Hospital Management System

Abstract

The **Hospital Management System** is developed on Salesforce CRM to provide a unified platform for managing hospital operations efficiently. Traditional hospital processes—such as appointment scheduling, patient record management, billing, pharmacy, and laboratory workflows—are often manual, prone to errors, and lack transparency. This system addresses those challenges by leveraging Salesforce's cloud capabilities to automate and centralize healthcare processes.

The solution manages **core hospital entities**, including patients, doctors, appointments, admissions, prescriptions, medical records, invoices, payments, rooms, and lab tests, with custom Salesforce objects and relationships. Automation is achieved through **Validation Rules, Flows, Approval Processes, and Apex Triggers**, ensuring accuracy and reducing manual effort. Advanced logic such as **double-booking prevention for doctors, automated billing creation, payment reminders, and lab result notifications** enhances operational efficiency and patient experience.

To support decision-making, the system provides **custom dashboards and reports** for revenue tracking, doctor utilization, patient history, and unpaid bills. Role-based security and compliance measures (HIPAA/GDPR) ensure confidentiality of sensitive medical data, while external integrations (SMS/WhatsApp reminders, insurance APIs, and pharmacy/lab systems) extend the platform's functionality.

Task 1: OBJECT

Salesforce Objects are database tables that store data specific to an organization.

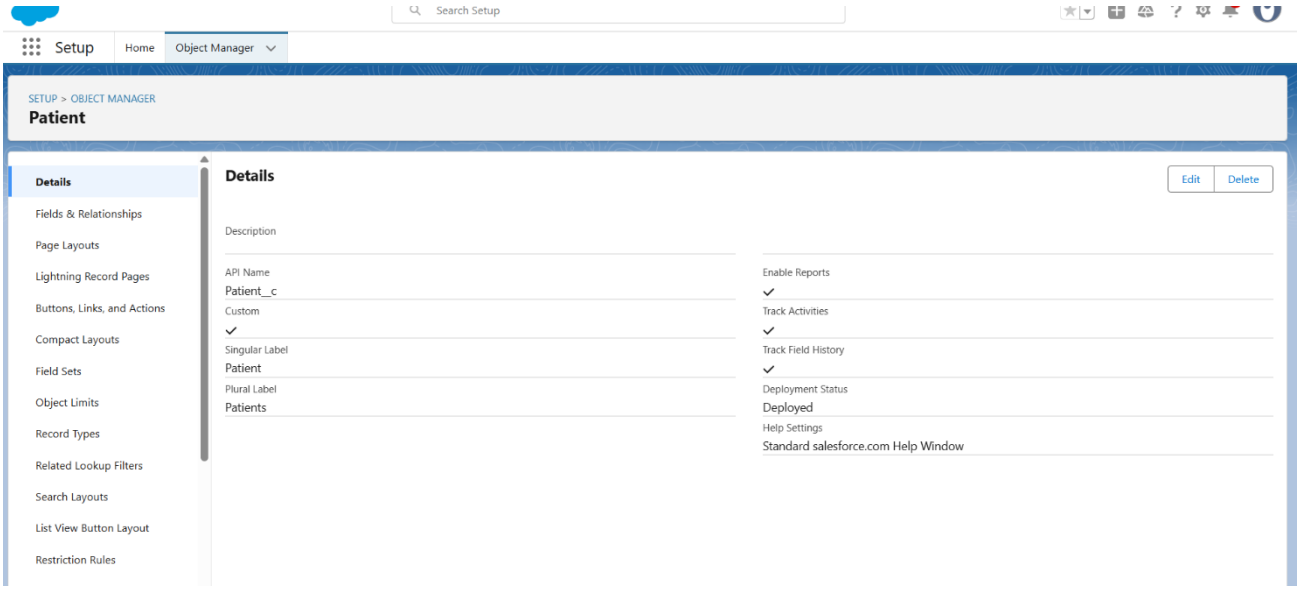
Types of Salesforce Objects

1. **Standard Objects**: Provided by Salesforce out-of-the-box (e.g., Users, Reports, Dashboards, Accounts, Contacts).
2. **Custom Objects**: Created by users to store unique business information. They form the backbone of custom applications, enabling tailored processes and structured data management.

Create Patient Object

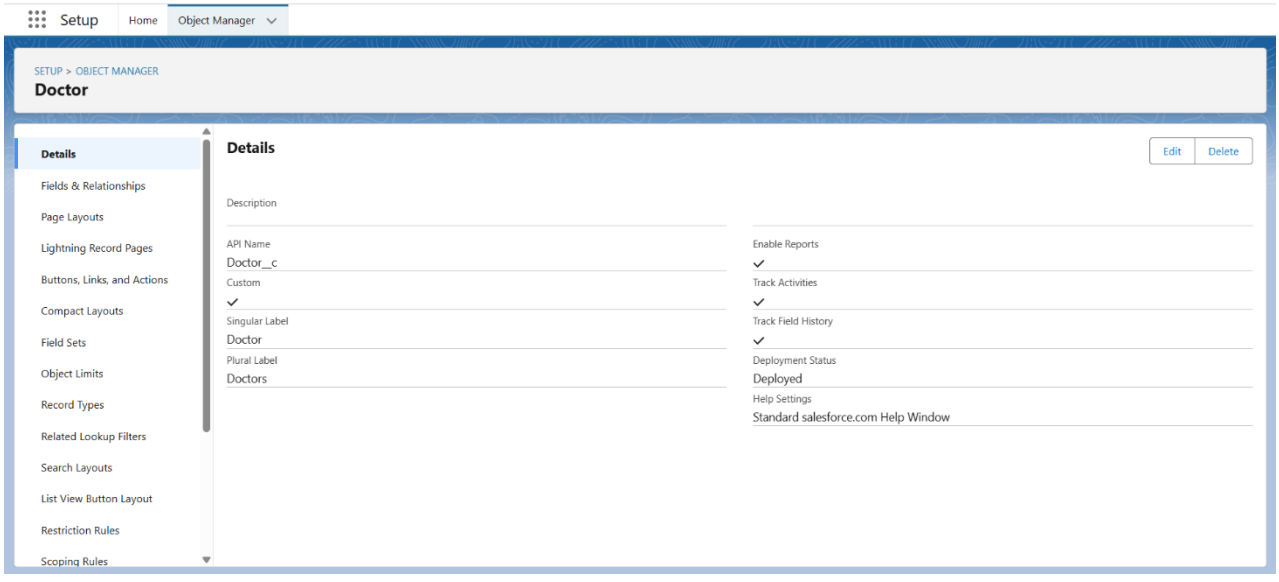
To create the object:

1. Go to **Setup** >> **Object Manager** >> **Create** >> **Custom Object**.
2. Enter details:
    - **Label Name**: Patient
    - **Plural Label Name**: Patients
    - **Record Name Label and Format**:
        - Record Name: Patient ID
        - Data Type: Auto-Number
        - Display Format: PAT-{00000}
3. Select Options:
    - Check **Allow Reports**
    - Check **Track Field History**
    - Check **Allow Activities**
    - Check **Allow Search**
4. Click **Save**.



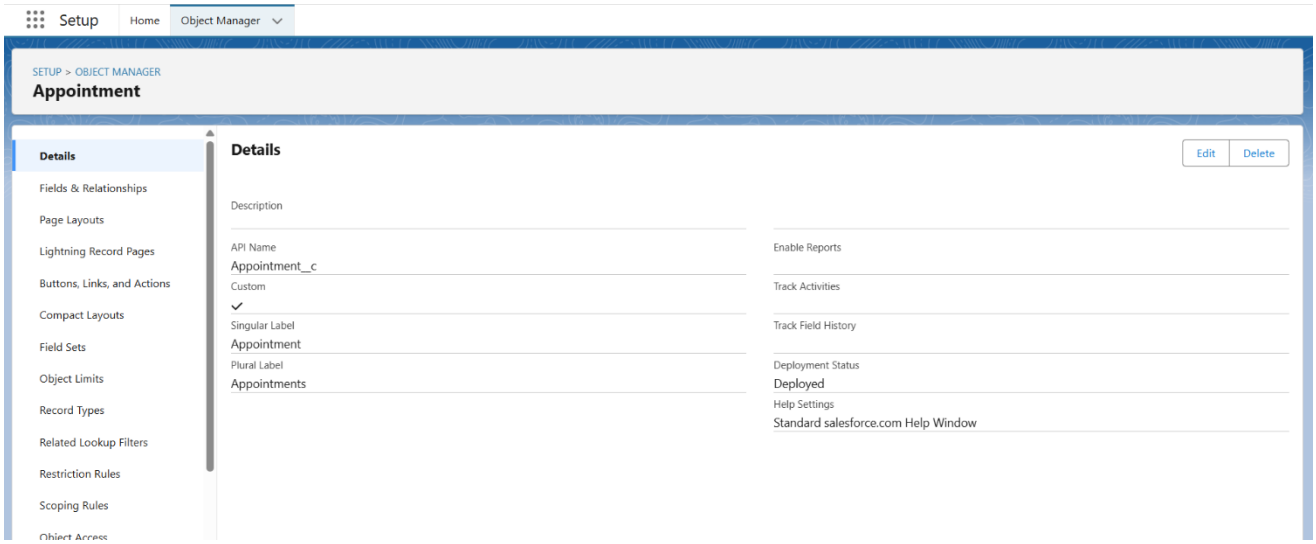
Create Doctor Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Doctor
    - **Plural Label Name**: Doctors
    - **Record Name**: Doctor Name (Text)
3. Check same options.
4. Save.



