



HOSPITAL MANAGEMENT SYSTEM

INTERNET APPLICATION DEVELOPMENT

SUBMITTED TO
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ABSTRACT

The Hospital Management System (HMS) is a comprehensive, role-based web application designed to streamline administrative, clinical, and operational processes within a healthcare facility. Developed using ASP.NET Web Forms (VB.NET) with a SQL Server backend, the system ensures efficient management of core hospital functions such as patient records, doctor scheduling, room assignments, tests, admissions, and billing operations.

This project specifically highlights the Doctor Dashboard module, which serves as a personalized interface for medical professionals within the system. Upon secure login, authenticated doctors can access a real-time overview of their upcoming and past appointments, including relevant details such as patient names, scheduled times, room numbers, and appointment statuses. Data is dynamically retrieved from a normalized relational database schema using role-specific queries, ensuring data privacy and access control.

By integrating the Doctor Dashboard, the HMS enhances physician productivity, reduces administrative overhead, and promotes patient-centric care. The modular design ensures scalability, allowing seamless extension to include additional features such as test result access, patient history summaries, and feedback integration in future iterations.

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1. INTRODUCTION

The modern healthcare environment demands a high degree of coordination, transparency, and efficiency to meet the growing needs of patients and healthcare providers. Traditional paper-based systems are not only inefficient but also prone to errors, delays, and data redundancy. To address these challenges, digital healthcare systems have emerged as a robust solution for streamlining hospital operations and improving service delivery.

The Hospital Management System (HMS) is a web-based application designed to digitize the management of hospital activities including patient registration, appointment scheduling, staff allocation, room management, billing, and reporting. Built using ASP.NET Web Forms (VB.NET) with a SQL Server backend, the system ensures role-based access, data integrity, and operational efficiency across multiple departments.

One of the essential components of this system is the Doctor Dashboard, which provides physicians with a centralized interface to view and manage their appointments. This module enables doctors to stay informed about their daily schedules, patient assignments, and consultation logistics, thereby enhancing clinical workflow and patient satisfaction.

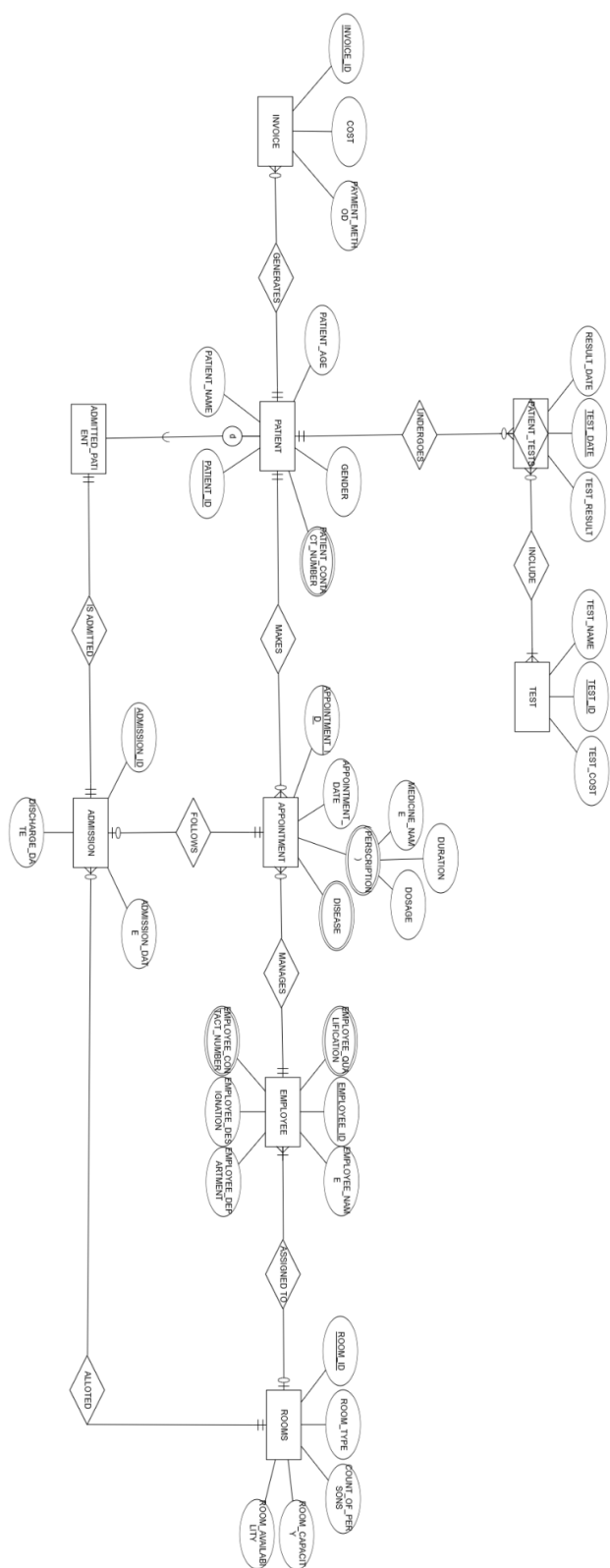
1.1 PROBLEM STATEMENT

Many hospitals still rely on manual processes for managing doctor schedules and patient appointments, leading to delays, miscommunication, and inefficiencies. Doctors often lack real-time access to their appointments, which hampers their ability to deliver timely and organized care. There is a need for a centralized digital system that enables doctors to efficiently manage and view their appointments with up-to-date information.

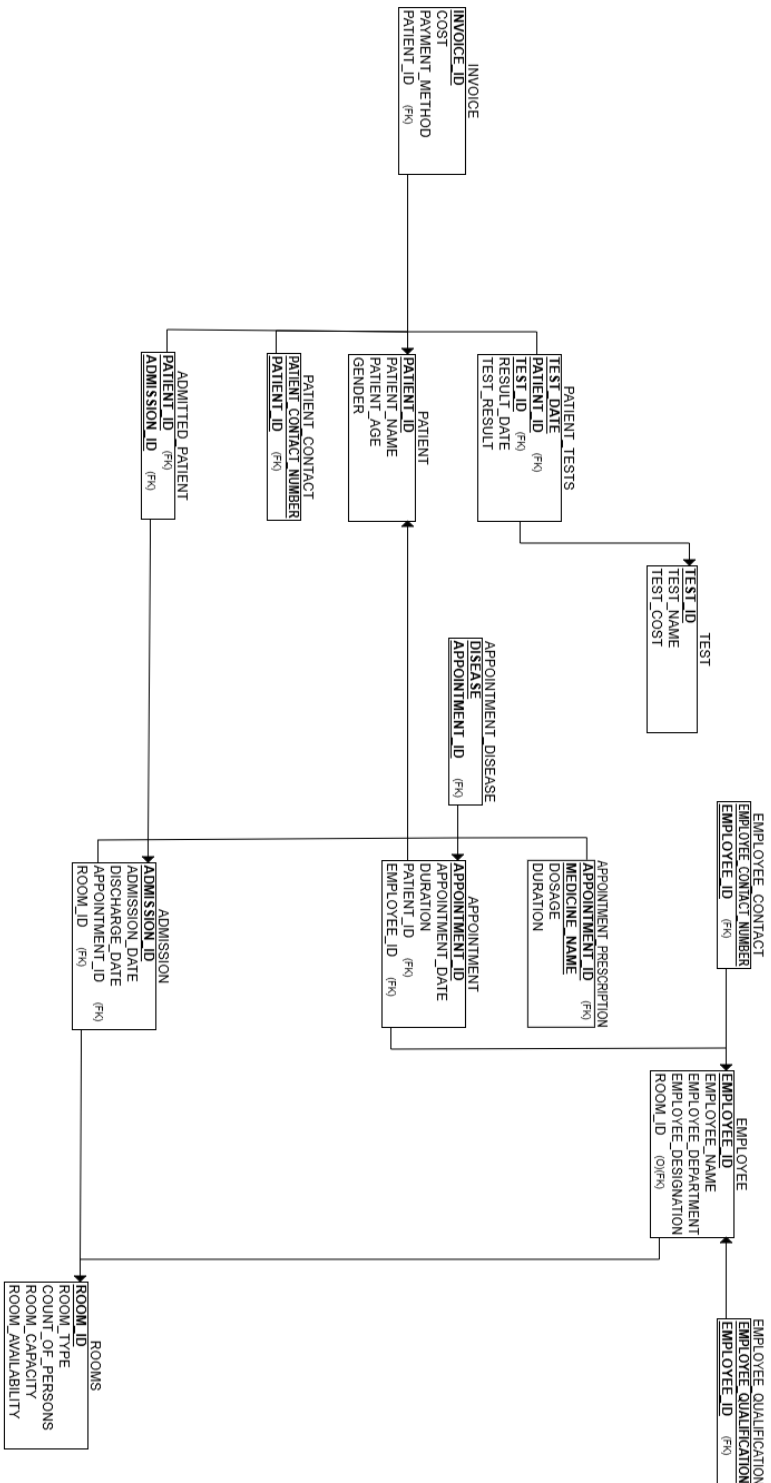
1.2 PROJECT SCOPE

This project focuses on developing a web-based Hospital Management System (HMS) with a key feature: the Doctor Dashboard. Using ASP.NET Web Forms and SQL Server, the system allows authenticated doctors to view their personalized appointment data, including patient details, timing, room assignments, and statuses. The system is designed to be secure, role-based, and scalable for future enhancements like test tracking and digital prescriptions.

2. COMPLETE ENTITY RELATIONSHIP DIAGRAM



3. RELATIONAL MODEL



4. NORMALIZATION

In this project, the database design adheres to the principles of **Third Normal Form (3NF)**. As all entities and relationships have been structured to comply with 3NF, further normalization is not required. Each table is free of partial and transitive dependencies, ensuring that:

1. All attributes depend solely on the **primary key** (no partial dependency).
2. There are no transitive dependencies where non-prime attributes depend on other non-prime attributes.

By achieving 3NF, the schema ensures minimal redundancy, improved data integrity, and optimal design for efficient querying and maintenance.

