PenTesting Microsoft LightSwitch

Visual Studio 2012 update 3 version

Default Vulnerabilities and Attacks Illustrated

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1 Brief Introduction

1.2 Introduction to Microsoft LightSwitch

Microsoft LightSwitch is a development framework initially released on the 26th of July 2011, tailored for creating line of business applications. The current version of LightSwitch is LightSwitch Visual Studio 2012 update 3 (1st Sept. 2013), which supports the new middle tier WebAPI functionality tailored for HTML5 and mobile devices.

LightSwitch can run in three distinct modes:
A local desktop Silverlight client
A Silverlight web client hosted on IIS and SQL servers
An HMTL5/JavaScript web client hosted on IIS and SQL servers

LighSwitch Silverlight web client requires IIS and SQL2008/SQL2012 to run; with Microsoft Azure cloud hosting also supported.

This paper concentrates on a Silverlight client running from an IIS hosted server on the Internet.

There are a number of security concerns with LightSwitch; one of the key concerns is that by default, access to screens and the OData services are not restricted. We hope this paper helps developers to become more aware of this concern, and how to programmatically restrict access to each screen and database table.

ProCheckUp conducted testing on a fully patched version of IIS/8.0 server running on Windows 2012, with SQL 2008 express server.

1.3 About this paper

The intent of this paper is to help Chief Security Officers (CSO) to better understand the vulnerabilities in default installations of LightSwitch, and then to ensure that remedial steps are taken to secure them.

To demonstrate the issues typically found within LightSwitch deployments, we downloaded Microsoft's Contoso Construction advanced deployment sample and deployed it to an IIS 8 web server using the latest version of Visual Studio 2012 Professional.
This sample can be deployed from here:-
http://code.msdn.microsoft.com/windowsdesktop/Contoso-Construction-9f944948

1.4 Summary of issues identified

There are two main components to a LightSwitch Silverlight web application: the SilverLight client screens, and the different WCF services which retrieve information from database tables, that are then consumed by the Silverlight application in OData format.

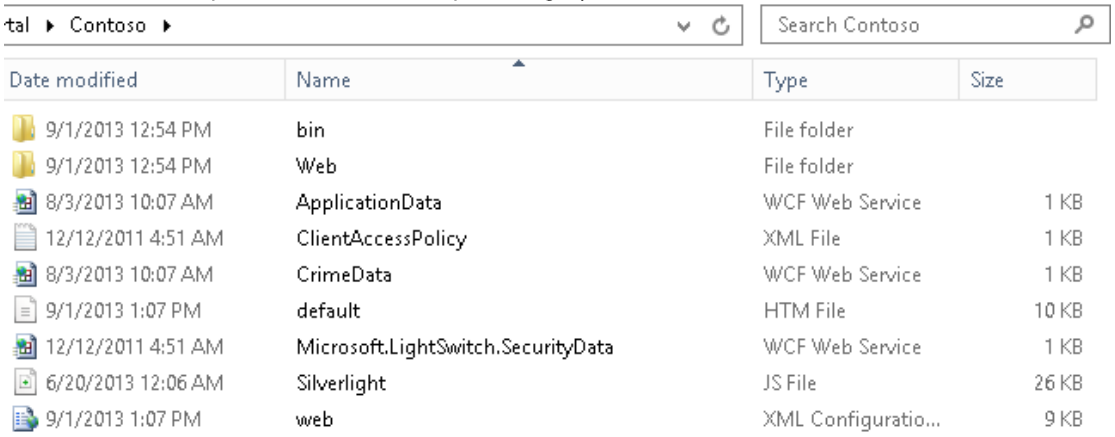
Anonymous access to the individual LightSwitch client screens needs to be restricted by using the "screen name"_CanRun access controls. See chapter 5 "Using LightSwitch anonymous access to bypass the login screen".

Similarly access to each of the OData WCF tables needs to be restricted by using the Set_Filter query on the database table. See chapter 6 "Querying OData services" and "Restricting OData access by using the Set_Filter method".

