# CTU 2025

## Advanced Design Pattern

## ADP631

## 2025

## Formative Assessment: - 1


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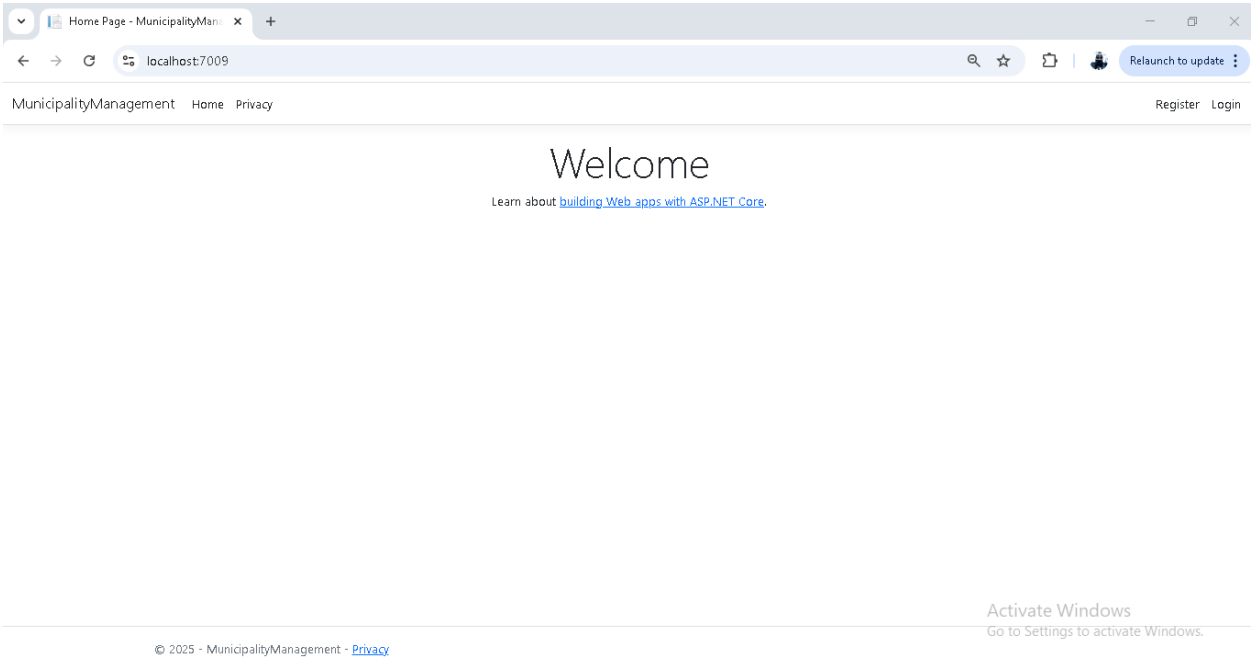
20220865@ctucareer.co.za


**04th April 2025**:

# The Beginning

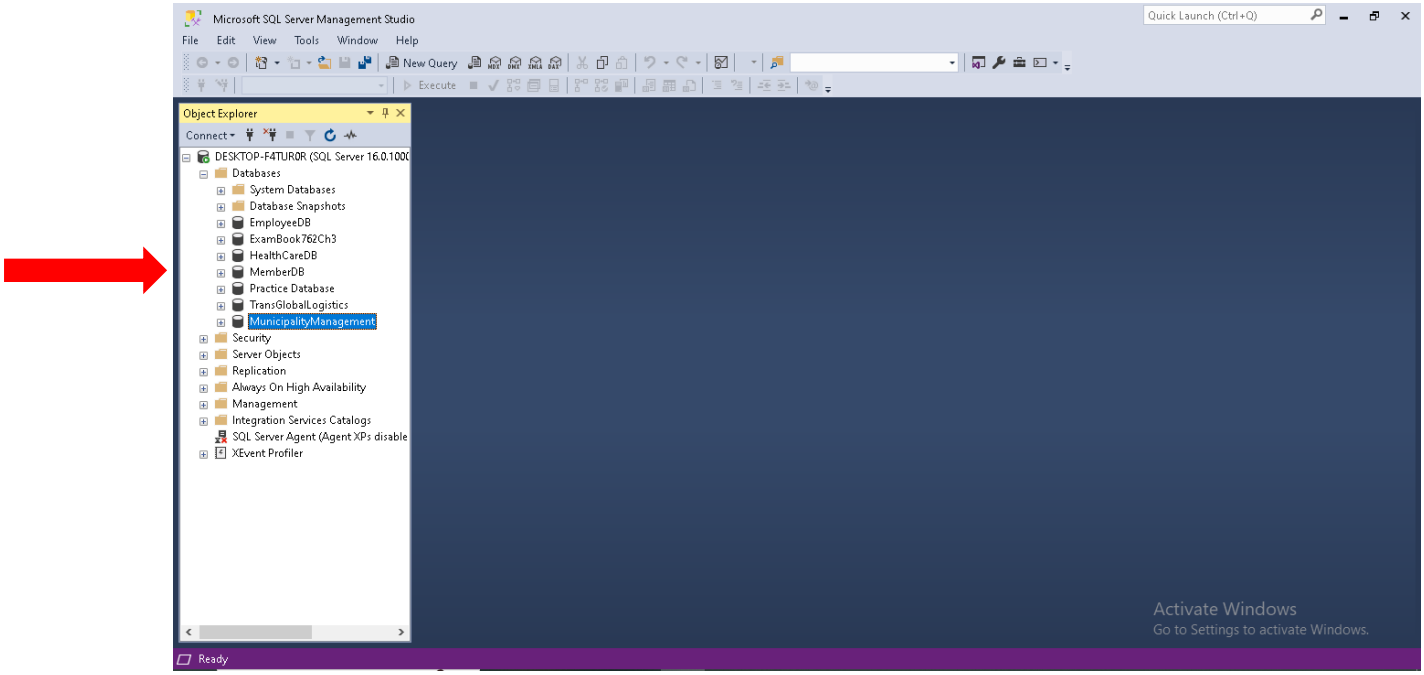
**ASP.Net Core MVC = Local Host**



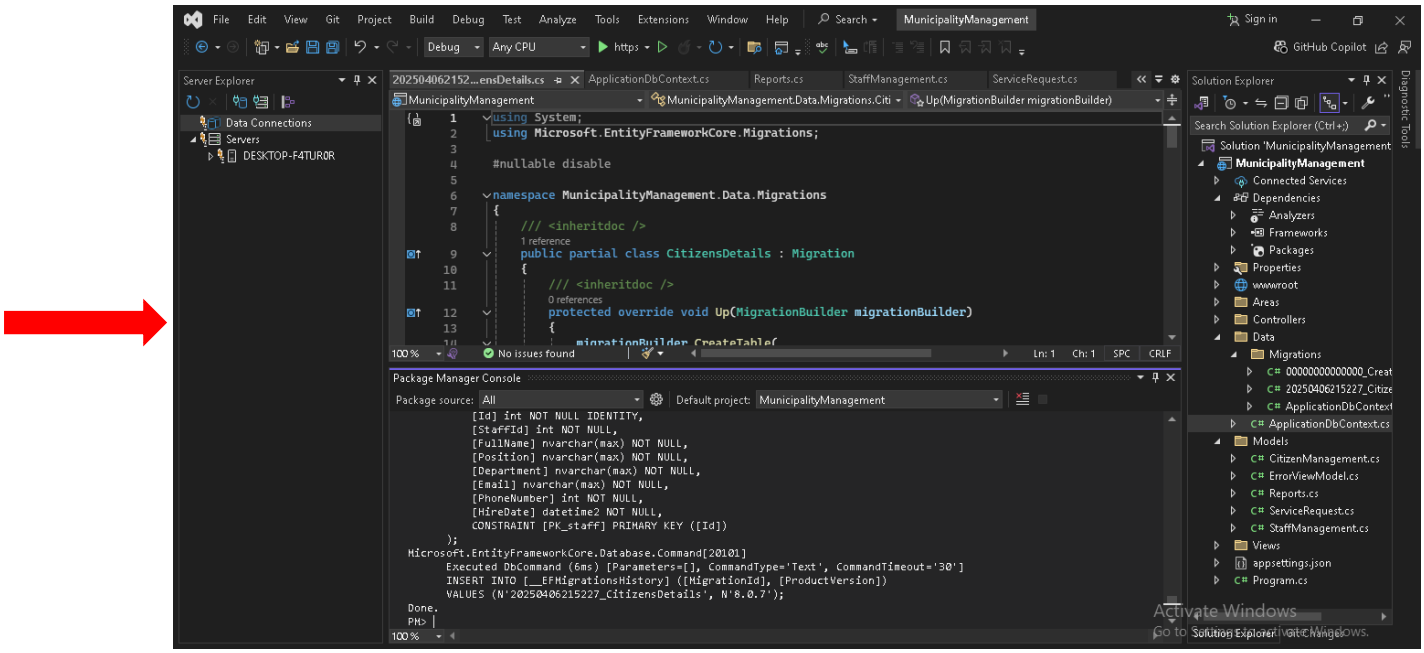

Link to the website Municipality Management System full build - https://localhost:7009/