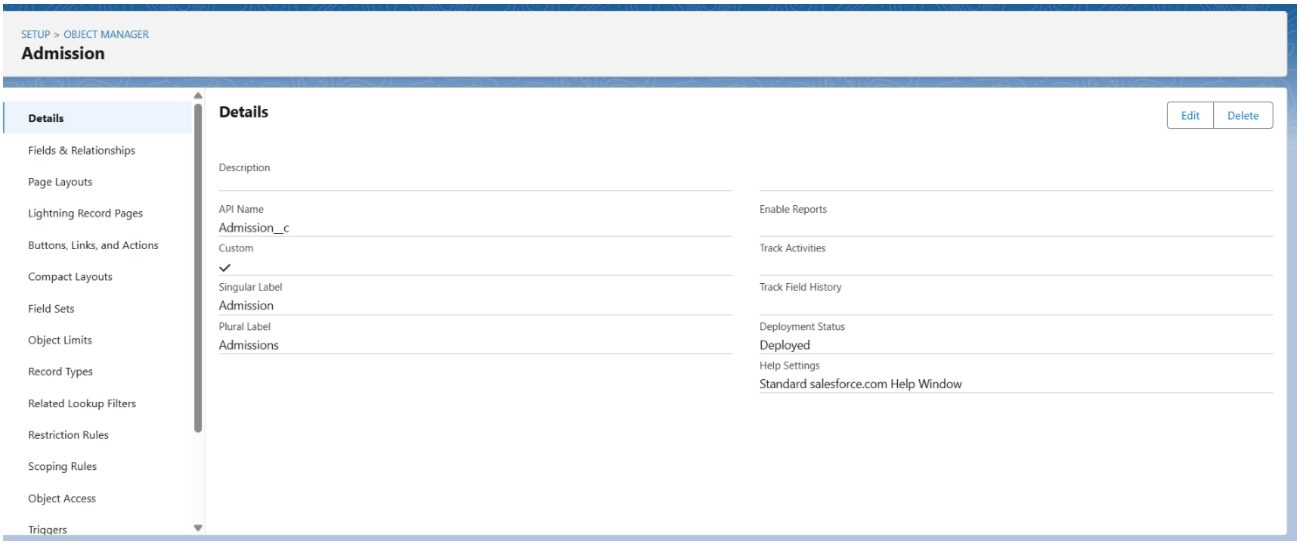
Create Appointment Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Appointment
    - **Plural Label Name**: Appointments
    - **Record Name**: Appointment Number (Auto-Number)
    - Display Format: APT-{00000}
3. Save.



Create Admission Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Admission
    - **Plural Label Name**: Admissions
    - **Record Name**: Admission Number (Auto-Number)
    - Display Format: ADM-{00000}
3. Save.



Create Invoice Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Invoice
    - **Plural Label Name**: Invoices
    - **Record Name**: Invoice Number (Auto-Number)
    - Display Format: INV-{00000}
3. Save.

Create Payment Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Payment
    - **Plural Label Name**: Payments
    - **Record Name**: Payment Number (Auto-Number)
    - Display Format: PAY-{00000}
3. Save.

Create Room Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Room
    - **Plural Label Name**: Rooms
    - **Record Name**: Room Number (Text)
3. Save.

Create Prescription Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Prescription
    - **Plural Label Name**: Prescriptions
    - **Record Name**: Prescription Number (Auto-Number)
    - Display Format: RX-{00000}
3. Save.

Create Medical Record Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Medical Record
    - **Plural Label Name**: Medical Records
    - **Record Name**: Record Number (Auto-Number)
    - Display Format: MR-{00000}

3. Save.

Create Lab Test Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Lab Test
    - **Plural Label Name**: Lab Tests
    - **Record Name**: Test Number (Auto-Number)
    - Display Format: LAB-{00000}
3. Save.

Create Department Object

1. Setup >> Object Manager >> Create >> Custom Object.
2. Enter:
    - **Label Name**: Department
    - **Plural Label Name**: Departments
    - **Record Name**: Department Name (Text)
3. Save.

Task 2: TABS

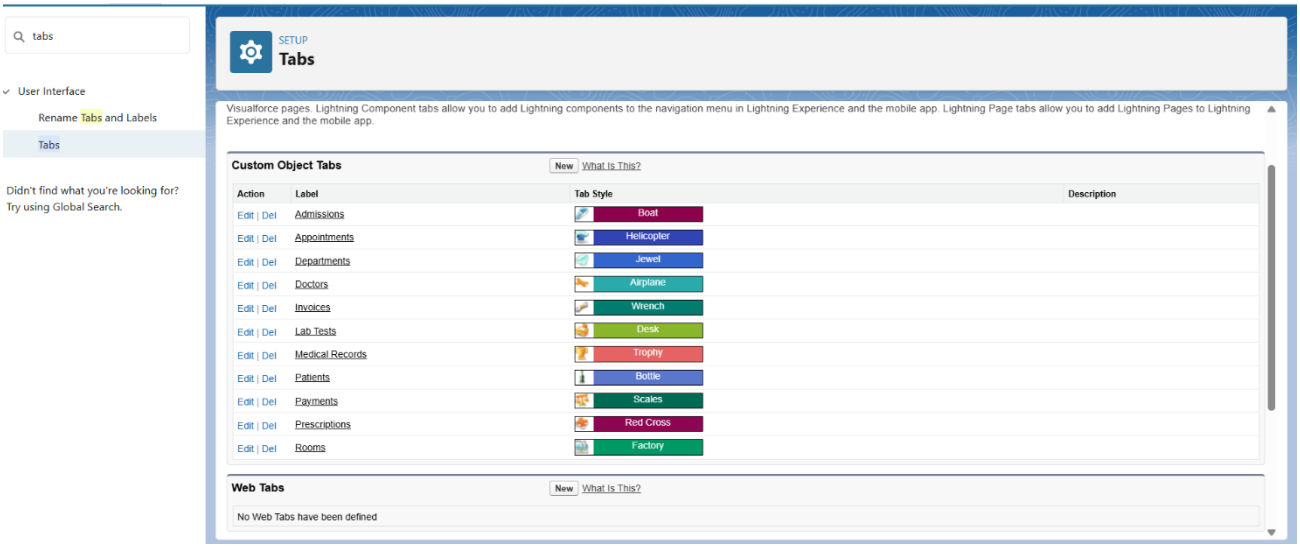
A **Tab** in Salesforce is like a "window" into an object. It allows users to **create new records** and **view existing records** for that object. Tabs provide easy navigation and make objects accessible from the app's navigation bar.

Steps to Create Custom Tabs

1. **Go to Setup Page**
    - Click the **Gear icon** in Salesforce → **Setup**.
    - In the Quick Find bar (left side), type **Tabs**.
    - Click on **Tabs**.
2. **Create a New Custom Tab**
    - Under **Custom Object Tabs**, click **New**.
    - Select the **Object** from the drop-down list (e.g., Patient).
    - Select a **Tab Style** (choose an icon & color to represent the tab).
    - Click **Next**.
3. **Add to Profiles**
    - On the profile page, keep the default option (**Tab Visibility = Default On**).
    - This ensures that the tab is available for all profiles.
    - Click **Next**.
4. **Add to Custom Apps**
    - On this page, **uncheck the "Include Tab"** option if you plan to control app navigation separately (via Lightning App).
    - Make sure the option **Append tab to users' existing personal customizations** is checked.
    - Click **Save**.
    -

5. **Repeat for All Objects**
    - Follow steps 1–4 again to create tabs for:
        - **Patients**
        - **Doctors**
        - **Appointments**
        - **Admissions**
        - **Invoices**
        - **Payments**
        - **Rooms**
        - **Prescriptions**
        - **Medical Records**
        - **Lab Tests**
        - **Departments (optional)**

Now, each object has its own tab, and users can access records directly from the navigation bar.