5. SQL IMPLEMENTATION

```
-- DROP TABLES

IF OBJECT_ID('INVOICE', 'U') IS NOT NULL DROP TABLE INVOICE;
IF OBJECT_ID('PATIENT_TESTS', 'U') IS NOT NULL DROP TABLE PATIENT_TESTS;
IF OBJECT_ID('TEST', 'U') IS NOT NULL DROP TABLE TEST;
IF OBJECT_ID('ADMITTED_PATIENT', 'U') IS NOT NULL DROP TABLE ADMITTED_PATIENT;
IF OBJECT_ID('ADMISSION', 'U') IS NOT NULL DROP TABLE ADMISSION;
IF OBJECT_ID('APPOINTMENT_PERScription', 'U') IS NOT NULL DROP TABLE
APPOINTMENT_PERScription;
IF OBJECT_ID('APPOINTMENT_DISEASE', 'U') IS NOT NULL DROP TABLE
APPOINTMENT_DISEASE;
IF OBJECT_ID('APPOINTMENT', 'U') IS NOT NULL DROP TABLE APPOINTMENT;
IF OBJECT_ID('PATIENT_CONTACT', 'U') IS NOT NULL DROP TABLE PATIENT_CONTACT;
IF OBJECT_ID('PATIENT', 'U') IS NOT NULL DROP TABLE PATIENT;
IF OBJECT_ID('EMPLOYEE_QUALIFICATION', 'U') IS NOT NULL DROP TABLE
EMPLOYEE_QUALIFICATION;
IF OBJECT_ID('EMPLOYEE_CONTACT', 'U') IS NOT NULL DROP TABLE EMPLOYEE_CONTACT;
```

```
IF OBJECT_ID('EMPLOYEE', 'U') IS NOT NULL DROP TABLE EMPLOYEE;
```

```
IF OBJECT_ID('ROOMS', 'U') IS NOT NULL DROP TABLE ROOMS;
```

```
IF OBJECT_ID('USERS', 'U') IS NOT NULL DROP TABLE USERS;
```

```
-- DROP ROLES
```

```
IF EXISTS (SELECT * FROM sys.database_principals WHERE name = 'PATIENT_ROLE') DROP  
ROLE PATIENT_ROLE;
```

```
IF EXISTS (SELECT * FROM sys.database_principals WHERE name = 'RECEPTIONIST') DROP  
ROLE RECEPTIONIST;
```

```
IF EXISTS (SELECT * FROM sys.database_principals WHERE name = 'DOCTOR') DROP ROLE  
DOCTOR;
```

```
IF EXISTS (SELECT * FROM sys.database_principals WHERE name = 'LAB_TECHNICIAN') DROP  
ROLE LAB_TECHNICIAN;
```

```
--DROP VIEWS
```

```
IF OBJECT_ID('DOCTOR_VIEW', 'V') IS NOT NULL DROP VIEW DOCTOR_VIEW;
```

```
IF OBJECT_ID('PATIENT_VIEW', 'V') IS NOT NULL DROP VIEW PATIENT_VIEW;
```

```
IF OBJECT_ID('EMPLOYEE_VIEW', 'V') IS NOT NULL DROP VIEW EMPLOYEE_VIEW;
```

```
IF OBJECT_ID('PATIENT_APPOINTMENT', 'V') IS NOT NULL DROP VIEW  
PATIENT_APPOINTMENT;
```

```
-- CREATE TABLES
```

```
CREATE TABLE USERS
```

```
(
```

```
    USER_ID INT IDENTITY(1,1) NOT NULL,
```

```
    USERNAME VARCHAR(50) NOT NULL UNIQUE,
```

```
    PASSWORD VARCHAR(100) NOT NULL, -- Will store hashed passwords
```

```
    EMAIL VARCHAR(100) NOT NULL UNIQUE,
```

```
    USER_TYPE VARCHAR(20) NOT NULL, -- 'PATIENT', 'DOCTOR', 'RECEPTIONIST',  
'LAB_TECHNICIAN'
```

```
    RELATED_ID VARCHAR(25), -- Will store PATIENT_ID or EMPLOYEE_ID
```

```
ACCOUNT_CREATED DATETIME DEFAULT GETDATE(),  
LAST_LOGIN DATETIME,  
IS_ACTIVE BIT DEFAULT 1,  
CONSTRAINT USERS_PK PRIMARY KEY (USER_ID)  
);
```

```
CREATE TABLE ROOMS  
(  
    ROOM_ID INT NOT NULL,  
    ROOM_TYPE VARCHAR(15),  
    COUNT_OF_PERSONS INT,  
    ROOM_CAPACITY INT,  
    ROOM_AVAILABILITY VARCHAR(3) CHECK(ROOM_AVAILABILITY IN ('YES', 'NO')),  
    CONSTRAINT ROOMS_PK PRIMARY KEY (ROOM_ID)  
);
```

```
CREATE TABLE TEST  
(  
    TEST_ID INT NOT NULL,  
    TEST_NAME VARCHAR(25),  
    TEST_COST DECIMAL(6,2),  
    CONSTRAINT TEST_PK PRIMARY KEY (TEST_ID)  
);
```

```
CREATE TABLE EMPLOYEE  
(  
    EMPLOYEE_ID VARCHAR(25) NOT NULL,  
    EMPLOYEE_NAME VARCHAR(25),  
    EMPLOYEE_DEPARTMENT VARCHAR(40),
```

```
EMPLOYEE_DESIGNATION VARCHAR(25),  
ROOM_ID INT,  
CONSTRAINT EMPLOYEE_PK PRIMARY KEY (EMPLOYEE_ID),  
CONSTRAINT EMPLOYEE_FK FOREIGN KEY (ROOM_ID) REFERENCES ROOMS(ROOM_ID)  
);
```

```
CREATE TABLE EMPLOYEE_CONTACT  
(  
    EMPLOYEE_ID VARCHAR(25) NOT NULL,  
    EMPLOYEE_CONTACT_NUMBER VARCHAR(15) NOT NULL,  
    CONSTRAINT EMPLOYEE_CONTACT_PK PRIMARY KEY (EMPLOYEE_ID,  
    EMPLOYEE_CONTACT_NUMBER),  
    CONSTRAINT EMPLOYEE_CONTACT_FK FOREIGN KEY (EMPLOYEE_ID) REFERENCES  
    EMPLOYEE(EMPLOYEE_ID)  
);
```

```
CREATE TABLE EMPLOYEE_QUALIFICATION  
(  
    EMPLOYEE_ID VARCHAR(25) NOT NULL,  
    QUALIFICATION VARCHAR(40) NOT NULL,  
    CONSTRAINT EMPLOYEE_QUALIFICATION_PK PRIMARY KEY (EMPLOYEE_ID,  
    QUALIFICATION),  
    CONSTRAINT EMPLOYEE_QUALIFICATION_FK FOREIGN KEY (EMPLOYEE_ID) REFERENCES  
    EMPLOYEE(EMPLOYEE_ID)  
);
```

```
CREATE TABLE PATIENT  
(  
    PATIENT_ID VARCHAR(25) NOT NULL,  
    PATIENT_NAME VARCHAR(25),
```

```
PATIENT_AGE INT,  
GENDER VARCHAR(1) CHECK(GENDER IN ('M', 'F')),  
CONSTRAINT PATIENT_PK PRIMARY KEY (PATIENT_ID)  
);
```

```
CREATE TABLE PATIENT_CONTACT  
(  
    PATIENT_ID VARCHAR(25) NOT NULL,  
    PATIENT_CONTACT_NUMBER VARCHAR(15) NOT NULL,  
    CONSTRAINT PATIENT_CONTACT_PK PRIMARY KEY (PATIENT_ID,  
PATIENT_CONTACT_NUMBER),  
    CONSTRAINT PATIENT_CONTACT_FK FOREIGN KEY (PATIENT_ID) REFERENCES  
PATIENT(PATIENT_ID)  
);
```

```
CREATE TABLE APPOINTMENT  
(  
    APPOINTMENT_ID INT NOT NULL,  
    EMPLOYEE_ID VARCHAR(25),  
    PATIENT_ID VARCHAR(25),  
    APPOINTMENT_DATE DATETIME DEFAULT GETDATE(),  
    CONSTRAINT APPOINTMENT_PK PRIMARY KEY (APPOINTMENT_ID),  
    CONSTRAINT APPOINTMENT_FK1 FOREIGN KEY (EMPLOYEE_ID) REFERENCES  
EMPLOYEE(EMPLOYEE_ID),  
    CONSTRAINT APPOINTMENT_FK2 FOREIGN KEY (PATIENT_ID) REFERENCES  
PATIENT(PATIENT_ID)  
);
```

```
CREATE TABLE APPOINTMENT_DISEASE  
(
```

```
APPOINTMENT_ID INT NOT NULL,  
DISEASE VARCHAR(25) NOT NULL,  
CONSTRAINT APPOINTMENT_DISEASE_PK PRIMARY KEY (APPOINTMENT_ID, DISEASE),  
CONSTRAINT APPOINTMENT_DISEASE_FK FOREIGN KEY (APPOINTMENT_ID) REFERENCES  
APPOINTMENT(APPOINTMENT_ID)  
);
```

```
CREATE TABLE APPOINTMENT_PERScription  
(  
    APPOINTMENT_ID INT NOT NULL,  
    MEDICINE_NAME VARCHAR(25) NOT NULL,  
    DOSAGE VARCHAR(40),  
    DURATION VARCHAR(25),  
    CONSTRAINT APPOINTMENT_PERScription_PK PRIMARY KEY (APPOINTMENT_ID,  
    MEDICINE_NAME),  
    CONSTRAINT APPOINTMENT_PERScription_FK FOREIGN KEY (APPOINTMENT_ID)  
    REFERENCES APPOINTMENT(APPOINTMENT_ID)  
);
```

```
CREATE TABLE ADMISSION  
(  
    ADMISSION_ID INT NOT NULL,  
    APPOINTMENT_ID INT,  
    ROOM_ID INT,  
    ADMISSION_DATE DATETIME DEFAULT GETDATE(),  
    DISCHARGE_DATE DATETIME,  
    CONSTRAINT ADMISSION_PK PRIMARY KEY (ADMISSION_ID),  
    CONSTRAINT ADMISSION_FK1 FOREIGN KEY (APPOINTMENT_ID) REFERENCES  
    APPOINTMENT(APPOINTMENT_ID),  
    CONSTRAINT ADMISSION_FK2 FOREIGN KEY (ROOM_ID) REFERENCES ROOMS(ROOM_ID)
```

```
);
```

```
CREATE TABLE ADMITTED_PATIENT
```

```
(
```

```
    PATIENT_ID VARCHAR(25) NOT NULL,
```

```
    ADMISSION_ID INT NOT NULL,
```

```
    CONSTRAINT ADMITTED_PATIENT_PK PRIMARY KEY (PATIENT_ID, ADMISSION_ID),
```

```
    CONSTRAINT ADMITTED_PATIENT_FK1 FOREIGN KEY (PATIENT_ID) REFERENCES  
PATIENT(PATIENT_ID),
```

```
    CONSTRAINT ADMITTED_PATIENT_FK2 FOREIGN KEY (ADMISSION_ID) REFERENCES  
ADMISSION(ADMISSION_ID)
```

```
);
```

```
CREATE TABLE PATIENT_TESTS
```

```
(
```

```
    PATIENT_ID VARCHAR(25) NOT NULL,
```

```
    TEST_ID INT NOT NULL,
```

```
    TEST_DATE DATETIME DEFAULT GETDATE() NOT NULL,
```

```
    RESULT_DATE DATETIME,
```

```
    TEST_RESULT VARCHAR(15),
```

```
    CONSTRAINT PATIENT_TESTS_PK PRIMARY KEY (PATIENT_ID, TEST_ID, TEST_DATE),
```

```
    CONSTRAINT PATIENT_TESTS_FK1 FOREIGN KEY (PATIENT_ID) REFERENCES  
PATIENT(PATIENT_ID),
```

```
    CONSTRAINT PATIENT_TESTS_FK2 FOREIGN KEY (TEST_ID) REFERENCES TEST(TEST_ID)
```

```
);
```

```
CREATE TABLE INVOICE
```

```
(
```

```
    INVOICE_ID INT NOT NULL,
```

```
    PATIENT_ID VARCHAR(25),
```

```
COST DECIMAL(10,2),  
PAYMENT_METHOD VARCHAR(25),  
CONSTRAINT INVOICE_PK PRIMARY KEY (INVOICE_ID),  
CONSTRAINT INVOICE_FK FOREIGN KEY (PATIENT_ID) REFERENCES PATIENT(PATIENT_ID)  
);
```

```
-- CREATE VIEWS (Separate each CREATE VIEW into a new batch with GO)
```

```
GO
```

```
CREATE VIEW DOCTOR_VIEW AS  
SELECT E.EMPLOYEE_NAME, E.EMPLOYEE_DEPARTMENT, E.EMPLOYEE_DESIGNATION,  
Q.QUALIFICATION, E.ROOM_ID  
FROM EMPLOYEE E  
JOIN EMPLOYEE_QUALIFICATION Q ON E.EMPLOYEE_ID = Q.EMPLOYEE_ID  
WHERE E.EMPLOYEE_NAME LIKE 'Dr%';
```

```
GO
```

```
CREATE VIEW PATIENT_VIEW AS  
SELECT P.PATIENT_ID, P.PATIENT_NAME, P.PATIENT_AGE, P.GENDER,  
C.PATIENT_CONTACT_NUMBER  
FROM PATIENT P  
JOIN PATIENT_CONTACT C ON P.PATIENT_ID = C.PATIENT_ID;
```

```
GO
```

```
CREATE VIEW EMPLOYEE_VIEW AS  
SELECT E.EMPLOYEE_NAME, E.EMPLOYEE_DEPARTMENT, E.EMPLOYEE_DESIGNATION,  
Q.QUALIFICATION, C.EMPLOYEE_CONTACT_NUMBER, E.ROOM_ID
```

```
FROM EMPLOYEE E
```

```
JOIN EMPLOYEE_CONTACT C ON E.EMPLOYEE_ID = C.EMPLOYEE_ID
```

```
JOIN EMPLOYEE_QUALIFICATION Q ON E.EMPLOYEE_ID = Q.EMPLOYEE_ID;
```

```
GO
```

```
CREATE VIEW PATIENT_APPOINTMENT AS
```

```
SELECT A.PATIENT_ID, A.APPOINTMENT_DATE, D.DISEASE, P.MEDICINE_NAME, P.DOSAGE,  
P.DURATION
```

```
FROM APPOINTMENT A
```

```
JOIN APPOINTMENT_DISEASE D ON A.APPOINTMENT_ID = D.APPOINTMENT_ID
```

```
JOIN APPOINTMENT_PERScription P ON A.APPOINTMENT_ID = P.APPOINTMENT_ID;
```

```
GO
```

```
-- CREATE ROLES AND PRIVILEGES (This part stays as is)
```

```
CREATE ROLE PATIENT_ROLE;
```

```
GRANT SELECT, INSERT, UPDATE (PATIENT_NAME, PATIENT_AGE, GENDER,  
PATIENT_CONTACT_NUMBER) ON PATIENT_VIEW TO PATIENT_ROLE;
```

```
GRANT SELECT ON TEST TO PATIENT_ROLE;
```

```
GRANT SELECT ON DOCTOR_VIEW TO PATIENT_ROLE;
```

```
GO
```

```
CREATE ROLE RECEPTIONIST;
```

```
GRANT INSERT, SELECT, UPDATE ON PATIENT TO RECEPTIONIST;
```

```
GRANT SELECT ON EMPLOYEE_VIEW TO RECEPTIONIST;
```

```
GRANT SELECT ON ROOMS TO RECEPTIONIST;
```

```
GRANT SELECT, INSERT, UPDATE, DELETE ON APPOINTMENT TO RECEPTIONIST;
```

```
GRANT SELECT ON TEST TO RECEPTIONIST;
```

```
GRANT INSERT, SELECT, UPDATE ON ADMISSION TO RECEPTIONIST;
```

```
GRANT INSERT, SELECT, UPDATE ON INVOICE TO RECEPTIONIST;
```

```
GO
```

```
CREATE ROLE DOCTOR;
```

```
GRANT SELECT, INSERT, UPDATE ON PATIENT_APPOINTMENT TO DOCTOR;
```

```
GO
```

```
CREATE ROLE LAB_TECHNICIAN;
```

```
GRANT SELECT, INSERT, UPDATE ON PATIENT_TESTS TO LAB_TECHNICIAN;
```

```
GRANT SELECT ON TEST TO LAB_TECHNICIAN;
```

```
GO
```

```
CREATE TRIGGER TRG_ADMISSION_INSERTION
```

```
ON ADMISSION
```

```
AFTER INSERT
```

```
AS
```

```
BEGIN
```

```
    SET NOCOUNT ON;
```

```
    INSERT INTO ADMITTED_PATIENT (PATIENT_ID, ADMISSION_ID)
```

```
    SELECT A.PATIENT_ID, I.ADMISSION_ID
```

```
    FROM inserted I
```

```
    JOIN APPOINTMENT A ON A.APPOINTMENT_ID = I.APPOINTMENT_ID;
```

```
END;
```

GO

CREATE TRIGGER TRG_CHECK_EMPLOYEE_DOCTOR

ON APPOINTMENT

INSTEAD OF INSERT

AS

BEGIN

SET NOCOUNT ON;

IF EXISTS (

SELECT 1

FROM inserted I

JOIN EMPLOYEE E ON I.EMPLOYEE_ID = E.EMPLOYEE_ID

WHERE E.EMPLOYEE_NAME NOT LIKE 'Dr.%'

)

BEGIN

RAISERROR('Employee must be a doctor (name starts with "Dr.")', 16, 1);

ROLLBACK TRANSACTION;

RETURN;

END

-- If all pass, insert rows

INSERT INTO APPOINTMENT (APPOINTMENT_ID, EMPLOYEE_ID, PATIENT_ID,
APPOINTMENT_DATE)

SELECT APPOINTMENT_ID, EMPLOYEE_ID, PATIENT_ID, APPOINTMENT_DATE

FROM inserted;

END;

GO

```
CREATE TRIGGER TRG_ROOMS_ADMISSION_UPDATE
ON ADMISSION
AFTER INSERT, DELETE
AS
BEGIN
    SET NOCOUNT ON;

    -- Handle Inserts
    IF EXISTS (SELECT * FROM inserted)
    BEGIN
        UPDATE R
        SET COUNT_OF_PERSONS = COUNT_OF_PERSONS + 1
        FROM ROOMS R
        JOIN inserted I ON R.ROOM_ID = I.ROOM_ID
        WHERE COUNT_OF_PERSONS < ROOM_CAPACITY;

        -- Check if any room capacity exceeded
        IF EXISTS (
            SELECT 1
            FROM inserted I
            JOIN ROOMS R ON I.ROOM_ID = R.ROOM_ID
            WHERE R.COUNT_OF_PERSONS >= R.ROOM_CAPACITY
        )
        BEGIN
            RAISERROR('Cannot insert: Room capacity has been reached.', 16, 1);
            ROLLBACK TRANSACTION;
            RETURN;
        END
    END
END
```

```

-- Handle Deletes
IF EXISTS (SELECT * FROM deleted)
BEGIN
    UPDATE R
        SET COUNT_OF_PERSONS = CASE WHEN COUNT_OF_PERSONS > 0 THEN
COUNT_OF_PERSONS - 1 ELSE 0 END
    FROM ROOMS R
    JOIN deleted D ON R.ROOM_ID = D.ROOM_ID;

    -- Check for invalid negative count
    IF EXISTS (
        SELECT 1
        FROM ROOMS
        WHERE COUNT_OF_PERSONS < 0
    )
    BEGIN
        RAISERROR('Cannot delete: No persons in the room.', 16, 1);
        ROLLBACK TRANSACTION;
        RETURN;
    END
END
END;
GO

CREATE TRIGGER TRG_ROOMS_EMPLOYEE_UPDATE
ON EMPLOYEE
AFTER INSERT, DELETE
AS

```

```
BEGIN

    SET NOCOUNT ON;

    -- Handle Inserts
    IF EXISTS (SELECT * FROM inserted)
    BEGIN
        UPDATE R
        SET COUNT_OF_PERSONS = COUNT_OF_PERSONS + 1
        FROM ROOMS R
        JOIN inserted I ON R.ROOM_ID = I.ROOM_ID
        WHERE COUNT_OF_PERSONS < ROOM_CAPACITY;

        IF EXISTS (
            SELECT 1
            FROM inserted I
            JOIN ROOMS R ON I.ROOM_ID = R.ROOM_ID
            WHERE R.COUNT_OF_PERSONS >= R.ROOM_CAPACITY
        )
        BEGIN
            RAISERROR('Cannot insert: Room capacity has been reached.', 16, 1);
            ROLLBACK TRANSACTION;
            RETURN;
        END
    END

    -- Handle Deletes
    IF EXISTS (SELECT * FROM deleted)
    BEGIN
        UPDATE R
```

```
        SET COUNT_OF_PERSONS = CASE WHEN COUNT_OF_PERSONS > 0 THEN  
COUNT_OF_PERSONS - 1 ELSE 0 END
```

```
FROM ROOMS R
```

```
JOIN deleted D ON R.ROOM_ID = D.ROOM_ID;
```

```
IF EXISTS (
```

```
    SELECT 1
```

```
    FROM ROOMS
```

```
    WHERE COUNT_OF_PERSONS < 0
```

```
)
```

```
BEGIN
```

```
    RAISERROR('Cannot delete: No persons in the room.', 16, 1);
```

```
    ROLLBACK TRANSACTION;
```

```
    RETURN;
```

```
END
```

```
END
```

```
END;
```

```
GO
```