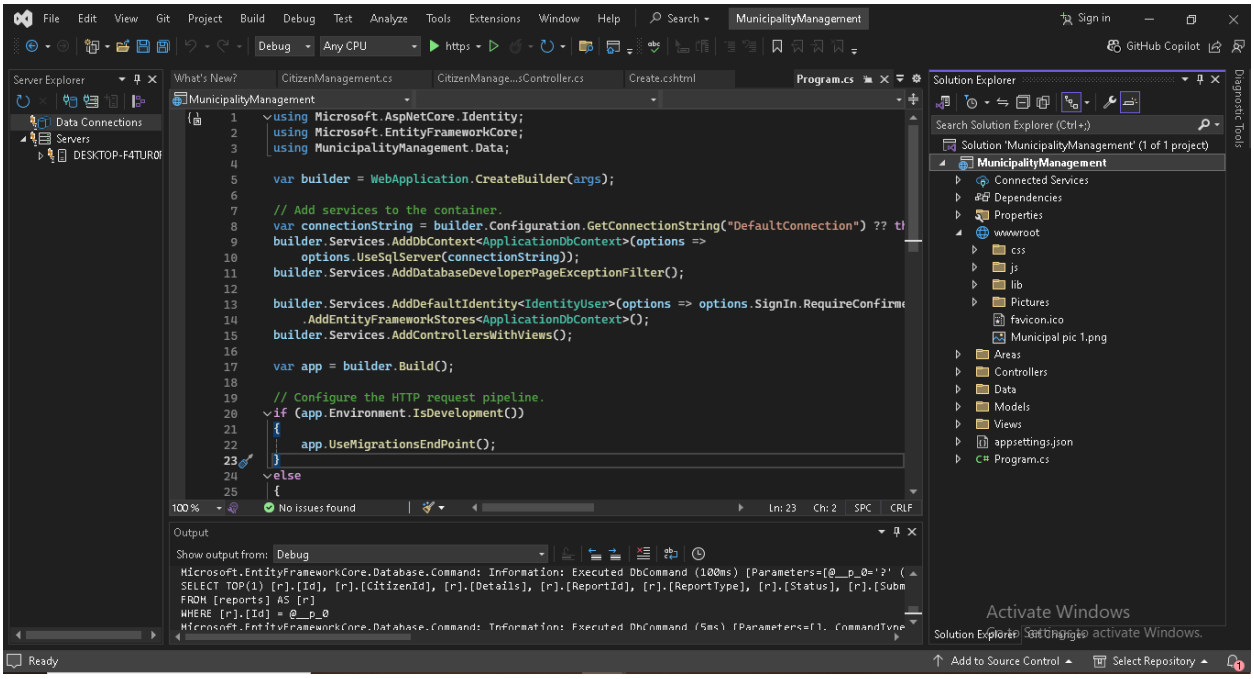
# Database Design

## Connecting web design to SQL Server Management

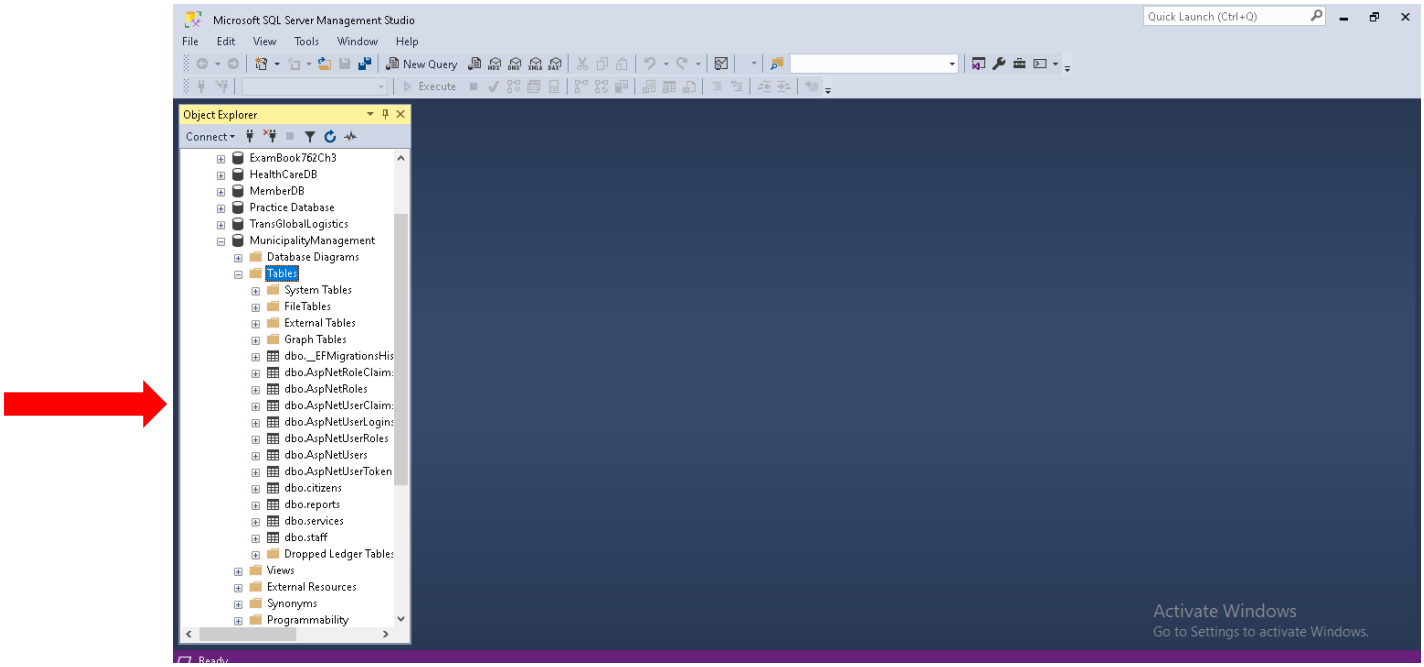



## NuGet Packager Manager Tools Loaded

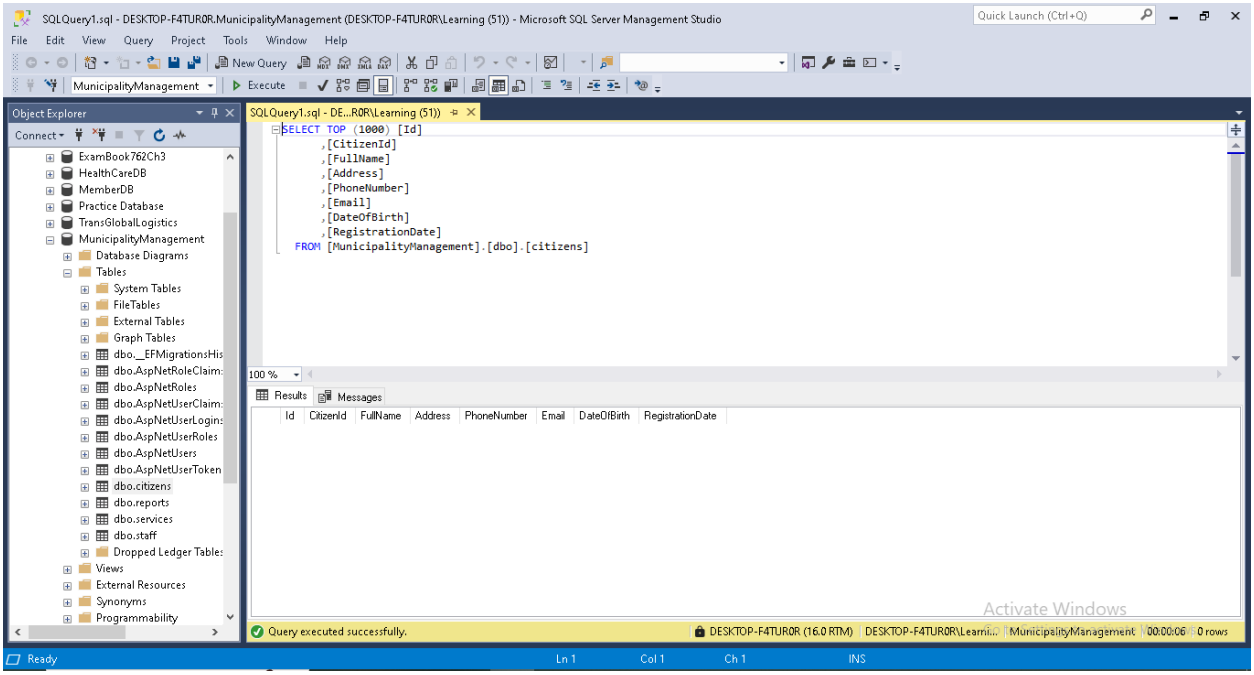




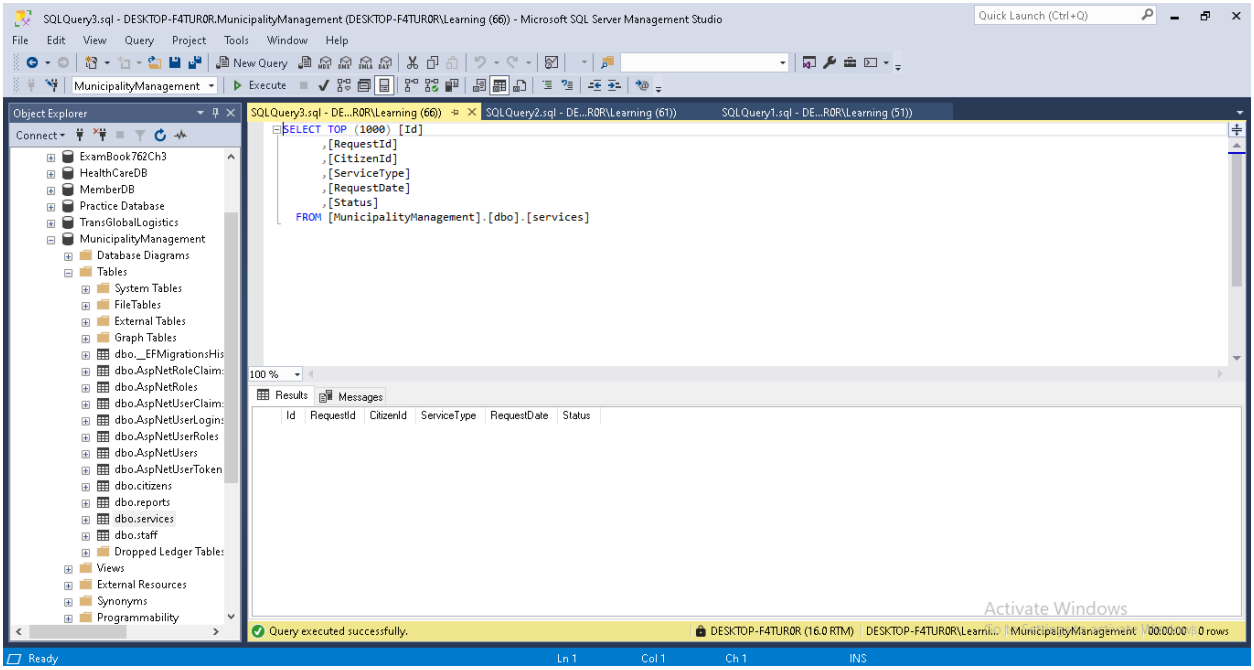

## Database Tables linked from my Municipality Management System to SQL Server Management



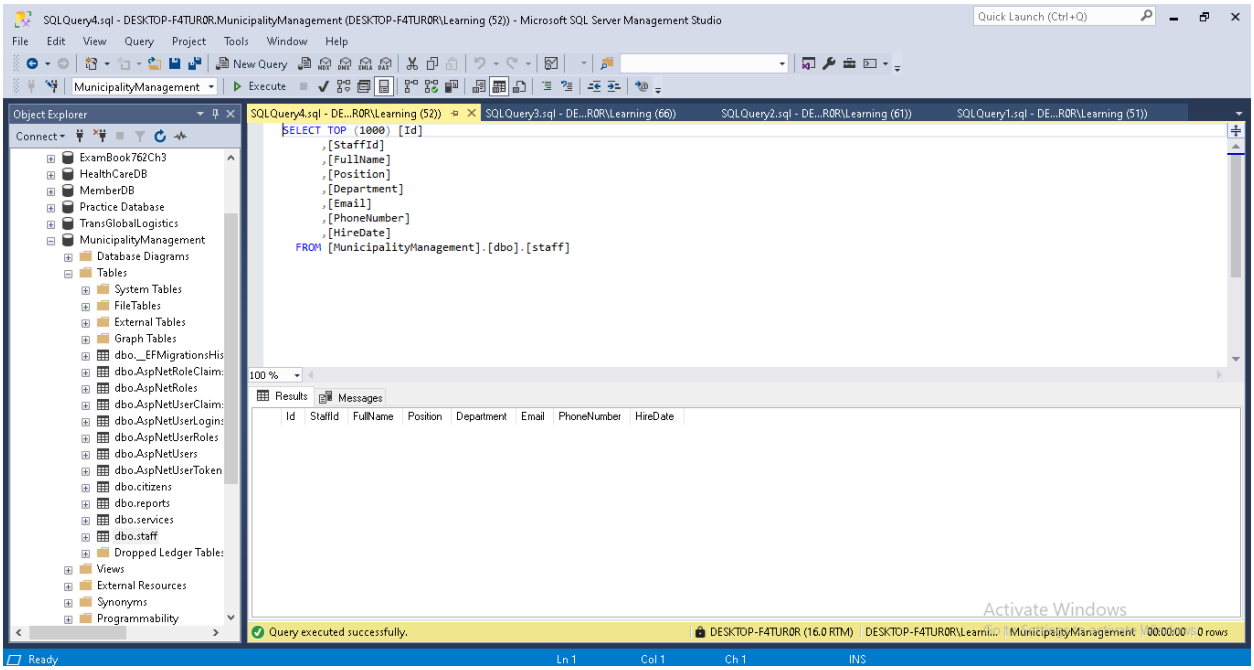
## Citizens



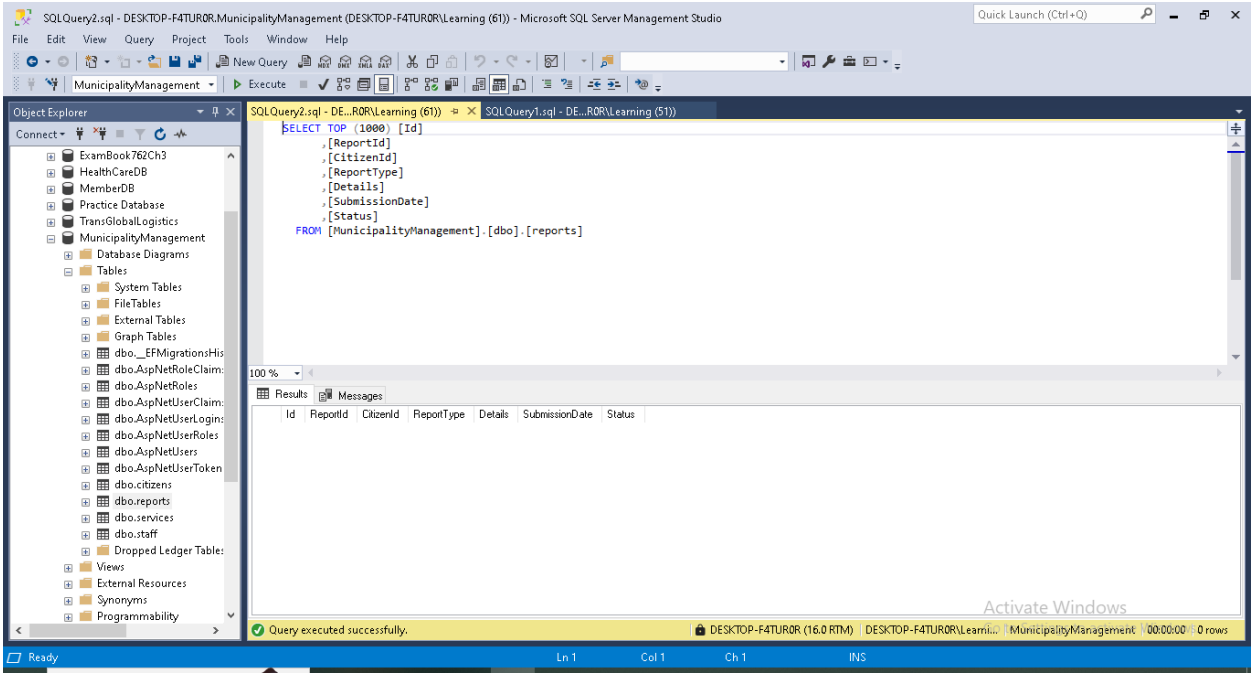

## Service Requests



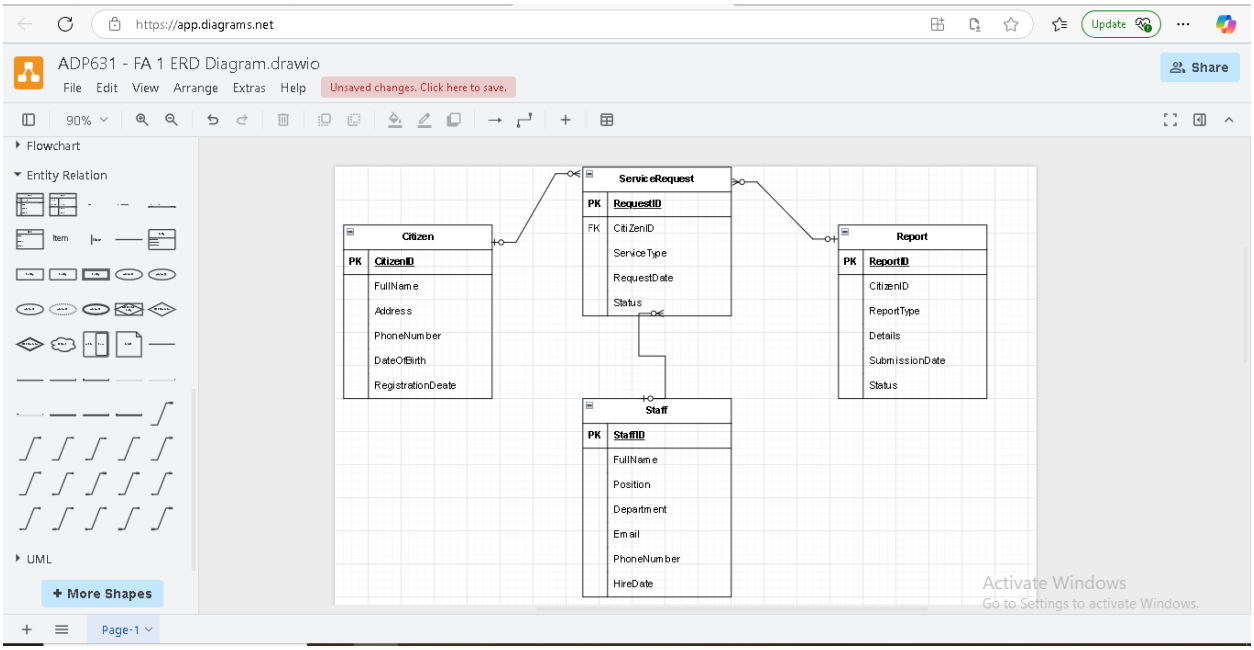
## Staff Management

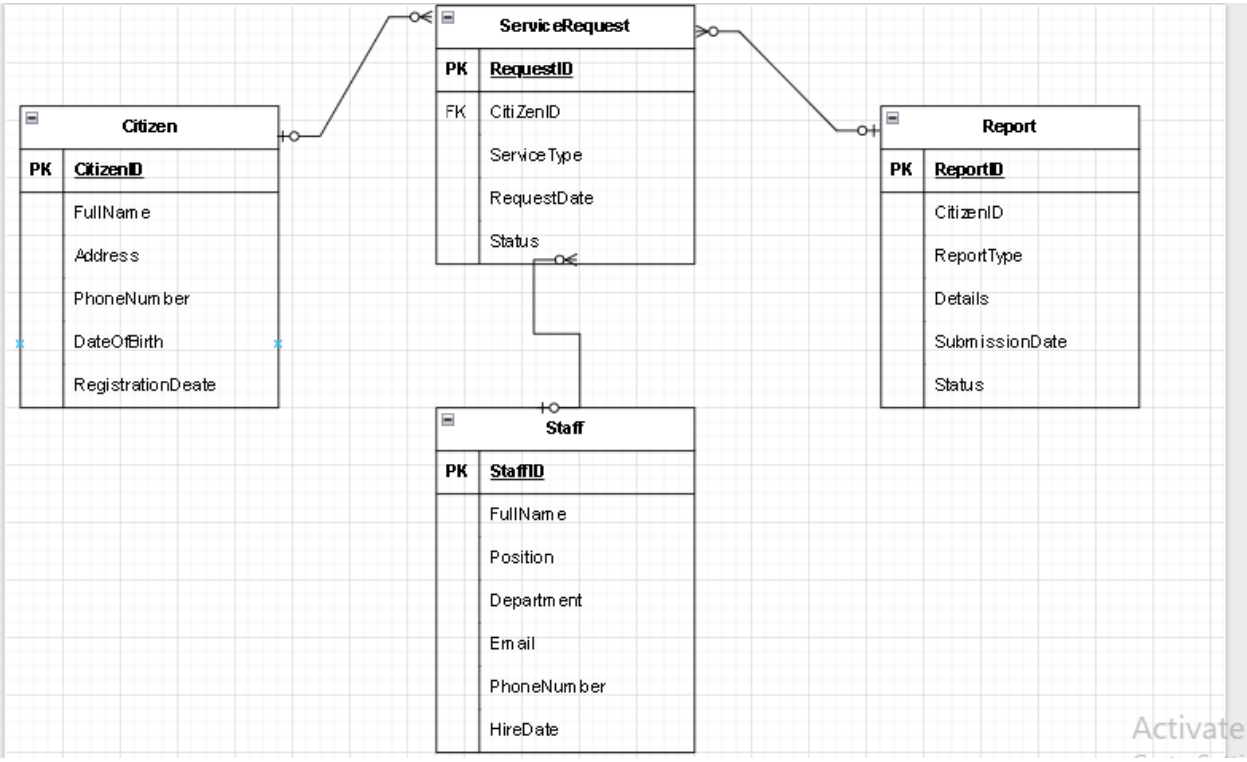



## Reports

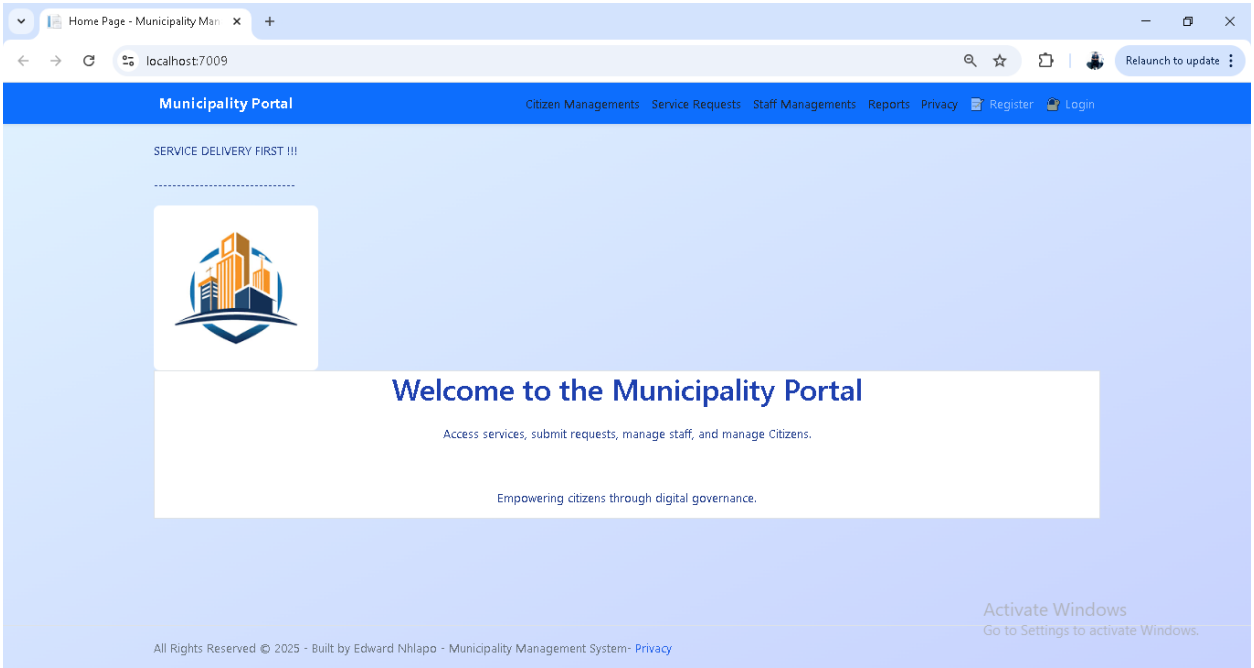


# ERD Diagram


https://app.diagrams.net
ADP631 - FA 1 ERD Diagram.drawio
File Edit View Arrange Extras Help
Unsaved changes. Click here to save.
Share
Flowchart
Entity Relation
UML
More Shapes
Page-1
ServiceRequest
PK RequestID
FK CitizenID
ServiceType
RequestDate
Status
Citizen
PK CitizenID
FullName
Address
PhoneNumber
DateOfBirth
RegistrationDeate
Report
PK ReportID
CitizenID
ReportType
Details
SubmissionDate
Status
Staff
PK StaffID
FullName
Position
Department
Email
PhoneNumber
HireDate
Activate Windows
Go to Settings to activate Windows.


