

Retail Manager Development Manual

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1 Introduction

1.1 Project Summary

The goal of tkhis project is to build a dektop app that runs a cash register, handles inventory and manages an entire retail store. Creating and implementing a **WebAPI layer**, will allow the whole project to grow. This lauyer will be able to serve each kind of application (desktop, mobile, web, ...).

2 Initial Plan

2.1 Outline

The App is going to be build as a MVP (Minimum Viable Product) that can be expanded to cover all of the features, which are needed over time - so it can grow into a full featured application. First step is getting all of the major pieces set up, including:

- Git on Azure DevOps
- SQL Database (SSDT)
- WebAPI with Authentication
- WPF application that can log into the API

2.2 Technologies

- | | |
|--------------------------------|-------------------|
| • Unit Testing | • Async |
| • Dependency Injection | • Reporting |
| • WPF | • WebAPI |
| • MVVM with Caliburn Micro | • Logging |
| • ASP.NET MVC (Web Frontend) | • Data Validation |
| • .NET Framework | • HTML |
| • .NET Core 3.0 | • CSS |
| • SSDT - SQL Server Data Tools | • JavaScript |
| • Git | • Authentication |
| • Azure DevOps | |

3 Initial Setup in Visual Studio

1. Setting up a Git-Repository, including README, GitIgnore (for VS) and License
2. Creating a **Blank Solution**: Other Project Types → Blank Solution
Such type of solution isn't language specific.

4 Creating a WebAPI with Authentication

1. Adding new Project to the Solution:

Web → ASP.NET Web Application (.NET Framework) → WebAPI

Add folders and references for:

- MVC
- Web API

Change Authentication to

- Individual User Accounts

2. Upgrading all NuGet-Packages

4.1 Indentity Configuration

App_Start → IdentityConfig.cs

In there are some settings for setting up the WebAPI, especially for authentication:

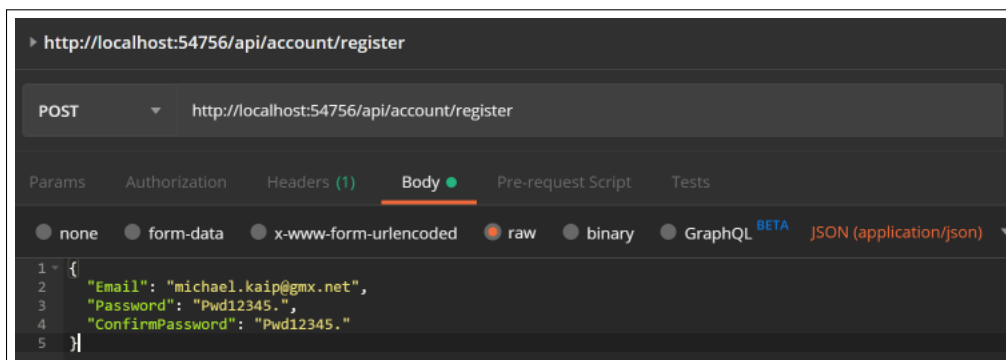
- UserValidator
- PasswordValidator

4.2 Getting authorized for development

4.2.1 Postman

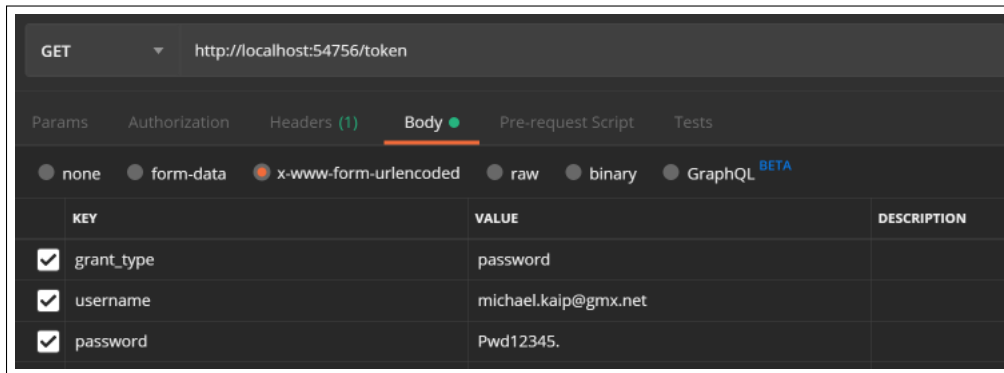
The following calls has to be applied in the given order:

1. POST



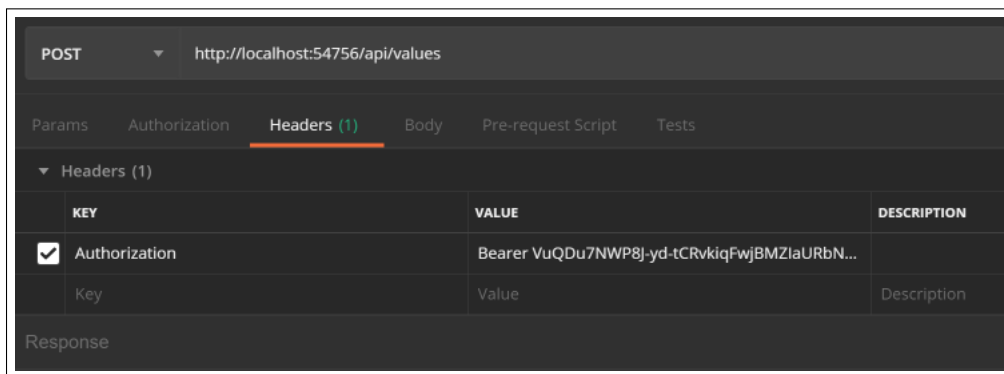
Creates a new user account and stores this information into the user database.
If **Status: 200 OK**, username and password has been succesfully created.

2. GET



It will return an **access_token** which is, by default, valid for 14 days. Token is needed for all further interaction with the server. Can be also configured for shorter valid periods.

3. POST



4.2.2 Getting User Information

In order to get the Identity of users returned, some changes have to be implemented. Through this it's becomes possible to apply different accessibility rules, based on the user-group a certain user is part of.

1. *RMDataManager.Controllers.ValuesController*

```
using System.Web.Http;
using Microsoft.AspNet.Identity; // Needed for getting information about the user

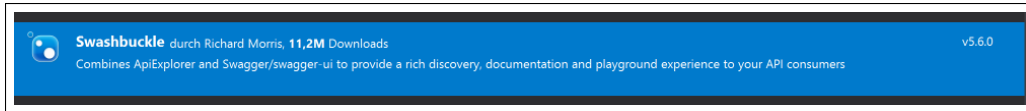
namespace RMDataManager.Controllers
{
    [Authorize]
    0 Verweise | 0 Änderungen | 0 Autoren, 0 Änderungen
    public class ValuesController : ApiController
    {
        // GET api/values
        0 Verweise | 0 Änderungen | 0 Autoren, 0 Änderungen
        public IEnumerable<string> Get()
        {
            // Stores the ID of each user
            var userId = RequestContext.Principal.Identity.GetUserId();
            return new string[] { "value1", "value2", userId };
        }
    }
}
```

5 Installing and configuring SWAGGER

SWAGGER is an API documentation and demonstration tool.