6. CODE IMPLEMENTATION

6.1.1 Login.aspx

```
<%@ Page Language="VB" AutoEventWireup="true" CodeFile="Login.aspx.vb"
Inherits="Login" %>

<!DOCTYPE html>

<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Hospital Management System - Login</title>
    <link
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/css/bootstrap.min.c
ss" rel="stylesheet" />
    <style>
        body {
            background-color: #f8f9fa;
        }
        .login-container {
            max-width: 450px;
            margin: 100px auto;
            padding: 30px;
            background-color: #fff;
            border-radius: 5px;
            box-shadow: 0 2px 10px rgba(0, 0, 0, 0.1);
        }
        .header {
            text-align: center;
            margin-bottom: 30px;
        }
        .form-group {
            margin-bottom: 20px;
        }
        .btn-login {
            width: 100%;
            background-color: #0d6efd;
            border: none;
            padding: 10px;
            font-size: 16px;
        }
        .alert {
            margin-top: 20px;
        }
        .register-link {
            display: block;
            text-align: center;
            margin-top: 20px;
        }
    </style>
</head>
<body>
    <form id="formLogin" runat="server">
        <div class="container login-container">
            <div class="header">
                <h2>Hospital Management System</h2>
                <h4>Login to Your Account</h4>
            </div>

            <!-- Success message after registration -->
```

```

        <asp:Panel ID="pnlSuccess" runat="server" CssClass="alert alert-
success" Visible="false">
            <asp:Literal ID="litSuccess" runat="server"></asp:Literal>
        </asp:Panel>

        <!-- Error message -->
        <asp:Panel ID="pnlError" runat="server" CssClass="alert alert-
danger" Visible="false">
            <asp:Literal ID="litError" runat="server"></asp:Literal>
        </asp:Panel>

        <div class="form-group">
            <label for="txtUsername" class="form-label">Username or
Email:</label>
            <asp:TextBox ID="txtUsername" runat="server" CssClass="form-
control" placeholder="Enter username or email" />
            <asp:RequiredFieldValidator ID="rfvUsername" runat="server"
ControlToValidate="txtUsername" ErrorMessage="Username or
email is required"
                ForeColor="Red" Display="Dynamic" />
        </div>

        <div class="form-group">
            <label for="txtPassword" class="form-label">Password:</label>
            <asp:TextBox ID="txtPassword" runat="server" CssClass="form-
control" TextMode="Password"
                placeholder="Enter password" />
            <asp:RequiredFieldValidator ID="rfvPassword" runat="server"
ControlToValidate="txtPassword" ErrorMessage="Password is
required"
                ForeColor="Red" Display="Dynamic" />
        </div>

        <div class="form-group form-check">
            <asp:CheckBox ID="chkRememberMe" runat="server" CssClass="form-
check-input" />
            <label for="chkRememberMe" class="form-check-label">Remember
me</label>
        </div>

        <div class="form-group">
            <asp:Button ID="btnLogin" runat="server" Text="Login"
CssClass="btn btn-primary btn-login"
                OnClick="btnLogin_Click" />
        </div>

        <div class="text-center">
            <a href="#" id="forgotPassword">Forgot Password?</a>
            <a href="Signup.aspx" class="register-link">Don't have an
account? Register now</a>
        </div>

    </div>
</form>

    <!-- JavaScript for Bootstrap -->
    <script
src="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/js/bootstrap.bundle.
min.js"></script>
</body>
</html>

```

6.1.2 Login.aspx.vb

```
Imports System.Data
Imports System.Data.SqlClient
Imports System.Configuration
Imports System.Web.Security
Imports System.Text
Imports System.Security.Cryptography

Partial Class Login
    Inherits System.Web.UI.Page

    Protected Sub Page_Load(ByVal sender As Object, ByVal e As System.EventArgs)
Handles Me.Load
        If Not IsPostBack Then
            ' If we were bounced here with a returnUrl (e.g. from
/Admin/Admin_Dashboard.aspx),
            ' clear it so the URL is just /Login.aspx
            If Not String.IsNullOrEmpty(Request.QueryString("ReturnUrl")) Then
                FormsAuthentication.SignOut()
                Session.Clear()
                Response.Redirect("~/Login.aspx", True)
                Return
            End If

            ' Force logout for testing (you can remove once sign-out link is in
place)
            FormsAuthentication.SignOut()
            Session.Clear()

            ' Show any messages
            If Request.QueryString("registered") = "true" Then
                pnlSuccess.Visible = True
                litSuccess.Text = "Registration successful! Please login with
your credentials."
            End If

            If Request.QueryString("timeout") = "true" Then
                pnlError.Visible = True
                litError.Text = "Your session has timed out. Please login
again."
            End If

            ' If somehow still authenticated, send them on
            If User.Identity.IsAuthenticated Then
                RedirectToUserDashboard()
            End If
        End Sub

    Protected Sub btnLogin_Click(ByVal sender As Object, ByVal e As
System.EventArgs)
        If Page.IsValid Then
            Try
                Dim connectionString As String =
ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionStri
ng").ConnectionString
                Dim conn As New SqlConnection(connectionString)
                Dim hashedPassword As String = HashPassword(txtPassword.Text)
                Dim userId As Integer = 0
                Dim userType As String = String.Empty
                Dim relatedId As String = String.Empty
```

```

Dim username As String = String.Empty

' Check if input is username or email
Dim isEmail As Boolean = txtUsername.Text.Contains("@")
Dim query As String

If isEmail Then
    query = "SELECT USER_ID, USERNAME, USER_TYPE, RELATED_ID
FROM USERS WHERE EMAIL = @UserInput AND PASSWORD = @Password AND IS_ACTIVE = 1"
Else
    query = "SELECT USER_ID, USERNAME, USER_TYPE, RELATED_ID
FROM USERS WHERE USERNAME = @UserInput AND PASSWORD = @Password AND IS_ACTIVE = 1"
End If

Using cmd As New SqlCommand(query, conn)
    cmd.Parameters.AddWithValue("@UserInput",
txtUsername.Text.Trim())
    cmd.Parameters.AddWithValue("@Password", hashedPassword)

    conn.Open()
    Dim reader As SqlDataReader = cmd.ExecuteReader()

    If reader.Read() Then
        userId = Convert.ToInt32(reader("USER_ID"))
        username = reader("USERNAME").ToString()
        userType = reader("USER_TYPE").ToString()
        relatedId = reader("RELATED_ID").ToString()

        reader.Close()

        ' Update last login time
        Using cmdUpdate As New SqlCommand("UPDATE USERS SET
LAST_LOGIN = GETDATE() WHERE USER_ID = @UserId", conn)
            cmdUpdate.Parameters.AddWithValue("@UserId", userId)
            cmdUpdate.ExecuteNonQuery()
        End Using

        ' Create authentication ticket
        CreateAuthenticationTicket(userId.ToString(), username,
userType, relatedId, chkRememberMe.Checked)

        ' Redirect to appropriate dashboard based on user type
        RedirectToUserDashboard(userType)
    Else
        pnlError.Visible = True
        litError.Text = "Invalid username or password. Please
try again."
    End If
End Using

conn.Close()

Catch ex As Exception
    pnlError.Visible = True
    litError.Text = "Error: " & ex.Message
End Try
End If
End Sub

' Create Forms Authentication Ticket

```

```

    Private Sub CreateAuthenticationTicket(ByVal userId As String, ByVal
username As String,
                                         ByVal userType As String, ByVal
relatedId As String,
                                         ByVal rememberMe As Boolean)
        ' Create user data string (pipe-separated values)
        Dim userData As String = String.Format("{0}|{1}|{2}", userId, userType,
relatedId)

        ' Set ticket expiration
        Dim expirationTime As DateTime
        If rememberMe Then
            expirationTime = DateTime.Now.AddDays(7) ' Remember for 7 days
        Else
            expirationTime = DateTime.Now.AddMinutes(30) ' Session times out
after 30 minutes
        End If

        Dim authenticationTicket As New FormsAuthenticationTicket(1, username,
DateTime.Now, expirationTime, rememberMe, userData,
FormsAuthentication.FormsCookiePath)

        ' Encrypting the ticket
        Dim encryptedTicket As String =
FormsAuthentication.Encrypt(authenticationTicket)

        ' Creating the cookie
        Dim authCookie As New HttpCookie(FormsAuthentication.FormsCookieName,
encryptedTicket)

        If rememberMe Then
            authCookie.Expires = authenticationTicket.Expiration
        End If

        ' Adding the cookie to the response
        Response.Cookies.Add(authCookie)
    End Sub

    ' Redirecting the user to appropriate dashboard based on role
    Private Sub RedirectToUserDashboard(Optional ByVal userType As String = "")
        If String.IsNullOrEmpty(userType) Then
            ' Getting the user type
            Dim ticket As FormsAuthenticationTicket =
FormsAuthentication.Decrypt(Request.Cookies(FormsAuthentication.FormsCookieName)
.Value)
            Dim userData As String() = ticket.UserData.Split("|"c)
            userType = userData(1)
        End If

        ' Redirecting the user based on user type
        Select Case userType
            Case "PATIENT"
                Response.Redirect("~/Patient/Patient_Dashboard.aspx")
            Case "DOCTOR"
                Response.Redirect("~/Doctor/Doctor_Dashboard.aspx")
            Case "RECEPTIONIST"
                Response.Redirect("~/Receptionist/Receptionist_Dashboard.aspx")
            Case "LAB_TECHNICIAN"
                Response.Redirect("~/LabTech/Dashboard.aspx")
            Case "ADMIN"
                Response.Redirect("~/Admin/Admin_Dashboard.aspx")
        End Select
    End Sub

```

```

        End Select
    End Sub

    ' Hash password using SHA256
    Private Function HashPassword(password As String) As String
        Using sha256 As SHA256 = SHA256.Create()
            Dim bytes As Byte() =
sha256.ComputeHash(Encoding.UTF8.GetBytes(password))
            Dim builder As New StringBuilder()

            For i As Integer = 0 To bytes.Length - 1
                builder.Append(bytes(i).ToString("x2"))
            Next

            Return builder.ToString()
        End Using
    End Function
End Class

```

6.2.1 Signup.aspx

```

<%@ Page Language="VB" AutoEventWireup="true" CodeFile="Signup.aspx.vb"
Inherits="Signup" %>

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Hospital Management System - Patient Sign Up</title>
    <link
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/css/bootstrap.min.c
ss" rel="stylesheet" />
    <style>
        body {
            background-color: #f8f9fa;
        }
        .signup-container {
            max-width: 500px;
            margin: 50px auto;
            padding: 20px;
            background-color: #fff;
            border-radius: 5px;
            box-shadow: 0 2px 10px rgba(0, 0, 0, 0.1);
        }
        .header {
            text-align: center;
            margin-bottom: 30px;
        }
        .form-group {
            margin-bottom: 15px;
        }
        .btn-signup {
            width: 100%;
            background-color: #0d6efd;
            border: none;
        }
    </style>
</head>
<body>
    <form id="formSignup" runat="server">
        <div class="container signup-container">
            <div class="header">
                <h2>Hospital Management System</h2>

```

```

        <h4>Patient Registration</h4>
    </div>

    <!-- Patient-specific fields -->
    <div class="form-group">
        <label for="txtPatientName" class="form-label">Full
Name:</label>
        <asp:TextBox ID="txtPatientName" runat="server" CssClass="form-
control" />
        <asp:RequiredFieldValidator ID="rfvPatientName" runat="server"
ControlToValidate="txtPatientName" ErrorMessage="Name is
required"
        ForeColor="Red" Display="Dynamic" />
    </div>

    <div class="form-group">
        <label for="txtPatientAge" class="form-label">Age:</label>
        <asp:TextBox ID="txtPatientAge" runat="server" CssClass="form-
control" TextMode="Number" />
        <asp:RequiredFieldValidator ID="rfvPatientAge" runat="server"
ControlToValidate="txtPatientAge" ErrorMessage="Age is
required"
        ForeColor="Red" Display="Dynamic" />
        <asp:RangeValidator ID="rvPatientAge" runat="server"
ControlToValidate="txtPatientAge" ErrorMessage="Age must be
between 1 and 120"
        MinimumValue="1" MaximumValue="120" Type="Integer"
        ForeColor="Red" Display="Dynamic" />
    </div>

    <div class="form-group">
        <label for="ddlGender" class="form-label">Gender:</label>
        <asp:DropDownList ID="ddlGender" runat="server" CssClass="form-
select">
            <asp:ListItem Text="Select gender" Value="" Selected="True"
/>
            <asp:ListItem Text="Male" Value="M" />
            <asp:ListItem Text="Female" Value="F" />
        </asp:DropDownList>
        <asp:RequiredFieldValidator ID="rfvGender" runat="server"
ControlToValidate="ddlGender" ErrorMessage="Please select
gender"
        ForeColor="Red" Display="Dynamic" />
    </div>

    <div class="form-group">
        <label for="txtContactNumber" class="form-label">Contact
Number:</label>
        <asp:TextBox ID="txtContactNumber" runat="server"
CssClass="form-control" />
        <asp:RequiredFieldValidator ID="rfvContactNumber" runat="server"
ControlToValidate="txtContactNumber" ErrorMessage="Contact
number is required"
        ForeColor="Red" Display="Dynamic" />
        <asp:RegularExpressionValidator ID="revContactNumber"
runat="server"
ControlToValidate="txtContactNumber"
ErrorMessage="Enter a valid contact number (e.g.,
03001234567)"
        ValidationExpression="^[0-9]{11}$"
        ForeColor="Red" Display="Dynamic" />
    </div>

```

```

        <!-- Common credentials fields -->
        <div class="form-group">
            <label for="txtUsername" class="form-label">Username:</label>
            <asp:TextBox ID="txtUsername" runat="server" CssClass="form-
control" />
            <asp:RequiredFieldValidator ID="rfvUsername" runat="server"
            ControlToValidate="txtUsername" ErrorMessage="Username is
required"
            ForeColor="Red" Display="Dynamic" />
        </div>

        <div class="form-group">
            <label for="txtEmail" class="form-label">Email:</label>
            <asp:TextBox ID="txtEmail" runat="server" CssClass="form-
control" TextMode="Email" />
            <asp:RequiredFieldValidator ID="rfvEmail" runat="server"
            ControlToValidate="txtEmail" ErrorMessage="Email is
required"
            ForeColor="Red" Display="Dynamic" />
            <asp:RegularExpressionValidator ID="revEmail" runat="server"
            ControlToValidate="txtEmail" ErrorMessage="Enter a valid
email address"
            ValidationExpression="^[a-zA-Z0-9._%+-]+@[a-zA-Z0-9.-]+\.[A-
Za-z]{2,}$"
            ForeColor="Red" Display="Dynamic" />
        </div>

        <div class="form-group">
            <label for="txtPassword" class="form-label">Password:</label>
            <asp:TextBox ID="txtPassword" runat="server" CssClass="form-
control" TextMode="Password" />
            <asp:RequiredFieldValidator ID="rfvPassword" runat="server"
            ControlToValidate="txtPassword" ErrorMessage="Password is
required"
            ForeColor="Red" Display="Dynamic" />
            <asp:RegularExpressionValidator ID="revPassword" runat="server"
            ControlToValidate="txtPassword"
            ErrorMessage="Password must be at least 8 characters with
letters and numbers"
            ValidationExpression="^(?=.*[A-Za-z])(?=.*\d)[A-Za-
z\d]{8,}$"
            ForeColor="Red" Display="Dynamic" />
        </div>

        <div class="form-group">
            <label for="txtConfirmPassword" class="form-label">Confirm
Password:</label>
            <asp:TextBox ID="txtConfirmPassword" runat="server"
            CssClass="form-control" TextMode="Password" />
            <asp:RequiredFieldValidator ID="rfvConfirmPassword"
            runat="server"
            ControlToValidate="txtConfirmPassword" ErrorMessage="Please
confirm your password"
            ForeColor="Red" Display="Dynamic" />
            <asp:CompareValidator ID="cvPassword" runat="server"
            ControlToValidate="txtConfirmPassword"
            ControlToCompare="txtPassword"
            ErrorMessage="Passwords do not match" ForeColor="Red"
            Display="Dynamic" />
        </div>

```

```

        <div class="form-group mb-4">
            <asp:Button ID="btnSignup" runat="server" Text="Sign Up"
CssClass="btn btn-primary btn-signup"
                OnClick="btnSignup_Click" />
        </div>

        <div class="text-center">
            <p>Already have an account? <a href="Login.aspx">Log In</a></p>
        </div>

        <asp:Label ID="lblMessage" runat="server" ForeColor="Red" />
    </div>
</form>

<script
src="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/js/bootstrap.bundle.
min.js"></script>
</body>
</html>