ServiceRequest
PK RequestID
FK CitizenID
ServiceType
RequestDate
Status
Citizen
PK CitizenID
FullName
Address
PhoneNumber
DateOfBirth
RegistrationDeate
Report
PK ReportID
CitizenID
ReportType
Details
SubmissionDate
Status
Staff
PK StaffID
FullName
Position
Department
Email
PhoneNumber
HireDate
Activate

## Project set up and Development

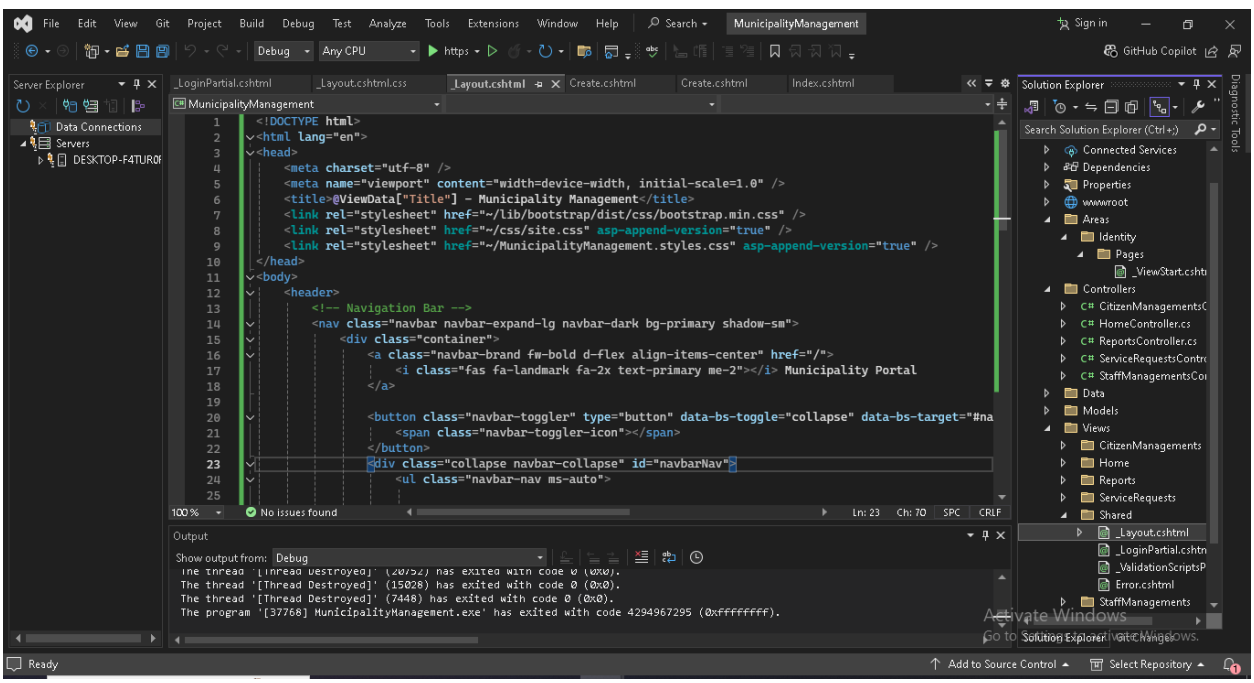



**Home Page Design**:

```
@{
    ViewData["Title"] = "Home Page";
}

<div class="min-h-screen bg-gradient-to-r from-blue-100 to-indigo-200 flex flex-col
items-center justify-center p-6">
    <p class="mt-4 text-sm text-gray-700 font-bold">
        SERVICE DELIVERY FIRST !!!
    </p>
    <p class="mt-4 text-sm text-gray-500">
        ------------------------------
    </p>
    <!-- Centered Image -->
    <img src="~/Municipal pic 1.png" alt="Municipality Logo" class="w-40 h-40 mb-6
rounded-full shadow-md border-4 border-white" />

    <!-- Welcome Text Box -->
    <div class="text-center max-w-xl p-8 bg-white rounded-2xl shadow-xl border
border-indigo-400">
```

```
        <h1 class="text-5xl font-bold text-indigo-600 mb-4">Welcome to the
Municipality Portal</h1>
        <p class="text-gray-800 text-lg mb-6">
            Access services, submit requests, manage staff, and manage Citizens.
        </p>

        <a href="/Citizen/Register" class="inline-block bg-indigo-600 hover:bg-
indigo-700 text-white font-semibold px-6 py-3 rounded-xl transition duration-300">
            Get Started
        </a>

        <p class="mt-4 text-sm text-gray-700">
            Empowering citizens through digital governance.
        </p>
    </div>
</div>
```

**Layout Page**:




```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0" />
```

```
    <title>@ViewData["Title"] - Municipality Management</title>
    <link rel="stylesheet" href="~/lib/bootstrap/dist/css/bootstrap.min.css" />
    <link rel="stylesheet" href="~/css/site.css" asp-append-version="true" />
    <link rel="stylesheet" href="~/MunicipalityManagement.styles.css" asp-append-
version="true" />
</head>
<body>
    <header>
        <!-- Navigation Bar -->
        <nav class="navbar navbar-expand-lg navbar-dark bg-primary shadow-sm">
            <div class="container">
                <a class="navbar-brand fw-bold d-flex align-items-center" href="/">
                    <i class="fas fa-landmark fa-2x text-primary me-2"></i>
Municipality Portal
                </a>

                <button class="navbar-toggler" type="button" data-bs-
toggle="collapse" data-bs-target="#navbarNav">
                    <span class="navbar-toggler-icon"></span>
                </button>
                <div class="collapse navbar-collapse" id="navbarNav">
                    <ul class="navbar-nav ms-auto">


                        <li class="nav-item">
                            <a class="nav-link text-dark" asp-area="" asp-
controller="CitizenManagements" asp-action="Index">Citizen Managements</a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link text-dark" asp-area="" asp-
controller="ServiceRequests" asp-action="Index">Service Requests</a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link text-dark" asp-area="" asp-
controller="StaffManagements" asp-action="Index">Staff Managements</a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link text-dark" asp-area="" asp-
controller="Reports" asp-action="Index">Reports</a>
                        </li>
                        <li class="nav-item">
                            <a class="nav-link text-dark" asp-area="" asp-
controller="Home" asp-action="Privacy">Privacy</a>
                        </li>
                    </ul>
                    <partial name="_LoginPartial" />
                </div>
            </div>
        </nav>
    </header>
    <div class="container">
        <main role="main" class="pb-3">
            @RenderBody()
        </main>
    </div>

    <footer class="border-top footer text-muted">
        <div class="container">
```

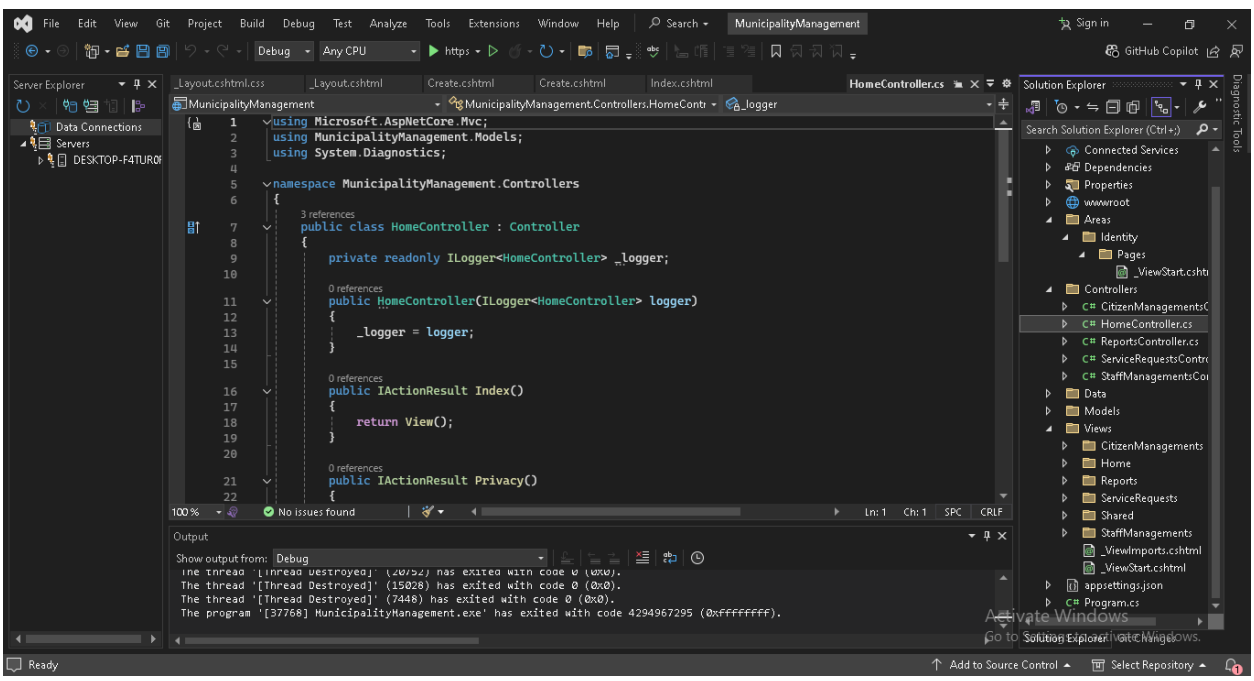
```
            All Rights Reserved &copy; 2025 - Built by Edward Nhlapo - Municipality
Management System- <a asp-area="" asp-controller="Home" asp-
action="Privacy">Privacy</a>
        </div>
    </footer>
    <script src="~/lib/jquery/dist/jquery.min.js"></script>
    <script src="~/lib/bootstrap/dist/js/bootstrap.bundle.min.js"></script>
    <script src="~/js/site.js" asp-append-version="true"></script>
    @await RenderSectionAsync("Scripts", required: false)
</body>
</html>
```

## Controllers.

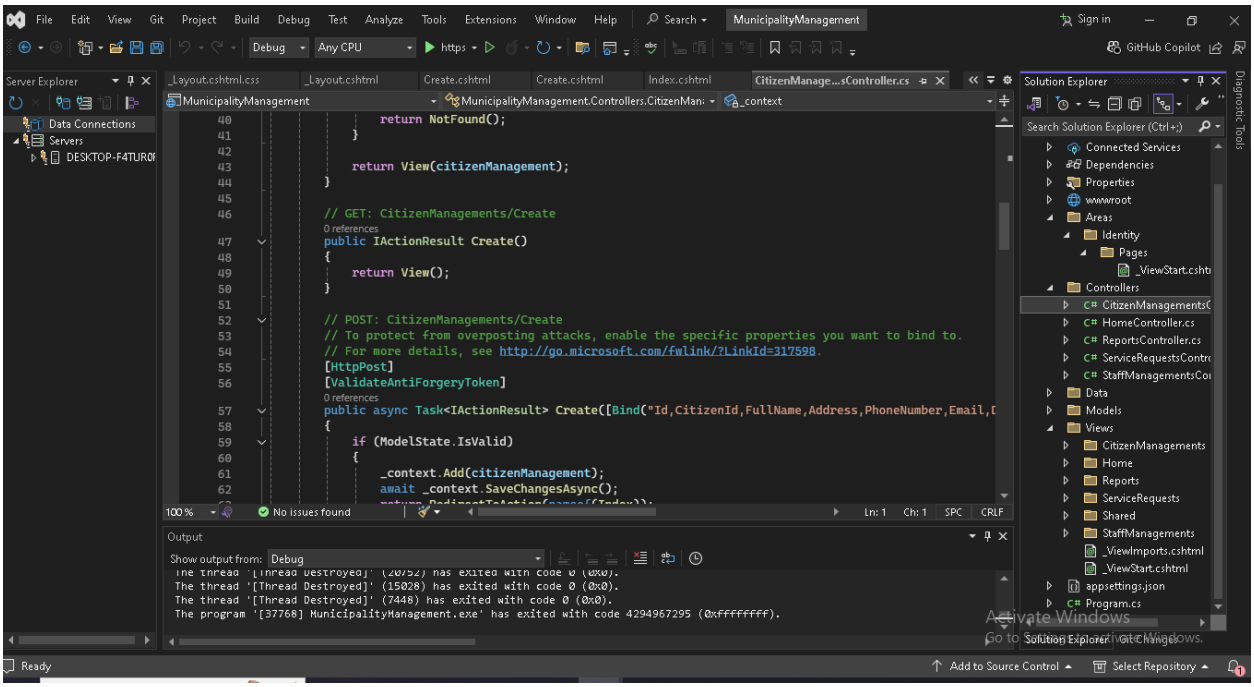
**Purpose:**

Controllers handle user input, interact with the model, and return a response (usually a view).