Task 3: THE LIGHTNING APP

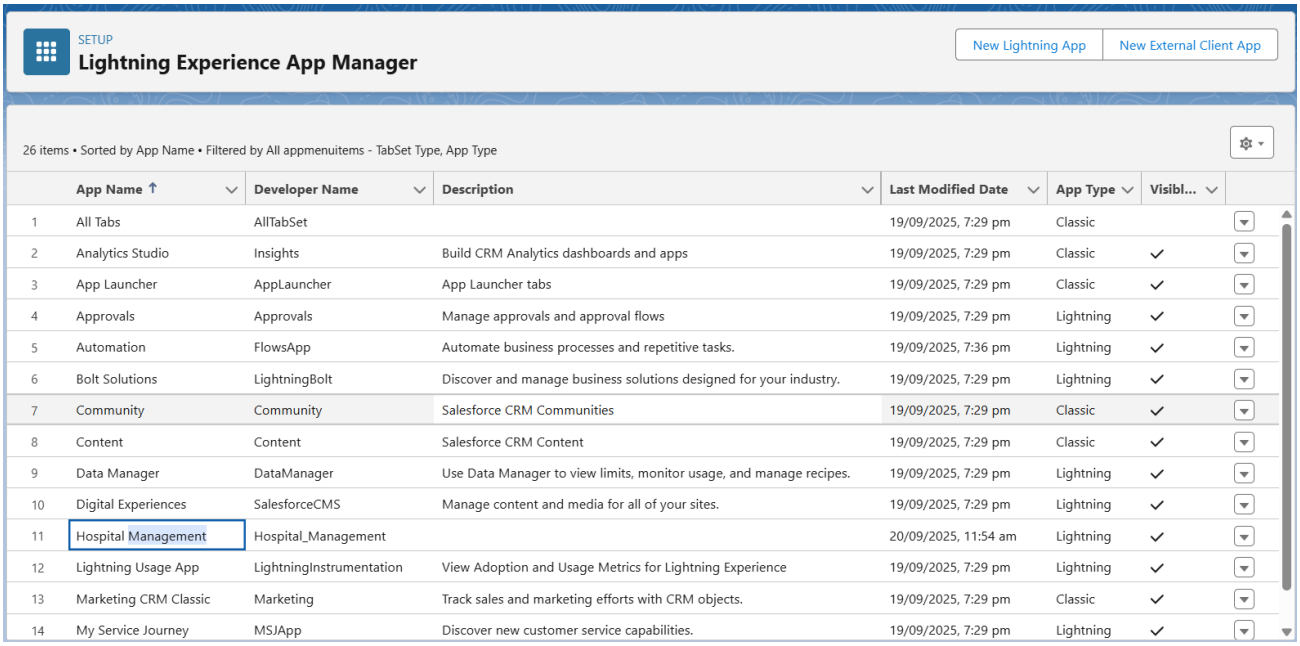
An **App** in Salesforce bundles together **tabs, objects, reports, dashboards, and utilities** in one place. In Lightning Experience, the navigation bar of the app allows users to quickly access everything they need for their role.

Steps to Create a Lightning App

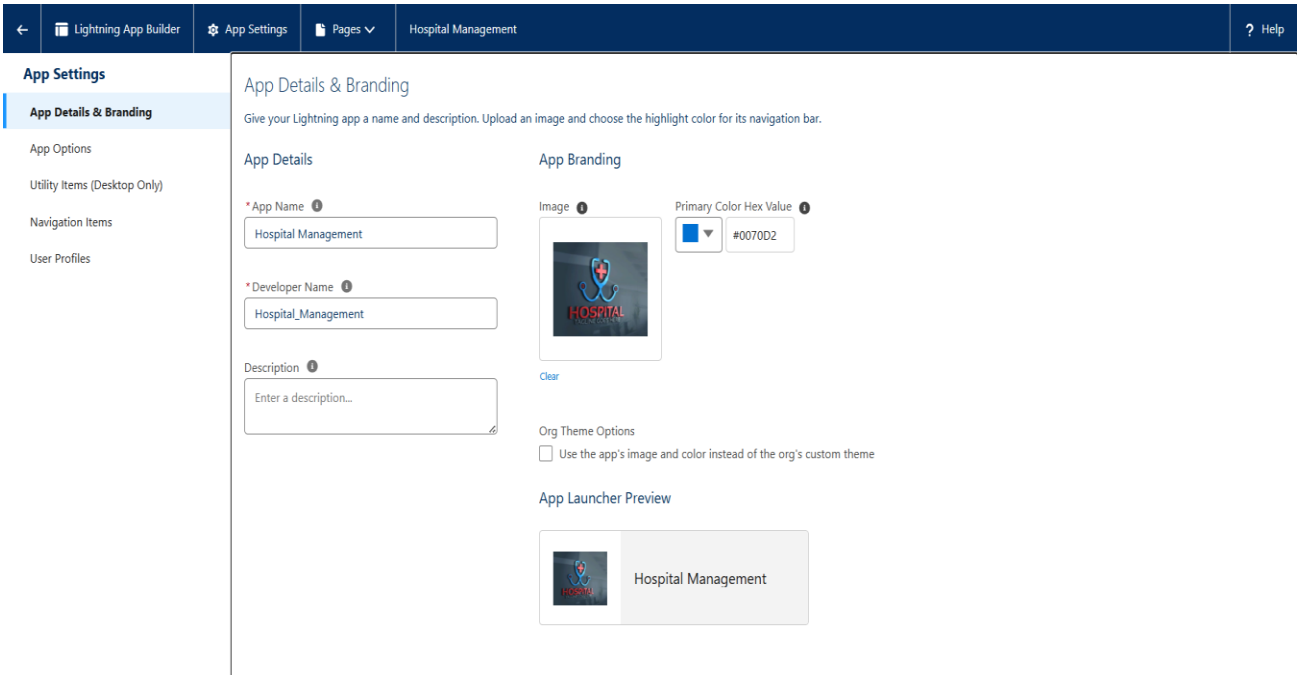
1. **Go to App Manager**
    - From Setup, type **App Manager** in the Quick Find bar.
    - Click **App Manager**.
    - On the top right, click **New Lightning App**.
2. **App Details**
    - Enter **App Name**: *Hospital Management Application*.
    - The Developer Name auto-fills.
    - Optionally, upload an app logo and choose a brand color.
    - Click **Next**.
3. **App Options**
    - Keep default options (Navigation, Setup, and App Visibility).
    - Click **Next**.
4. **Utility Items**
    - Keep as default (e.g., History, Notes).
    - Optionally, you can add shortcuts like **Recent Items** or **Chatter**.
    - Click **Next**.
5. **Navigation Items**
    - Select all custom objects you created earlier.
    - Add them one by one from the **Available Items** list to the **Selected Items** list using the arrow button.

- Recommended items to include:
  - **Patients**
  - **Doctors**
  - **Appointments**
  - **Admissions**
  - **Invoices**
  - **Payments**
  - **Rooms**
  - **Prescriptions**
  - **Medical Records**
  - **Lab Tests**
  - **Reports**
  - **Dashboards**
- Arrange them in the order you want to appear in the app.
- Click **Next**.

6. **Assign Profiles**
   - Select **System Administrator** (so you can access everything).
   - Optionally, add other profiles (Receptionist, Doctor, Billing Manager).
   - Click **Save & Finish**.
7. **Test the App**
   - Go to the **App Launcher (9 dots icon)** in Salesforce.
   - Search for *Hospital Management Application*.
   - Open it and confirm all tabs (Patients, Doctors, Appointments, etc.) appear in the navigation bar.