```

6.2.2 Signup.aspx.vb

```

Imports System.Data
Imports System.Data.SqlClient
Imports System.Configuration
Imports System.Security.Cryptography
Imports System.Text

Partial Class Signup
    Inherits System.Web.UI.Page

    Protected Sub Page_Load(ByVal sender As Object, ByVal e As System.EventArgs)
Handles Me.Load
        ' Nothing special on initial load
    End Sub

    Protected Sub btnSignup_Click(ByVal sender As Object, ByVal e As
System.EventArgs)
        If Page.IsValid Then
            Try
                ' Only PATIENT registrations allowed here
                Dim userType As String = "PATIENT"

                ' Get connection string
                Dim connectionString As String =
ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionStri
ng").ConnectionString
                Dim conn As New SqlConnection(connectionString)

                ' 1) Generate new patient ID
                Dim patientId As String = GenerateNewID("P", "SELECT
MAX(PATIENT_ID) FROM PATIENT")

                ' 2) Insert into PATIENT
                Using cmdPatient As New SqlCommand(
                    "INSERT INTO PATIENT (PATIENT_ID, PATIENT_NAME, PATIENT_AGE,
GENDER) " &
                    "VALUES (@PatientId, @Name, @Age, @Gender)", conn)

                    cmdPatient.Parameters.AddWithValue("@PatientId", patientId)
                    cmdPatient.Parameters.AddWithValue("@Name",
txtPatientName.Text.Trim())

```

```

        cmdPatient.Parameters.AddWithValue("@Age",
Convert.ToInt32(txtPatientAge.Text))
        cmdPatient.Parameters.AddWithValue("@Gender",
ddlGender.SelectedValue)

        conn.Open()
        cmdPatient.ExecuteNonQuery()
        conn.Close()
    End Using

    ' 3) Insert into PATIENT_CONTACT
    Using cmdContact As New SqlCommand(
        "INSERT INTO PATIENT_CONTACT (PATIENT_ID,
PATIENT_CONTACT_NUMBER) " &
        "VALUES (@PatientId, @ContactNumber)", conn)

        cmdContact.Parameters.AddWithValue("@PatientId", patientId)
        cmdContact.Parameters.AddWithValue("@ContactNumber",
txtContactNumber.Text.Trim())

        conn.Open()
        cmdContact.ExecuteNonQuery()
        conn.Close()
    End Using

    ' 4) Create the USER record
    Dim hashedPassword As String = HashPassword(txtPassword.Text)

    Using cmdUser As New SqlCommand(
        "INSERT INTO USERS (USERNAME, PASSWORD, EMAIL, USER_TYPE,
RELATED_ID) " &
        "VALUES (@Username, @Password, @Email, @UserType,
@RelatedId)", conn)

        cmdUser.Parameters.AddWithValue("@Username",
txtUsername.Text.Trim())
        cmdUser.Parameters.AddWithValue("@Password", hashedPassword)
        cmdUser.Parameters.AddWithValue("@Email",
txtEmail.Text.Trim())
        cmdUser.Parameters.AddWithValue("@UserType", userType)
        cmdUser.Parameters.AddWithValue("@RelatedId", patientId)

        conn.Open()
        cmdUser.ExecuteNonQuery()
        conn.Close()
    End Using

    ' 5) Redirect to Login
    Response.Redirect("Login.aspx?registered=true")
    Catch ex As Exception
        lblMessage.Text = "Error: " & ex.Message
    End Try
End If
End Sub

Private Function GenerateNewID(prefix As String, sqlQuery As String) As
String
    Dim newId As String = String.Empty
    Dim connectionString As String =
ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionStri
ng").ConnectionString
    Dim conn As New SqlConnection(connectionString)

```

```

Try
    Using cmd As New SqlCommand(sqlQuery, conn)
        conn.Open()
        Dim lastId As String = Convert.ToString(cmd.ExecuteScalar())

        If String.IsNullOrEmpty(lastId) Then
            newId = prefix & "001"
        Else
            Dim numericPart As String = lastId.Substring(prefix.Length)
            Dim nextNumber As Integer = Convert.ToInt32(numericPart) + 1
            newId = prefix & nextNumber.ToString().PadLeft(3, "0"c)
        End If
    End Using
Catch ex As Exception
    Throw New Exception("Error generating new ID: " & ex.Message)
Finally
    If conn.State = ConnectionState.Open Then conn.Close()
End Try

Return newId
End Function

Private Function HashPassword(password As String) As String
    Using sha256 As SHA256 = SHA256.Create()
        Dim bytes As Byte() =
sha256.ComputeHash(Encoding.UTF8.GetBytes(password))
        Dim builder As New StringBuilder()
        For Each b As Byte In bytes
            builder.Append(b.ToString("x2"))
        Next
        Return builder.ToString()
    End Using
End Function
End Class

```

6.3.1 Patient_Dashboard.aspx

```

<%@ Page Language="VB" AutoEventWireup="true"
CodeFile="Patient_Dashboard.aspx.vb" Inherits="Patient_Dashboard" %>

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Patient Dashboard</title>
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <link
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/css/bootstrap.min.c
ss"
        rel="stylesheet" />
    <style>
        body { background-color: #f4f7f9; }
        .dashboard { max-width: 1200px; margin: 30px auto; }
        .card { box-shadow: 0 2px 8px rgba(0,0,0,0.05); }
        .card-header { background-color: #0d6efd; color: #fff; }
        .card-body { max-height: 300px; overflow-y: auto; }
        .form-control[readonly] { background-color: #e9ecef; }
    </style>
</head>
<body>
    <form runat="server" class="dashboard">

```

```

        <asp:Panel ID="pnLError" runat="server" CssClass="alert alert-danger"
Visible="False">
        <asp:Literal ID="litError" runat="server" />
    </asp:Panel>
    <asp:Panel ID="pnlSuccess" runat="server" CssClass="alert alert-success"
Visible="False">
        <asp:Literal ID="litSuccess" runat="server" />
    </asp:Panel>

    <div class="row g-4">
        <!-- Profile / Edit Card -->
        <div class="col-lg-4">
            <div class="card">
                <div class="card-header">
                    <h5 class="mb-0">My Profile</h5>
                </div>
                <div class="card-body">
                    <div class="mb-3">
                        <label class="form-label">Patient ID</label>
                        <asp:TextBox ID="txtPatientId" runat="server" CssClass="form-
control" ReadOnly="True" />
                    </div>
                    <div class="mb-3">
                        <label class="form-label">Name</label>
                        <asp:TextBox ID="txtName" runat="server" CssClass="form-control"
/>
                    </div>
                    <div class="mb-3">
                        <label class="form-label">Age</label>
                        <asp:TextBox ID="txtAge" runat="server" CssClass="form-control" />
                    </div>
                    <div class="mb-3">
                        <label class="form-label">Gender</label>
                        <asp:DropDownList ID="ddlGender" runat="server" CssClass="form-
select">
                            <asp:ListItem Text="M" Value="M" />
                            <asp:ListItem Text="F" Value="F" />
                        </asp:DropDownList>
                    </div>
                    <div class="mb-3">
                        <label class="form-label">Contact</label>
                        <asp:TextBox ID="txtContact" runat="server" CssClass="form-
control" />
                    </div>
                    <div class="text-end">
                        <asp:Button ID="btnUpdateProfile" runat="server" CssClass="btn
btn-primary"
                            Text="Update Profile" OnClick="btnUpdateProfile_Click"
/>
                    </div>
                </div>
            </div>
        </div>
        <div class="col-lg-8">
            <div class="card">
                <div class="card-header">
                    <h5 class="mb-0">Upcoming Appointments</h5>
                </div>
                <div class="card-body p-0">
                    <asp:GridView ID="gvAppointments" runat="server"

```

```

        CssClass="table table-hover mb-0"
        AutoGenerateColumns="False">
        <Columns>
            <asp:BoundField DataField="AppointmentDate" HeaderText="Date"
                DataFormatString="{0:yyyy-MM-dd HH:mm}" />
            <asp:BoundField DataField="Disease" HeaderText="Disease" />
            <asp:BoundField DataField="MedicineName"
HeaderText="Prescription" />
            <asp:BoundField DataField="Dosage" HeaderText="Dosage" />
            <asp:BoundField DataField="Duration" HeaderText="Duration" />
        </Columns>
        <EmptyDataTemplate>
            <div class="text-center text-muted py-3">No upcoming
appointments.</div>
        </EmptyDataTemplate>
    </asp:GridView>
</div>
</div>
</div>

<!-- Tests Card -->
<div class="col-lg-6">
    <div class="card">
        <div class="card-header">
            <h5 class="mb-0">Recent Test Results</h5>
        </div>
        <div class="card-body p-0">
            <asp:GridView ID="gvTests" runat="server"
                CssClass="table table-hover mb-0"
                AutoGenerateColumns="False">

                <Columns>
                    <asp:BoundField DataField="TestName" HeaderText="Test" />
                    <asp:BoundField DataField="TestDate" HeaderText="Date"
                        DataFormatString="{0:yyyy-MM-dd}" />
                    <asp:BoundField DataField="TestResult" HeaderText="Result" />
                </Columns>
                <EmptyDataTemplate>
                    <div class="text-center text-muted py-3">No test results
found.</div>
                </EmptyDataTemplate>
            </asp:GridView>
        </div>
    </div>
</div>

<!-- Doctors Card -->
<div class="col-lg-6">
    <div class="card">
        <div class="card-header">
            <h5 class="mb-0">My Doctors</h5>
        </div>
        <div class="card-body p-0">
            <asp:GridView ID="gvDoctors" runat="server"
                CssClass="table table-hover mb-0"
                AutoGenerateColumns="False">

                <Columns>
                    <asp:BoundField DataField="EMPLOYEE_NAME" HeaderText="Doctor" />
                    <asp:BoundField DataField="EMPLOYEE_DEPARTMENT"
HeaderText="Department" />
                    <asp:BoundField DataField="EMPLOYEE_DESIGNATION"
HeaderText="Designation" />

```

```

                <asp:BoundField DataField="QUALIFICATION"
HeaderText="Qualification" />
                <asp:BoundField DataField="ROOM_ID" HeaderText="Room #" />
            </Columns>
            <EmptyDataTemplate>
                <div class="text-center text-muted py-3">No doctors found.</div>
            </EmptyDataTemplate>
        </asp:GridView>
    </div>
</div>
</div>
</div>
</form>

<script
src="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/js/bootstrap.bundle.
min.js">
</script>
</body>
</html>

```

6.3.2 Patient_Dashboard.aspx.vb

```

Imports System
Imports System.Data
Imports System.Data.SqlClient
Imports System.Configuration
Imports System.Web.Security

Partial Class Patient_Dashboard
    Inherits System.Web.UI.Page

    Private ReadOnly _connString As String =
        ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionString").ConnectionString

    Protected Sub Page_Load(ByVal sender As Object, ByVal e As EventArgs)
        Handles Me.Load
            If Not IsPostBack Then

                ' Read patient ID from auth ticket
                Dim ticket =
                    FormsAuthentication.Decrypt(Request.Cookies(FormsAuthentication.FormsCookieName)
                    .Value)

                Dim parts = ticket.UserData.Split("|"c)
                Dim patientId = parts(2)

                ' Populate controls
                txtPatientId.Text = patientId
                LoadProfile(patientId)
                LoadAppointments(patientId)
                LoadTests(patientId)
                LoadDoctors(patientId)
            End If
        End Sub

        Private Sub LoadProfile(patientId As String)
            Const sql As String =
                "SELECT P.PATIENT_NAME, P.PATIENT_AGE, P.GENDER,
                C.PATIENT_CONTACT_NUMBER " &
                "FROM PATIENT P " &

```

```

"JOIN PATIENT_CONTACT C ON P.PATIENT_ID = C.PATIENT_ID " &
"WHERE P.PATIENT_ID = @PatientId;"

Using conn As New SqlConnection(_connString),
    cmd As New SqlCommand(sql, conn)
cmd.Parameters.AddWithValue("@PatientId", patientId)
conn.Open()
Using rdr = cmd.ExecuteReader()
    If rdr.Read() Then
        txtName.Text = rdr("PATIENT_NAME").ToString()
        txtAge.Text = rdr("PATIENT_AGE").ToString()
        ddlGender.SelectedValue = rdr("GENDER").ToString()
        txtContact.Text = rdr("PATIENT_CONTACT_NUMBER").ToString()
    End If
End Using
End Using
End Sub

Protected Sub btnUpdateProfile_Click(ByVal sender As Object, ByVal e As
EventArgs)
    Dim patientId = txtPatientId.Text.Trim()

    ' Update PATIENT
    Const sqlUpdPat As String =
        "UPDATE PATIENT SET PATIENT_NAME = @Name, PATIENT_AGE = @Age, GENDER
= @Gender " &
        "WHERE PATIENT_ID = @PatientId;"

    Using conn As New SqlConnection(_connString),
        cmd As New SqlCommand(sqlUpdPat, conn)
        cmd.Parameters.AddWithValue("@Name", txtName.Text.Trim())
        cmd.Parameters.AddWithValue("@Age",
Integer.Parse(txtAge.Text.Trim()))
        cmd.Parameters.AddWithValue("@Gender", ddlGender.SelectedValue)
        cmd.Parameters.AddWithValue("@PatientId", patientId)
        conn.Open()
        cmd.ExecuteNonQuery()
        conn.Close()
    End Using

    ' Update PATIENT_CONTACT
    Const sqlUpdCont As String =
        "UPDATE PATIENT_CONTACT SET PATIENT_CONTACT_NUMBER = @Contact " &
        "WHERE PATIENT_ID = @PatientId;"

    Using conn As New SqlConnection(_connString),
        cmd As New SqlCommand(sqlUpdCont, conn)
        cmd.Parameters.AddWithValue("@Contact", txtContact.Text.Trim())
        cmd.Parameters.AddWithValue("@PatientId", patientId)
        conn.Open()
        cmd.ExecuteNonQuery()
        conn.Close()
    End Using

    pnlSuccess.Visible = True
    litSuccess.Text = "Profile updated successfully."
End Sub

Private Sub LoadAppointments(patientId As String)
    Const sql As String =
        "SELECT A.APPOINTMENT_DATE AS AppointmentDate, D.DISEASE, " &
        "          P.MEDICINE_NAME AS MedicineName, P.DOSAGE, P.DURATION " &

```

```

        "FROM APPOINTMENT A " &
        "JOIN APPOINTMENT_DISEASE D ON A.APPOINTMENT_ID = D.APPOINTMENT_ID "
    &
        "JOIN APPOINTMENT_PERScription P ON A.APPOINTMENT_ID =
P.APPOINTMENT_ID " &
        "WHERE A.PATIENT_ID = @PatientId AND A.APPOINTMENT_DATE >= GETDATE()"
    " &
        "ORDER BY A.APPOINTMENT_DATE;"

    BindGrid(sql, patientId, gvAppointments)
End Sub

Private Sub LoadTests(patientId As String)
    Const sql As String =
        "SELECT T.TEST_NAME AS TestName, PT.TEST_DATE AS TestDate,
PT.TEST_RESULT AS TestResult " &
        "FROM PATIENT_TESTS PT " &
        "JOIN TEST T ON PT.TEST_ID = T.TEST_ID " &
        "WHERE PT.PATIENT_ID = @PatientId " &
        "ORDER BY PT.TEST_DATE DESC;"

    BindGrid(sql, patientId, gvTests)
End Sub

Private Sub LoadDoctors(patientId As String)
    Const sql As String =
        "SELECT DISTINCT E.EMPLOYEE_NAME, E.EMPLOYEE_DEPARTMENT,
E.EMPLOYEE_DESIGNATION, " &
        "      Q.QUALIFICATION, E.ROOM_ID " &
        "FROM EMPLOYEE E " &
        "JOIN EMPLOYEE_QUALIFICATION Q ON E.EMPLOYEE_ID = Q.EMPLOYEE_ID " &
        "JOIN APPOINTMENT A ON E.EMPLOYEE_ID = A.EMPLOYEE_ID " &
        "WHERE A.PATIENT_ID = @PatientId;"

    BindGrid(sql, patientId, gvDoctors)
End Sub

Private Sub BindGrid(sql As String, patientId As String, grid As GridView)
    Dim dt As New DataTable()
    Using conn As New SqlConnection(_connString),
        da As New SqlDataAdapter(sql, conn)
        da.SelectCommand.Parameters.AddWithValue("@PatientId", patientId)
        da.Fill(dt)
    End Using
    grid.DataSource = dt
    grid.DataBind()
End Sub
End Class