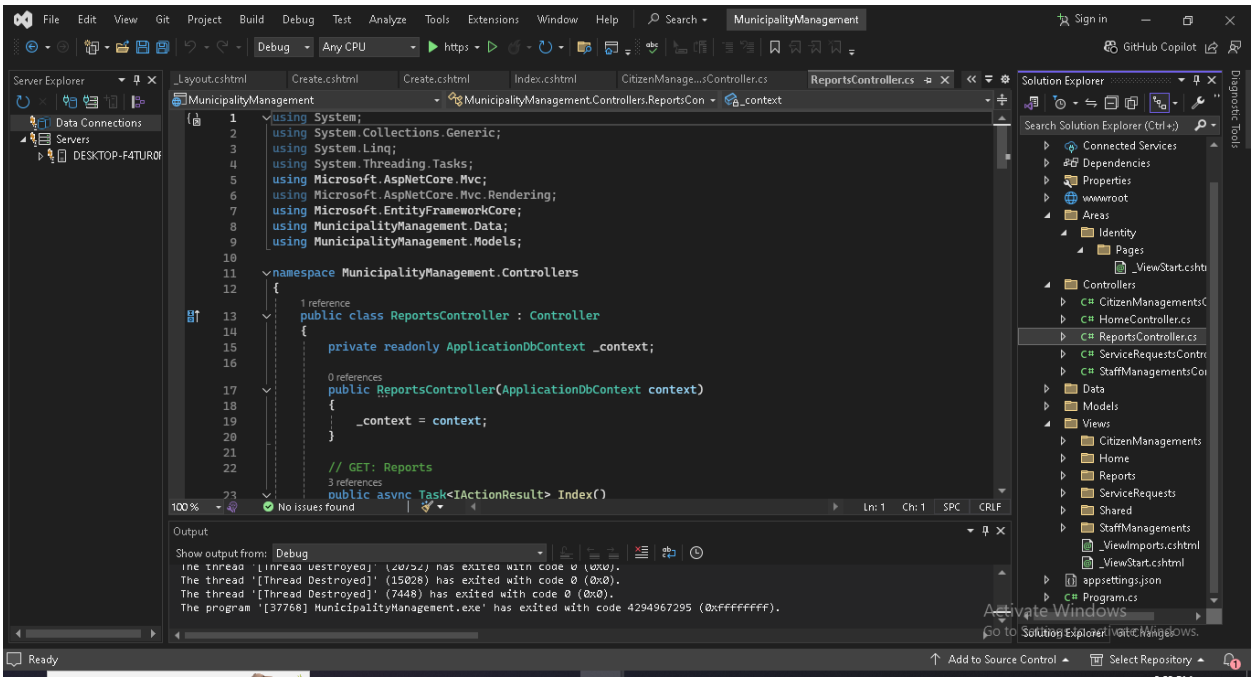
**<u>Home controllers</u>**



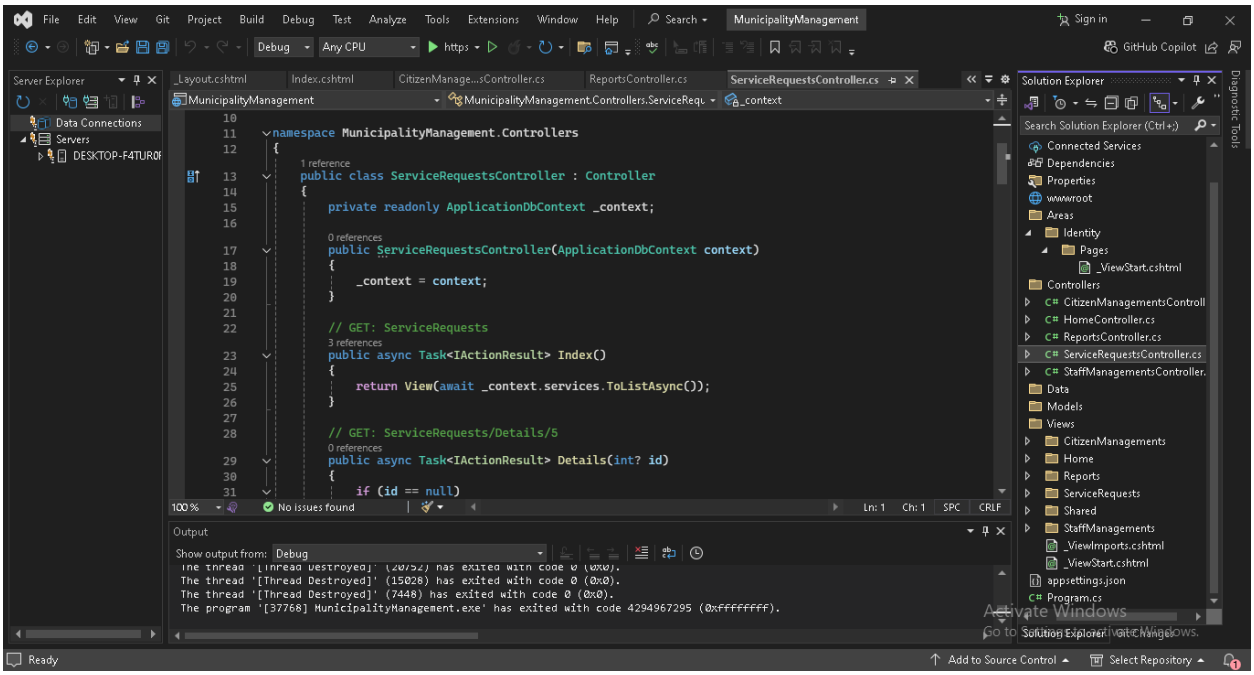
## Citizens Management controller



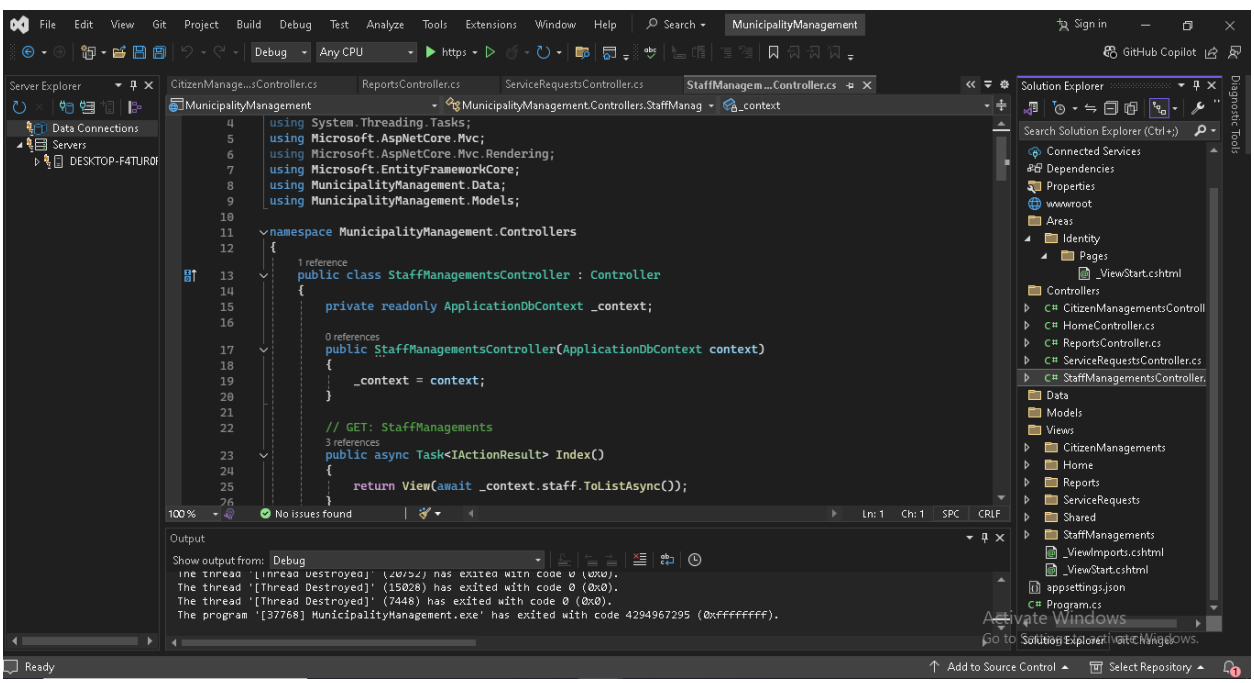

## Reports controller:



## Service Requests controllers:




## Staff Management controller:



# Models.

**Purpose:**

Models represent the structure of the data used in the app and usually mirror database tables.

**Citizens Managements**:

```
using Microsoft.EntityFrameworkCore;
using System.ComponentModel.DataAnnotations;

namespace MunicipalityManagement.Models
{
    public class CitizenManagement
    {

        [Key] public int Id { get; set; }
        public int CitizenId { get; set; }
        public string FullName { get; set; }
        public string Address { get; set; }
        public int PhoneNumber { get; set; }
        public string Email { get; set; }
        public DateTime DateOfBirth  { get; set; }
        public DateTime RegistrationDate { get; set; }



    }
}
```

**Service Requests**:

```
using System.ComponentModel.DataAnnotations;

namespace MunicipalityManagement.Models
{
    public class ServiceRequest
    {
        [Key] public int Id { get; set; }
        public int RequestId { get; set; }
        public int CitizenId { get; set; }
        public string ServiceType { get; set; }
        public DateTime RequestDate { get; set; }
        public string Status { get; set; }
    }
}
```

**Staff Managements**:

```
using System.ComponentModel.DataAnnotations;
```

```
namespace MunicipalityManagement.Models
{
    public class StaffManagement
    {
        [Key] public int Id { get; set; }
        public int StaffId { get; set; }
        public string FullName { get; set; }
        public string Position { get; set; }
        public string Department { get; set; }
        public string Email { get; set; }
        public int PhoneNumber { get; set; }
        public DateTime HireDate { get; set; }

    }
}
```

**Reports**:

```
using System.ComponentModel.DataAnnotations;

namespace MunicipalityManagement.Models
{
    public class Reports
    {
        [Key] public int Id { get; set; }
        public int ReportId { get; set; }
        public int CitizenId { get; set; }
        public string ReportType { get; set; }
        public string Details { get; set; }
        public DateTime SubmissionDate { get; set; }
        public string Status { get; set; }
    }
}
```

## DBContext:

DbContext – "The Database Bridge"

**Purpose:**

DbContext is the primary class used to interact with the database using Entity Framework Core.

```
using Microsoft.AspNetCore.Identity.EntityFrameworkCore;
using Microsoft.EntityFrameworkCore;
using MunicipalityManagement.Models;
using System.ComponentModel.DataAnnotations;

namespace MunicipalityManagement.Data
{
    public class ApplicationDbContext : IdentityDbContext
    {
```

```
        public ApplicationDbContext(DbContextOptions<ApplicationDbContext> options)
            : base(options)
        {
        }
        [Key]
        public DbSet<CitizenManagement> citizens { get; set; }
        public DbSet<ServiceRequest> services  { get; set; }
        public DbSet<StaffManagement> staff { get; set; }
        public DbSet<Reports> reports { get; set; }
    }
}
```

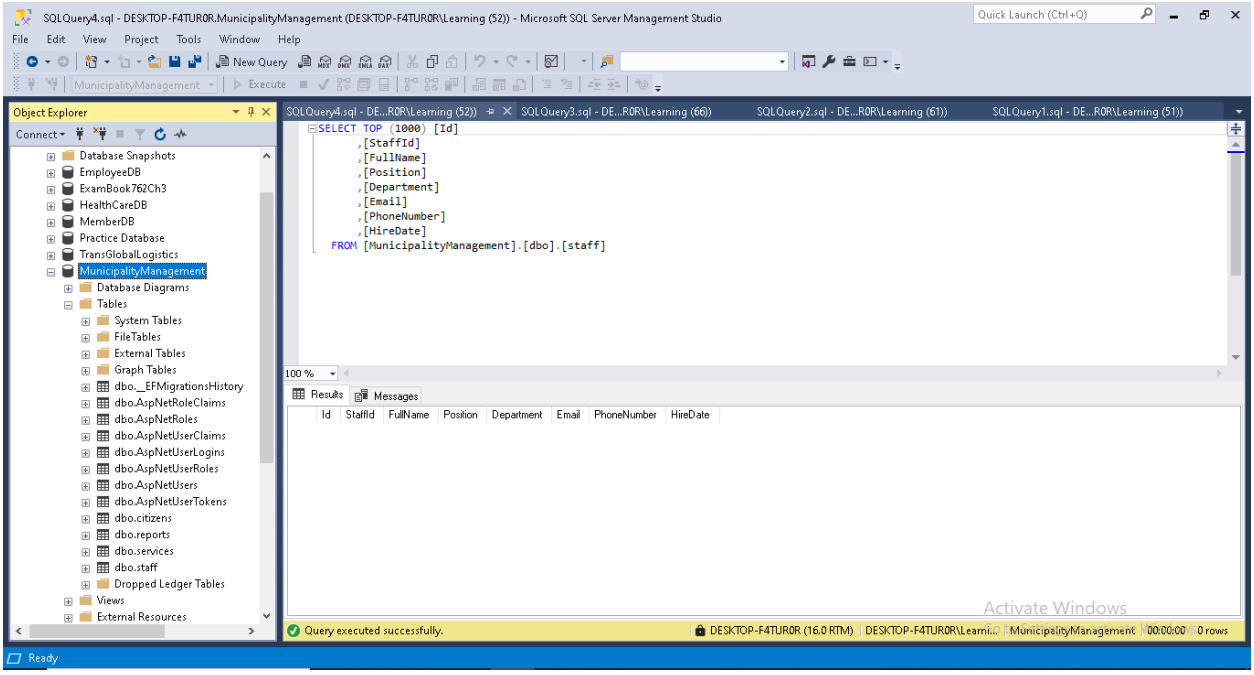
## **App Settings**:

AppSettings.json – "The Configuration Vault"

**Purpose:**

Stores key configuration settings like database connection strings, API keys, or environment info.

```
{
  "ConnectionStrings": {
    "DefaultConnection": "Server=DESKTOP-
F4TUR0R;Database=MunicipalityManagement;Trusted_Connection=True;TrustServerCertifica
te=True;MultipleActiveResultSets=true"
  },
  "Logging": {
    "LogLevel": {
      "Default": "Information",
      "Microsoft.AspNetCore": "Warning"
    }
  },
  "AllowedHosts": "*"
}
```




## **Program.CS**:

Program.cs – "The Startup Engine"

**Purpose:**

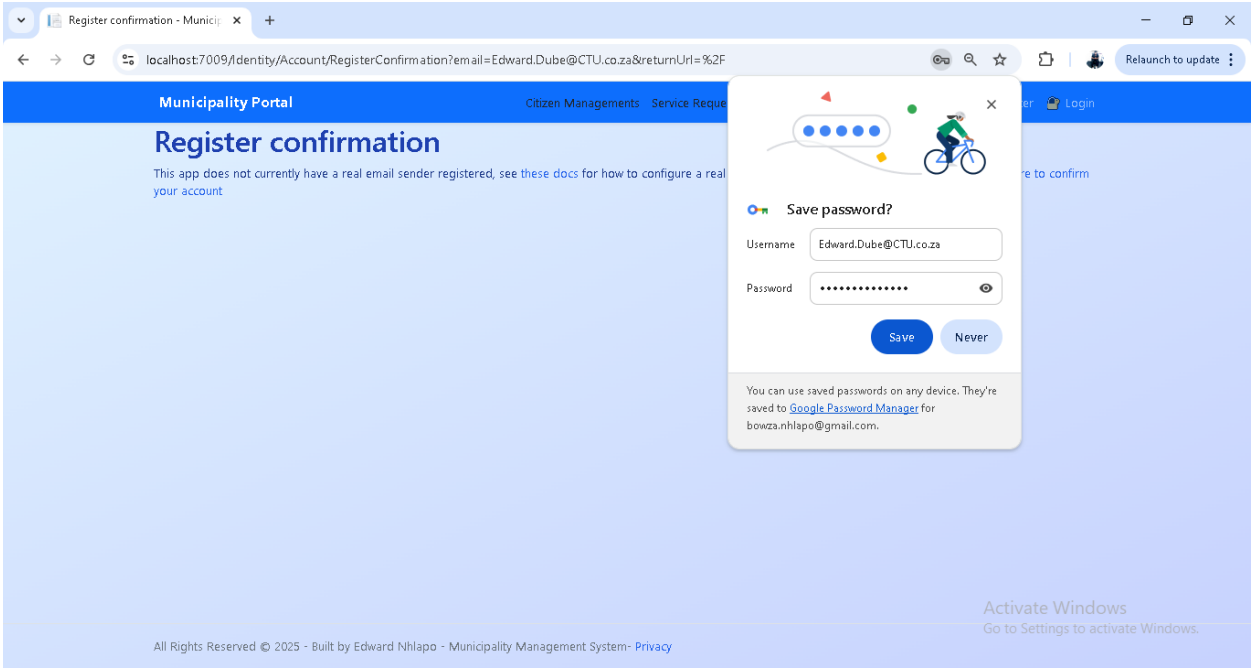
This is the entry point of your application where all services and middleware are registered and the app starts running.

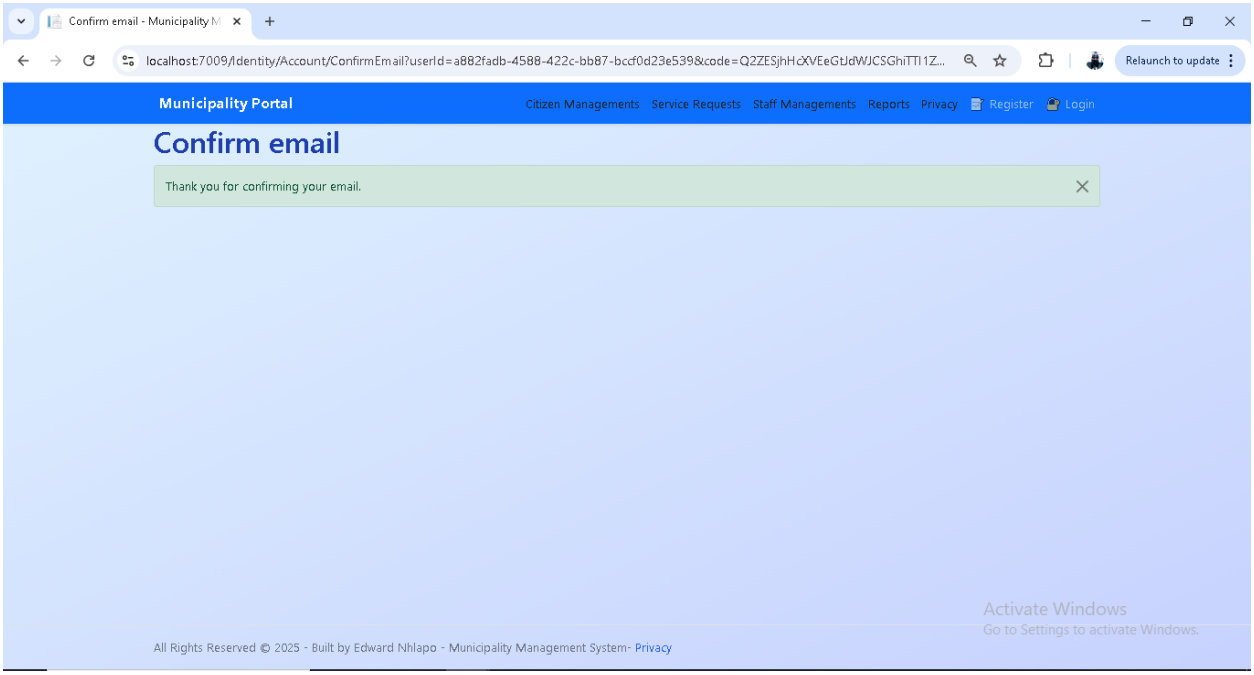
```
using Microsoft.AspNetCore.Identity;
using Microsoft.EntityFrameworkCore;
using MunicipalityManagement.Data;

var builder = WebApplication.CreateBuilder(args);

// Add services to the container.
var connectionString =
builder.Configuration.GetConnectionString("DefaultConnection") ?? throw new
InvalidOperationException("Connection string 'DefaultConnection' not found.");
builder.Services.AddDbContext<ApplicationDbContext>(options =>
    options.UseSqlServer(connectionString));
builder.Services.AddDatabaseDeveloperPageExceptionFilter();
```