2 Directory contents of the Contoso application

2.2 "root" directory

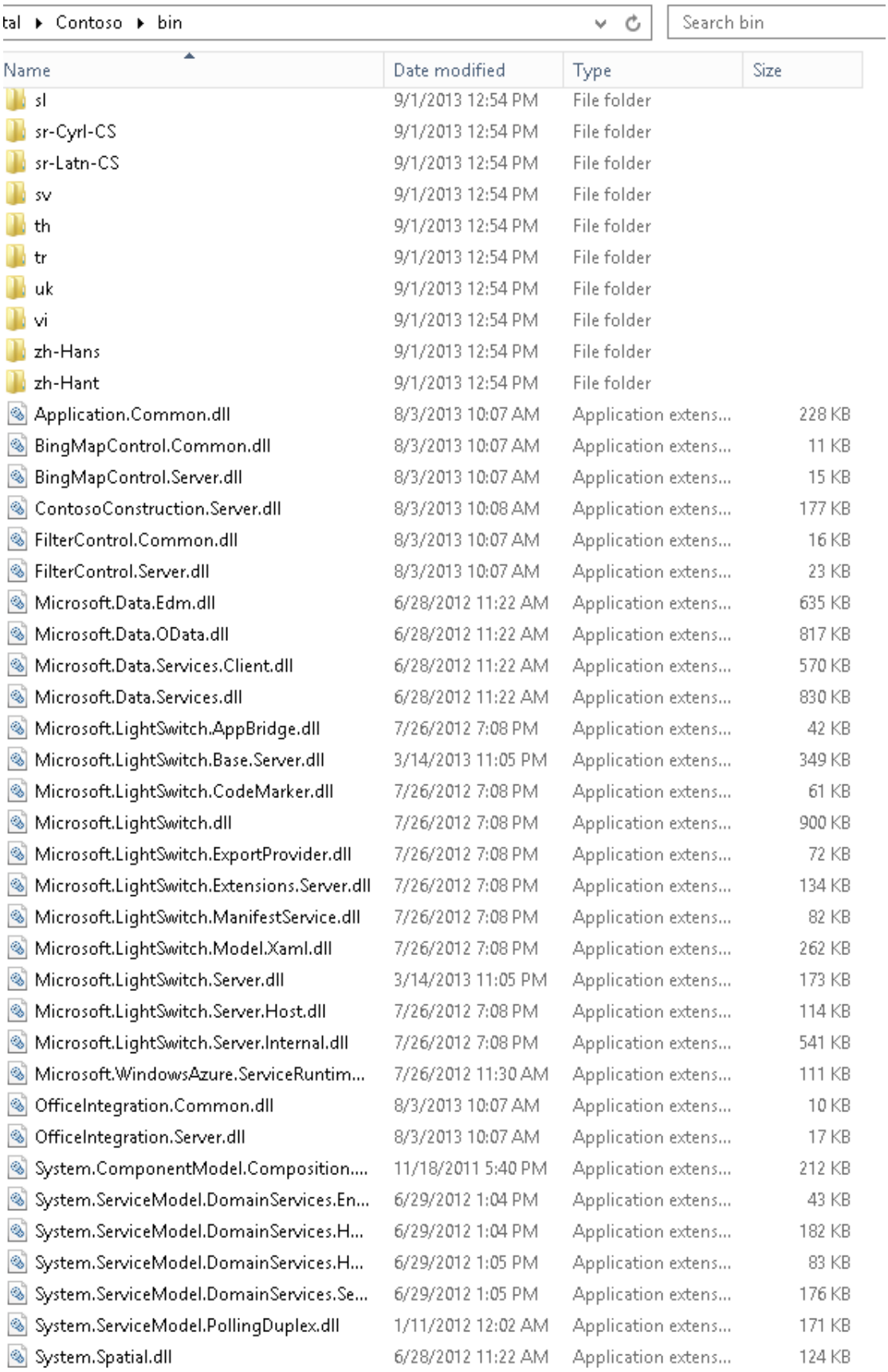
The "root" directory of Contoso contains the web.config (the server service configuration file – which is not remotely accessible), and the ClientAccessPolicy.xml files (used to restrict Silverlight across domains to prevent Cross Site Request forgery attacks), as shown below:-



The above "root" directory also contains three associated WCF files: ApplicationData.svc, CrimeData.svc and Microsoft.LightSwitch.SecurityData.svc. All of these WCF files provide OData services (More on querying Odata services later) and are simply accessed by requesting their name (https://testserv/Contoso/ApplicationData.svc/) from the web server. ApplicationData.svc and Microsoft.LightSwitch.SecurityData.svc are the default LightSwitch WCF services and if forms' access is enabled, access by default is password protected.

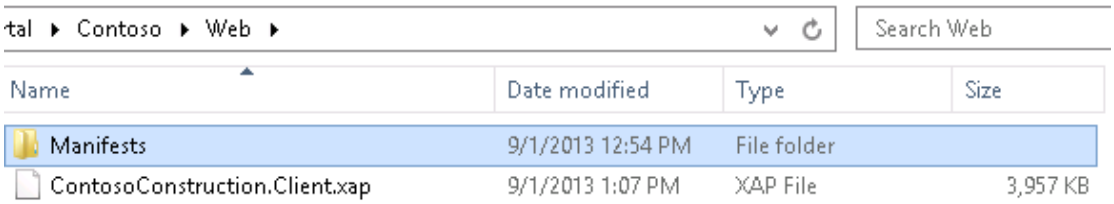
2.3 The bin directory

The bin directory contains language directories, and the dll's used by the LightSwitch application, some of which are added by the extensions used.