```

6.4.1 Doctor_Dashboard.aspx

```

<%@ Page Language="vb" AutoEventWireup="false"
CodeFile="Doctor_Dashboard.aspx.vb" Inherits="Doctor_Dashboard" %>
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Doctor Dashboard</title>
    <style>
        .dashboard-container { width: 80%; margin: 20px auto; font-family:
Arial, sans-serif; }
        .dashboard-header { text-align: center; margin-bottom: 20px; }
    </style>

```

```

        .gridview { width: 100%; border: 1px solid #ccc; border-collapse:
collapse; }
        .gridview th, .gridview td { padding: 8px; border: 1px solid #ccc; text-
align: left; }
        .gridview th { background-color: #f4f4f4; }
    </style>
</head>
<body>
    <form id="form1" runat="server">
        <div class="dashboard-container">
            <h2 class="dashboard-header">My Appointments</h2>
            <asp:GridView ID="gvAppointments" runat="server" CssClass="gridview"
AutoGenerateColumns="false">
                <Columns>
                    <asp:BoundField DataField="AppointmentID" HeaderText="ID" />
                    <asp:BoundField DataField="PatientName" HeaderText="Patient"
/>
                    <asp:BoundField DataField="AppointmentDate" HeaderText="Date
& Time" DataFormatString="{0:MM/dd/yyyy HH:mm}" />
                    <asp:BoundField DataField="RoomNumber" HeaderText="Room" />
                    <asp:BoundField DataField="Status" HeaderText="Status" />
                </Columns>
            </asp:GridView>
        </div>
    </form>
</body>
</html>

```

6.4.2 Doctor_Dashboard.aspx.vb

```

Imports System
Imports System.Data
Imports System.Data.SqlClient

Partial Class Doctor_Dashboard
    Inherits System.Web.UI.Page

    Private ReadOnly Property DoctorID As Integer
        Get
            If Session("UserID") IsNot Nothing Then
                Return Convert.ToInt32(Session("UserID"))
            Else
                Return 0
            End If
        End Get
    End Property

    Protected Sub Page_Load(ByVal sender As Object, ByVal e As EventArgs)
Handles Me.Load
        If Not IsPostBack Then
            If DoctorID > 0 Then
                LoadAppointments()
            Else
                Response.Redirect("Login.aspx")
            End If
        End If
    End Sub

    Private Sub LoadAppointments()
        Dim connString As String =
System.Configuration.ConfigurationManager.ConnectionStrings("HMSConnectionString
").ConnectionString

```

```

        Using conn As New SqlConnection(connString)
        Dim sql As String = "SELECT a.AppointmentID, p.FullName AS
PatientName, a.AppointmentDate, r.RoomNumber, a.Status " &
        "FROM Appointments a " &
        "JOIN Patients p ON a.PatientID = p.PatientID "
&
        "LEFT JOIN Rooms r ON a.RoomID = r.RoomID " &
        "WHERE a.DoctorID = @DoctorID " &
        "ORDER BY a.AppointmentDate DESC"
        Using cmd As New SqlCommand(sql, conn)
        cmd.Parameters.AddWithValue("@DoctorID", DoctorID)
        Dim dt As New DataTable()
        Using da As New SqlDataAdapter(cmd)
            da.Fill(dt)
        End Using
        gvAppointments.DataSource = dt
        gvAppointments.DataBind()
    End Using
End Using
End Sub
End Class

```

6.5.1 Admin_Dashboard.aspx

```

<%@ Page Language="VB" AutoEventWireup="true" CodeFile="Admin_Dashboard.aspx.vb"
Inherits="Admin_Dashboard" %>

```

```

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Admin - Employee Management Dashboard</title>
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <link
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/css/bootstrap.min.c
ss" rel="stylesheet" />
    <style>
        body {
            background-color: #f0f2f5;
            font-family: 'Segoe UI', sans-serif;
        }

        .dashboard-container {
            max-width: 900px;
            margin: 60px auto;
            padding: 20px;
        }

        .dashboard-header {
            text-align: center;
            margin-bottom: 40px;
        }

        .action-card {
            cursor: pointer;
            transition: transform 0.2s ease, box-shadow 0.2s ease;
            border: none;
            border-radius: 12px;
            overflow: hidden;
            background: #ffffff;
            box-shadow: 0 4px 12px rgba(0,0,0,0.1);
        }
    </style>

```

```

.action-card:hover {
  transform: translateY(-5px);
  box-shadow: 0 6px 20px rgba(0,0,0,0.15);
}

.card-icon {
  font-size: 48px;
  color: #0d6efd;
  margin-bottom: 10px;
}

.card-title {
  font-size: 20px;
  font-weight: 600;
}

.card-subtitle {
  color: #6c757d;
}
</style>
</head>
<body>
  <form id="form1" runat="server">
    <div class="dashboard-container">
      <div class="dashboard-header">
        <h2 class="fw-bold">Employee Management</h2>
        <p class="text-muted">Choose an action to perform</p>
      </div>

      <div class="row g-4 justify-content-center">
        <!-- Add Employee Card -->
        <div class="col-md-5">
          <asp:LinkButton runat="server" ID="btnAddEmployee"
OnClick="btnAddEmployee_Click" CssClass="text-decoration-none">
            <div class="card action-card text-center p-4">
              <div class="card-icon">+</div>
              <div class="card-title">Add Employee</div>
              <div class="card-subtitle">Register new employee and user
account</div>
            </div>
          </asp:LinkButton>
        </div>

        <!-- Remove Employee Card -->
        <div class="col-md-5">
          <asp:LinkButton runat="server" ID="btnDeleteEmployee"
OnClick="btnDeleteEmployee_Click" CssClass="text-decoration-none">
            <div class="card action-card text-center p-4">
              <div class="card-icon">-</div>
              <div class="card-title">Remove Employee</div>
              <div class="card-subtitle">Delete employee & related records</div>
            </div>
          </asp:LinkButton>
        </div>

        <!-- Edit Employee Card -->
        <div class="col-md-5">
          <asp:LinkButton runat="server" ID="btnEditEmployee"
OnClick="btnEditEmployee_Click" CssClass="text-decoration-none">
            <div class="card action-card text-center p-4">
              <div class="card-icon">✎</div>

```

```

        <div class="card-title">Edit Employee</div>
        <div class="card-subtitle">Update employee details and access</div>
    </div>
</asp:LinkButton>
</div>
</div>
</form>

<script
src="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/js/bootstrap.bundle.
min.js"></script>
</body>
</html>

```

6.5.2 Admin_Dashboard.aspx.vb

```

Partial Class Admin_Dashboard
    Inherits System.Web.UI.Page

    Protected Sub Page_Load(sender As Object, e As EventArgs) Handles Me.Load
        ' Optional: Add role-based access check here if needed
    End Sub

    Protected Sub btnAddEmployee_Click(sender As Object, e As EventArgs)
        Response.Redirect("Add_Employee.aspx")
    End Sub

    Protected Sub btnDeleteEmployee_Click(sender As Object, e As EventArgs)
        Response.Redirect("Delete_Employee.aspx")
    End Sub

    Protected Sub btnEditEmployee_Click(sender As Object, e As EventArgs)
        Response.Redirect("Edit_Employee.aspx")
    End Sub
End Class

```

6.6.1 Add_Employee.aspx

```

<%@ Page Language="VB" AutoEventWireup="true" CodeFile="Add_Employee.aspx.vb"
Inherits="Add_Employee" %>

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Add New Employee</title>
    <link
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/css/bootstrap.min.c
ss" rel="stylesheet" />
    <style>
        body { background-color: #f0f2f5; }
        .container { max-width: 800px; margin-top: 50px; }
        .card { box-shadow: 0 2px 8px rgba(0,0,0,0.1); }
        .card-header { background-color: #0d6efd; color: white; }
    </style>
</head>
<body>
    <form runat="server">
        <div class="container">
            <div class="card">

```

```

        <div class="card-header">
            <h5 class="mb-0">Add Employee</h5>
        </div>
        <div class="card-body">
            <!-- EMPLOYEE -->
            <div class="mb-3">
                <label class="form-label">Employee ID</label>
                <asp:TextBox ID="txtEmpId" runat="server"
CssClass="form-control" />
            </div>
            <div class="mb-3">
                <label class="form-label">Name</label>
                <asp:TextBox ID="txtEmpName" runat="server"
CssClass="form-control" />
            </div>
            <div class="mb-3">
                <label class="form-label">Department</label>
                <asp:TextBox ID="txtDept" runat="server" CssClass="form-
control" />
            </div>
            <div class="mb-3">
                <label class="form-label">Designation</label>
                <asp:TextBox ID="txtDesig" runat="server"
CssClass="form-control" />
            </div>
            <div class="mb-3">
                <label class="form-label">Room ID</label>
                <asp:TextBox ID="txtRoomId" runat="server"
CssClass="form-control" />
            </div>

            <!-- CONTACT -->
            <div class="mb-3">
                <label class="form-label">Contact Number</label>
                <asp:TextBox ID="txtContact" runat="server"
CssClass="form-control" />
            </div>

            <!-- QUALIFICATION -->
            <div class="mb-3">
                <label class="form-label">Qualification</label>
                <asp:TextBox ID="txtQual" runat="server" CssClass="form-
control" />
            </div>

            <!-- USERS -->
            <hr />
            <h5>User Account</h5>
            <div class="mb-3">
                <label class="form-label">Username</label>
                <asp:TextBox ID="txtUsername" runat="server"
CssClass="form-control" />
            </div>
            <div class="mb-3">
                <label class="form-label">Email</label>
                <asp:TextBox ID="txtEmail" runat="server"
CssClass="form-control" />
            </div>
            <div class="mb-3">
                <label class="form-label">Password</label>
                <asp:TextBox ID="txtPassword" runat="server"
CssClass="form-control" TextMode="Password" />

```

```

        </div>
        <div class="mb-3">
            <label class="form-label">Role</label>
            <asp:DropDownList ID="ddlRole" runat="server"
                CssClass="form-select">
                <asp:ListItem Text="Select role" Value="" />
                <asp:ListItem Text="Doctor" Value="DOCTOR" />
                <asp:ListItem Text="Nurse" Value="NURSE" />
                <asp:ListItem Text="Receptionist"
                    Value="RECEPTIONIST" />
                <asp:ListItem Text="Lab Technician"
                    Value="LAB_TECHNICIAN" />
            </asp:DropDownList>
        </div>

        <asp:Button ID="btnAddEmp" runat="server" Text="Add
Employee" CssClass="btn btn-primary" OnClick="btnAddEmp_Click" />
    </div>
</div>
</form>
</body>
</html>

```

6.6.2 Add_Employee.aspx.vb

```

Imports System.Data.SqlClient
Imports System.Configuration
Imports System.Security.Cryptography
Imports System.Text

Partial Class Add_Employee
    Inherits System.Web.UI.Page

    Private ReadOnly _cs As String =
        ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionString").ConnectionString

    Protected Sub btnAddEmp_Click(sender As Object, e As EventArgs)
        Try
            Using conn As New SqlConnection(_cs)
                conn.Open()
                Dim trans = conn.BeginTransaction()

                Try
                    ' EMPLOYEE
                    Dim sqlEmp = "INSERT INTO EMPLOYEE (EMPLOYEE_ID,
EMPLOYEE_NAME, EMPLOYEE_DEPARTMENT, EMPLOYEE_DESIGNATION, ROOM_ID) VALUES (@id,
@name, @dept, @desig, @room)"
                    Using cmd As New SqlCommand(sqlEmp, conn, trans)
                        cmd.Parameters.AddWithValue("@id", txtEmpId.Text.Trim())
                        cmd.Parameters.AddWithValue("@name",
txtEmpName.Text.Trim())
                        cmd.Parameters.AddWithValue("@dept",
txtDept.Text.Trim())
                        cmd.Parameters.AddWithValue("@desig",
txtDesig.Text.Trim())
                        cmd.Parameters.AddWithValue("@room",
If(txtRoomId.Text.Trim() = "", DBNull.Value, txtRoomId.Text.Trim()))
                        cmd.ExecuteNonQuery()
                    End Using
                Catch

```

```

        ' CONTACT
        Dim sqlContact = "INSERT INTO EMPLOYEE_CONTACT (EMPLOYEE_ID,
EMPLOYEE_CONTACT_NUMBER) VALUES (@id, @contact)"
        Using cmd As New SqlCommand(sqlContact, conn, trans)
            cmd.Parameters.AddWithValue("@id", txtEmpId.Text.Trim())
            cmd.Parameters.AddWithValue("@contact",
txtContact.Text.Trim())
            cmd.ExecuteNonQuery()
        End Using

        ' QUALIFICATION
        Dim sqlQual = "INSERT INTO EMPLOYEE_QUALIFICATION
(EMPLOYEE_ID, QUALIFICATION) VALUES (@id, @qual)"
        Using cmd As New SqlCommand(sqlQual, conn, trans)
            cmd.Parameters.AddWithValue("@id", txtEmpId.Text.Trim())
            cmd.Parameters.AddWithValue("@qual",
txtQual.Text.Trim())
            cmd.ExecuteNonQuery()
        End Using

        ' USERS
        Dim sqlUser = "INSERT INTO USERS (USERNAME, PASSWORD, EMAIL,
USER_TYPE, RELATED_ID) VALUES (@username, @password, @email, @role, @related)"
        Using cmd As New SqlCommand(sqlUser, conn, trans)
            cmd.Parameters.AddWithValue("@username",
txtUsername.Text.Trim())
            cmd.Parameters.AddWithValue("@password",
HashPassword(txtPassword.Text.Trim()))
            cmd.Parameters.AddWithValue("@email",
txtEmail.Text.Trim())
            cmd.Parameters.AddWithValue("@role",
ddlRole.SelectedValue)
            cmd.Parameters.AddWithValue("@related",
txtEmpId.Text.Trim())
            cmd.ExecuteNonQuery()
        End Using

        trans.Commit()
        Response.Write("<script>alert('Employee added
successfully.');

```

```

        txtUsername.Text = ""
        txtEmail.Text = ""
        txtPassword.Text = ""
        ddlRole.SelectedIndex = 0
    End Sub

    Private Function HashPassword(pwd As String) As String
        Using sha256 As SHA256 = SHA256.Create()
            Dim bytes = sha256.ComputeHash(Encoding.UTF8.GetBytes(pwd))
            Dim sb As New StringBuilder()
            For Each b In bytes
                sb.Append(b.ToString("x2"))
            Next
            Return sb.ToString()
        End Using
    End Function
End Class

```

6.7.1 Edit_Employee.aspx

```

<%@ Page Language="VB" AutoEventWireup="true" CodeFile="Edit_Employee.aspx.vb"
Inherits="Edit_Employee" %>

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Edit Employee</title>
    <link
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/css/bootstrap.min.c
ss" rel="stylesheet" />
    <style>
        body { background-color: #f0f2f5; }
        .container { max-width: 700px; margin-top: 50px; }
        .card { box-shadow: 0 2px 8px rgba(0,0,0,0.1); }
        .card-header { background-color: #ffc107; color: #212529; }
    </style>
</head>
<body>
    <form runat="server">
        <div class="container">
            <asp:Panel ID="pnlError" runat="server" CssClass="alert alert-danger"
Visible="False">
                <asp:Literal ID="litError" runat="server" />
            </asp:Panel>
            <asp:Panel ID="pnlSuccess" runat="server" CssClass="alert alert-success"
Visible="False">
                <asp:Literal ID="litSuccess" runat="server" />
            </asp:Panel>

            <div class="card">
                <div class="card-header">
                    <h5 class="mb-0">Edit Employee</h5>
                </div>
                <div class="card-body">
                    <!-- Search -->
                    <div class="mb-3 row">
                        <div class="col-md-8">
                            <asp:TextBox ID="txtSearchEmpId" runat="server" CssClass="form-
control"
                                placeholder="Enter Employee ID to load" />
                        </div>
                        <div class="col-md-4">