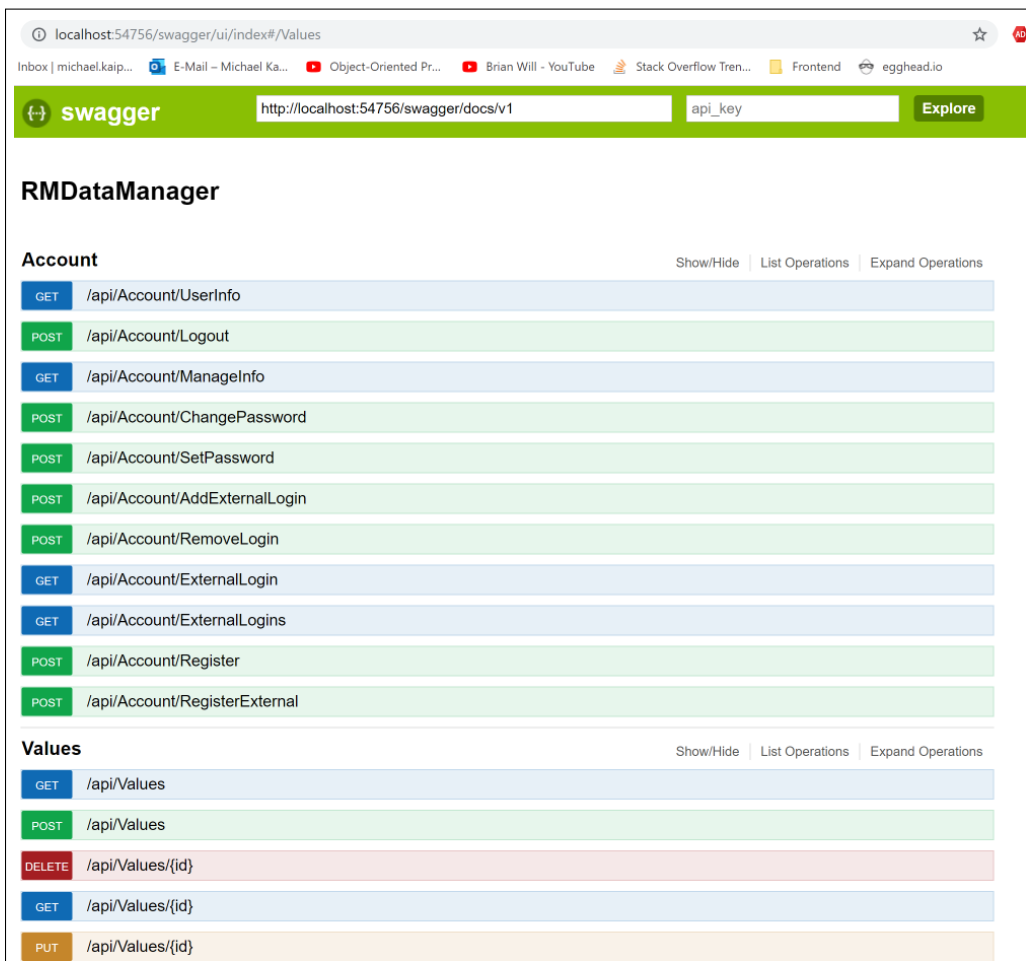
5.1 Installing SWAGGER

1. NuGet-Manager



Adds a SWAGGER to WebAPI-Projects.

2. Starting SWAGGER



5.2 Changing the configuration of SWAGGER

RMDDataManager.App_Start.SwaggerConfig.cs

1. Changing title

```
// Use "SingleApiVersion" to describe a single version API. Swagger 2.0 includes an "Info" object to
// hold additional metadata for an API. Version and title are required but you can also provide
// additional fields by chaining methods off SingleApiVersion.
//
c.SingleApiVersion("v1", title: "Retail Manager API"); // Changed to a proper name
```


2. Enabling proper printing of documents

```
// If you want the output Swagger docs to be indented properly, enable the "PrettyPrint" option.
//
c.PrettyPrint(); // enabled
```

3. Treating Enums as Strings

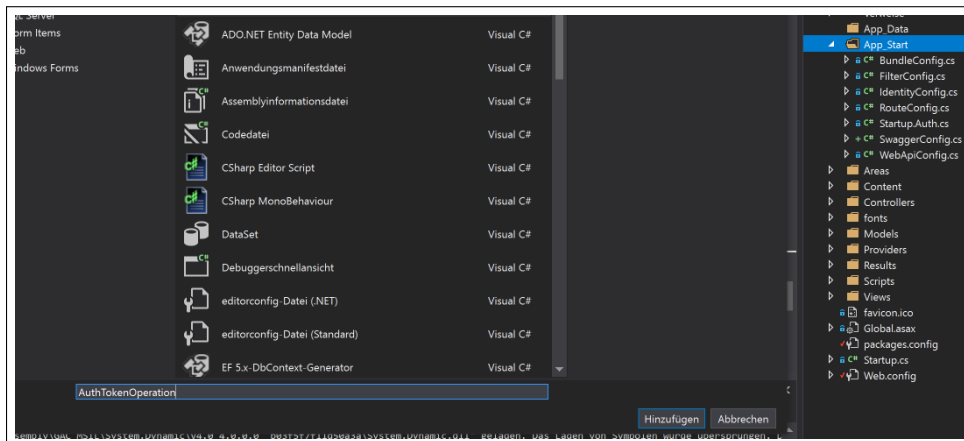
```
// In accordance with the built in JsonSerializer, Swashbuckle will, by default, describe enums as integers.
// You can change the serializer behavior by configuring the StringToEnumConverter globally or for a given
// enum type. Swashbuckle will honor this change out-of-the-box. However, if you use a different
// approach to serialize enums as strings, you can also force Swashbuckle to describe them as strings.
//
c.DescribeAllEnumsAsStrings(); // enabled
```

4. Changing document title

```
.EnableSwaggerUi(configure: c =>
{
    // Use the "DocumentTitle" option to change the Document title.
    // Very helpful when you have multiple Swagger pages open, to tell them apart.
    //
    c.DocumentTitle("RM API"); // changed the name
});
```

5.3 Adding OAuth ability

1. Enabling token endpoint allowance in the SWAGGER documentation

(a) Adding a new Class to `RMDataManager.App_Start`

(b) Implementing the required Interface

```

public class AuthTokenOperation : IDocumentFilter
{
    0 Version: 1.0 | 0 Änderungen | 0 Autoren, 0 Änderungen
    public void Apply(SwaggerDocument swaggerDoc, SchemaRegistry schemaRegistry, IApiExplorer apiExplorer)
    {
        swaggerDoc.paths.Add("/token", new PathItem
        {
            post = new Operation
            {
                tags = new List<string> { "Auth" },
                consumes = new List<string>
                {
                    "application/x-www-form-urlencoded"
                },
                parameters = new List<Parameter>
                {
                    new Parameter
                    {
                        type = "string",
                        name = "grant_type",
                        required = true,
                        @in = "formData",
                        @default = "password"
                    },
                    new Parameter
                    {
                        type = "string",
                        name = "username",
                        required = false,
                        @in = "formData"
                    },
                    new Parameter
                    {
                        type = "string",
                        name = "password",
                        required = false,
                        @in = "formData"
                    }
                }
            }
        });
    }
}