	App Name	Developer Name	Description	Last Modified Date	App Type	Visibl...
1	All Tabs	AllTabSet		19/09/2025, 7:29 pm	Classic	
2	Analytics Studio	Insights	Build CRM Analytics dashboards and apps	19/09/2025, 7:29 pm	Classic	✓
3	App Launcher	AppLauncher	App Launcher tabs	19/09/2025, 7:29 pm	Classic	✓
4	Approvals	Approvals	Manage approvals and approval flows	19/09/2025, 7:29 pm	Lightning	✓
5	Automation	FlowsApp	Automate business processes and repetitive tasks.	19/09/2025, 7:36 pm	Lightning	✓
6	Bolt Solutions	LightningBolt	Discover and manage business solutions designed for your industry.	19/09/2025, 7:29 pm	Lightning	✓
7	Community	Community	Salesforce CRM Communities	19/09/2025, 7:29 pm	Classic	✓
8	Content	Content	Salesforce CRM Content	19/09/2025, 7:29 pm	Classic	✓
9	Data Manager	DataManager	Use Data Manager to view limits, monitor usage, and manage recipes.	19/09/2025, 7:29 pm	Lightning	✓
10	Digital Experiences	SalesforceCMS	Manage content and media for all of your sites.	19/09/2025, 7:29 pm	Lightning	✓
11	Hospital Management	Hospital_Management		20/09/2025, 11:54 am	Lightning	✓
12	Lightning Usage App	LightningInstrumentation	View Adoption and Usage Metrics for Lightning Experience	19/09/2025, 7:29 pm	Lightning	✓
13	Marketing CRM Classic	Marketing	Track sales and marketing efforts with CRM objects.	19/09/2025, 7:29 pm	Classic	✓
14	My Service Journey	MSJApp	Discover new customer service capabilities.	19/09/2025, 7:29 pm	Lightning	✓



Task 4: FIELDS

In Salesforce, **Fields** represent the data stored in the columns of a relational database. They hold valuable information required for a specific object. Fields make it easier to search, update, and manage records.

Types of Fields

1. **Standard Fields** – Provided by Salesforce (e.g., Record Name, Created Date, Owner).
2. **Custom Fields** – Created by users to capture additional information specific to their process.

Example 1: Creating Fields for Patient Object

1. Go to **Setup** >> click **Object Manager** >> search for **Patient** >> click on the object.
2. Click on **Fields & Relationships** >> **New**.
3. Select Data Type → e.g., **Text** → Click **Next**.
4. Fill as follows:
    - **Field Label**: First Name
    - **Field Name**: auto-generated
    - Length: 40
    - Required: ☑
    - Click **Next >> Next >> Save & New**.
5. Repeat the process to create additional fields:
    - **Last Name** → Text (40), Required
    - **Email** → Email, Required
    - **Phone** → Phone
    - **Date of Birth** → Date
    - **Gender** → Picklist (Male, Female, Other, Prefer not to say)
    - **Blood Type** → Picklist (A+, A-, B+, B-, AB+, AB-, O+, O-)

- **Allergies** → Long Text Area (255)
- **Address** → Long Text Area (255)
- **Primary Doctor** → Lookup (Doctor)
- **Active** → Checkbox (default true)

Example 2: Creating Fields for Doctor Object

- **Email** → Email (Required)
- **Phone** → Phone
- **Specialty** → Picklist (Cardiology, Orthopedics, Pediatrics, General Medicine, Surgery, etc.)
- **Department** → Lookup (Department)
- **License Number** → Text (20)
- **Available** → Checkbox

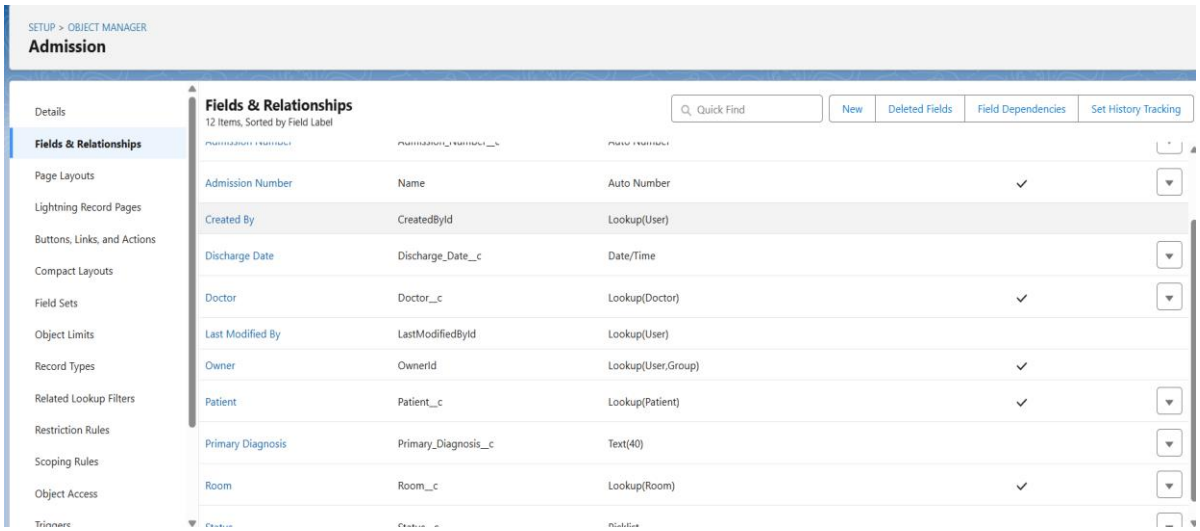
Example 3: Creating Fields for Appointment Object

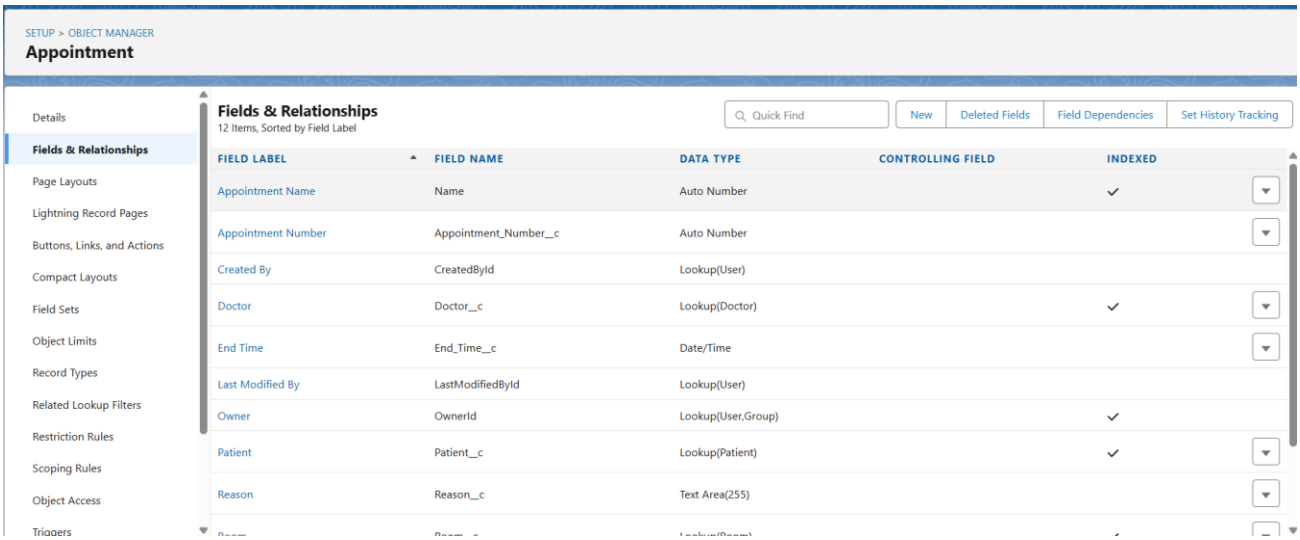
- **Start Time** → Date/Time (Required)
- **End Time** → Date/Time (Required)
- **Patient** → Lookup (Patient)
- **Doctor** → Lookup (Doctor)
- **Room** → Lookup (Room, optional)
- **Status** → Picklist (Scheduled, Completed, Cancelled, NoShow)
- **Reason** → Long Text Area