```

```

w-100"
        <asp:Button ID="btnLoad" runat="server" CssClass="btn btn-warning
                        Text="Load Employee" OnClick="btnLoad_Click" />
    </div>
</div>

<!-- Editable Fields -->
<asp:Panel ID="pnlEdit" runat="server" Visible="False">
    <!-- EMPLOYEE -->
    <div class="mb-3">
        <label class="form-label">Name</label>
        <asp:TextBox ID="txtEmpName" runat="server" CssClass="form-
control" />
    </div>
    <div class="mb-3">
        <label class="form-label">Department</label>
        <asp:TextBox ID="txtDept" runat="server" CssClass="form-control"
/>
    </div>
    <div class="mb-3">
        <label class="form-label">Designation</label>
        <asp:TextBox ID="txtDesig" runat="server" CssClass="form-control"
/>
    </div>
    <div class="mb-3">
        <label class="form-label">Room ID</label>
        <asp:TextBox ID="txtRoomId" runat="server" CssClass="form-control"
/>
    </div>

    <!-- CONTACT -->
    <div class="mb-3">
        <label class="form-label">Contact Number</label>
        <asp:TextBox ID="txtContact" runat="server" CssClass="form-
control" />
    </div>

    <!-- QUALIFICATION -->
    <div class="mb-3">
        <label class="form-label">Qualification</label>
        <asp:TextBox ID="txtQual" runat="server" CssClass="form-control"
/>
    </div>

    <asp:Button ID="btnUpdate" runat="server" CssClass="btn btn-warning"
        Text="Save Changes" OnClick="btnUpdate_Click" />
</asp:Panel>
</div>
</div>
</form>
</body>
</html>

```

6.7.2 Edit_Employee.aspx.vb

```

Imports System.Data.SqlClient
Imports System.Configuration

Partial Class Edit_Employee
    Inherits System.Web.UI.Page

```

```

Private ReadOnly _cs As String =

ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionString").ConnectionString

Protected Sub btnLoad_Click(sender As Object, e As EventArgs)
    pnlError.Visible = False
    pnlSuccess.Visible = False

    Dim empId = txtSearchEmpId.Text.Trim()
    If empId = "" Then
        ShowError("Please enter an Employee ID.")
        Return
    End If

    ' Load existing data
    Dim sql As String = " SELECT E.EMPLOYEE_NAME, E.EMPLOYEE_DEPARTMENT,
E.EMPLOYEE_DESIGNATION, E.ROOM_ID, C.EMPLOYEE_CONTACT_NUMBER, Q.QUALIFICATION
FROM EMPLOYEE E LEFT JOIN EMPLOYEE_CONTACT C ON E.EMPLOYEE_ID = C.EMPLOYEE_ID
LEFT JOIN EMPLOYEE_QUALIFICATION Q ON E.EMPLOYEE_ID = Q.EMPLOYEE_ID WHERE
E.EMPLOYEE_ID = @id"

    Using conn As New SqlConnection(_cs),
        cmd As New SqlCommand(sql, conn)
        cmd.Parameters.AddWithValue("@id", empId)
        conn.Open()
        Using rdr = cmd.ExecuteReader()
            If rdr.Read() Then
                pnlEdit.Visible = True
                txtEmpName.Text = rdr("EMPLOYEE_NAME").ToString()
                txtDept.Text = rdr("EMPLOYEE_DEPARTMENT").ToString()
                txtDesig.Text = rdr("EMPLOYEE_DESIGNATION").ToString()
                txtRoomId.Text = If(IsDBNull(rdr("ROOM_ID")), "",
rdr("ROOM_ID").ToString())
                txtContact.Text =
If(IsDBNull(rdr("EMPLOYEE_CONTACT_NUMBER")), "",
rdr("EMPLOYEE_CONTACT_NUMBER").ToString())
                txtQual.Text = If(IsDBNull(rdr("QUALIFICATION")), "",
rdr("QUALIFICATION").ToString())
            Else
                ShowError("Employee ID not found.")
                pnlEdit.Visible = False
            End If
        End Using
    End Using
End Sub

Protected Sub btnUpdate_Click(sender As Object, e As EventArgs)
    pnlError.Visible = False
    pnlSuccess.Visible = False

    Dim empId = txtSearchEmpId.Text.Trim()
    Using conn As New SqlConnection(_cs)
        conn.Open()
        Dim trans = conn.BeginTransaction()
        Try
            ' Update EMPLOYEE
            Dim sqlEmp = " UPDATE EMPLOYEE SET EMPLOYEE_NAME = @name,
EMPLOYEE_DEPARTMENT = @dept, EMPLOYEE_DESIGNATION = @desig, ROOM_ID = @room
WHERE EMPLOYEE_ID = @id"
            Using cmd As New SqlCommand(sqlEmp, conn, trans)
                cmd.Parameters.AddWithValue("@id", empId)

```

```

        cmd.Parameters.AddWithValue("@name", txtEmpName.Text.Trim())
        cmd.Parameters.AddWithValue("@dept", txtDept.Text.Trim())
        cmd.Parameters.AddWithValue("@desig", txtDesig.Text.Trim())
        cmd.Parameters.AddWithValue("@room", If(txtRoomId.Text = "",
DBNull.Value, txtRoomId.Text))
        cmd.ExecuteNonQuery()
    End Using

    ' Update EMPLOYEE_CONTACT
    Dim sqlCon = "IF EXISTS (SELECT 1 FROM EMPLOYEE_CONTACT WHERE
EMPLOYEE_ID = @id) UPDATE EMPLOYEE_CONTACT SET EMPLOYEE_CONTACT_NUMBER =
@contact WHERE EMPLOYEE_ID = @id ELSE INSERT INTO EMPLOYEE_CONTACT (EMPLOYEE_ID,
EMPLOYEE_CONTACT_NUMBER) VALUES (@id, @contact)"
    Using cmd As New SqlCommand(sqlCon, conn, trans)
        cmd.Parameters.AddWithValue("@id", empId)
        cmd.Parameters.AddWithValue("@contact",
txtContact.Text.Trim())
        cmd.ExecuteNonQuery()
    End Using

    ' Update EMPLOYEE_QUALIFICATION
    Dim sqlQual = " IF EXISTS (SELECT 1 FROM EMPLOYEE_QUALIFICATION
WHERE EMPLOYEE_ID = @id) UPDATE EMPLOYEE_QUALIFICATION SET QUALIFICATION = @qual
WHERE EMPLOYEE_ID = @id ELSE INSERT INTO EMPLOYEE_QUALIFICATION (EMPLOYEE_ID,
QUALIFICATION) VALUES (@id, @qual)"
    Using cmd As New SqlCommand(sqlQual, conn, trans)
        cmd.Parameters.AddWithValue("@id", empId)
        cmd.Parameters.AddWithValue("@qual", txtQual.Text.Trim())
        cmd.ExecuteNonQuery()
    End Using

    trans.Commit()
    ShowSuccess("Employee updated successfully.")
Catch ex As Exception
    trans.Rollback()
    ShowError("Update failed: " & ex.Message)
End Try
End Using
End Sub

Private Sub ShowError(msg As String)
    litError.Text = msg
    pnlError.Visible = True
End Sub

Private Sub ShowSuccess(msg As String)
    litSuccess.Text = msg
    pnlSuccess.Visible = True
End Sub
End Class

```

6.8.1 Delete_Employee.aspx

```

<%@ Page Language="VB" AutoEventWireup="true" CodeFile="Delete_Employee.aspx.vb"
Inherits="Delete_Employee" %>

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Remove Employee</title>

```

```

<link
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/css/bootstrap.min.c
ss" rel="stylesheet" />
<style>
body { background-color: #f0f2f5; }
.container { max-width: 700px; margin-top: 50px; }
.card { box-shadow: 0 2px 8px rgba(0,0,0,0.1); }
.card-header { background-color: #dc3545; color: white; }
</style>
</head>
<body>
<form runat="server">
<div class="container">
<div class="card">
<div class="card-header">
<h5 class="mb-0">Remove Employee</h5>
</div>
<div class="card-body">
<div class="mb-3">
<label class="form-label">Enter Employee ID</label>
<asp:TextBox ID="txtEmpId" runat="server" CssClass="form-control" />
</div>
<asp:Button ID="btnSearch" runat="server" CssClass="btn btn-secondary
mb-3" Text="Search Employee" OnClick="btnSearch_Click" />
<asp:Panel ID="pnlEmpInfo" runat="server" Visible="False"
CssClass="mt-3">
<h6>Employee Info</h6>
<p><strong>Name:</strong> <asp:Label ID="lblName" runat="server"
/></p>
<p><strong>Department:</strong> <asp:Label ID="lblDept"
runat="server" /></p>
<p><strong>Designation:</strong> <asp:Label ID="lblDesig"
runat="server" /></p>
<asp:Button ID="btnDelete" runat="server" Text="Delete Employee"
CssClass="btn btn-danger" OnClick="btnDelete_Click" />
</asp:Panel>
<asp:Literal ID="litMsg" runat="server" />
</div>
</div>
</div>
</form>
</body>
</html>

```

6.8.2 Delete_Employee.aspx.vb

```

Imports System.Data.SqlClient
Imports System.Configuration

Partial Class Delete_Employee
    Inherits System.Web.UI.Page

    Private ReadOnly _cs As String =
ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionStri
ng").ConnectionString

    Protected Sub btnSearch_Click(sender As Object, e As EventArgs)
        pnlEmpInfo.Visible = False
        litMsg.Text = ""

        If txtEmpId.Text = "" Then

```

```

        litMsg.Text = "<div class='alert alert-warning'>Please enter
Employee ID.</div>"
        Return
    End If

    Using conn As New SqlConnection(_cs),
        cmd As New SqlCommand("SELECT EMPLOYEE_NAME, EMPLOYEE_DEPARTMENT,
EMPLOYEE_DESIGNATION FROM EMPLOYEE WHERE EMPLOYEE_ID = @id", conn)
        cmd.Parameters.AddWithValue("@id", txtEmpId.Text.Trim())

        conn.Open()
        Dim rdr = cmd.ExecuteReader()

        If rdr.Read() Then
            lblName.Text = rdr("EMPLOYEE_NAME").ToString()
            lblDept.Text = rdr("EMPLOYEE_DEPARTMENT").ToString()
            lblDesig.Text = rdr("EMPLOYEE_DESIGNATION").ToString()
            pnlEmpInfo.Visible = True
        Else
            litMsg.Text = "<div class='alert alert-danger'>Employee not
found.</div>"
        End If
    End Using
End Sub

Protected Sub btnDelete_Click(sender As Object, e As EventArgs)
    Dim empId = txtEmpId.Text.Trim()
    Try
        Using conn As New SqlConnection(_cs)
            conn.Open()
            Dim trans = conn.BeginTransaction()

            Try
                ' USERS
                Using cmd As New SqlCommand("DELETE FROM USERS WHERE
RELATED_ID = @id", conn, trans)
                    cmd.Parameters.AddWithValue("@id", empId)
                    cmd.ExecuteNonQuery()
                End Using

                ' EMPLOYEE_CONTACT
                Using cmd As New SqlCommand("DELETE FROM EMPLOYEE_CONTACT
WHERE EMPLOYEE_ID = @id", conn, trans)
                    cmd.Parameters.AddWithValue("@id", empId)
                    cmd.ExecuteNonQuery()
                End Using

                ' EMPLOYEE_QUALIFICATION
                Using cmd As New SqlCommand("DELETE FROM
EMPLOYEE_QUALIFICATION WHERE EMPLOYEE_ID = @id", conn, trans)
                    cmd.Parameters.AddWithValue("@id", empId)
                    cmd.ExecuteNonQuery()
                End Using

                ' EMPLOYEE
                Using cmd As New SqlCommand("DELETE FROM EMPLOYEE WHERE
EMPLOYEE_ID = @id", conn, trans)
                    cmd.Parameters.AddWithValue("@id", empId)
                    cmd.ExecuteNonQuery()
                End Using

                trans.Commit()
            End Try
        End Using
    End Try
End Sub

```

```

        litMsg.Text = "<div class='alert alert-success'>Employee
deleted successfully.</div>"
        pnlEmpInfo.Visible = False
        txtEmpId.Text = ""

        Catch ex As Exception
            trans.Rollback()
            litMsg.Text = "<div class='alert alert-danger'>Deletion
failed: " & ex.Message & "</div>"
        End Try
    End Using
    Catch ex As Exception
        litMsg.Text = "<div class='alert alert-danger'>Error: " & ex.Message
& "</div>"
    End Try
End Sub
End Class

```

6.9.1 Receptionist_Dashboard.aspx

```

<%@ Page Language="VB" AutoEventWireup="true"
CodeFile="Receptionist_Dashboard.aspx.vb" Inherits="Receptionist_Dashboard" %>

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Receptionist Dashboard</title>
    <meta name="viewport" content="width=device-width, initial-scale=1" />
    <link
href="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/css/bootstrap.min.c
ss" rel="stylesheet" />
    <style>
        body { background-color: #f4f7f9; }
        .dashboard { max-width: 1000px; margin: 50px auto; }
        .dashboard-header { text-align: center; margin-bottom: 40px; }
        .card { border: none; border-radius: 12px; box-shadow: 0 4px 12px
rgba(0,0,0,0.05); transition: transform .2s; }
        .card:hover { transform: translateY(-5px); }
        .card-body { text-align: center; padding: 2rem; }
        .card-icon { font-size: 2.5rem; color: #0d6efd; margin-bottom: .5rem; }
        .card-title { font-size: 1.2rem; font-weight: 600; }
    </style>
</head>
<body>
    <form runat="server" class="dashboard">
        <div class="row g-4">
            <div class="dashboard-header">
                <h2 class="fw-bold">Receptionist Dashboard</h2>
                <p class="text-muted">Choose an action to perform</p>
            </div>

            <!-- Manage Patients -->
            <div class="col-md-4">
                <asp:LinkButton ID="lnkPatients" runat="server"
OnClick="lnkPatients_Click" CssClass="text-decoration-none">
                    <div class="card">
                        <div class="card-body">
                            <div class="card-icon">👤</div>
                            <div class="card-title">Manage Patients</div>
                        </div>
                    </div>
                </asp:LinkButton>
            </div>

```

```

</div>

<!-- Manage Rooms -->
<div class="col-md-4">
  <asp:LinkButton ID="lnkRooms" runat="server" OnClick="lnkRooms_Click"
  CssClass="text-decoration-none">
    <div class="card">
      <div class="card-body">
        <div class="card-icon">🏠</div>
        <div class="card-title">Manage Rooms</div>
      </div>
    </div>
  </asp:LinkButton>
</div>

<!-- Manage Appointments -->
<div class="col-md-4">
  <asp:LinkButton ID="lnkAppointments" runat="server"
  OnClick="lnkAppointments_Click" CssClass="text-decoration-none">
    <div class="card">
      <div class="card-body">
        <div class="card-icon">📅</div>
        <div class="card-title">Manage Appointments</div>
      </div>
    </div>
  </asp:LinkButton>
</div>

<!-- Manage Patient Tests -->
<div class="col-md-4">
  <asp:LinkButton ID="lnkTests" runat="server" OnClick="lnkTests_Click"
  CssClass="text-decoration-none">
    <div class="card">
      <div class="card-body">
        <div class="card-icon">🔍</div>
        <div class="card-title">Manage Tests</div>
      </div>
    </div>
  </asp:LinkButton>
</div>

<!-- Manage Admissions -->
<div class="col-md-4">
  <asp:LinkButton ID="lnkAdmissions" runat="server"
  OnClick="lnkAdmissions_Click" CssClass="text-decoration-none">
    <div class="card">
      <div class="card-body">
        <div class="card-icon">👤</div>
        <div class="card-title">Manage Admissions</div>
      </div>
    </div>
  </asp:LinkButton>
</div>

<!-- Manage Invoices -->
<div class="col-md-4">
  <asp:LinkButton ID="lnkInvoices" runat="server"
  OnClick="lnkInvoices_Click" CssClass="text-decoration-none">
    <div class="card">
      <div class="card-body">
        <div class="card-icon">📄</div>