```

(c) Applying it to SwaggerConfig.cs

```

GlobalConfiguration.Configuration
    .EnableSwagger(c =>
    {
        c.DocumentFilter<AuthTokenOperation>(); // adding the implemented document filter
    }
)

```

(d) Logging into the application using SWAGGER and get the token

Retail Manager API

Account [Show/Hide](#) [List Operations](#) [Expand Operations](#)

Values [Show/Hide](#) [List Operations](#) [Expand Operations](#)

Auth [Show/Hide](#) [List Operations](#) [Expand Operations](#)

post /token

Parameter	Value	Description	Parameter Type	Data Type
grant_type	password		formData	string
username	michael.kaip@gmx.net		formData	string
password	Pwd12345		formData	string

[Try it out!](#) [Hide Response](#)

Curl

```
curl -X POST --header 'Content-Type: application/x-www-form-urlencoded' --header 'Accept: application/json' -d 'grant_type=password&username=michael.kaip@gmx.net&password=Pwd12345'
```

Request URL

```
http://localhost:54756/token
```

Response Body

```
{
  "access_token": "MofCgsbIKqt10Nn1j4fh4BuY3HfLYxt1qp-c3659v0LKzc-tME92xVP-McBT9d1UjZuHvEQPt1-4dQkKoxhKLQhMeSek8jM2SXX-pTr",
  "token_type": "bearer",
  "expires_in": 1209599,
  "userName": "michael.kaip@gmx.net",
  ".issued": "Thu, 08 Aug 2019 12:18:18 GMT",
  ".expires": "Thu, 22 Aug 2019 12:18:18 GMT"
}
```

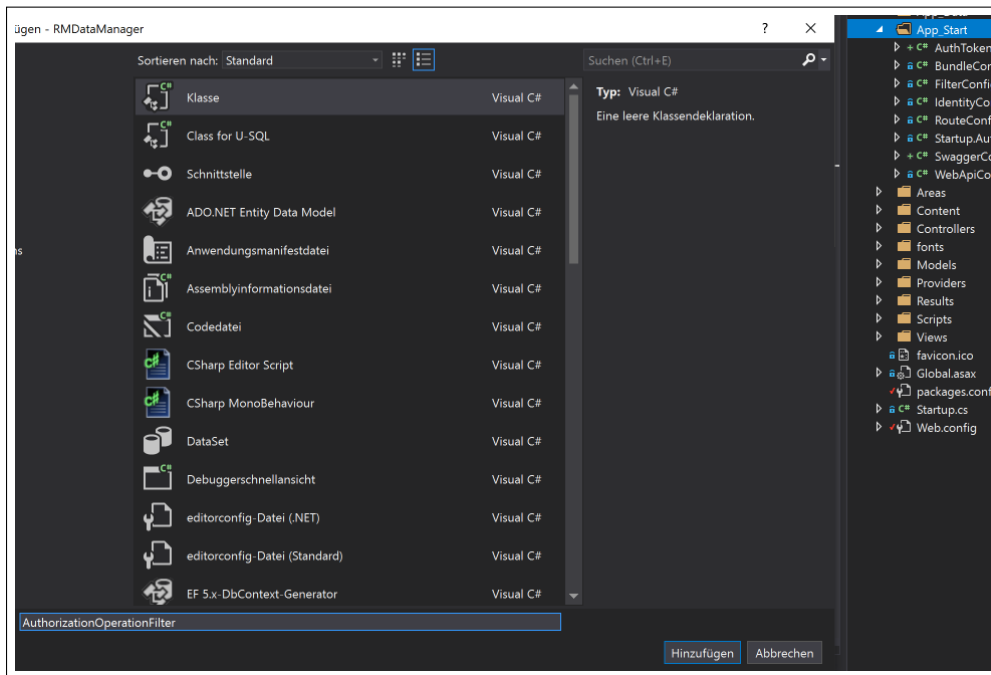
Response Code

```
200
```

Response Headers

```
{
  "pragma": "no-cache",
  "date": "Thu, 08 Aug 2019 12:18:20 GMT",
  "server": "Microsoft-IIS/10.0",
  "x-powered-by": "ASP.NET",
  "content-type": "application/json; charset=UTF-8",
  "cache-control": "no-cache",
  "x-sourcefiles": "JUTF-8787XFxNYWncSG9tZVxib2N1bWVudhRlcUSR12G11bVx5ZXRhawxNYW5hZ2VzYXJNRG90YU1ibG9nZXJ0c3d0d9Zm4=",
  "content-length": "693",
  "expires": "-1"
}
```

2. Enabling to paste in the bearer token in order to authorize restricted commands

(a) Adding a new Class to `RMDataManager.App_Start`

(b) Implementing the required Interface

```

0 Verweise | 0 Änderungen | 0 Autoren, 0 Änderungen
public class AuthorizationOperationFilter : IOperationFilter
{
    0 Verweise | 0 Änderungen | 0 Autoren, 0 Änderungen
    public void Apply(Operation operation, SchemaRegistry schemaRegistry, ApiDescription apiDescription)
    {
        // Adding a parameter to each operation.
        if (operation.parameters == null)
        {
            operation.parameters = new List<Parameter>();
        }

        operation.parameters.Add(new Parameter
        {
            name = "Authorization",
            @in = "header",
            description = "access token",
            type = "string"
        });
    }
}

```

(c) Applying it to SwaggerConfig.cs

```

.EnableSwagger(configure: c =>
{
    c.DocumentFilter<AuthTokenOperation>(); // adding the implemented document filter
    c.OperationFilter<AuthorizationOperationFilter>(); // adding the implmented operation filter
}

```

(d) Get user information from the application via SWAGGER using the token

Values [Show/Hide](#) [List Operations](#) [Expand Operations](#)

GET /api/Values

Response Class (Status 200)
OK

Model: **Example Value**

```
[
  "string"
]
```

Response Content Type: application/json ▼

Parameters

Parameter	Value	Description	Parameter Type	Data Type
Authorization	bearer PbvcDU53IDWQvxxWnxBaBOs57EWmT6	access token	header	string

[Try it out!](#) [Hide Response](#)

Curl

```
curl -X GET --header 'Accept: application/json' --header 'Authorization: bearer PbvcDU53IDWQvxxWnxBaBOs57EWmT6NoXhgIdem07kJoP1Vvh' http://localhost:54756/api/Values
```

Request URL

```
http://localhost:54756/api/Values
```

Response Body

```
[
  "value1",
  "value2",
  "2268F0be-21b1-4b31-98a5-8b9e32c2ea75"
]
```