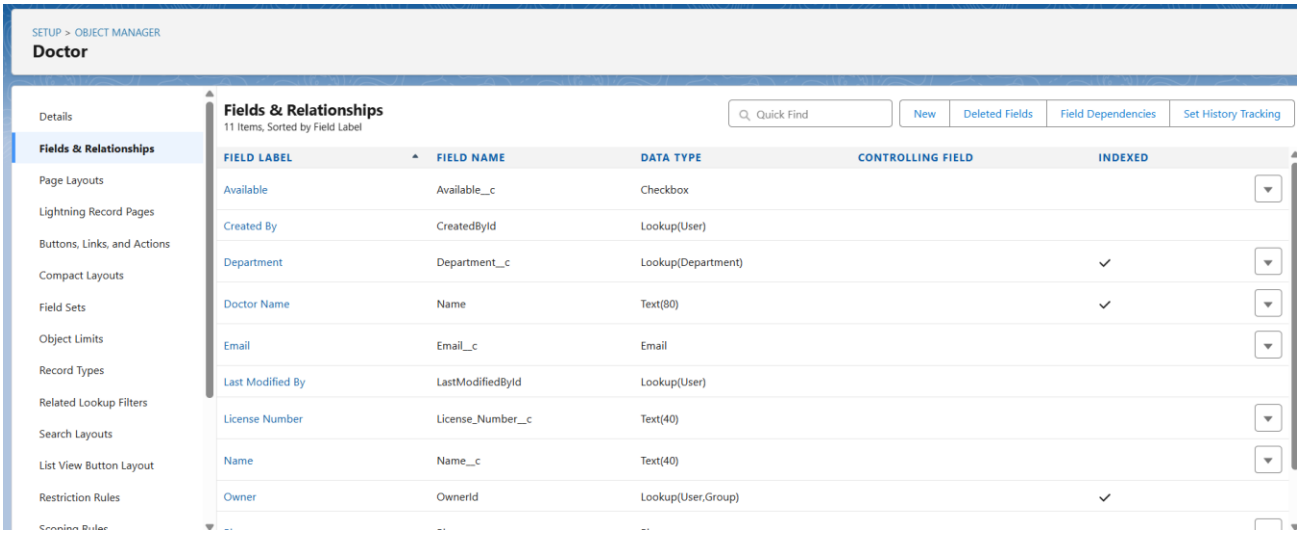
Example 4: Creating Lookup Fields

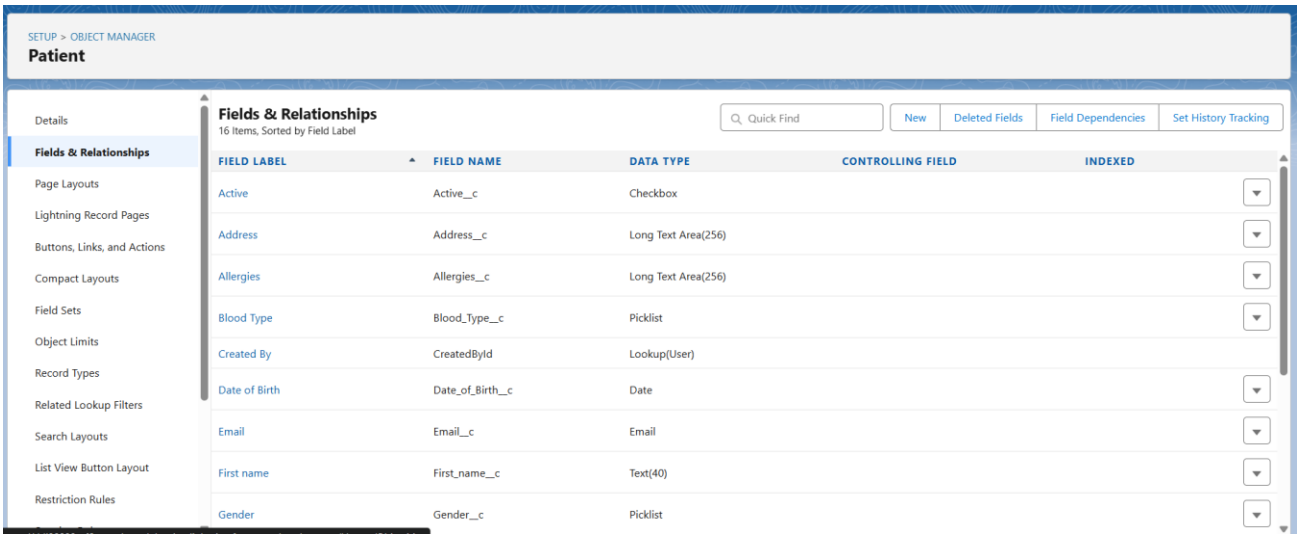
1. Go to **Setup** >> **Object Manager** >> search for **Appointment** >> open it.
2. Click on **Fields & Relationships** >> **New**.

3. Select **Lookup Relationship** >> click **Next**.
4. Select the related object → Example: **Patient**.
5. Click **Next >> Next >> Save & New**.
6. Repeat the same to create Lookup fields for:
    - Appointment → Doctor
    - Appointment → Room
    - Invoice → Patient
    - Payment → Invoice
    - Medical Record → Patient (Master-Detail recommended)






SETUP > OBJECT MANAGER
Doctor
Details
Fields & Relationships
Page Layouts
Lightning Record Pages
Buttons, Links, and Actions
Compact Layouts
Field Sets
Object Limits
Record Types
Related Lookup Filters
Search Layouts
List View Button Layout
Restriction Rules
Fields & Relationships
11 Items, Sorted by Field Label
Quick Find
New
Deleted Fields
Field Dependencies
Set History Tracking
FIELD LABEL
FIELD NAME
DATA TYPE
CONTROLLING FIELD
INDEXED
Available
Available__c
Checkbox
Created By
CreatedById
Lookup(User)
Department
Department__c
Lookup(Department)
Doctor Name
Name
Text(80)
Email
Email__c
Email
Last Modified By
LastModifiedById
Lookup(User)
License Number
License_Number__c
Text(40)
Name
Name__c
Text(40)
Owner
OwnerId
Lookup(User,Group)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Field Dependencies
Set History Tracking
FIELD LABEL
FIELD NAME
DATA TYPE
CONTROLLING FIELD
INDEXED
Active
Active__c
Checkbox
Address
Address__c
Long Text Area(256)
Allergies
Allergies__c
Long Text Area(256)
Blood Type
Blood_Type__c
Picklist
Created By
CreatedById
Lookup(User)
Date of Birth
Date_of_Birth__c
Date
Email
Email__c
Email
First name
First_name__c
Text(40)
Gender
Gender__c
Picklist

Task 5: VALIDATION RULE

Validation Rules in Salesforce are used to maintain data quality. They are executed when a user attempts to save a record. If the entered data does not meet the defined criteria, Salesforce displays an error message and prevents the record from being saved until the issue is corrected.

This ensures that records are accurate, consistent, and reliable.

Example 1: Validation Rule for Appointment Object

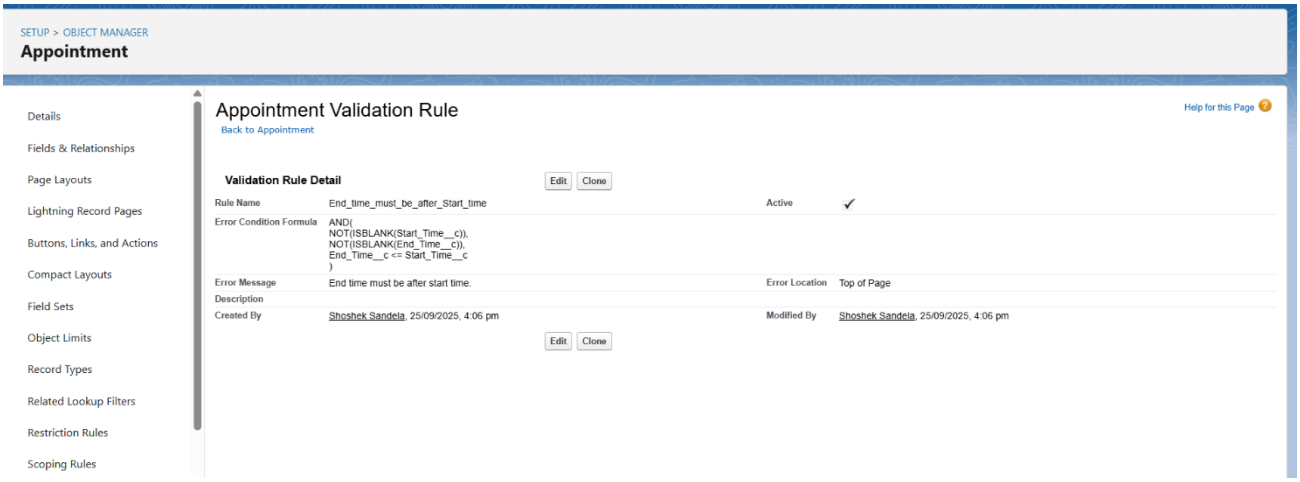
Scenario: Ensure that the appointment **end time** is always after the **start time**.

Steps:

1. Go to **Setup** >> click on **Object Manager**.
2. Select **Appointment** object >> click on **Validation Rules**.
3. Click **New**.
4. Enter Rule Name: **Appointment_EndTime_Check**.
5. Enter the Error Condition Formula:

```
AND(
  NOT(ISBLANK(Start_Time__c)),
  NOT(ISBLANK(End_Time__c)),
  End_Time__c <= Start_Time__c
)
```

6. EnterErrorMessage:
   “End Time must be later than Start Time.”
7. Error Location: Field → select **End Time**.
8. Click **Save**.