```

```

        <div class="card-title">Manage Invoices</div>
    </div>
</div>
</asp:LinkButton>
</div>
-->

</div>
</form>
<script
src="https://cdnjs.cloudflare.com/ajax/libs/bootstrap/5.3.0/js/bootstrap.bundle.
min.js"></script>
</body>
</html>

```

6.9.2 Receptionist_Dashboard.aspx.vb

```

Imports System
Imports System.Web.Security

Partial Class Receptionist_Dashboard
    Inherits System.Web.UI.Page

    Protected Sub Page_Load(sender As Object, e As EventArgs) Handles Me.Load
        If Not IsPostBack Then
            ' Ensure only receptionists can access
            Dim ticket =
FormsAuthentication.Decrypt(Request.Cookies(FormsAuthentication.FormsCookieName)
.Value)
            If ticket.UserData.Split("|c")(1) <> "RECEPTIONIST" Then
                Response.Redirect("~/Login.aspx")
            End If
        End If
    End Sub

    Protected Sub lnkPatients_Click(sender As Object, e As EventArgs)
        Response.Redirect("Manage_Patients.aspx")
    End Sub

    Protected Sub lnkRooms_Click(sender As Object, e As EventArgs)
        Response.Redirect("Manage_Rooms.aspx")
    End Sub

    Protected Sub lnkAppointments_Click(sender As Object, e As EventArgs)
        Response.Redirect("Manage_Appointments.aspx")
    End Sub

    Protected Sub lnkTests_Click(sender As Object, e As EventArgs)
        Response.Redirect("Manage_PatientTests.aspx")
    End Sub

    Protected Sub lnkAdmissions_Click(sender As Object, e As EventArgs)
        Response.Redirect("Manage_Admissions.aspx")
    End Sub

    Protected Sub lnkInvoices_Click(sender As Object, e As EventArgs)
        Response.Redirect("Manage_Invoices.aspx")
    End Sub
End Class

```

6.10.1 Manage_Patients.aspx

```
<%@ Page Language="VB" AutoEventWireup="true" CodeFile="Manage_Patients.aspx.vb"
Inherits="Manage_Patients" %>
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Manage Patients</title>
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css"
rel="stylesheet" />
</head>
<body>
    <form id="form1" runat="server" class="container mt-5">

        <div class="mb-3">
            <asp:Button ID="btnBack" runat="server" Text="Back to Dashboard"
CssClass="btn btn-secondary" OnClick="btnBack_Click" />
        </div>
        <h3 class="mb-4">Manage Patients</h3>

        <!-- Search -->
        <div class="mb-3 row">
            <div class="col-md-4">
                <asp:TextBox ID="txtSearch" runat="server" CssClass="form-
control" placeholder="Search by Name or ID"></asp:TextBox>
            </div>
            <div class="col-md-2">
                <asp:Button ID="btnSearch" runat="server" Text="Search"
CssClass="btn btn-primary" OnClick="btnSearch_Click" />
            </div>
        </div>

        <!-- Add New Patient -->
        <div class="row g-2 mb-3">
            <div class="col-md-2"><asp:TextBox ID="txtId" runat="server"
CssClass="form-control" placeholder="Patient ID" /></div>
            <div class="col-md-2"><asp:TextBox ID="txtName" runat="server"
CssClass="form-control" placeholder="Name" /></div>
            <div class="col-md-1"><asp:TextBox ID="txtAge" runat="server"
CssClass="form-control" placeholder="Age" TextMode="Number" /></div>
            <div class="col-md-2">
                <asp:DropDownList ID="ddlGender" runat="server" CssClass="form-
select">

                    <asp:ListItem Text="Select Gender" Value="" />
                    <asp:ListItem Text="Male" Value="M" />
                    <asp:ListItem Text="Female" Value="F" />
                </asp:DropDownList>
            </div>
            <div class="col-md-3"><asp:TextBox ID="txtContact" runat="server"
CssClass="form-control" placeholder="Contact No." /></div>
            <div class="col-md-2">
                <asp:Button ID="btnAdd" runat="server" Text="Add Patient"
CssClass="btn btn-success w-100" OnClick="btnAdd_Click" />
            </div>
        </div>

        <!-- Grid -->
        <asp:GridView ID="gvPatients" runat="server" CssClass="table table-
bordered"

            AutoGenerateColumns="False" DataKeyNames="PATIENT_ID"
            OnRowEditing="gvPatients_RowEditing"
```

```

        OnRowUpdating="gvPatients_RowUpdating"
        OnRowCancelingEdit="gvPatients_RowCancelingEdit"
        OnRowDeleting="gvPatients_RowDeleting">
        <Columns>
            <asp:BoundField DataField="PATIENT_ID" HeaderText="ID"
ReadOnly="True" />
            <asp:BoundField DataField="PATIENT_NAME" HeaderText="Name" />
            <asp:BoundField DataField="PATIENT_AGE" HeaderText="Age" />
            <asp:BoundField DataField="GENDER" HeaderText="Gender" />
            <asp:BoundField DataField="CONTACT" HeaderText="Contact" />
            <asp:CommandField ShowEditButton="True" ShowDeleteButton="True"
/>
        </Columns>
    </asp:GridView>

    <asp:Label ID="lblMessage" runat="server" CssClass="text-danger fw-
bold"></asp:Label>

</form>
</body>
</html>

```

6.10.2 Manage_Patients

```

Imports System.Configuration
Imports System.Data
Imports System.Data.SqlClient

Partial Class Manage_Patients
    Inherits System.Web.UI.Page

    Private ReadOnly cs As String =
ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionStri
ng").ConnectionString

    Protected Sub Page_Load(sender As Object, e As EventArgs) Handles Me.Load
        If Not IsPostBack Then
            LoadPatients()
        End If
    End Sub

    Protected Sub btnBack_Click(sender As Object, e As EventArgs)
        Response.Redirect("Receptionist_Dashboard.aspx")
    End Sub

    Private Sub LoadPatients(Optional searchTerm As String = "")
        Dim query As String = "SELECT P.PATIENT_ID, P.PATIENT_NAME,
P.PATIENT_AGE, P.GENDER, C.PATIENT_CONTACT_NUMBER AS CONTACT " &
"FROM PATIENT P INNER JOIN PATIENT_CONTACT C ON
P.PATIENT_ID = C.PATIENT_ID"

        If Not String.IsNullOrEmpty(searchTerm) Then
            query &= " WHERE P.PATIENT_ID LIKE @term OR P.PATIENT_NAME LIKE
@term"
        End If

        Using conn As New SqlConnection(cs), cmd As New SqlCommand(query, conn)
            If Not String.IsNullOrEmpty(searchTerm) Then
                cmd.Parameters.AddWithValue("@term", "%" & searchTerm & "%")
            End If
            Dim dt As New DataTable()
            Using da As New SqlDataAdapter(cmd)

```

```

        da.Fill(dt)
    End Using
    gvPatients.DataSource = dt
    gvPatients.DataBind()
End Using
End Sub

Protected Sub btnAdd_Click(sender As Object, e As EventArgs)
    lblMessage.Text = ""
    lblMessage.CssClass = "text-danger"

    ' Validate inputs
    If txtId.Text.Trim() = "" OrElse txtName.Text.Trim() = "" OrElse
txtAge.Text.Trim() = "" OrElse ddlGender.SelectedValue = "" OrElse
txtContact.Text.Trim() = "" Then
        lblMessage.Text = "All fields are required."
        Return
    End If

    Try
        Using conn As New SqlConnection(cs)
            conn.Open()

            ' Check for duplicate ID
            Dim checkCmd As New SqlCommand("SELECT COUNT(*) FROM PATIENT
WHERE PATIENT_ID=@id", conn)
            checkCmd.Parameters.AddWithValue("@id", txtId.Text.Trim())
            If Convert.ToInt32(checkCmd.ExecuteScalar()) > 0 Then
                lblMessage.Text = "Patient ID already exists. Please use a
different ID."
                Return
            End If

            ' Start transaction
            Dim transaction = conn.BeginTransaction()

            Try
                ' Insert into PATIENT
                Dim cmd1 As New SqlCommand("INSERT INTO PATIENT (PATIENT_ID,
PATIENT_NAME, PATIENT_AGE, GENDER) VALUES (@id, @name, @age, @gender)", conn,
transaction)

                cmd1.Parameters.AddWithValue("@id", txtId.Text.Trim())
                cmd1.Parameters.AddWithValue("@name", txtName.Text.Trim())
                cmd1.Parameters.AddWithValue("@age",
Convert.ToInt32(txtAge.Text.Trim()))
                cmd1.Parameters.AddWithValue("@gender",
ddlGender.SelectedValue)
                cmd1.ExecuteNonQuery()

                ' Insert into PATIENT_CONTACT
                Dim cmd2 As New SqlCommand("INSERT INTO PATIENT_CONTACT
(PATIENT_ID, PATIENT_CONTACT_NUMBER) VALUES (@id, @contact)", conn, transaction)
                cmd2.Parameters.AddWithValue("@id", txtId.Text.Trim())
                cmd2.Parameters.AddWithValue("@contact",
txtContact.Text.Trim())
                cmd2.ExecuteNonQuery()

                transaction.Commit()
                lblMessage.CssClass = "text-success"
                lblMessage.Text = "Patient added successfully."
                ClearForm()
                LoadPatients()
            End Try
        End Using
    End Try
End Sub

```

```

        Catch ex As Exception
            transaction.Rollback()
            lblMessage.Text = "Error: " & ex.Message
        End Try
    End Using
    Catch ex As Exception
        lblMessage.Text = "Error: " & ex.Message
    End Try
End Sub

Protected Sub btnSearch_Click(sender As Object, e As EventArgs)
    gvPatients.EditIndex = -1
    LoadPatients(txtSearch.Text.Trim())
End Sub

Private Sub ClearForm()
    txtId.Text = ""
    txtName.Text = ""
    txtAge.Text = ""
    txtContact.Text = ""
    ddlGender.SelectedIndex = 0
End Sub

Protected Sub gvPatients_RowEditing(sender As Object, e As
GridViewEditEventArgs)
    gvPatients.EditIndex = e.NewEditIndex
    LoadPatients()
End Sub

Protected Sub gvPatients_RowCancelingEdit(sender As Object, e As
GridViewCancelEventArgs)
    gvPatients.EditIndex = -1
    LoadPatients()
End Sub

Protected Sub gvPatients_RowUpdating(sender As Object, e As
GridViewUpdateEventArgs)
    Dim row = gvPatients.Rows(e.RowIndex)
    Dim id = gvPatients.DataKeys(e.RowIndex).Value.ToString()
    Dim name = CType(row.Cells(1).Controls(0), TextBox).Text
    Dim age = CType(row.Cells(2).Controls(0), TextBox).Text
    Dim gender = CType(row.Cells(3).Controls(0), TextBox).Text
    Dim contact = CType(row.Cells(4).Controls(0), TextBox).Text

    Try
        Using conn As New SqlConnection(cs)
            conn.Open()
            Dim cmd1 As New SqlCommand("UPDATE PATIENT SET
PATIENT_NAME=@name, PATIENT_AGE=@age, GENDER=@gender WHERE PATIENT_ID=@id",
conn)

            cmd1.Parameters.AddWithValue("@id", id)
            cmd1.Parameters.AddWithValue("@name", name)
            cmd1.Parameters.AddWithValue("@age", age)
            cmd1.Parameters.AddWithValue("@gender", gender)
            cmd1.ExecuteNonQuery()

            Dim cmd2 As New SqlCommand("UPDATE PATIENT_CONTACT SET
PATIENT_CONTACT_NUMBER=@contact WHERE PATIENT_ID=@id", conn)
            cmd2.Parameters.AddWithValue("@id", id)
            cmd2.Parameters.AddWithValue("@contact", contact)
            cmd2.ExecuteNonQuery()
        End Using
    End Try
End Sub

```

```

        gvPatients.EditIndex = -1
        LoadPatients()
    Catch ex As Exception
        lblMessage.Text = "Error: " & ex.Message
    End Try
End Sub

Protected Sub gvPatients_RowDeleting(sender As Object, e As
GridViewDeleteEventArgs)
    Dim id = gvPatients.DataKeys(e.RowIndex).Value.ToString()

    Try
        Using conn As New SqlConnection(cs)
            conn.Open()

            Dim tran As SqlTransaction = conn.BeginTransaction()

            Try
                ' First delete from dependent table: PATIENT_CONTACT
                Dim cmd1 As New SqlCommand("DELETE FROM PATIENT_CONTACT
WHERE PATIENT_ID=@id", conn, tran)
                cmd1.Parameters.AddWithValue("@id", id)
                cmd1.ExecuteNonQuery()

                ' Then delete from main table: PATIENT
                Dim cmd2 As New SqlCommand("DELETE FROM PATIENT WHERE
PATIENT_ID=@id", conn, tran)
                cmd2.Parameters.AddWithValue("@id", id)
                cmd2.ExecuteNonQuery()

                tran.Commit()
                lblMessage.CssClass = "text-success"
                lblMessage.Text = "Patient deleted successfully."
            Catch exInner As SqlException
                tran.Rollback()

                If exInner.Number = 547 Then
                    lblMessage.CssClass = "text-danger"
                    lblMessage.Text = "Cannot delete: This patient has
related records (appointments, admissions, etc.)."
                Else
                    lblMessage.CssClass = "text-danger"
                    lblMessage.Text = "SQL Error: " & exInner.Message
                End If
            End Try
        End Using

        gvPatients.EditIndex = -1
        LoadPatients()
    Catch ex As Exception
        lblMessage.CssClass = "text-danger"
        lblMessage.Text = "Error: " & ex.Message
    End Try
End Sub

End Class

```

6.11.1 Manage_Rooms

```
<%@ Page Language="VB" AutoEventWireup="true" CodeFile="Manage_Rooms.aspx.vb"
Inherits="Manage_Rooms" %>

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Manage Rooms</title>
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css"
rel="stylesheet" />
</head>
<body>
    <form id="form1" runat="server" class="container mt-5">

        <div class="mt-4">
            <asp:Button ID="btnBack" runat="server" Text="Back to Dashboard"
CssClass="btn btn-secondary" OnClick="btnBack_Click" />
        </div>
        <h3 class="mb-4">Manage Rooms</h3>

        <!-- Search -->
        <div class="mb-3 row">
            <div class="col-md-4">
                <asp:TextBox ID="txtSearch" runat="server" CssClass="form-
control" placeholder="Search by Room ID or Type"></asp:TextBox>
            </div>
            <div class="col-md-2">
                <asp:Button ID="btnSearch" runat="server" Text="Search"
CssClass="btn btn-primary" OnClick="btnSearch_Click" />
            </div>
        </div>

        <!-- Rooms Grid -->
        <asp:GridView ID="gvRooms" runat="server" CssClass="table table-
bordered"
                    AutoGenerateColumns="False">
            <Columns>
                <asp:BoundField DataField="ROOM_ID" HeaderText="Room ID" />
                <asp:BoundField DataField="ROOM_TYPE" HeaderText="Type" />
                <asp:BoundField DataField="ROOM_CAPACITY" HeaderText="Capacity"
/>
                <asp:BoundField DataField="ROOM_AVAILABILITY"
HeaderText="Availability" />
            </Columns>
        </asp:GridView>

        <asp:Label ID="lblMessage" runat="server" CssClass="text-danger fw-
bold"></asp:Label>
    </form>
</body>
</html>
```