Response Code

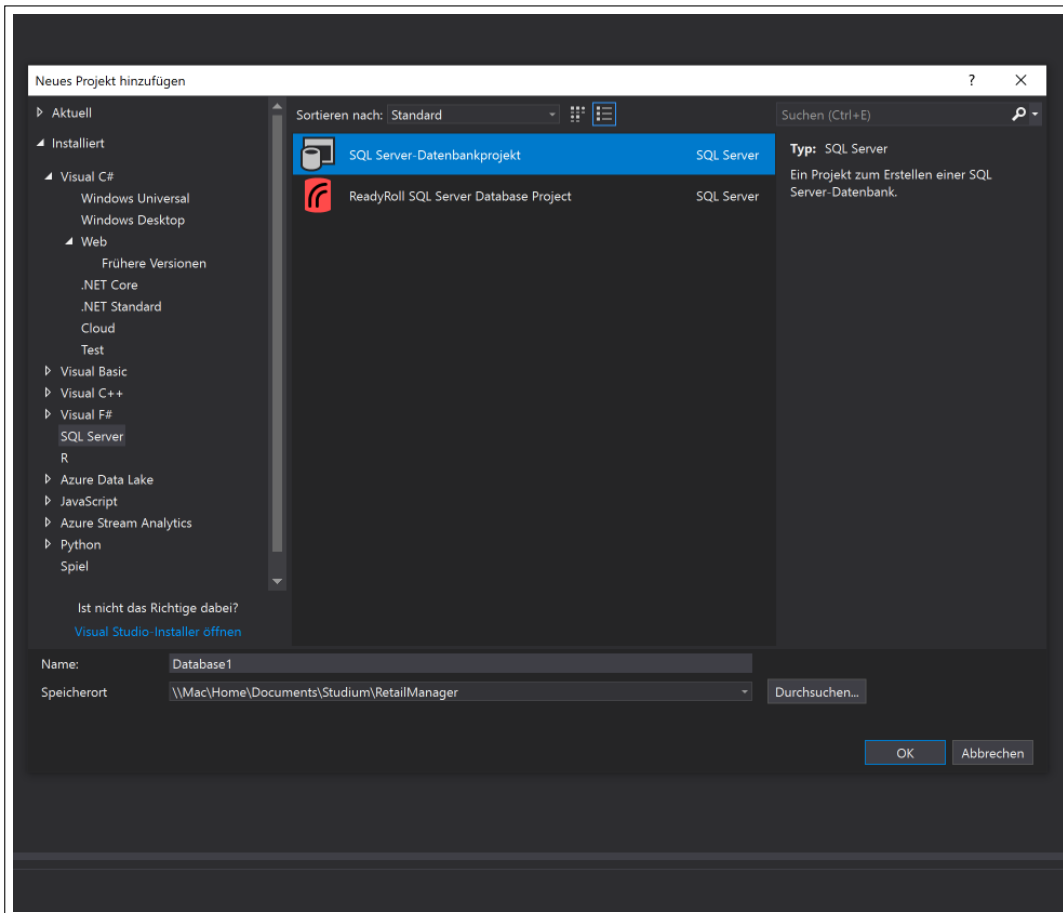
```
200
```

Response Headers

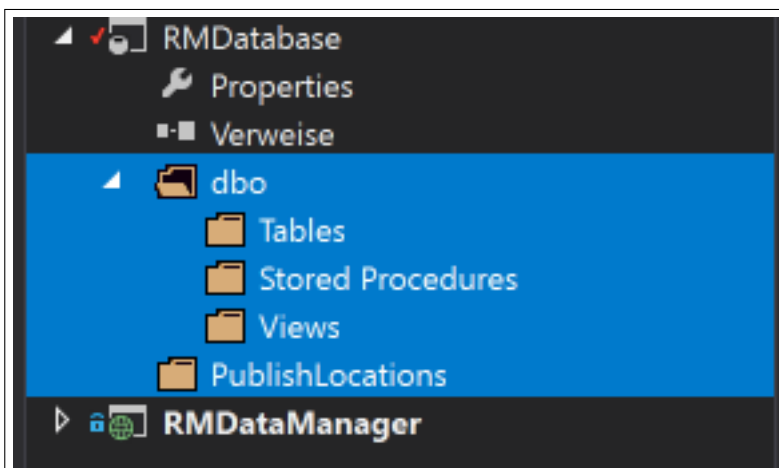
```
{
  "pragma": "no-cache",
  "date": "Thu, 08 Aug 2019 13:04:28 GMT",
  "server": "Microsoft-IIS/10.0",
  "x-aspnet-version": "4.0.30319",
  "x-powered-by": "ASP.NET",
  "content-type": "application/json; charset=utf-8",
  "cache-control": "no-cache",
  "x-sourcefiles": "~7UTF-878fXfxNvMhc569t2VxEb2N1bMvudHncU3R1ZG11bVxSZXRhahxWYShZVvYXFjNRGF0YU1hbmFnZXI-cyXBPfZhhbW1cw==7-",
  "content-length": "58",
  "expires": "-1"
}
```