2.4 The web directory

The final important directory is the web directory:-



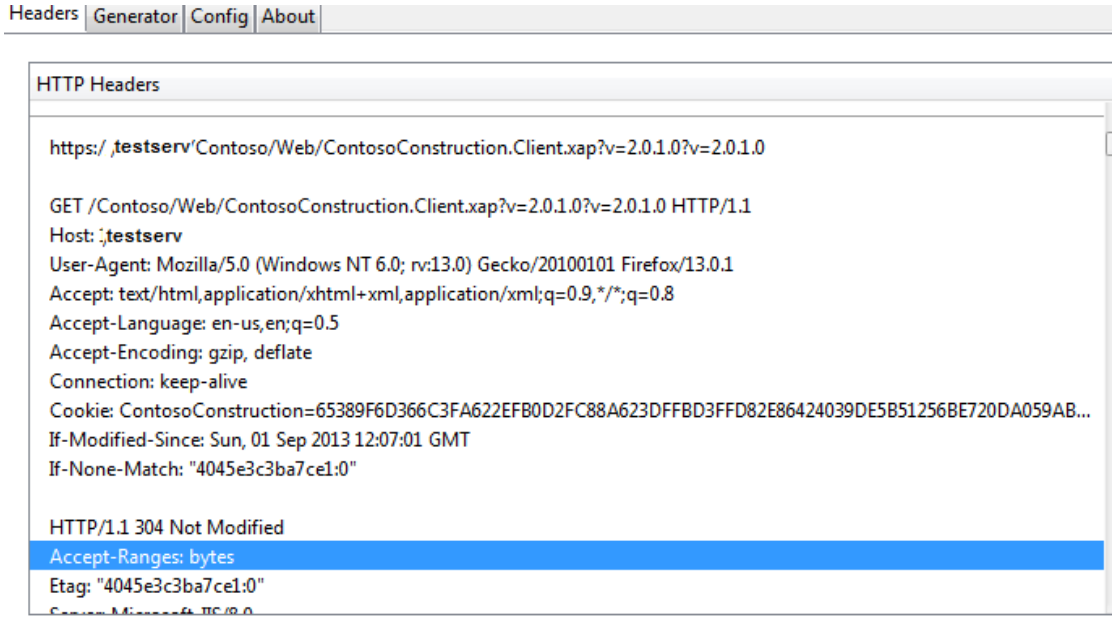
This includes the *.Client.xap which is used to build the Silverlight client frontend, and then communicates using OData to the exposed WCF services.

3 Reading the Client.xap file

When starting a LightSwitch Silverlight application by submitting a similar URL:-
https://testserv/Contoso/

After accessing the root directory /, the first loaded file is the client.xap file:-
https://testserv/Contoso/Web/ContosoConstruction.Client.xap?v=2.0.1.0?v=2.0.1.0

The Client.xap name can be easily determined by intercepting requests between the SilverLight client and the server. (In this case Firefox's LiveHTTPHeaders was used)
https://addons.mozilla.org/en-US/firefox/addon/live-http-headers/



3.2 Examining the contents of the Client.xap file

By simply downloading this file and renaming the xap extension to zip, we can examine the contents of the file in a zip archive viewer:-

First request the file and save locally.
https://testserv/Contoso/Web/ContosoConstruction.Client.xap?v=2.0.1.0?v=2.0.1.0

Rename the file extension from xap to zip, so ContosoConstruction.Client.xap becomes ContosoConstruction.Client.zip.