6.11.2 Manage_Rooms.aspx.vb

```
Imports System.Configuration
Imports System.Data
Imports System.Data.SqlClient

Partial Class Manage_Rooms
```

```

Inherits System.Web.UI.Page

Private ReadOnly cs As String =
ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionStri
ng").ConnectionString

Protected Sub Page_Load(sender As Object, e As EventArgs) Handles Me.Load
    If Not IsPostBack Then
        LoadRooms()
    End If
End Sub

Protected Sub btnBack_Click(sender As Object, e As EventArgs)
    Response.Redirect("Receptionist_Dashboard.aspx")
End Sub

Private Sub LoadRooms(Optional searchTerm As String = "")
    Dim query As String = "SELECT ROOM_ID, ROOM_TYPE, ROOM_CAPACITY,
ROOM_AVAILABILITY FROM ROOMS"

    If Not String.IsNullOrEmpty(searchTerm) Then
        query &= " WHERE ROOM_ID LIKE @term OR ROOM_TYPE LIKE @term"
    End If

    Using conn As New SqlConnection(cs), cmd As New SqlCommand(query, conn)
        If Not String.IsNullOrEmpty(searchTerm) Then
            cmd.Parameters.AddWithValue("@term", "%" & searchTerm & "%")
        End If

        Dim dt As New DataTable()
        Using da As New SqlDataAdapter(cmd)
            da.Fill(dt)
        End Using

        gvRooms.DataSource = dt
        gvRooms.DataBind()
    End Using
End Sub

Protected Sub btnSearch_Click(sender As Object, e As EventArgs)
    LoadRooms(txtSearch.Text.Trim())
End Sub
End Class

```

6.12.1 Manage_Appointments.aspx

```

<%@ Page Language="VB" AutoEventWireup="true"
CodeFile="Manage_Appointments.aspx.vb" Inherits="Manage_Appointments" %>

<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Manage Appointments</title>
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css"
rel="stylesheet" />
</head>
<body>
    <form id="form1" runat="server" class="container mt-5">

        <div class="mt-4">

```

```

        <asp:Button ID="btnBack" runat="server" Text="Back to Dashboard"
        CssClass="btn btn-secondary" OnClick="btnBack_Click" />
    </div>
    <h3 class="mb-4">Manage Appointments</h3>

    <hr />
    <h4 class="mt-5">Search Doctors by Department</h4>
    <div class="row mb-3">
        <div class="col-md-4">
            <asp:TextBox ID="txtDepartmentSearch" runat="server"
            CssClass="form-control" placeholder="Enter Department" />
        </div>
        <div class="col-md-2">
            <asp:Button ID="btnSearchDoctors" runat="server" Text="Search
            Doctors" CssClass="btn btn-primary" OnClick="btnSearchDoctors_Click"/>
        </div>
    </div>

    <asp:GridView ID="gvDoctors" runat="server" CssClass="table table-
    bordered"
        AutoGenerateColumns="False">
        <Columns>
            <asp:BoundField DataField="EMPLOYEE_ID" HeaderText="Doctor ID"
            />
            <asp:BoundField DataField="EMPLOYEE_NAME" HeaderText="Name" />
            <asp:BoundField DataField="EMPLOYEE_DEPARTMENT"
            HeaderText="Department" />
            <asp:BoundField DataField="EMPLOYEE_DESIGNATION"
            HeaderText="Designation" />
            <asp:BoundField DataField="ROOM_ID" HeaderText="Room ID" />
        </Columns>
    </asp:GridView>

    <div class="mb-3 row">
        <div class="col-md-4">
            <asp:TextBox ID="txtSearch" runat="server" CssClass="form-
            control" placeholder="Search by Patient or Doctor ID"></asp:TextBox>
        </div>
        <div class="col-md-2">
            <asp:Button ID="btnSearch" runat="server" Text="Search"
            CssClass="btn btn-primary" OnClick="btnSearch_Click"/>
        </div>
    </div>

    <!-- Add Appointment -->
    <div class="row g-2 mb-3">
        <div class="col-md-3"><asp:TextBox ID="txtAppointmentID"
        runat="server" CssClass="form-control" placeholder="Appointment ID" /></div>
        <div class="col-md-3"><asp:TextBox ID="txtEmployeeID" runat="server"
        CssClass="form-control" placeholder="Doctor ID" /></div>
        <div class="col-md-3"><asp:TextBox ID="txtPatientID" runat="server"
        CssClass="form-control" placeholder="Patient ID" /></div>
        <div class="col-md-3"><asp:TextBox ID="txtDate" runat="server"
        CssClass="form-control" TextMode="DateTimeLocal" /></div>
    </div>
    <div class="row mb-3">
        <div class="col-md-2">
            <asp:Button ID="btnAdd" runat="server" Text="Add Appointment"
            CssClass="btn btn-success w-100" OnClick="btnAdd_Click" />
        </div>
    </div>

```

```

<!-- Grid -->
<asp:GridView ID="gvAppointments" runat="server" CssClass="table table-
bordered"
                AutoGenerateColumns="False" DataKeyNames="APPOINTMENT_ID"
                OnRowEditing="gvAppointments_RowEditing"
                OnRowUpdating="gvAppointments_RowUpdating"
                OnRowCancelingEdit="gvAppointments_RowCancelingEdit"
                OnRowDeleting="gvAppointments_RowDeleting">
    <Columns>
        <asp:BoundField DataField="APPOINTMENT_ID"
HeaderText="Appointment ID" ReadOnly="True" />
        <asp:BoundField DataField="EMPLOYEE_ID" HeaderText="Doctor ID"
/>
        <asp:BoundField DataField="PATIENT_ID" HeaderText="Patient ID"
/>
        <asp:BoundField DataField="APPOINTMENT_DATE" HeaderText="Date"
DataFormatString="{0:yyyy-MM-dd HH:mm}" />
        <asp:CommandField ShowEditButton="True" ShowDeleteButton="True"
/>
    </Columns>
</asp:GridView>

<asp:Label ID="lblMessage" runat="server" CssClass="text-danger fw-bold"
/>
</form>
</body>
</html>

```

6.12.2 Manage_Appointments

```

Imports System.Configuration
Imports System.Data
Imports System.Data.SqlClient

```

```

Partial Class Manage_Appointments
    Inherits System.Web.UI.Page

```

```

    Private ReadOnly cs As String =
ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionStri
ng").ConnectionString

```

```

    Protected Sub Page_Load(sender As Object, e As EventArgs) Handles Me.Load
        If Not IsPostBack Then LoadAppointments()
    End Sub

```

```

    Protected Sub btnBack_Click(sender As Object, e As EventArgs)
        Response.Redirect("Receptionist_Dashboard.aspx")
    End Sub

```

```

    Protected Sub btnSearchDoctors_Click(sender As Object, e As EventArgs)
        Dim dept As String = txtDepartmentSearch.Text.Trim()
        If dept <> "" Then
            LoadDoctorsByDepartment(dept)
        End If
    End Sub

```

```

    Private Sub LoadDoctorsByDepartment(dept As String)
        Dim query As String = "SELECT EMPLOYEE_ID, EMPLOYEE_NAME,
EMPLOYEE_DEPARTMENT, EMPLOYEE_DESIGNATION, ROOM_ID FROM EMPLOYEE WHERE
(EMPLOYEE_DESIGNATION LIKE '%Doctor%') AND EMPLOYEE_DEPARTMENT LIKE @dept"

```

```

        Using conn As New SqlConnection(cs), cmd As New SqlCommand(query, conn)
            cmd.Parameters.AddWithValue("@dept", "%" & dept & "%") ' partial
match
        Dim dt As New DataTable()
        Using da As New SqlDataAdapter(cmd)
            da.Fill(dt)
        End Using
        gvDoctors.DataSource = dt
        gvDoctors.DataBind()
    End Using
End Sub

Private Sub LoadAppointments(Optional search As String = "")
    Dim query As String = "SELECT * FROM APPOINTMENT"
    If Not String.IsNullOrEmpty(search) Then
        query &= " WHERE PATIENT_ID LIKE @term OR EMPLOYEE_ID LIKE @term"
    End If

    Using conn As New SqlConnection(cs), cmd As New SqlCommand(query, conn)
        If Not String.IsNullOrEmpty(search) Then
            cmd.Parameters.AddWithValue("@term", "%" & search & "%")
        End If
        Dim dt As New DataTable()
        Using da As New SqlDataAdapter(cmd)
            da.Fill(dt)
        End Using
        gvAppointments.DataSource = dt
        gvAppointments.DataBind()
    End Using
End Sub

Protected Sub btnAdd_Click(sender As Object, e As EventArgs)
    lblMessage.Text = ""

    If txtAppointmentID.Text = "" OrElse txtEmployeeID.Text = "" OrElse
txtPatientID.Text = "" OrElse txtDate.Text = "" Then
        lblMessage.Text = "All fields are required."
        Return
    End If

    Try
        Using conn As New SqlConnection(cs)
            conn.Open()
            Dim checkCmd As New SqlCommand("SELECT COUNT(*) FROM APPOINTMENT
WHERE APPOINTMENT_ID = @id", conn)
            checkCmd.Parameters.AddWithValue("@id",
txtAppointmentID.Text.Trim())
            If CInt(checkCmd.ExecuteScalar()) > 0 Then
                lblMessage.Text = "Appointment ID already exists."
                Return
            End If

            Dim insertCmd As New SqlCommand("INSERT INTO APPOINTMENT
(APPOINTMENT_ID, EMPLOYEE_ID, PATIENT_ID, APPOINTMENT_DATE) VALUES (@aid, @eid,
@pid, @dt)", conn)
            insertCmd.Parameters.AddWithValue("@aid",
txtAppointmentID.Text.Trim())
            insertCmd.Parameters.AddWithValue("@eid",
txtEmployeeID.Text.Trim())
            insertCmd.Parameters.AddWithValue("@pid",
txtPatientID.Text.Trim())

```

```

        insertCmd.Parameters.AddWithValue("@dt",
DateTime.Parse(txtDate.Text.Trim()))
        insertCmd.ExecuteNonQuery()
    End Using
    lblMessage.CssClass = "text-success"
    lblMessage.Text = "Appointment added successfully."
    LoadAppointments()
Catch ex As Exception
    lblMessage.Text = "Error: " & ex.Message
End Try
End Sub

Protected Sub btnSearch_Click(sender As Object, e As EventArgs)
    gvAppointments.EditIndex = -1
    LoadAppointments(txtSearch.Text.Trim())
End Sub

Protected Sub gvAppointments_RowEditing(sender As Object, e As
GridViewEditEventArgs)
    gvAppointments.EditIndex = e.NewEditIndex
    LoadAppointments()
End Sub

Protected Sub gvAppointments_RowCancelingEdit(sender As Object, e As
GridViewCancelEventArgs)
    gvAppointments.EditIndex = -1
    LoadAppointments()
End Sub

Protected Sub gvAppointments_RowUpdating(sender As Object, e As
GridViewUpdateEventArgs)
    Dim row = gvAppointments.Rows(e.RowIndex)
    Dim id = gvAppointments.DataKeys(e.RowIndex).Value.ToString()
    Dim eid = CType(row.Cells(1).Controls(0), TextBox).Text
    Dim pid = CType(row.Cells(2).Controls(0), TextBox).Text
    Dim dt = CType(row.Cells(3).Controls(0), TextBox).Text

    Try
        Using conn As New SqlConnection(cs)
            conn.Open()
            Dim updateCmd As New SqlCommand("UPDATE APPOINTMENT SET
EMPLOYEE_ID=@e, PATIENT_ID=@p, APPOINTMENT_DATE=@d WHERE APPOINTMENT_ID=@id",
conn)
            updateCmd.Parameters.AddWithValue("@e", eid)
            updateCmd.Parameters.AddWithValue("@p", pid)
            updateCmd.Parameters.AddWithValue("@d", DateTime.Parse(dt))
            updateCmd.Parameters.AddWithValue("@id", id)
            updateCmd.ExecuteNonQuery()
        End Using
        gvAppointments.EditIndex = -1
        LoadAppointments()
    Catch ex As Exception
        lblMessage.Text = "Error: " & ex.Message
    End Try
End Sub

Protected Sub gvAppointments_RowDeleting(sender As Object, e As
GridViewDeleteEventArgs)
    Dim id = gvAppointments.DataKeys(e.RowIndex).Value.ToString()
    Try
        Using conn As New SqlConnection(cs)
            conn.Open()

```

```

        Dim delCmd As New SqlCommand("DELETE FROM APPOINTMENT WHERE
APPOINTMENT_ID=@id", conn)
        delCmd.Parameters.AddWithValue("@id", id)
        delCmd.ExecuteNonQuery()
    End Using
    LoadAppointments()
Catch ex As Exception
    lblMessage.Text = "Error deleting: " & ex.Message
End Try
End Sub
End Class

```

6.13.1 Manage_PatientTests.aspx

```

<%@ Page Language="VB" AutoEventWireup="true"
CodeFile="Manage_PatientTests.aspx.vb" Inherits="Manage_PatientTests" %>
<!DOCTYPE html>
<html xmlns="http://www.w3.org/1999/xhtml">
<head runat="server">
    <title>Manage Patient Tests</title>
    <link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.3.0/dist/css/bootstrap.min.css"
rel="stylesheet" />
</head>
<body>
    <form id="form1" runat="server" class="container mt-5">

        <div class="mt-4">
            <asp:Button ID="btnBack" runat="server" Text="Back to Dashboard"
CssClass="btn btn-secondary" OnClick="btnBack_Click" />
        </div>
        <h3 class="mb-4">Manage Patient Tests</h3>

        <!-- Search -->
        <div class="mb-3 row">
            <div class="col-md-4">
                <asp:TextBox ID="txtSearch" runat="server" CssClass="form-
control" placeholder="Search by Test Name or ID"></asp:TextBox>
            </div>
            <div class="col-md-2">
                <asp:Button ID="btnSearch" runat="server" Text="Search"
CssClass="btn btn-primary w-100" OnClick="btnSearch_Click" />
            </div>
        </div>

        <!-- Grid -->
        <asp:GridView ID="gvTests" runat="server" CssClass="table table-
bordered"
            AutoGenerateColumns="False">
            <Columns>
                <asp:BoundField DataField="TEST_ID" HeaderText="Test ID" />
                <asp:BoundField DataField="TEST_NAME" HeaderText="Test Name" />
                <asp:BoundField DataField="TEST_COST" HeaderText="Cost"
DataFormatString="{0:C}" />
            </Columns>
        </asp:GridView>

    </form>
</body>
</html>

```

6.13.2 Manage_PatientTests.aspx.vb

```
Imports System.Configuration
Imports System.Data
Imports System.Data.SqlClient

Partial Class Manage_PatientTests
    Inherits System.Web.UI.Page

    Private ReadOnly cs As String =
ConfigurationManager.ConnectionStrings("Hospital_Management_SystemConnectionStri
ng").ConnectionString

    Protected Sub Page_Load(sender As Object, e As EventArgs) Handles Me.Load
        If Not IsPostBack Then
            LoadTests()
        End If
    End Sub

    Protected Sub btnBack_Click(sender As Object, e As EventArgs)
        Response.Redirect("Receptionist_Dashboard.aspx")
    End Sub

    Protected Sub btnSearch_Click(sender As Object, e As EventArgs)
        LoadTests(txtSearch.Text.Trim())
    End Sub

    Private Sub LoadTests(Optional searchTerm As String = "")
        Dim query As String = "SELECT TEST_ID, TEST_NAME, TEST_COST FROM TEST"

        If Not String.IsNullOrEmpty(searchTerm) Then
            query &= " WHERE TEST_ID LIKE @term OR TEST_NAME LIKE @term"
        End If

        Using conn As New SqlConnection(cs), cmd As New SqlCommand(query, conn)
            If Not String.IsNullOrEmpty(searchTerm) Then
                cmd.Parameters.AddWithValue("@term", "%" & searchTerm & "%")
            End If

            Dim dt As New DataTable()
            Using da As New SqlDataAdapter(cmd)
                da.Fill(dt)
            End Using

            gvTests.DataSource = dt
            gvTests.DataBind()
        End Using
    End Sub
End Class
```