6 SQL Database Setup

6.1 Adding new Database Project to the solution

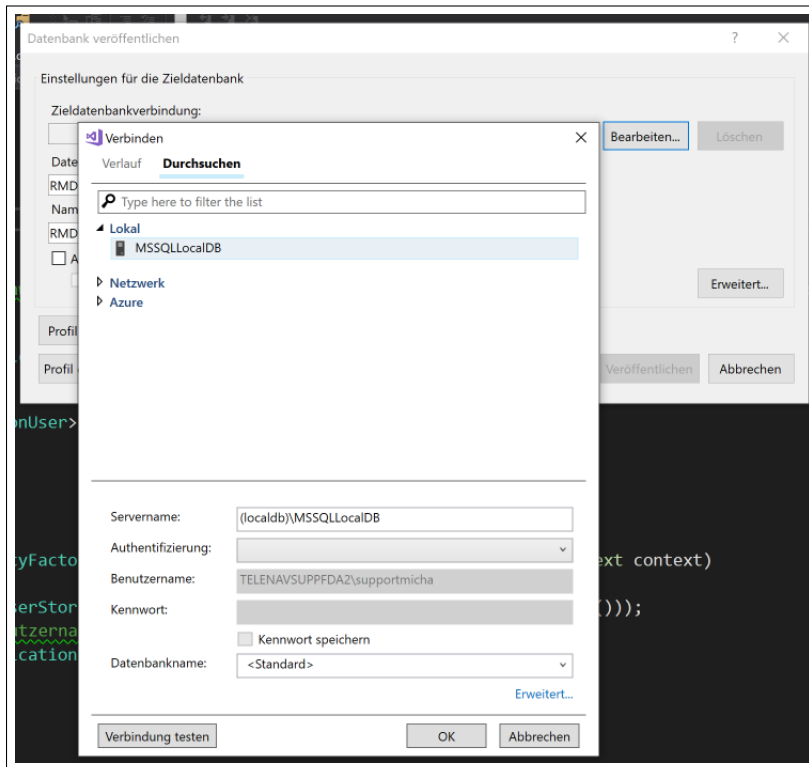


6.2 Adding several folders to the project

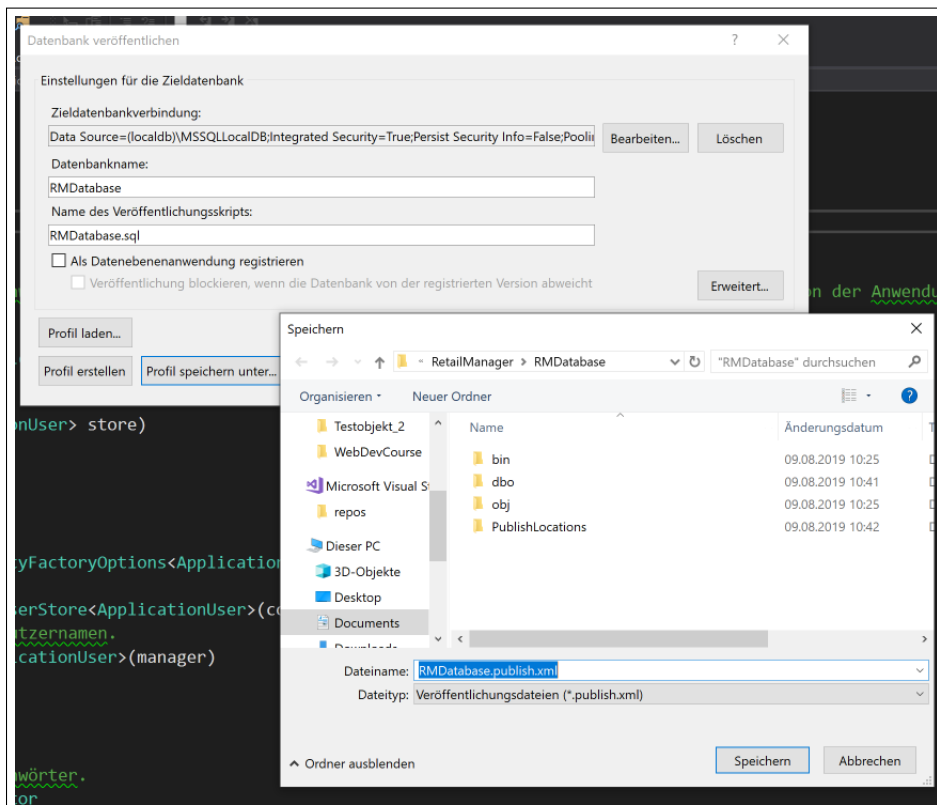


6.3 Creating a profile and publishing the Database

1. *RightClick on RMDatabase → Publish → Edit → Browse*

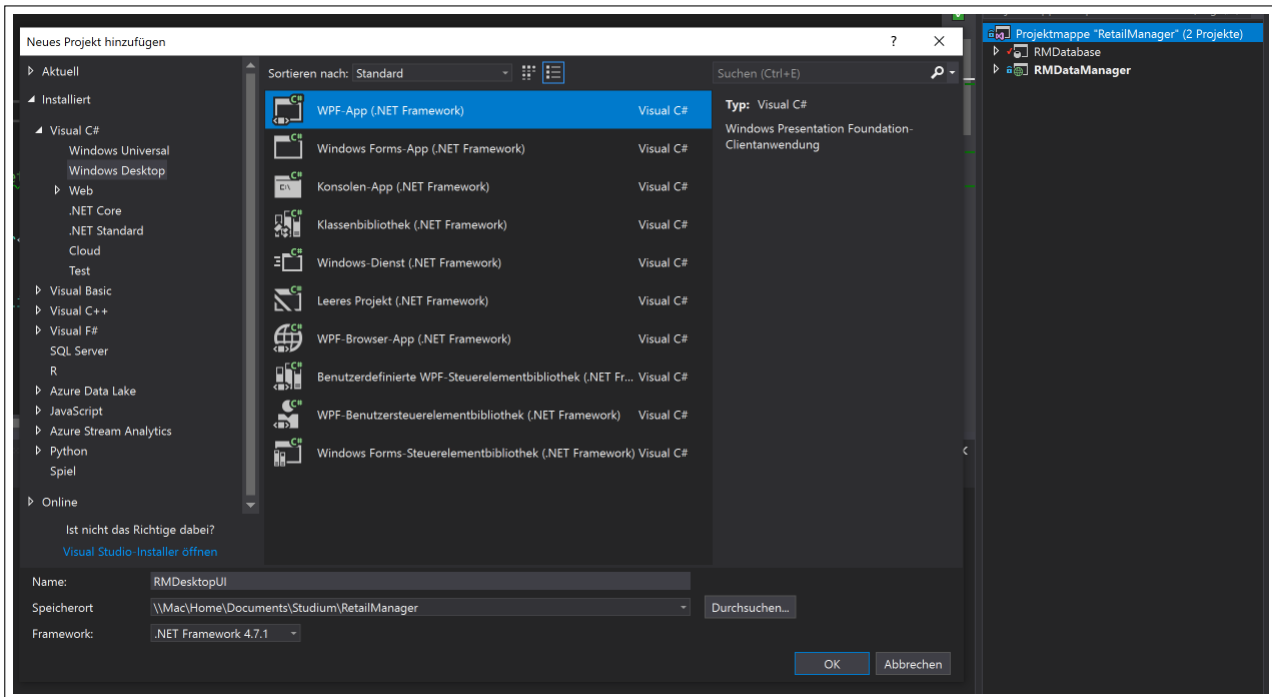


2. Naming and saving profile to PublishLocations

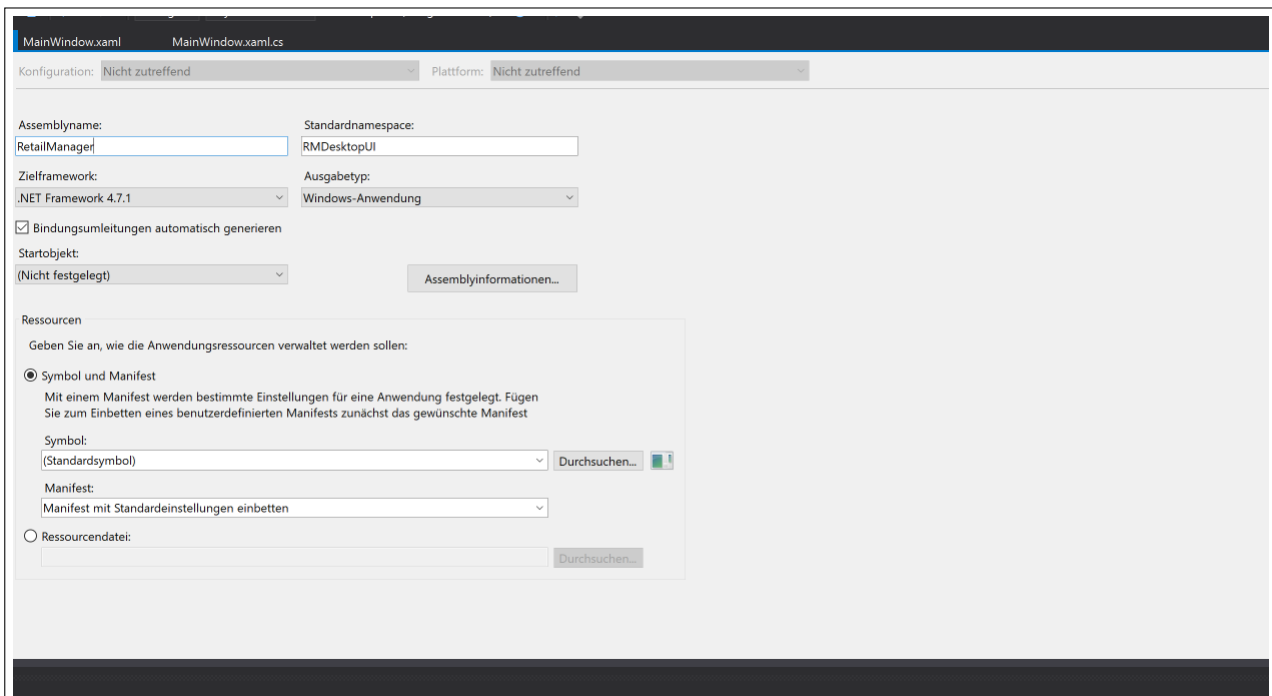


7 WPF with MVVM Project Setup

7.1 Adding the WPF Project to the solution