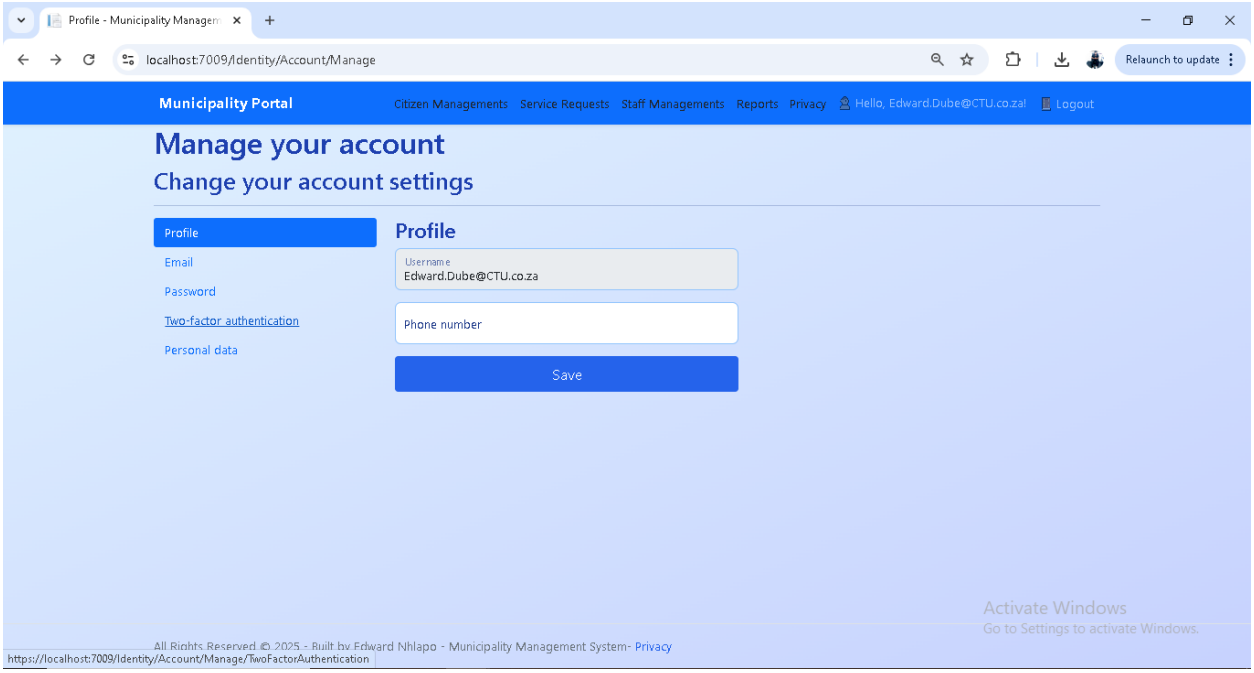
```
builder.Services.AddDefaultIdentity<IdentityUser>(options =>
options.SignIn.RequireConfirmedAccount = true)
    .AddEntityFrameworkStores<ApplicationDbContext>();
builder.Services.AddControllersWithViews();

var app = builder.Build();

// Configure the HTTP request pipeline.
if (app.Environment.IsDevelopment())
{
    app.UseMigrationsEndPoint();
}
else
{
    app.UseExceptionHandler("/Home/Error");
    // The default HSTS value is 30 days. You may want to change this for production
scenarios, see https://aka.ms/aspnetcore-hsts.
    app.UseHsts();
}

app.UseHttpsRedirection();
app.UseStaticFiles();

app.UseRouting();

app.UseAuthorization();

app.MapControllerRoute(
    name: "default",
    pattern: "{controller=Home}/{action=Index}/{id?}");
app.MapRazorPages();

app.Run();
```

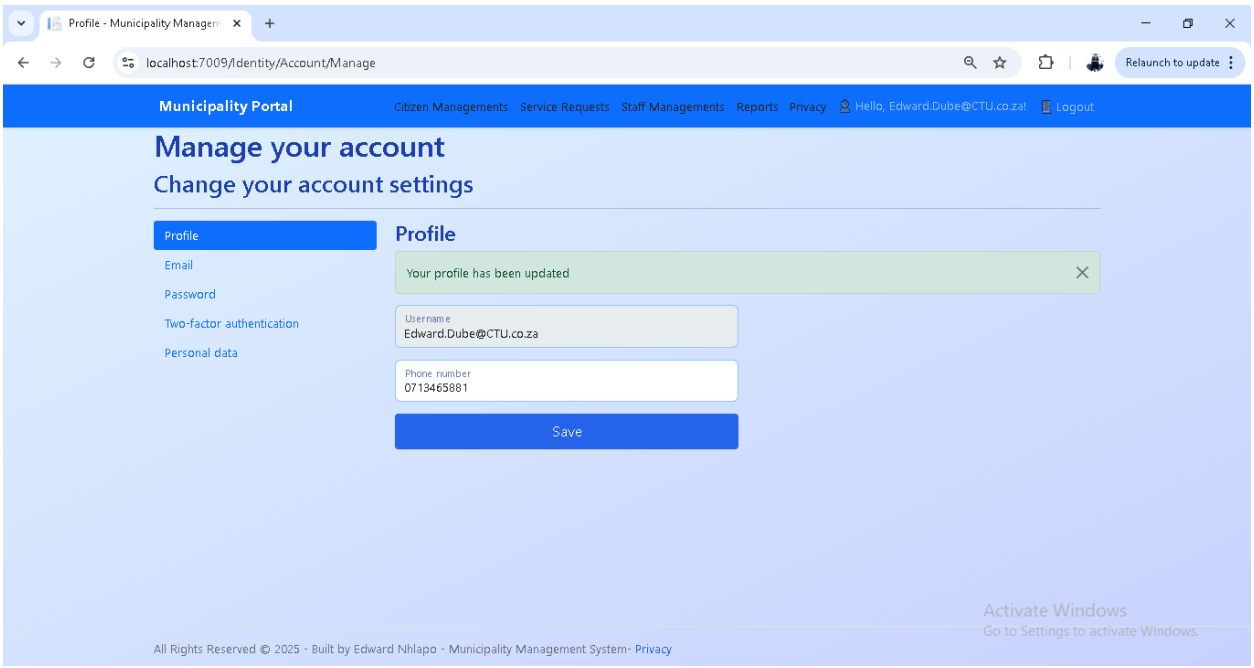
# **Testing and Debugging**:

User Registration - Edward.Dube@CTU.co.za

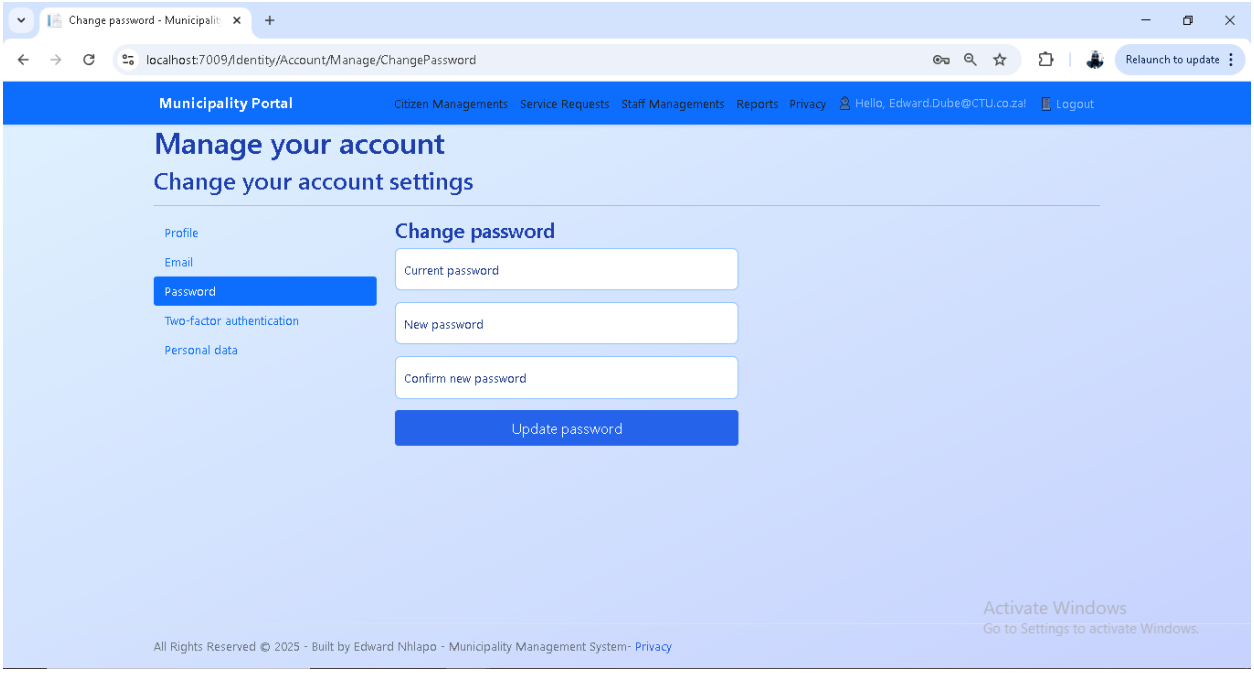


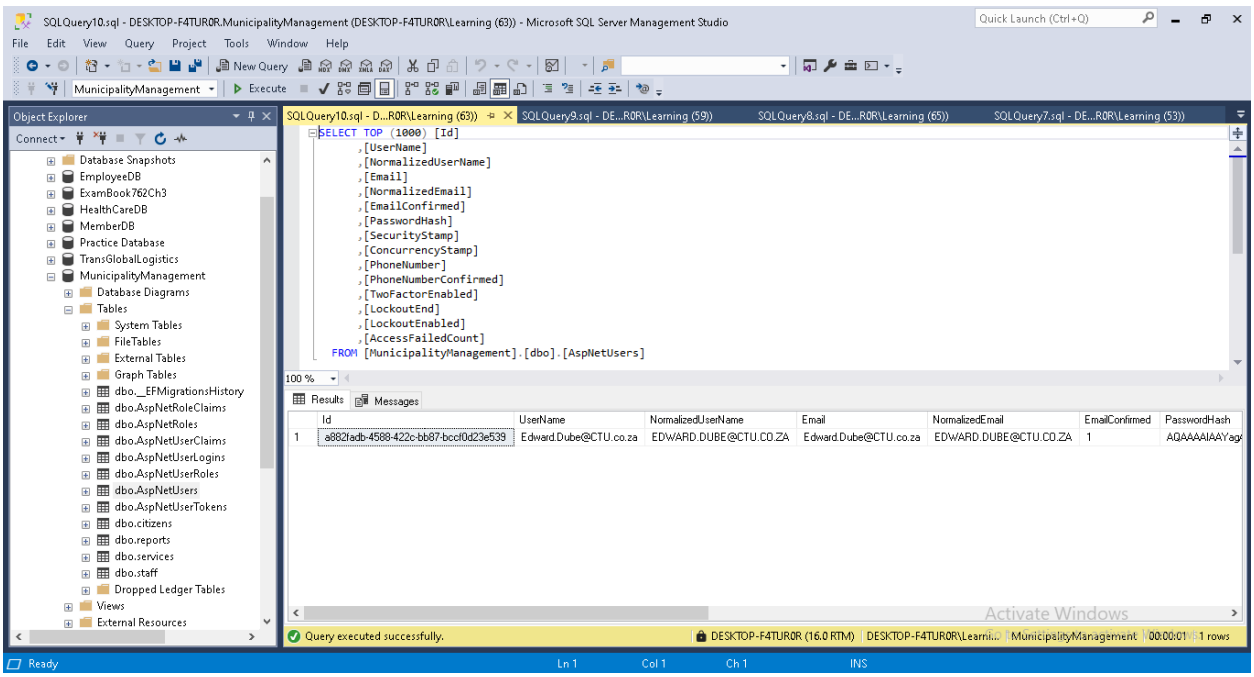



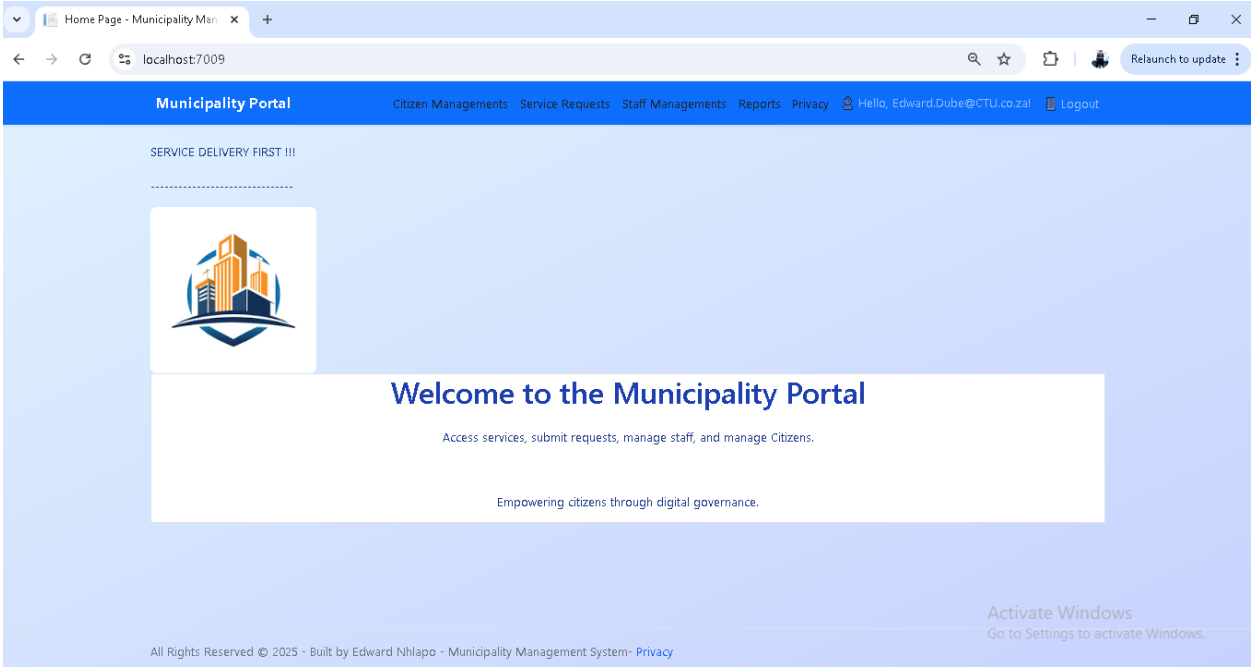


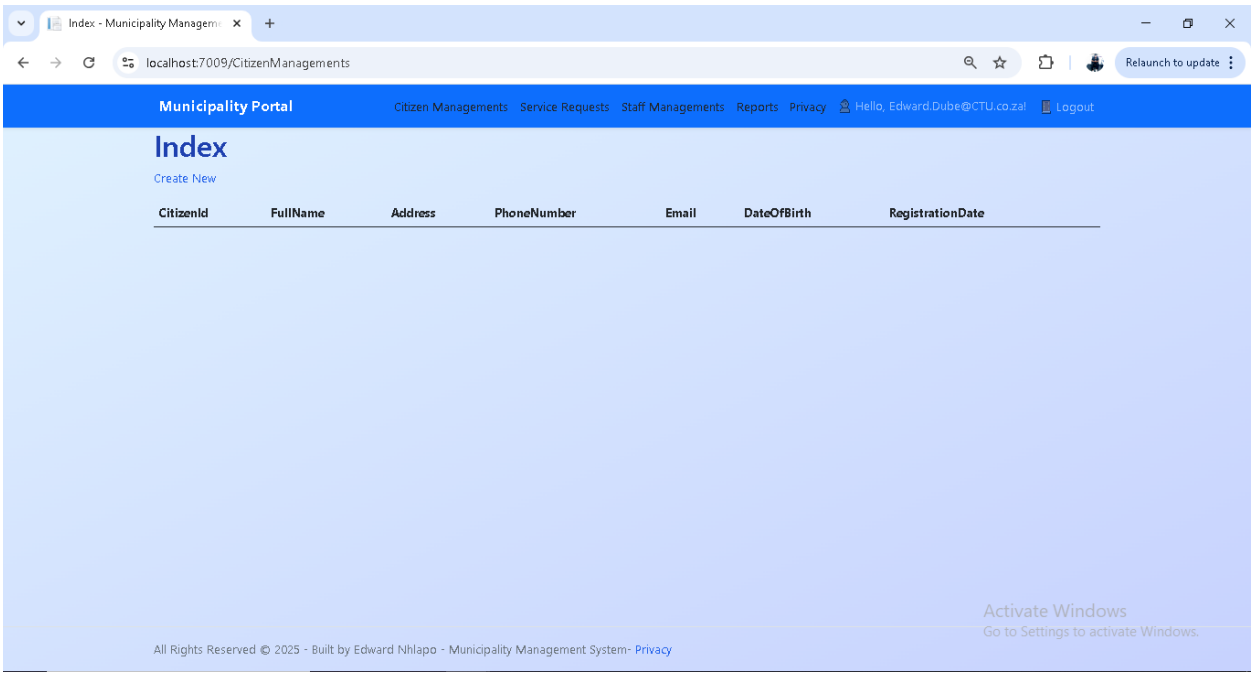

**User Registered into the system:**

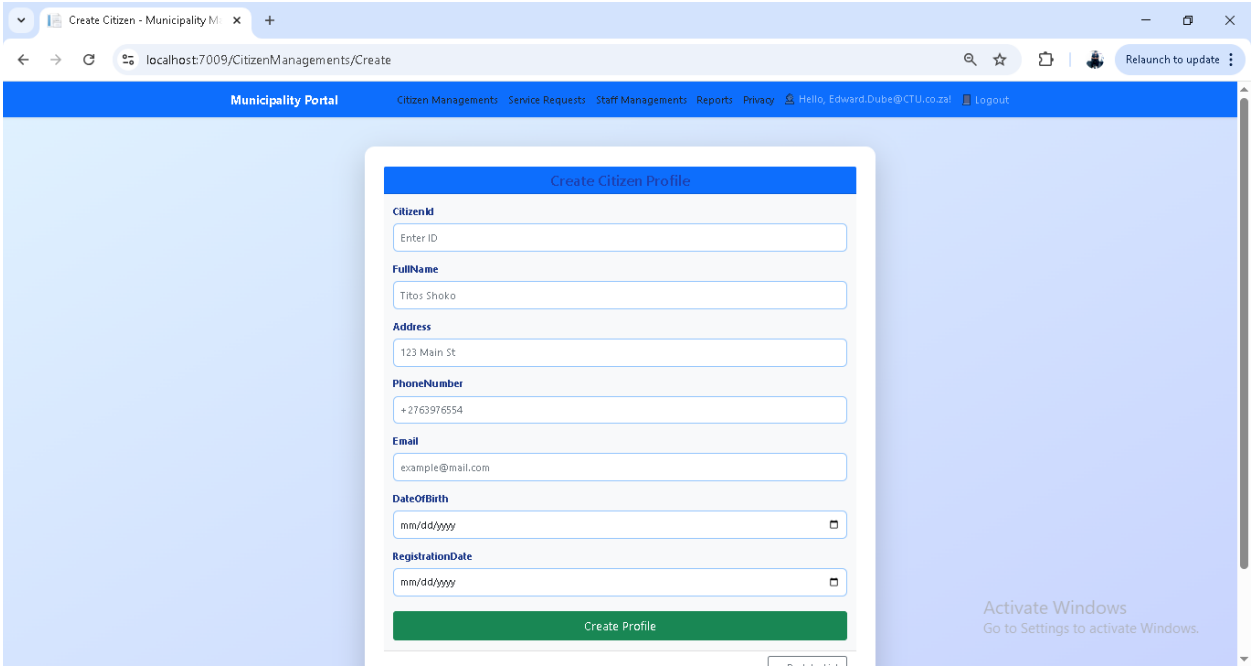

Change password - Municipalit
localhost:7009/Identity/Account/Manage/ChangePassword
Relaunch to update
Municipality Portal
Citizen Managements
Service Requests
Staff Managements
Reports
Privacy
Hello, Edward.Dube@CTU.co.za!
Logout
Manage your account
Change your account settings
Profile
Email
Password
Two-factor authentication
Personal data
Change password
Current password
New password
Confirm new password
Update password
Activate Windows
Go to Settings to activate Windows.
All Rights Reserved © 2025 - Built by Edward Nhlapo - Municipality Management System- Privacy


