Table Structure (PostgreSQL)**

**1. Users (Employees / System Users)**

CREATE TABLE users (

user\_id SERIAL PRIMARY KEY,

username VARCHAR(100) UNIQUE NOT NULL,

email VARCHAR(150) UNIQUE NOT NULL,

password\_hash TEXT NOT NULL,

full\_name VARCHAR(200),

is\_active BOOLEAN DEFAULT TRUE,

created\_at TIMESTAMP DEFAULT CURRENT\_TIMESTAMP

);

**2. Roles (Admin, HR Manager, Finance Officer, Sales Rep…)**

CREATE TABLE roles (

role\_id SERIAL PRIMARY KEY,

role\_name VARCHAR(100) UNIQUE NOT NULL,

description TEXT

);

**3. Modules (ERP Major Components)**

Examples: HR, Finance, Inventory, Procurement, Sales, Reports, Admin.

CREATE TABLE modules (

module\_id SERIAL PRIMARY KEY,

module\_name VARCHAR(100) UNIQUE NOT NULL,

description TEXT

);

**4. Pages (Screens under each Module)**

Each module contains multiple pages/screens.

CREATE TABLE pages (

page\_id SERIAL PRIMARY KEY,

module\_id INT REFERENCES modules(module\_id) ON DELETE CASCADE,

page\_name VARCHAR(150) NOT NULL,

url VARCHAR(255) NOT NULL,

description TEXT

);

**5. Reports (ERP Reports)**

CREATE TABLE reports (

report\_id SERIAL PRIMARY KEY,

module\_id INT REFERENCES modules(module\_id) ON DELETE CASCADE,

report\_name VARCHAR(150) NOT NULL,

description TEXT

);

**6. Charts / Dashboards**

(For BI & analytics inside ERP)

CREATE TABLE charts (

chart\_id SERIAL PRIMARY KEY,

module\_id INT REFERENCES modules(module\_id) ON DELETE CASCADE,

chart\_name VARCHAR(150) NOT NULL,

description TEXT

);

**7. Role Access (Permissions)**

Defines what a role can do in ERP → at **page**, **report**, and **chart** level.

CREATE TABLE role\_access (

access\_id SERIAL PRIMARY KEY,

role\_id INT REFERENCES roles(role\_id) ON DELETE CASCADE,

module\_id INT REFERENCES modules(module\_id) ON DELETE CASCADE,

page\_id INT REFERENCES pages(page\_id),

report\_id INT REFERENCES reports(report\_id),

chart\_id INT REFERENCES charts(chart\_id),

can\_view BOOLEAN DEFAULT TRUE,

can\_create BOOLEAN DEFAULT FALSE,

can\_update BOOLEAN DEFAULT FALSE,

can\_delete BOOLEAN DEFAULT FALSE,

UNIQUE(role\_id, module\_id, page\_id, report\_id, chart\_id)

);

**8. User Roles (Mapping Users to Roles)**

A user can have multiple roles (Admin + Finance Officer).

CREATE TABLE user\_roles (

user\_role\_id SERIAL PRIMARY KEY,

user\_id INT REFERENCES users(user\_id) ON DELETE CASCADE,

role\_id INT REFERENCES roles(role\_id) ON DELETE CASCADE,

UNIQUE(user\_id, role\_id)

);

**🔹 Example ERP Setup**

* **Modules:** HR, Finance, Sales, Procurement, Inventory, Reports, Admin.
* **Pages (HR):** Employee Master, Attendance, Payroll.
* **Pages (Finance):** Ledger, Vouchers, Bank Reconciliation.
* **Reports:** Sales Report, Balance Sheet, Employee Attendance.
* **Charts:** Sales Trend, Expense Pie Chart, HR Attrition Dashboard.

**🔹 ERP Access Flow**

1. **User** logs in → assigned one or more **Roles**.
2. **Roles** define which **Modules** they can access.
3. Inside each module, **Pages / Reports / Charts** are enabled with **CRUD rights**.
4. **Role Access Table** enforces fine-grained security.