7.2 Changing the Assembly Name to the name of the solution in Properties

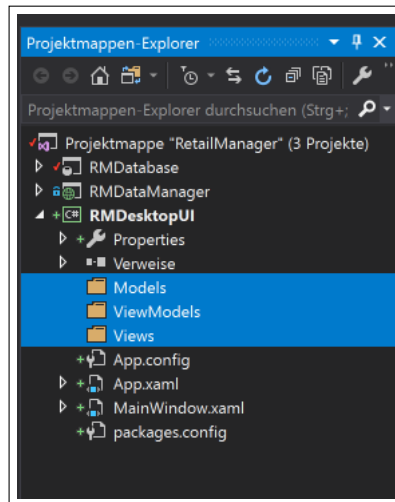


Also set project as the default startup-project.

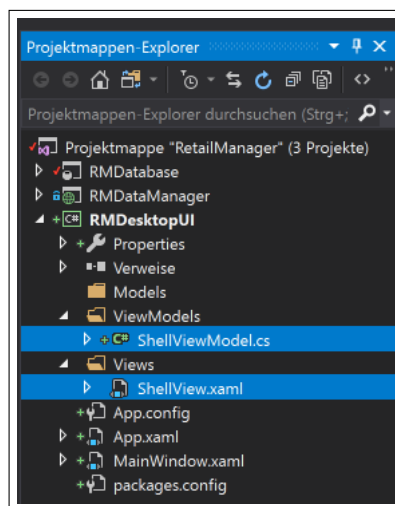
7.3 Adding Caliburn Micro MVVM-Framework

Add NuGet-Package to references.

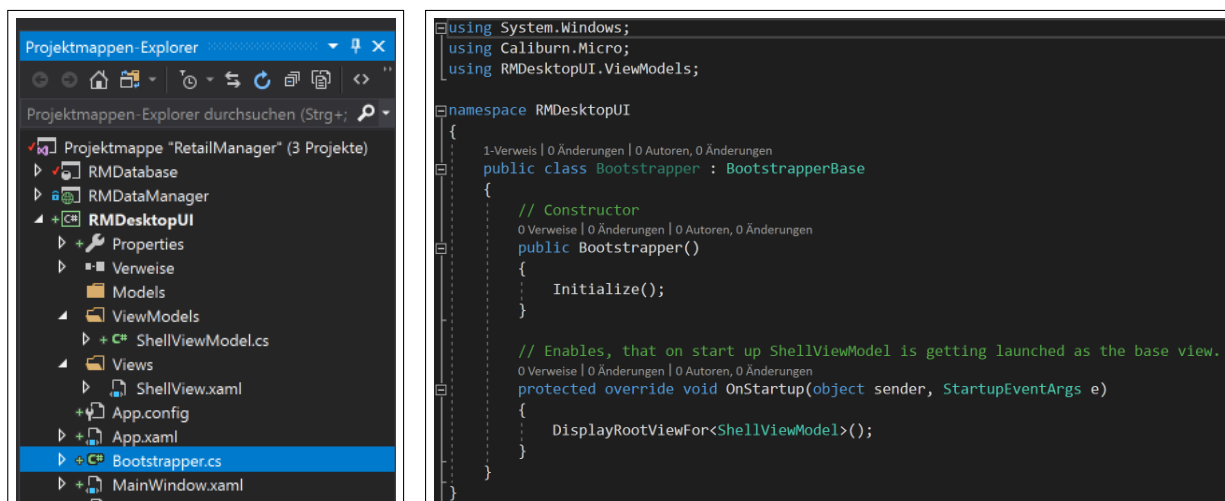
7.3.1 Adding the folder structure for the MVVM-Framework



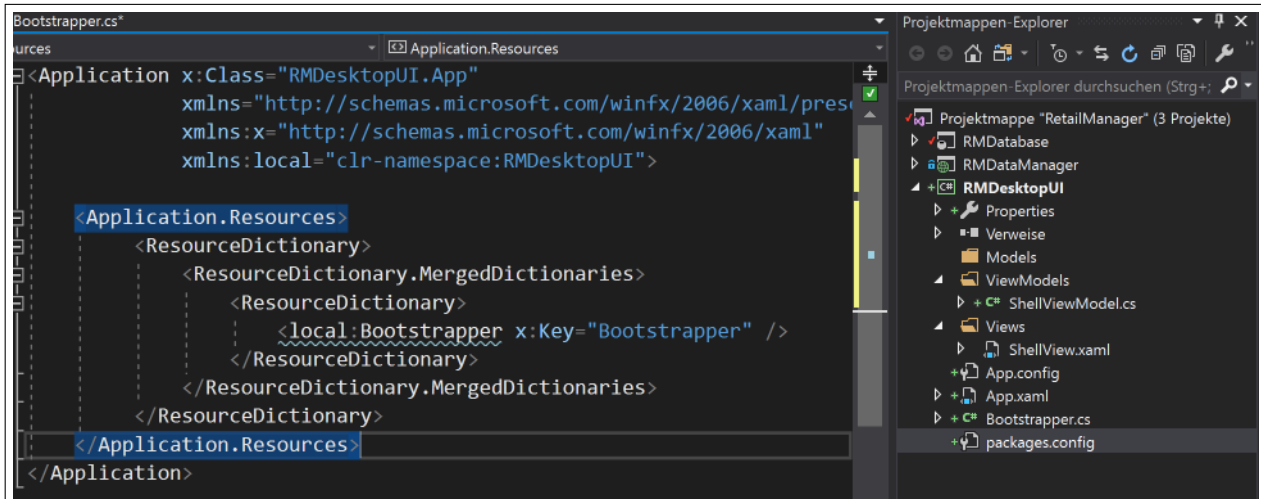
7.3.2 Adding a new ShellViewModel class and a SchellView window