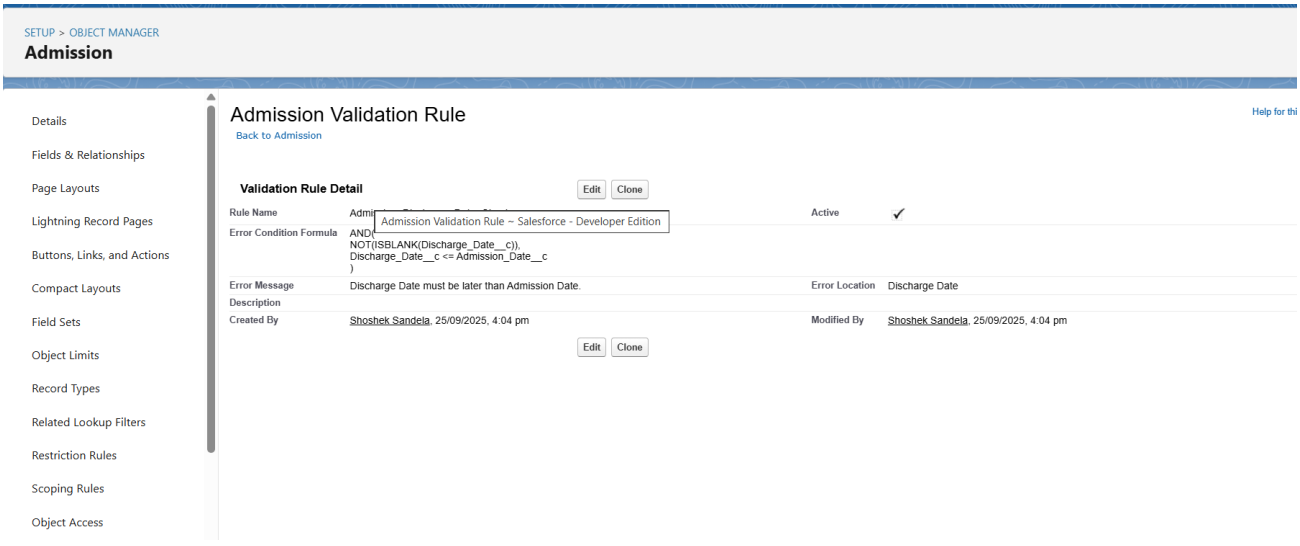
Example 2: Validation Rule for Admission Object

Scenario: Ensure that the **Discharge Date** is always after the **Admission Date**.

Formula:

```
AND(
  NOT(ISBLANK(Discharge_Date__c)),
  Discharge_Date__c <= Admission_Date__c
)
```

Error Message: *"Discharge Date must be after Admission Date."*



Example 3: Validation Rule for Patient Object

Scenario: Ensure that the **Date of Birth** is not in the future.

Formula:

Date_of_Birth__c > TODAY()

Error Message: *"Date of Birth cannot be in the future."*

Task 6: DUPLICATE RULE

In Salesforce, **Duplicate Rules** prevent the creation of duplicate records by comparing data across specified fields. They work together with **Matching Rules** to identify records that share the same values. This ensures data quality and avoids redundancy in the system.

Example: Creating a Matching Rule for the Patient Object

Steps:

1. Go to **Setup** >> in the **Quick Find box**, search for **Matching Rules**.
2. Click on **Matching Rules** >> click on **New Rule**.
3. Select the object as **Patient** >> click **Next**.
4. Enter:
    - **Rule Name**: Matching Patient Details
    - **Unique Name**: auto-populated
5. Define the matching criteria:
    - **Field 1**: Email → Matching Method: **Exact**
    - **Field 2**: Phone → Matching Method: **Exact**
6. Click **Save**.
7. After saving, click **Activate**.

Example: Creating a Duplicate Rule for the Patient Object

1. In **Setup**, search for **Duplicate Rules** in the Quick Find box.
2. Click on **Duplicate Rules** >> **New Rule**.
3. Select **Object**: Patient.
4. Enter:
    - **Rule Name**: Patient Duplicate Rule
    - **Unique Name**: auto-populated
5. Under **Matching Rule**, select the one you created earlier (*Matching Patient Details*).
6. Define the action when a duplicate is found:
    - **Block**: Prevent users from saving the record.
    - **Allow**: Allow saving but alert the user with a warning.
      (Recommended: Block for strict hospital data accuracy).
7. Click **Save** and then **Activate**.

Task 7: EMAIL TEMPLATES

In Salesforce, **Email Templates** are predefined formats that allow sending professional and consistent emails quickly. They can include **merge fields** to pull dynamic data (like patient name, appointment date, or invoice number) from Salesforce records.

Types of email templates in Salesforce:

1. **Text** – Simple plain text emails.
2. **HTML (with Letterhead)** – Branded emails with letterhead.
3. **Custom HTML** – Fully customizable HTML templates.
4. **Lightning Email Templates** – Modern version, supports rich text, merge fields, and dynamic content.

Steps to Create an Email Template

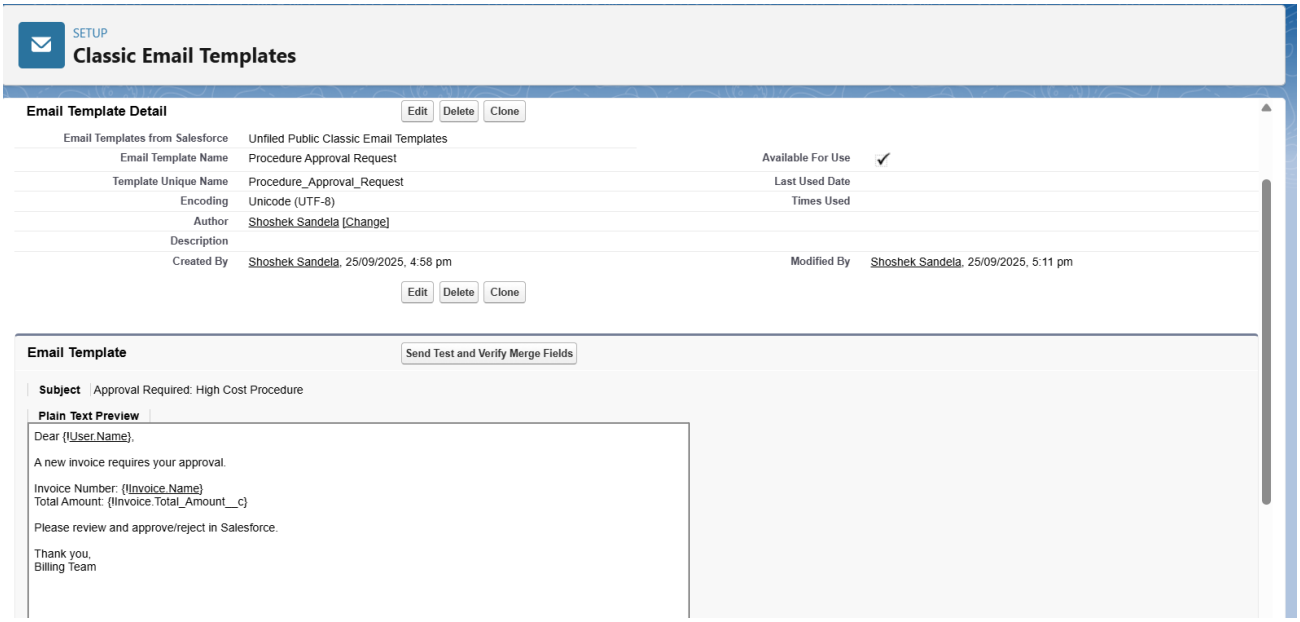
1. Go to **Setup** >> In the **Quick Find Box**, type **Email Templates**.
2. Click on **Email Templates** >> **New Template**.
3. Choose the type (e.g., **Text** or **Lightning Email Template**).
4. Fill in details:
    - **Template Name**
    - **Subject Line** (you can insert merge fields here too)
    - **Email Body** (write your content and use merge fields for dynamic values).
5. Click **Save**.
6. Mark the template as **Available for Use**.

Example 1: Appointment Reminder

- **Template Name:** Appointment_Reminder
- **Subject:** Reminder: Your Appointment on {!Appointment__c.Start_Time__c}
- **Body:**
- Dear {!Appointment__c.Patient__r.Name},
-
- This is a reminder for your appointment scheduled on {!Appointment__c.Start_Time__c} with Dr. {!Appointment__c.Doctor__r.Name}.
- Location: {!Appointment__c.Room__r.Room_Number}

- If you need to reschedule, please contact us.
- Regards,

Hospital Admin



Task 8: USERS

A **User** in Salesforce is anyone who can log in to the system. Users are hospital staff such as **administrators, doctors, receptionists, billing managers, pharmacy staff, and lab technicians** who need access to records. Every user in Salesforce has a **user account**, which defines:

- The user's identity.
- Login details.
- Role in the organization.
- Features and records they can access (based on Profiles, Roles, and Permission Sets).