SQLQuery10.sql - DESKTOP-F4TUR0R.MunicipalityManagement (DESKTOP-F4TUR0R\Learning (63)) - Microsoft SQL Server Management Studio
File Edit View Query Project Tools Window Help
New Query
MunicipalityManagement
Execute
Object Explorer
Connect
Database Snapshots
EmployeeDB
ExamBook762Ch3
HealthCareDB
MemberDB
Practice Database
TransGlobalLogistics
MunicipalityManagement
Database Diagrams
Tables
System Tables
FileTables
External Tables
Graph Tables
dbo.__EFMigrationsHistory
dbo.AspNetRoleClaims
dbo.AspNetRoles
dbo.AspNetUserClaims
dbo.AspNetUserLogins
dbo.AspNetUserRoles
dbo.AspNetUsers
dbo.AspNetUserTokens
dbo.citizens
dbo.reports
dbo.services
dbo.staff
Dropped Ledger Tables
Views
External Resources
SQLQuery10.sql - D...R0R\Learning (63))
SQLQuery9.sql - DE...R0R\Learning (59))
SQLQuery8.sql - DE...R0R\Learning (65))
SQLQuery7.sql - DE...R0R\Learning (53))
SELECT TOP (1000) [Id]
,[UserName]
,[NormalizedUserName]
,[Email]
,[NormalizedEmail]
,[EmailConfirmed]
,[PasswordHash]
,[SecurityStamp]
,[ConcurrencyStamp]
,[PhoneNumber]
,[PhoneNumberConfirmed]
,[TwoFactorEnabled]
,[LockoutEnd]
,[LockoutEnabled]
,[AccessFailedCount]
FROM [MunicipalityManagement].[dbo].[AspNetUsers]
100 %
Results
Messages
Id
UserName
NormalizedUserName
Email
NormalizedEmail
EmailConfirmed
PasswordHash
1
a882fadb-4588-422c-bb87-bccf0d23e539
Edward.Dube@CTU.co.za
EDWARD.DUBE@CTU.CO.ZA
Edward.Dube@CTU.co.za
EDWARD.DUBE@CTU.CO.ZA
1
AQAAAAIAAYag
Activate Windows
Query executed successfully.
DESKTOP-F4TUR0R (16.0 RTM)
DESKTOP-F4TUR0R\Learni...
MunicipalityManagement
00:00:01
1 rows
Ready
Ln 1
Col 1
Ch 1
INS

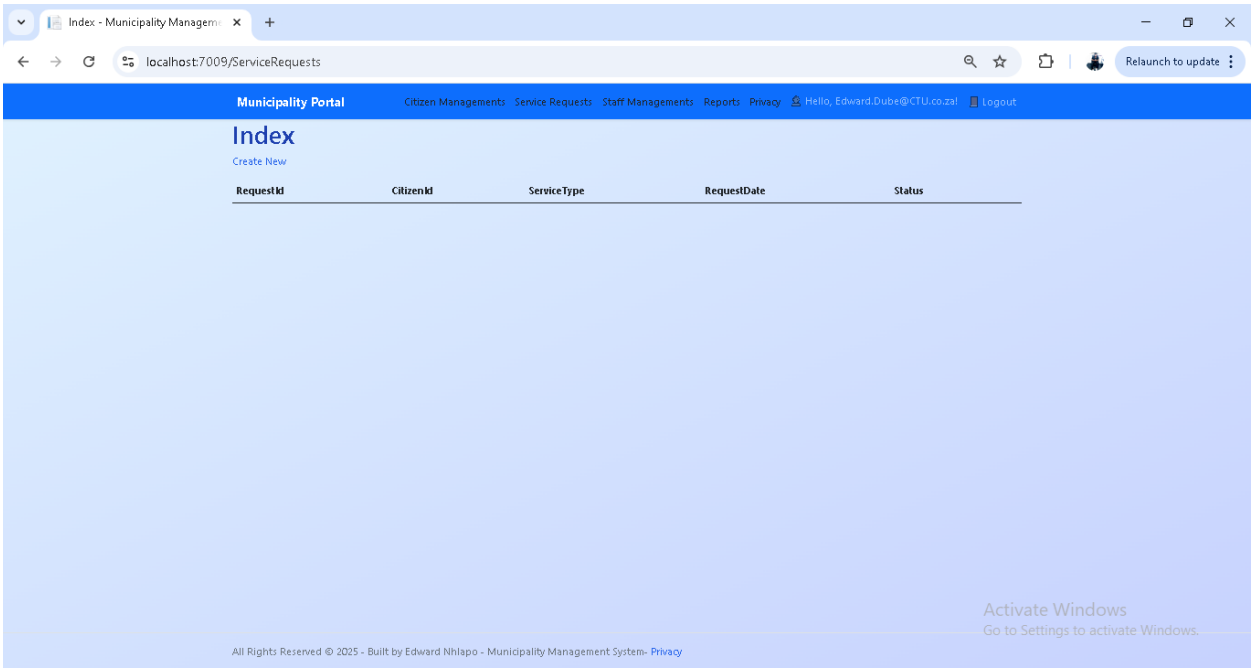


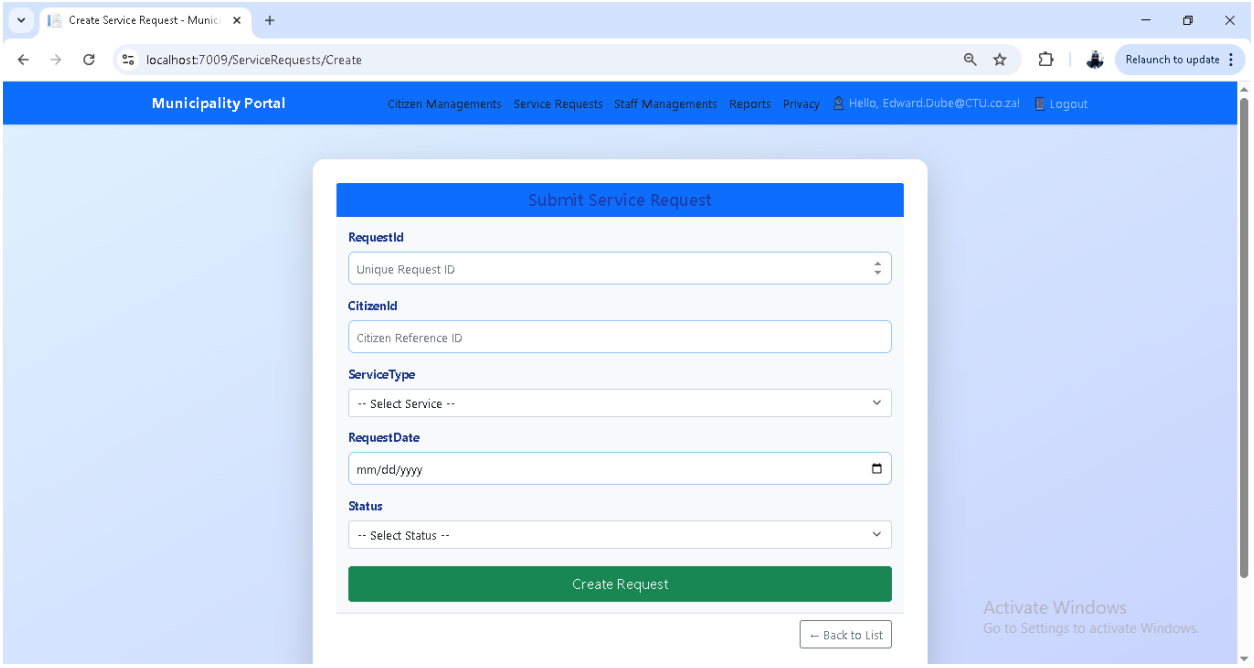

**Citizen Management**:



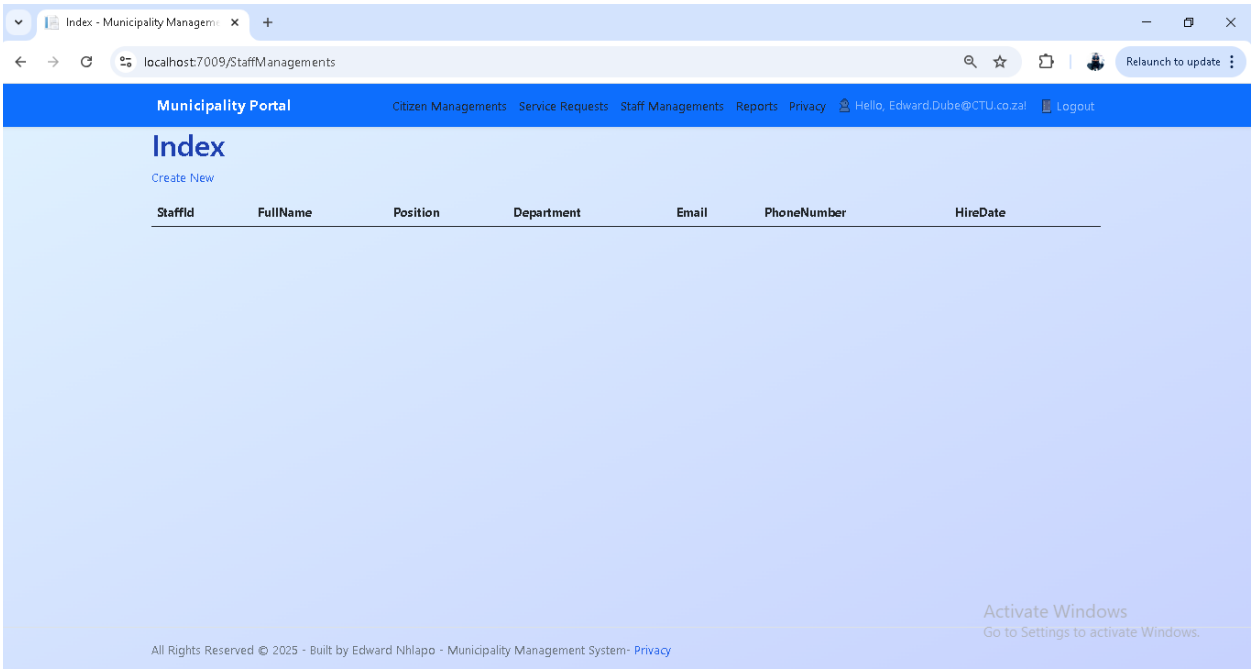


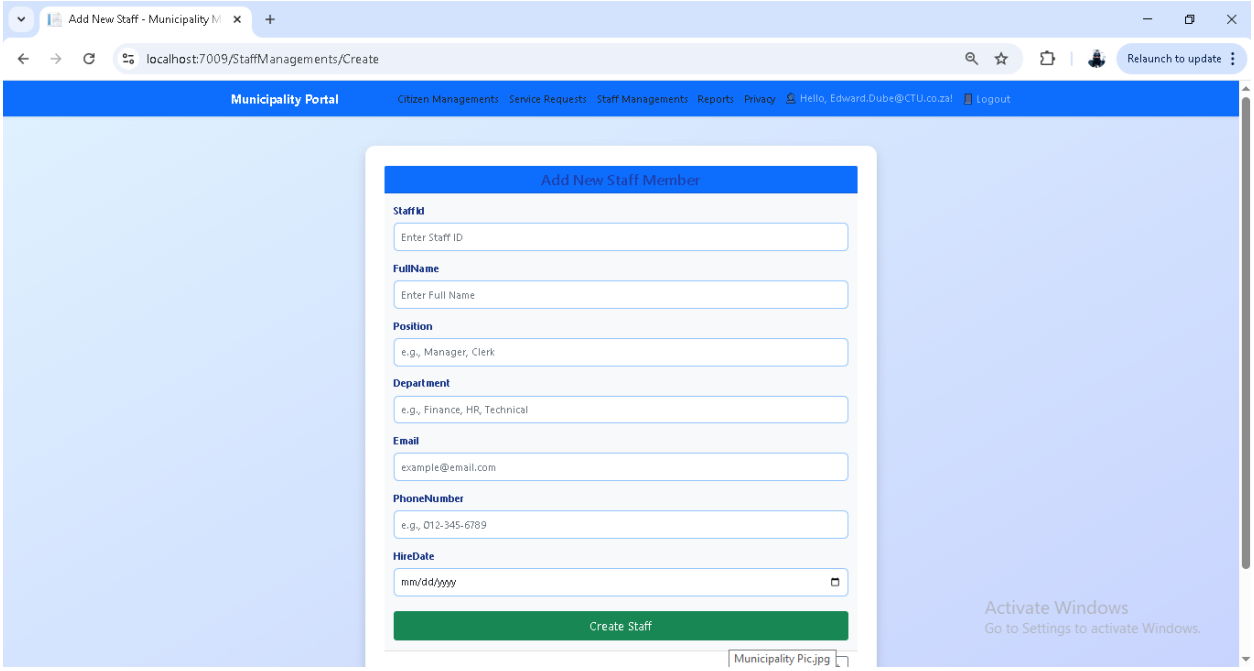

## Service Requests:



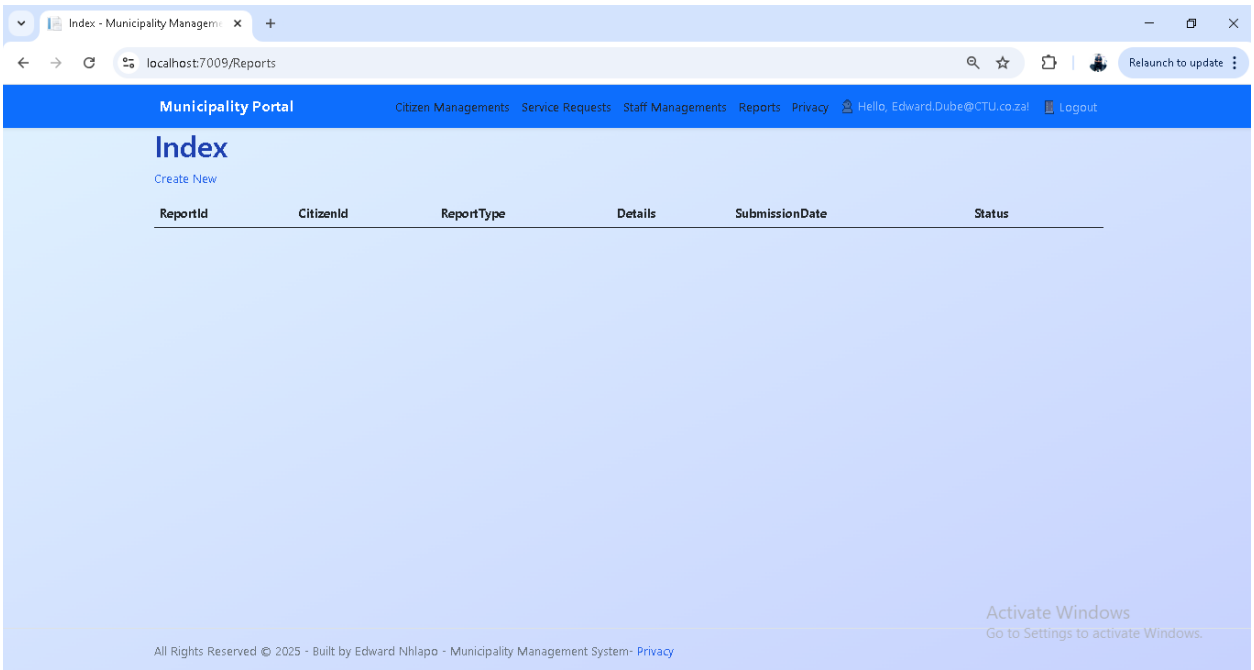



## Staff Management:




Add New Staff - Municipality M
localhost:7009/StaffManagements/Create
Relaunch to update
Municipality Portal
Citizen Managements
Service Requests
Staff Managements
Reports
Privacy
Hello, Edward.Dube@CTU.co.za!
Logout
Add New Staff Member
StaffId
Enter Staff ID
FullName
Enter Full Name
Position
e.g., Manager, Clerk
Department
e.g., Finance, HR, Technical
Email
example@email.com
PhoneNumber
e.g., 012-345-6789
HireDate
mm/dd/yyyy
Create Staff
Municipality Pic.jpg
Activate Windows
Go to Settings to activate Windows.