7.3.3 Adding a Bootstrapper class to DesktopUI



7.3.4 Removing StartUpURI from App.xaml and adding a new Ressource Dictionary



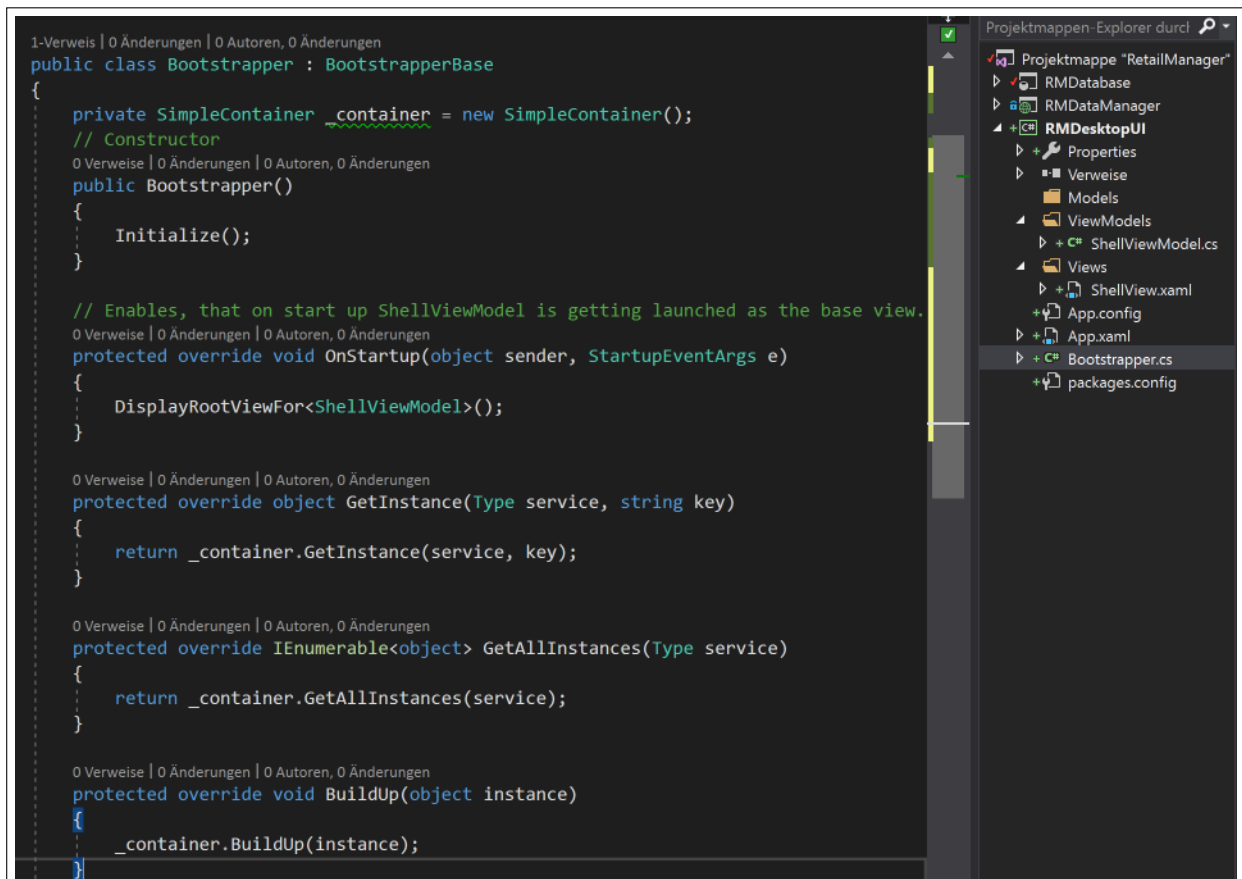
MainWindow.xaml can be deleted afterwards!!!

8 Dependency Injection in WPF

8.1 SimpleContainer in Caliburn Micro

Caliburn.Micro comes pre-bundled with a Dependency Injection container called SimpleContainer. A dependency injection container is an object that is used to hold dependency mappings for use later in an app via Dependency Injection. Dependency Injection is actually a pattern typically using the container element instead of manual service mapping.

8.1.1 Implementing SimpleContainer in Bootstrapper.cs



8.2 Overriding Configure() Method for the container

```

1-Verweis | 0 Änderungen | 0 Autoren, 0 Änderungen
public class Bootstrapper : BootstrapperBase
{
    private SimpleContainer _container = new SimpleContainer();
    // Constructor
    0 Verweise | 0 Änderungen | 0 Autoren, 0 Änderungen
    public Bootstrapper()
    {
        Initialize();
    }

    0 Verweise | 0 Änderungen | 0 Autoren, 0 Änderungen
    protected override void Configure()
    {
        _container.Instance(_container);

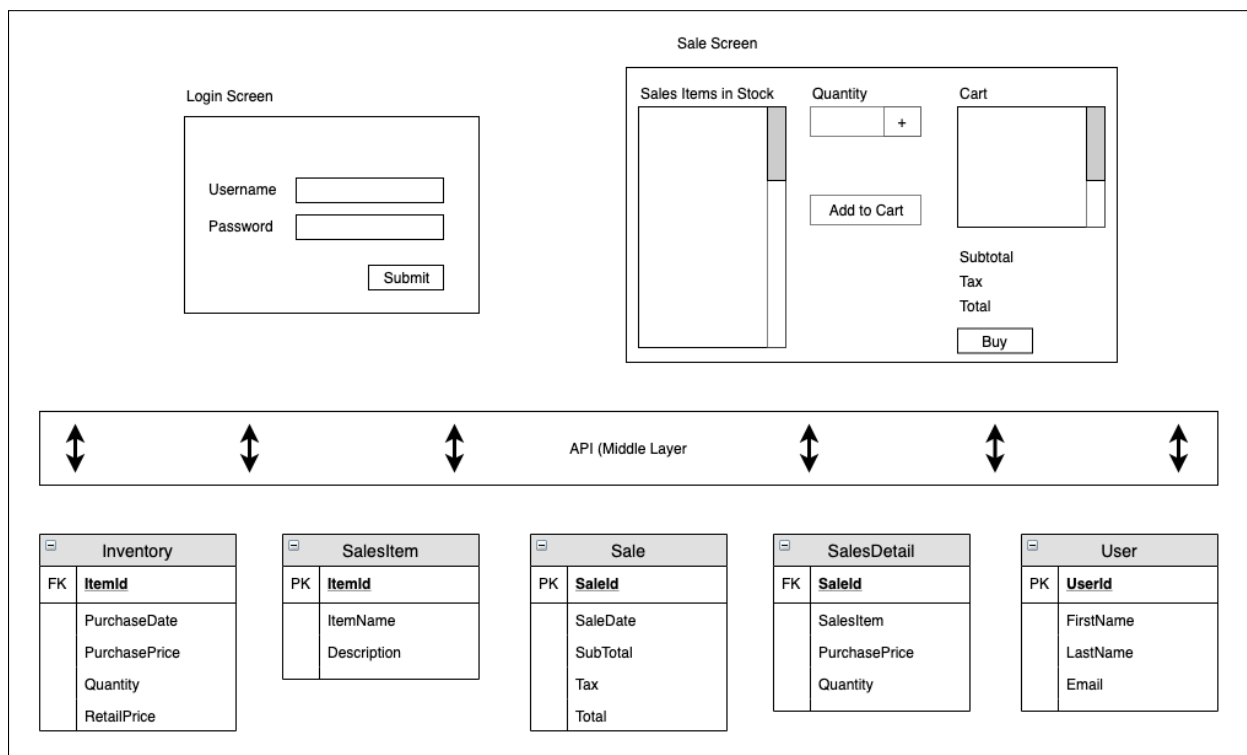
        _container
            .Singleton<IWindowManager, WindowManager>()
            .Singleton<EventAggregator, EventAggregator>();

        // Connecting the ViewModel to the Views using reflection
        GetType().Assembly.GetTypes()
            .Where(type => type.IsClass)
            .Where(type => type.Name.EndsWith(value: "ViewModel"))
            .ToList()
            .ForEach(action: viewModelType => _container.RegisterPerRequest(
                service: viewModelType, viewModelType.ToString(), implementation: viewModelType));
    }
}