This ensures **secure and role-based access** to sensitive hospital data.

Steps to Create a New User

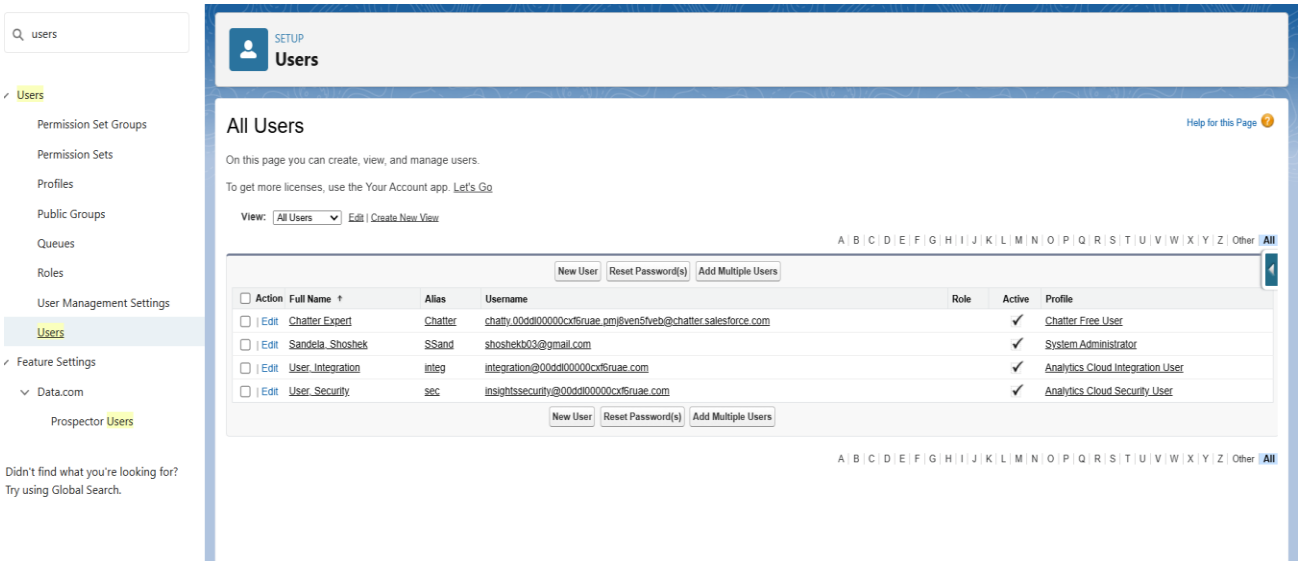
1. Go to **Setup**.
2. In the **Quick Find Box**, type **Users** >> select **Users**.
3. Click on **New User**.
4. Fill in the required fields:
    - **First Name**: Niklaus
    - **Last Name**: Mikaelson
    - **Alias**: e.g., NMIKA
    - **Email**: your personal email (used for login verification and notifications).
    - **Username**: must be in the format text@text.text (e.g., niklaus.mikaelson@hospitalcrm.com).
    - **Nickname**: e.g., NikMik
    - **Role**: Manager (decides hierarchy and data visibility).
    - **User License**: Salesforce (provides CRM features).
    - **Profile**: Manager (defines access permissions).
5. Click **Save**.

Example Hospital Users

You can create users for different roles in the hospital:

- **System Administrator** – Full access (for IT/admin staff).
- **Doctor** – Can view their patients, appointments, and medical records.

- **Receptionist** – Can create and manage appointments.
- **Billing Manager** – Can create invoices, manage payments, and approvals.
- **Pharmacy Staff** – Can view prescriptions and manage medicine availability.
- **Lab Technician** – Can view and update lab test results.



Task 9: Reporting, Dashboards & Security Review

Goal: The purpose of this phase is to **monitor hospital KPIs (Key Performance Indicators)** and ensure **data security and compliance** with healthcare standards. Accurate reports and dashboards help management make data-driven decisions, while security controls protect sensitive patient information.

Reports

Reports in Salesforce provide detailed insights into hospital operations. Some key reports include:

- **Doctor Utilization Report** – Tracks the number of appointments handled by each doctor.
- **Department-wise Revenue Report** – Shows earnings across different departments (Cardiology, Pediatrics, Surgery, etc.).
- **Patient Visit History Report** – Provides a complete record of visits and treatments for each patient.
- **Unpaid Bills Report** – Identifies invoices that are overdue or pending payment.

Dashboards

Dashboards visually summarize the reports and display them in real-time. Example dashboards include:

- **Admin Dashboard (Revenue Overview)** – Gives management a view of hospital earnings and unpaid amounts.
- **Doctor Dashboard (Appointments)** – Shows upcoming appointments, completed consultations, and cancellations for each doctor.
- **Billing Dashboard (Payments Collected)** – Tracks daily, weekly, and monthly payments received by the hospital.

Dynamic Dashboards

Dynamic dashboards are configured so that users see only the data relevant to them:

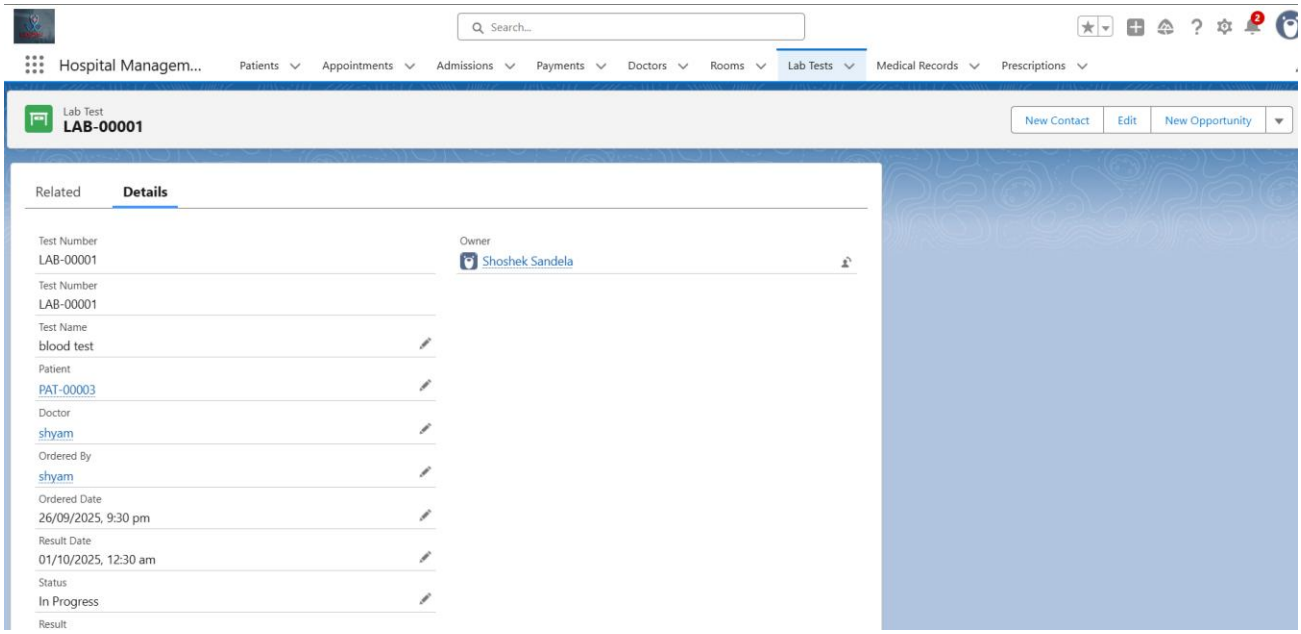
- Doctors see **only their appointments and patients**.
- Billing staff see **only financial transactions**.
- Admins see **all hospital-wide reports**.