## **Reports**:


Index - Municipality Managem
localhost:7009/Reports
Relaunch to update
Municipality Portal
Citizen Managements
Service Requests
Staff Managements
Reports
Privacy
Hello, Edward.Dube@CTU.co.za!
Logout
Index
Create New
ReportId
CitizenId
ReportType
Details
SubmissionDate
Status
Activate Windows
Go to Settings to activate Windows.
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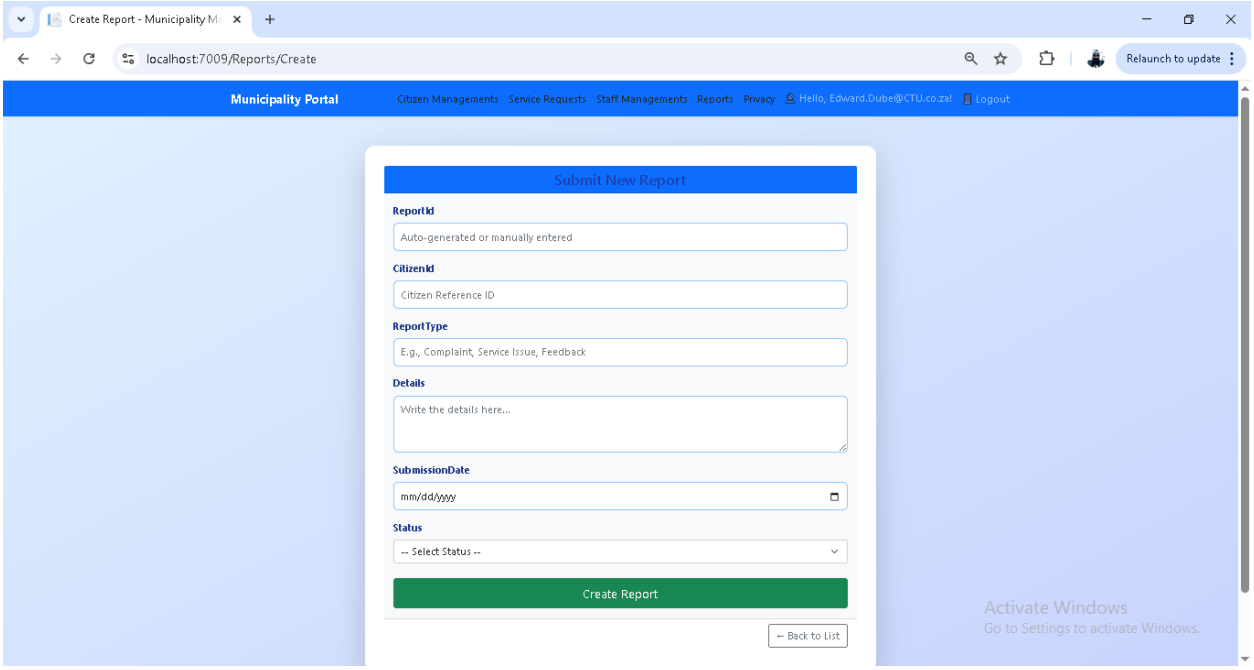
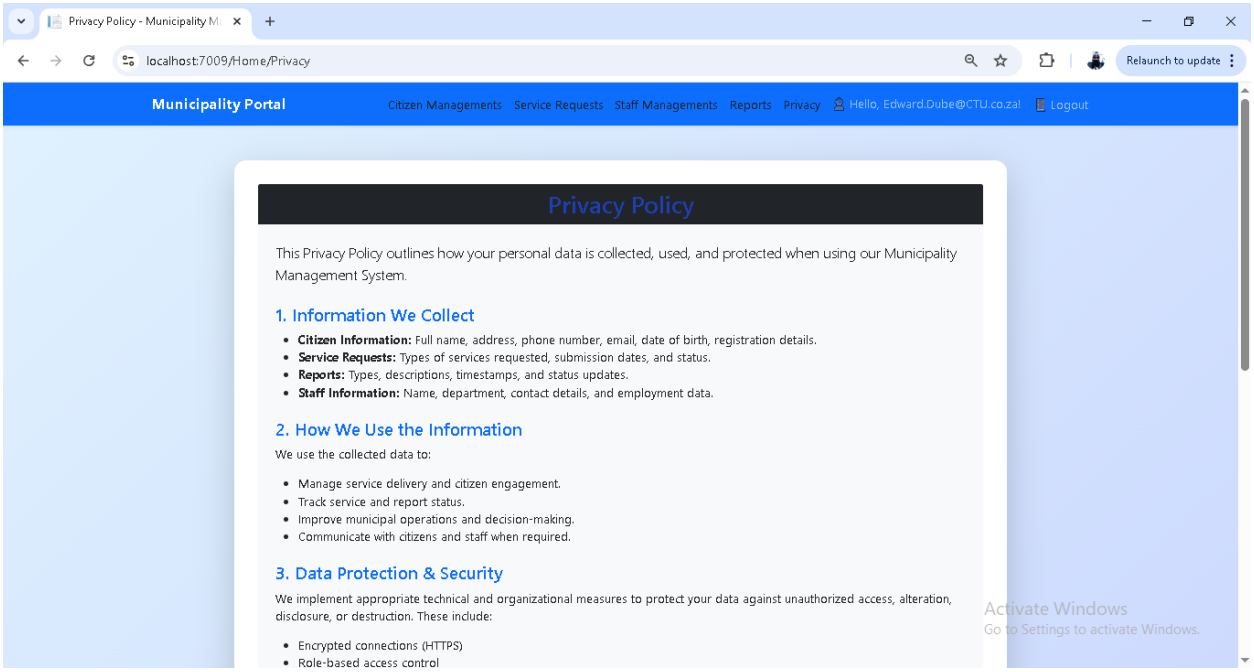
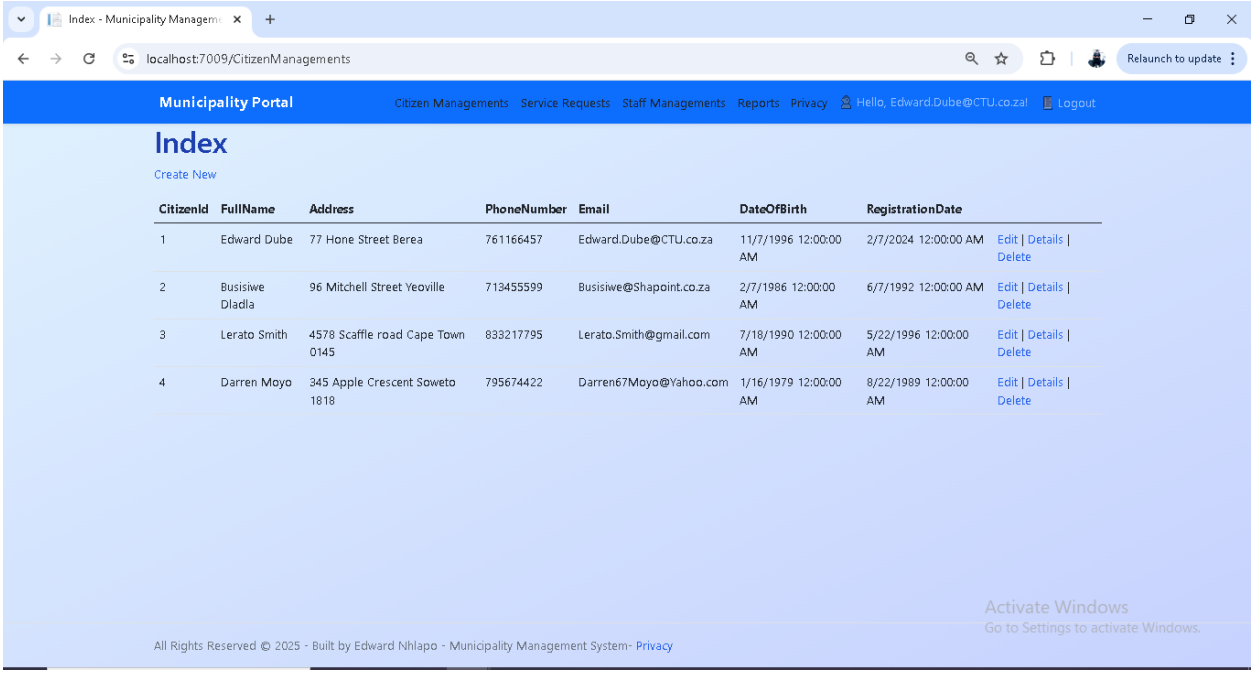


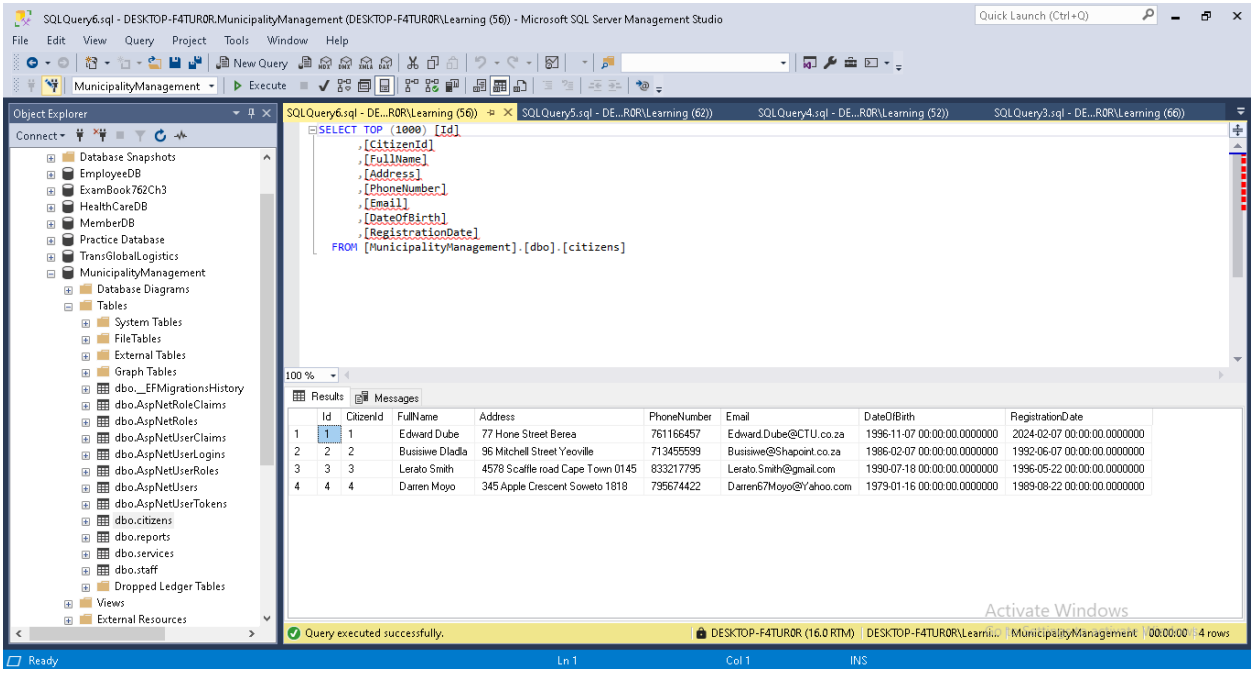

## **Privacy Page**:



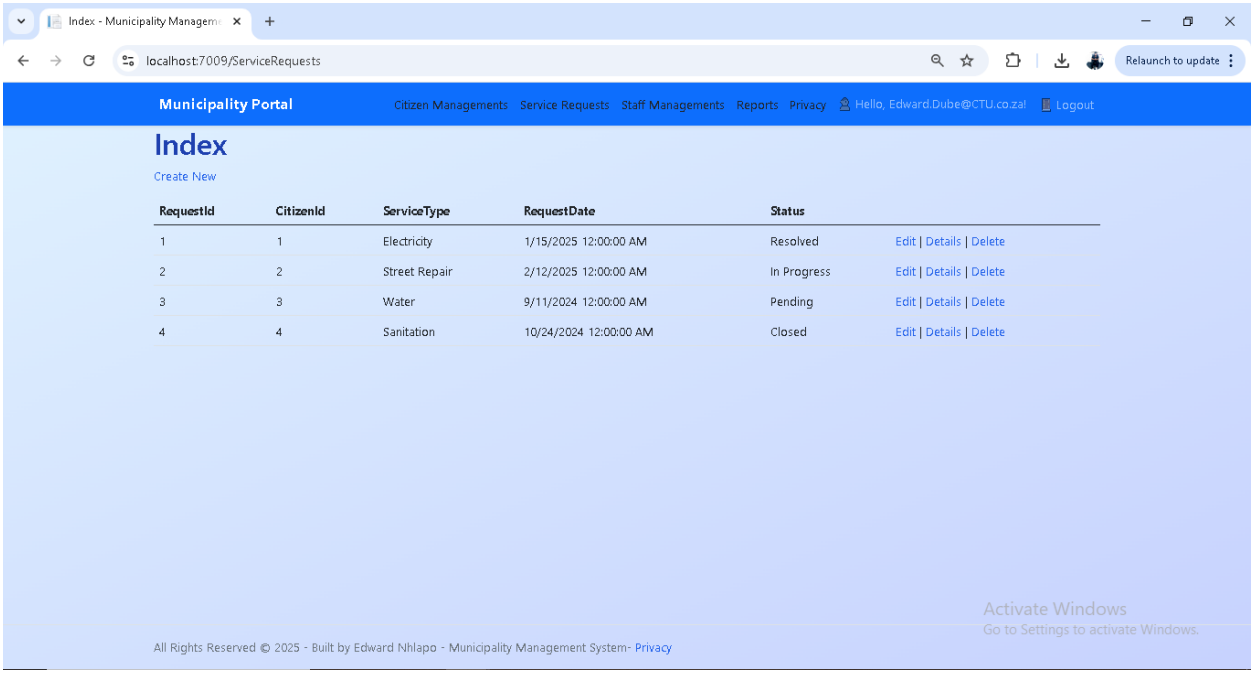

## **Final product**:

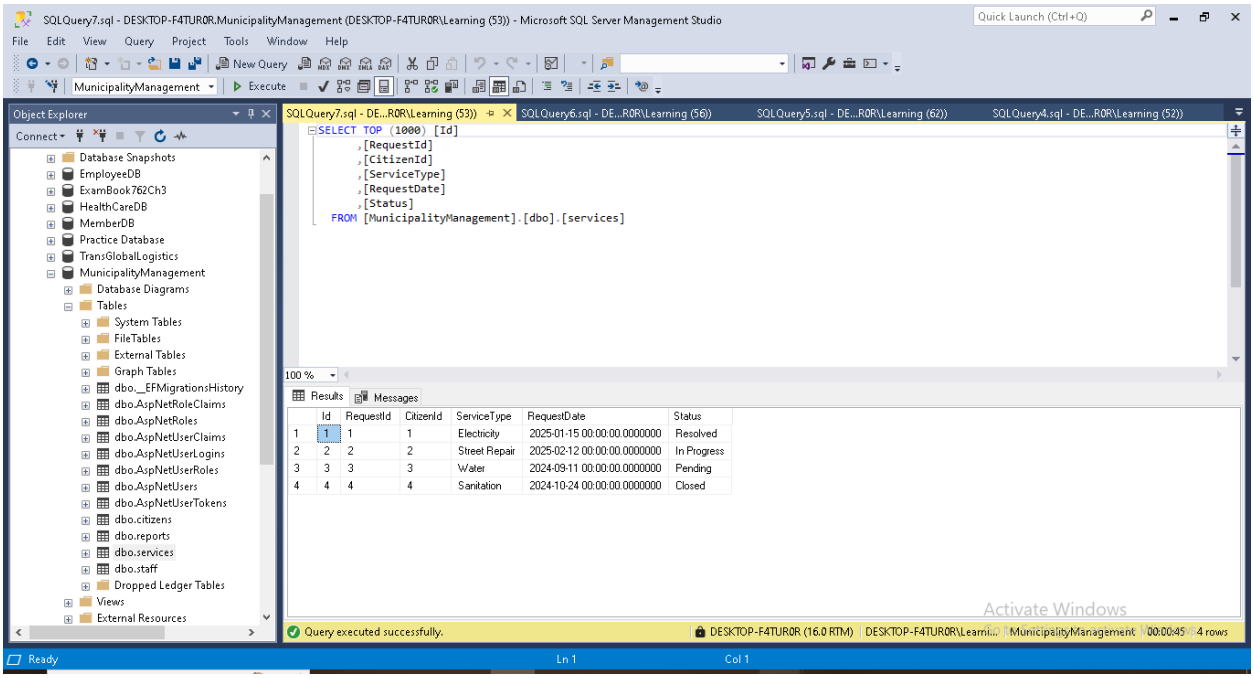
## Citizens Registrar:



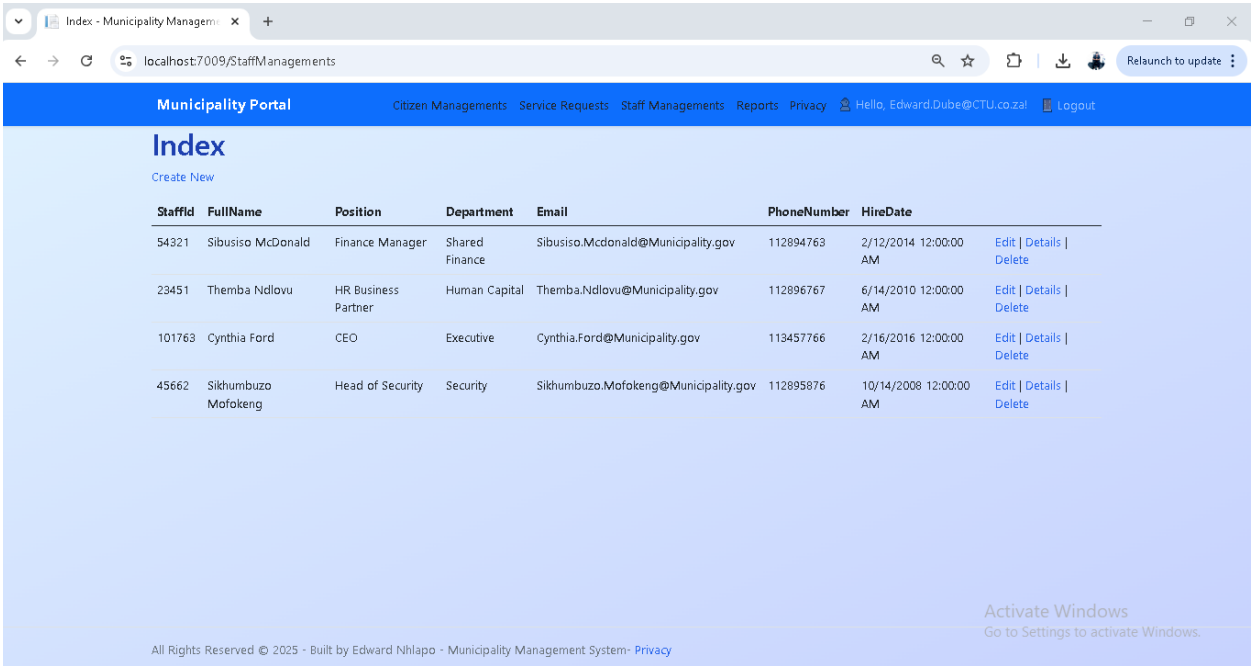



**Service Requests**:

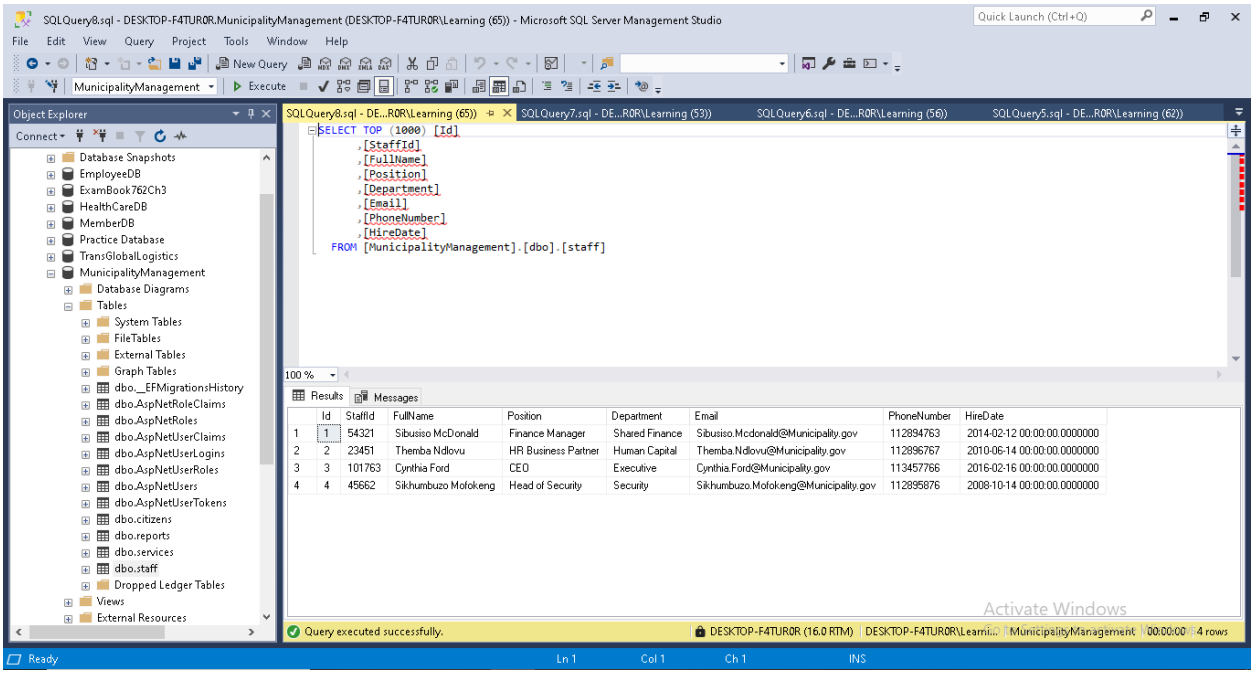


## Staff Management:

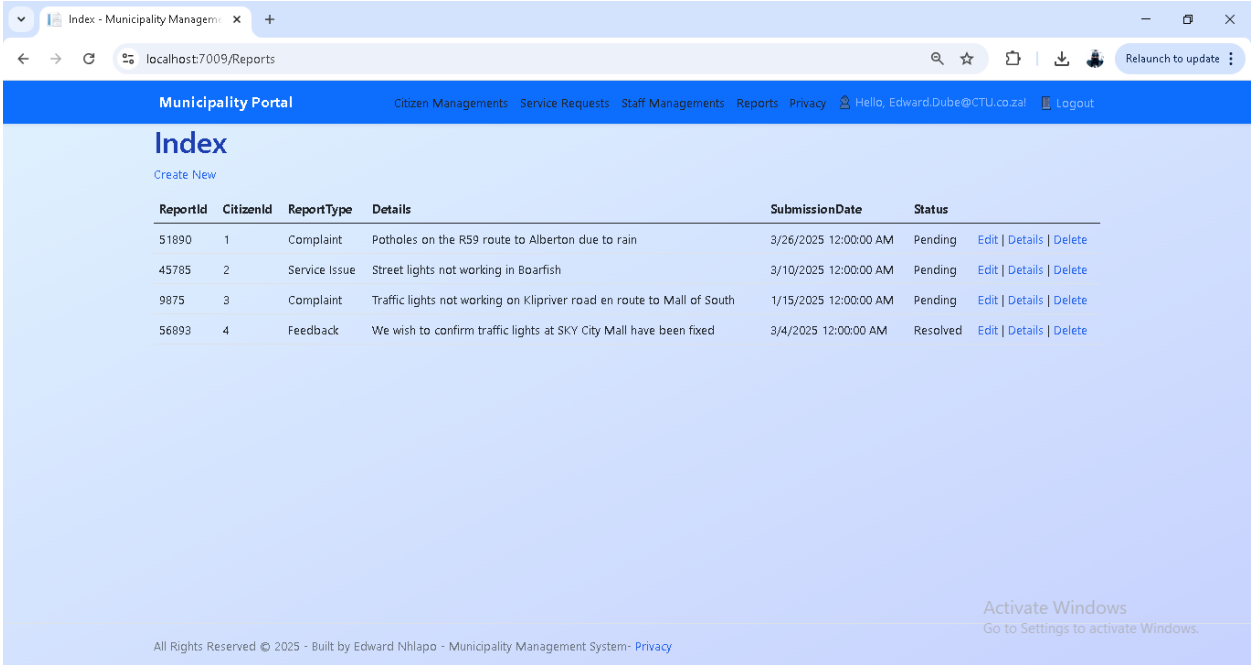


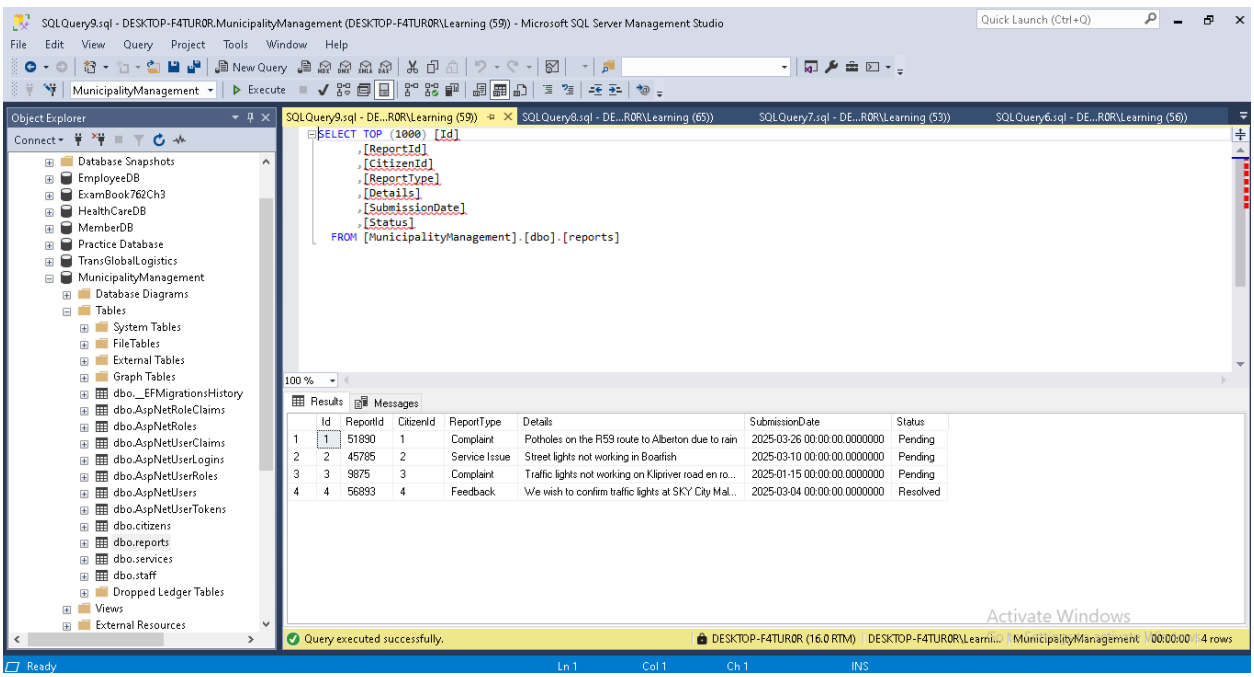

| StaffId | FullName | Position | Department | Email | PhoneNumber | HireDate | |
|---|---|---|---|---|---|---|---|
| 54321 | Sibusiso McDonald | Finance Manager | Shared Finance | Sibusiso.Mcdonald@Municipality.gov | 112894763 | 2/12/2014 12:00:00 AM | Edit \| Details \| Delete |
| 23451 | Themba Ndlovu | HR Business Partner | Human Capital | Themba.Ndlovu@Municipality.gov | 112896767 | 6/14/2010 12:00:00 AM | Edit \| Details \| Delete |
| 101763 | Cynthia Ford | CEO | Executive | Cynthia.Ford@Municipality.gov | 113457766 | 2/16/2016 12:00:00 AM | Edit \| Details \| Delete |
| 45662 | Sikhumbuzo Mofokeng | Head of Security | Security | Sikhumbuzo.Mofokeng@Municipality.gov | 112895876 | 10/14/2008 12:00:00 AM | Edit \| Details \| Delete |




| | Id | StaffId | FullName | Position | Department | Email | PhoneNumber | HireDate |
|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 54321 | Sibusiso McDonald | Finance Manager | Shared Finance | Sibusiso.Mcdonald@Municipality.gov | 112894763 | 2014-02-12 00:00:00.0000000 |
| 2 | 2 | 23451 | Themba Ndlovu | HR Business Partner | Human Capital | Themba.Ndlovu@Municipality.gov | 112896767 | 2010-06-14 00:00:00.0000000 |
| 3 | 3 | 101763 | Cynthia Ford | CEO | Executive | Cynthia.Ford@Municipality.gov | 113457766 | 2016-02-16 00:00:00.0000000 |
| 4 | 4 | 45662 | Sikhumbuzo Mofokeng | Head of Security | Security | Sikhumbuzo.Mofokeng@Municipality.gov | 112895876 | 2008-10-14 00:00:00.0000000 |

## Reports:




Other functions:

Delete - Municipality Managem

localhost:7009/CitizenManagements/Delete/2

Relaunch to update

Municipality Portal | Citizen Managements | Service Requests | Staff Managements | Reports | Privacy | Hello, Edward.Dube@CTU.co.za! | Logout

# Delete

## Are you sure you want to delete this?

### CitizenManagement

| | |
|---|---|
| **CitizenId** | 2 |
| **FullName** | Busisiwe Dladla |
| **Address** | 96 Mitchell Street Yeoville |
| **PhoneNumber** | 713455599 |
| **Email** | Busisiwe@Shapoint.co.za |
| **DateOfBirth** | 2/7/1986 12:00:00 AM |
| **RegistrationDate** | 6/7/1992 12:00:00 AM |

Delete | Back to List

Activate Windows
Go to Settings to activate Windows.

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Details - Municipality Managem

localhost:7009/StaffManagements/Details/3

Relaunch to update

Municipality Portal | Citizen Managements | Service Requests | Staff Managements | Reports | Privacy | Hello, Edward.Dube@CTU.co.za! | Logout

# Details

### StaffManagement

| | |
|---|---|
| **StaffId** | 101763 |
| **FullName** | Cynthia Ford |
| **Position** | CEO |
| **Department** | Executive |
| **Email** | Cynthia.Ford@Municipality.gov |
| **PhoneNumber** | 113457766 |
| **HireDate** | 2/16/2016 12:00:00 AM |

Edit | Back to List

Activate Windows
Go to Settings to activate Windows.

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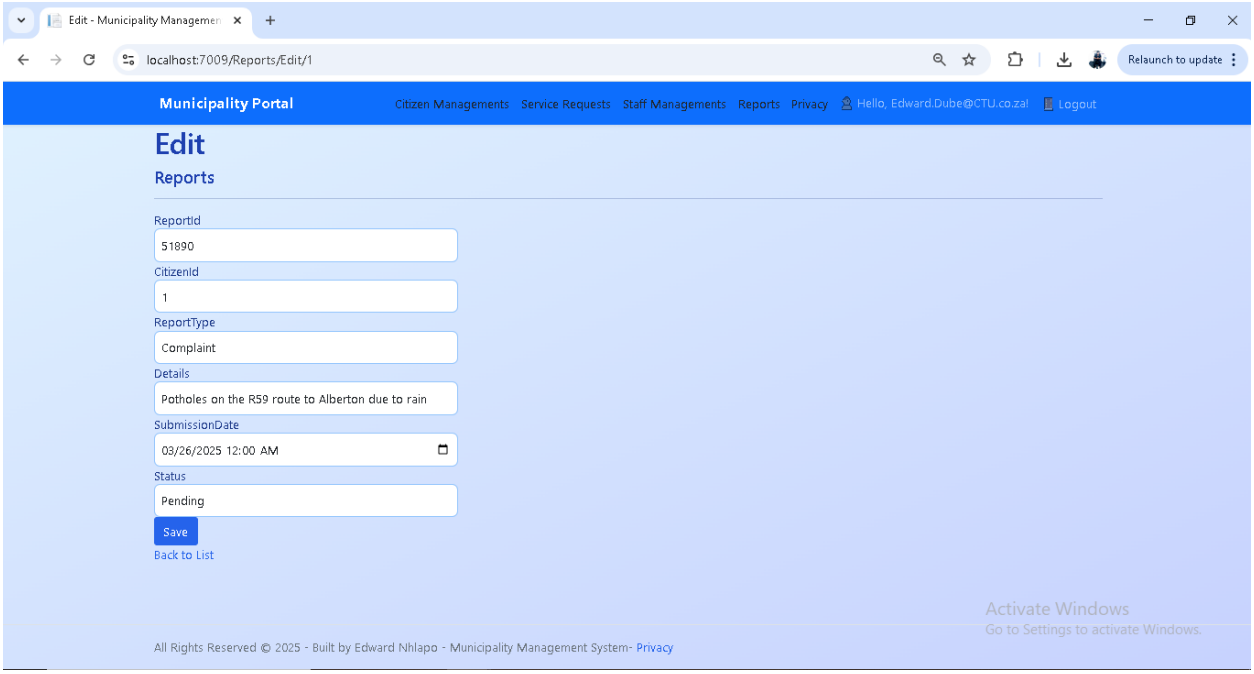
Edit - Municipality Managemen
localhost:7009/Reports/Edit/1
Relaunch to update
Municipality Portal
Citizen Managements
Service Requests
Staff Managements
Reports
Privacy
Hello, Edward.Dube@CTU.co.za!
Logout
Edit
Reports
ReportId
51890
CitizenId
1
ReportType
Complaint
Details
Potholes on the R59 route to Alberton due to rain
SubmissionDate
03/26/2025 12:00 AM
Status
Pending
Save
Back to List
Activate Windows
Go to Settings to activate Windows.
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