```

9 Datamodel - planning and setup

9.1 Planning the Register



9.2 SQL Database Table Creation

User.sql

Name	Datentyp	NULL-Werte zulassen	Standard
Id	nvarchar(128)	<input type="checkbox"/>	
FirstName	nvarchar(50)	<input type="checkbox"/>	
LastName	nvarchar(50)	<input type="checkbox"/>	
EmailAddress	nvarchar(256)	<input type="checkbox"/>	
CreatedDate	datetime2(7)	<input type="checkbox"/>	getutcdate()


```

1 CREATE TABLE [dbo].[User]
2 (
3     [Id] NVARCHAR(128) NOT NULL,
4     [FirstName] NVARCHAR(50) NOT NULL,
5     [LastName] NVARCHAR(50) NOT NULL,
6     [EmailAddress] NVARCHAR(256) NOT NULL,
7     [CreatedDate] DATETIME2 NOT NULL DEFAULT getutcdate()
8 )
9

```

Product.sql

Name	Datentyp	NULL-Werte zulassen	Standard
Id	int	<input type="checkbox"/>	
ProductName	nvarchar(100)	<input type="checkbox"/>	
Description	nvarchar(MAX)	<input type="checkbox"/>	
RetailPrice	money	<input type="checkbox"/>	
CreateDate	datetime2(7)	<input type="checkbox"/>	getutcdate()
LastModified	datetime2(7)	<input type="checkbox"/>	getutcdate()


```

1 CREATE TABLE [dbo].[Product]
2 (
3     [Id] INT NOT NULL PRIMARY KEY IDENTITY,
4     [ProductName] NVARCHAR(100) NOT NULL,
5     [Description] NVARCHAR(MAX) NOT NULL,
6     [RetailPrice] MONEY NOT NULL,
7     [CreateDate] DATETIME2 NOT NULL DEFAULT getutcdate(),
8     /* Has to be modified manually everytime the entry gets modified.*/
9     [LastModified] DATETIME2 NOT NULL DEFAULT getutcdate()
10 )

```

Sale.sql

Name	Datentyp	NULL-Werte zulassen	Standard
Id	int	<input type="checkbox"/>	
CashierId	nvarchar(128)	<input type="checkbox"/>	
SaleDate	datetime2(7)	<input type="checkbox"/>	
SubTotal	money	<input type="checkbox"/>	
Tax	money	<input type="checkbox"/>	
Total	money	<input type="checkbox"/>	


```

1 CREATE TABLE [dbo].[Sale]
2 (
3     [Id] INT NOT NULL PRIMARY KEY IDENTITY, /* IDENTITY Makes the Id auto increment */
4     [CashierId] NVARCHAR(128) NOT NULL,
5     [SaleDate] DATETIME2 NOT NULL,
6     [SubTotal] MONEY NOT NULL,
7     [Tax] MONEY NOT NULL,
8     [Total] MONEY NOT NULL
9 )

```

SaleDetail.sql

Name	Datentyp	NULL-Werte zulassen	Standard
Id	int	<input type="checkbox"/>	
SaleId	int	<input type="checkbox"/>	
ProductId	int	<input type="checkbox"/>	
Quantity	nchar(10)	<input checked="" type="checkbox"/>	1
PurchasePrice	money	<input type="checkbox"/>	
Tax	money	<input type="checkbox"/>	0


```

1 CREATE TABLE [dbo].[SaleDetail]
2 (
3     [Id] INT NOT NULL PRIMARY KEY IDENTITY,
4     [SaleId] INT NOT NULL,
5     [ProductId] INT NOT NULL,
6     [Quantity] NCHAR(10) NOT NULL DEFAULT 1,
7     [PurchasePrice] MONEY NOT NULL,
8     [Tax] MONEY NOT NULL DEFAULT 0,
9 )

```

Inventory.sql

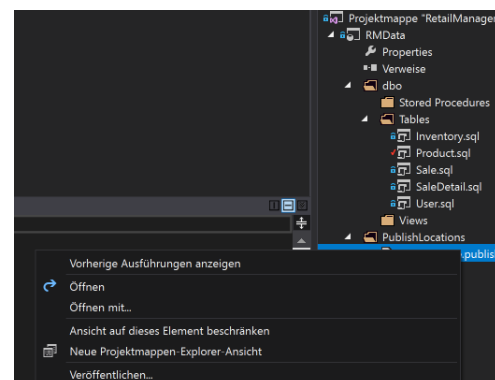
Name	Datentyp	NULL-Werte zulassen	Standard
Id	int	<input type="checkbox"/>	
ProductId	int	<input type="checkbox"/>	
Quantity	nchar(10)	<input type="checkbox"/>	1
PurchasePrice	money	<input type="checkbox"/>	
PurchaseDate	datetime2(7)	<input checked="" type="checkbox"/>	getutcdate()


```

1 CREATE TABLE [dbo].[Inventory]
2 (
3     [Id] INT NOT NULL PRIMARY KEY IDENTITY,
4     [ProductId] INT NOT NULL,
5     [Quantity] NCHAR(10) NOT NULL DEFAULT 1,
6     [PurchasePrice] MONEY NOT NULL,
7     [PurchaseDate] DATETIME2 NOT NULL DEFAULT getutcdate()
8 )
9

```

!!! Publishing Tables !!!



- 10 WPF Login Form Creation
- 11 Wiring up the WPF Login Form to the API
- 12 Login Form Error Handling