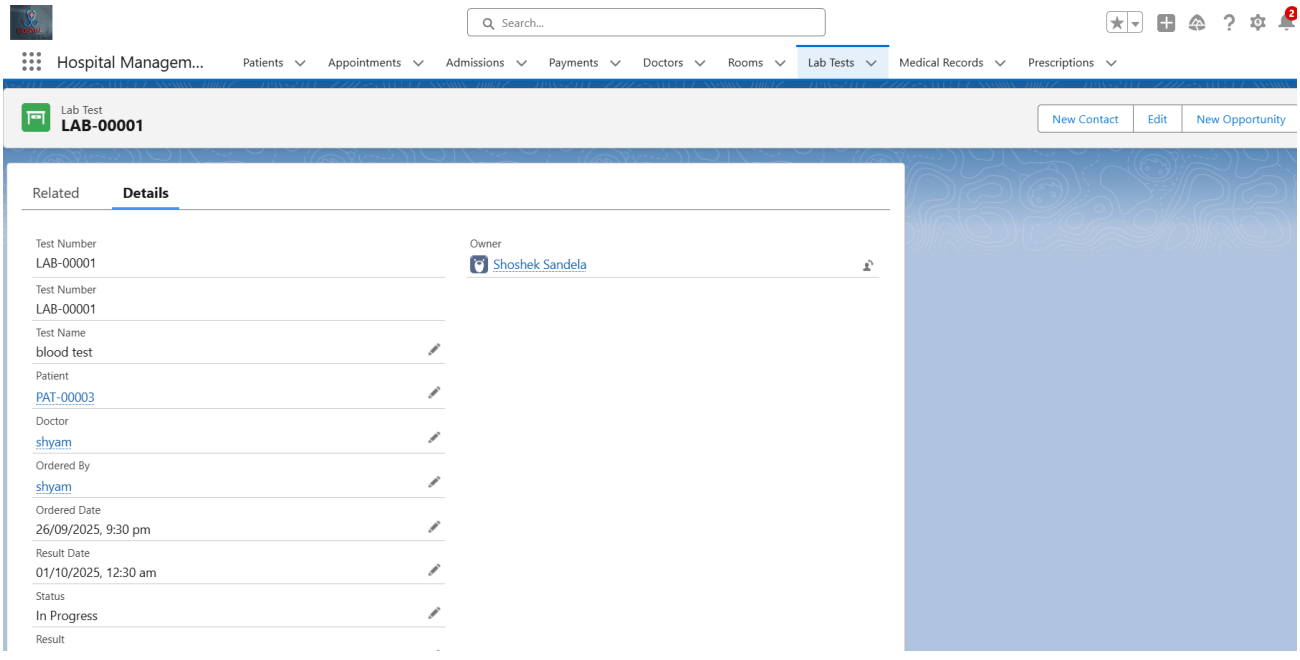
Security Review

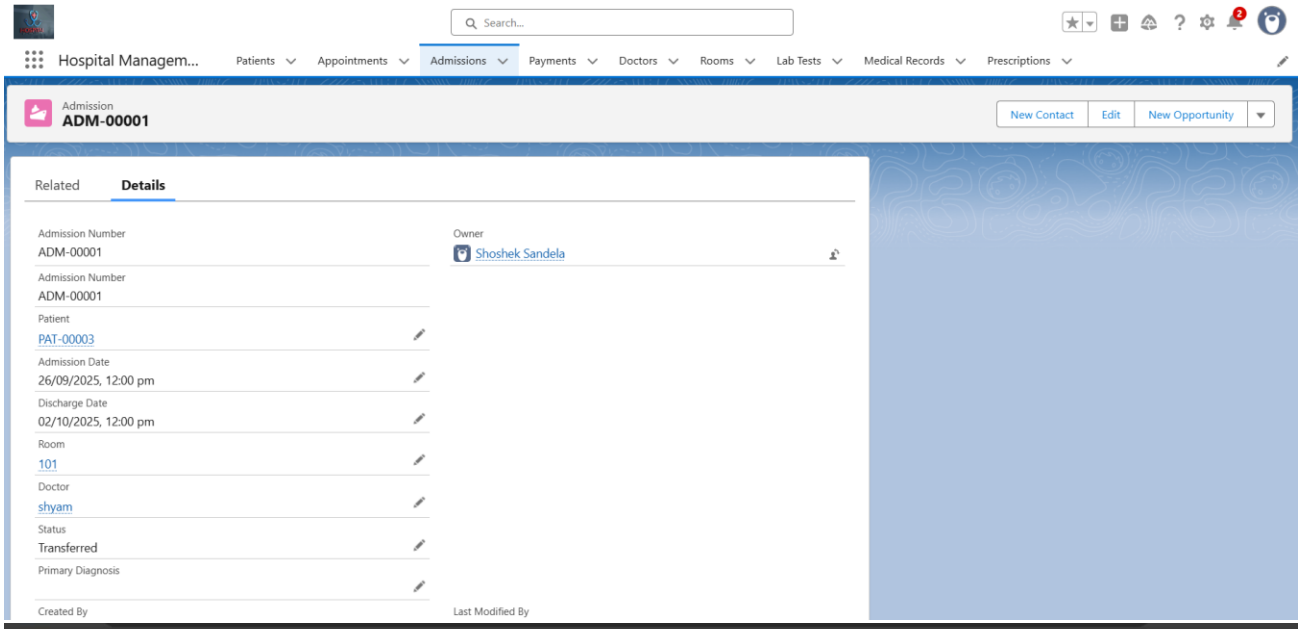
Protecting sensitive healthcare data is critical. Salesforce provides security controls to enforce this:

- **Field-Level Security** – Hide confidential fields (e.g., *Medical History*) from unauthorized users like receptionists.
- **Role-Based Access Control** – Ensure doctors can access only their patients' data.

- **HIPAA/GDPR Compliance** – Safeguard patient data according to healthcare privacy regulations.
- **Audit Trail** – Track all changes made to sensitive fields such as diagnosis, prescriptions, and lab results.



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Appointments
Admissions
Payments
Doctors
Rooms
Lab Tests
Medical Records
Prescriptions
Admission
ADM-00001
New Contact
Edit
New Opportunity
Related
Details
Admission Number
ADM-00001
Owner
Shoshek Sandela
Admission Number
ADM-00001
Patient
PAT-00003
Admission Date
26/09/2025, 12:00 pm
Discharge Date
02/10/2025, 12:00 pm
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Doctor
shyam
Status
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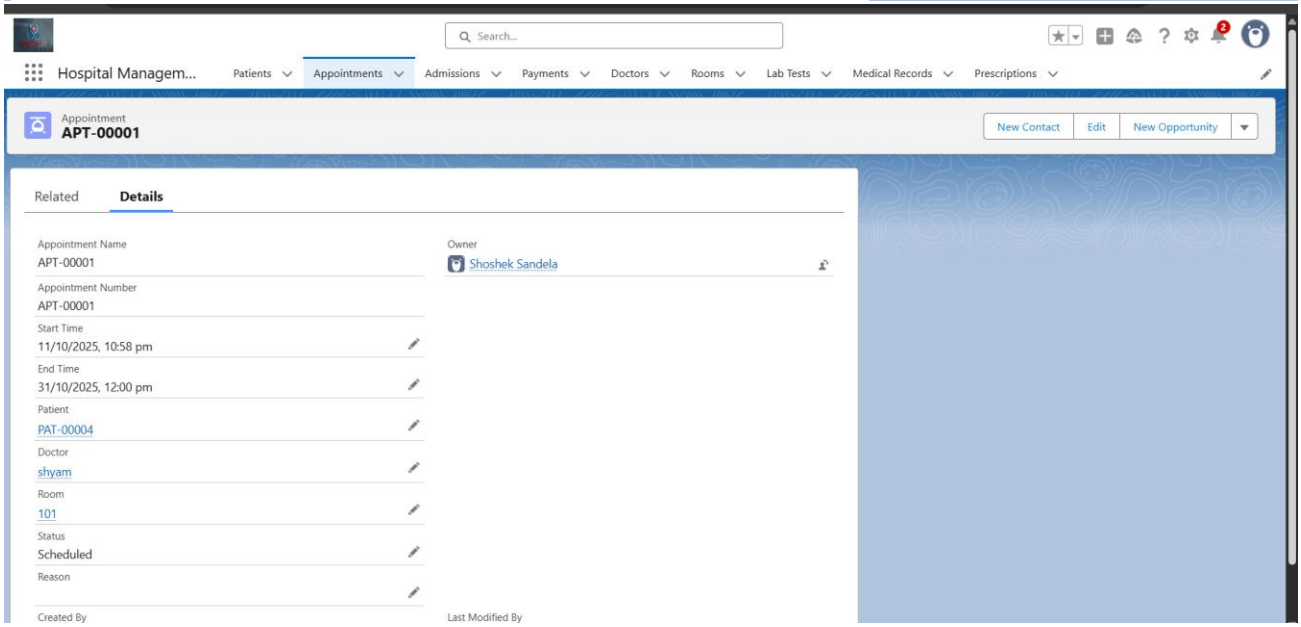
Primary Diagnosis
Created By
Last Modified By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Medical Records
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New Contact
Edit
New Opportunity
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Shoshek Sandela
Appointment Number
APT-00001
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End Time
31/10/2025, 12:00 pm
Patient
PAT-00004
Doctor
shyam
Room
101
Status
Scheduled
Reason
Created By
Last Modified By

THANK YOU