The open up the renamed file in a zip viewer:-

Address \

Name	Type	Size	Ratio	Packed
Resources	File Folder			
Application.Common.dll	Applicatio...	232,960	76%	56,599
AppManifest.xaml	Windows ...	5,434	86%	803
BingMapControl.Client.Design....	Applicatio...	8,704	61%	3,398
BingMapControl.Client.dll	Applicatio...	52,736	67%	17,677
BingMapControl.Common.dll	Applicatio...	10,752	65%	3,799
Config.xml	XML Docu...	3,819	82%	709
Contoso Construction.Client.dll	Applicatio...	678,400	84%	113,1...
FilterControl.Client.Design.dll	Applicatio...	10,752	66%	3,658
FilterControl.Client.dll	Applicatio...	98,816	73%	27,019
FilterControl.Common.dll	Applicatio...	15,872	75%	4,125
Microsoft.CSharp.dll	Applicatio...	469,344	62%	180,4...
Microsoft.Data.Edm.SL.dll	Applicatio...	648,800	68%	213,2...
Microsoft.Data.OData.SL.dll	Applicatio...	783,968	70%	238,9...
Microsoft.Data.Services.Client....	Applicatio...	612,448	65%	215,5...
Microsoft.LightSwitch.Base.Cli...	Applicatio...	168,496	58%	71,345
Microsoft.LightSwitch.Base.Cli...	XML Docu...	151	6%	142
Microsoft.LightSwitch.Client.dll	Applicatio...	1,566,232	77%	374,7...
Microsoft.LightSwitch.Client.In...	Applicatio...	1,808,448	77%	427,0...
Microsoft.LightSwitch.Client.In...	XML Docu...	156	7%	146
Microsoft.LightSwitch.Client.M...	XML Docu...	147	5%	140
Microsoft.LightSwitch.CodeMa...	Applicatio...	61,480	62%	23,408
Microsoft.LightSwitch.Cosmop...	Applicatio...	934,464	86%	136,4...
Microsoft.LightSwitch.dll	Applicatio...	921,600	67%	304,7...
Microsoft.LightSwitch.ExportPr...	Applicatio...	72,760	58%	30,781
Microsoft.LightSwitch.Extensio...	Applicatio...	294,472	76%	73,546
Microsoft.LightSwitch.Extensio...	Applicatio...	46,696	57%	20,420
Microsoft.LightSwitch.Manifest...	Applicatio...	82,016	58%	34,463
Microsoft.LightSwitch.Model.X...	Applicatio...	266,312	66%	92,769
Microsoft.LightSwitch.Model.X...	XML Docu...	157	8%	146
Microsoft.LightSwitch.Runtime...	Applicatio...	543,328	70%	163,5...
Microsoft.LightSwitch.Runtime...	XML Docu...	162	8%	150
Microsoft.LightSwitch.SDKProx...	Applicatio...	28,704	48%	15,066
Microsoft.Maps.MapControl.C...	Applicatio...	51,112	64%	18,532
Microsoft.Maps.MapControl.dll	Applicatio...	296,872	66%	102,0...
Microsoft.VisualStudio.Debugg...	Applicatio...	39,512	57%	17,017
Microsoft.VisualStudio.Debugg...	XML Docu...	161	9%	148
OfficeIntegration.Client.Design...	Applicatio...	9,216	61%	3,607
OfficeIntegration.Client.dll	Applicatio...	98,304	67%	32,714
OfficeIntegration.Common.dll	Applicatio...	10,240	66%	3,521
ProjectStatus.docx	Microsoft ...	37,814	14%	32,661
Service.lsml	LSML File	12,068	90%	1,291
ServiceMetadataFiles.txt	Text Docu...	14		16

4 Looking at the contents of the Client.xap file

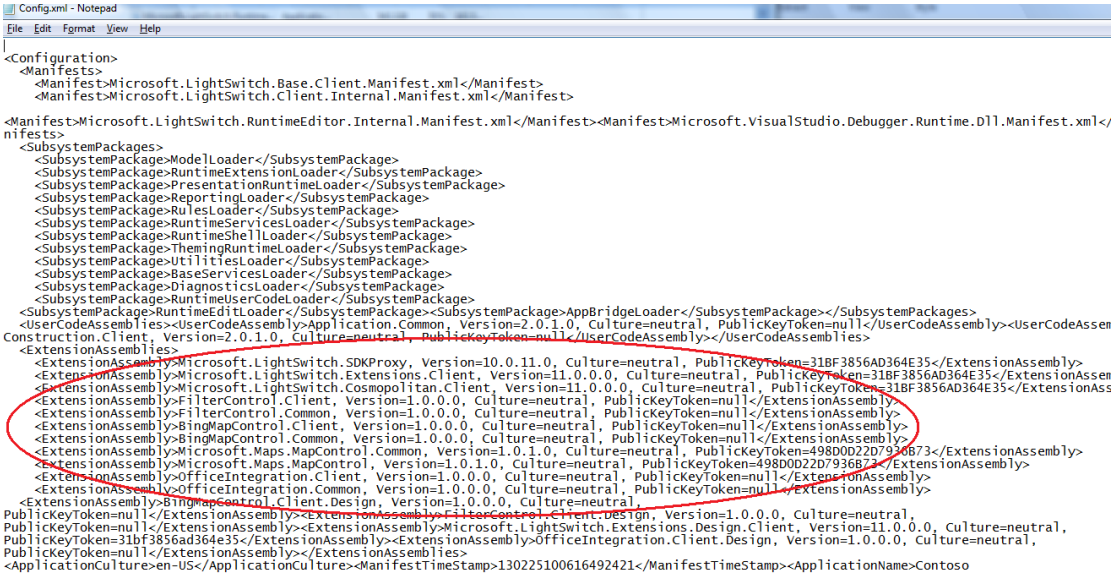
4.2 AppManifest.xaml

The AppManifest.xaml file lists the dll's used by the LightSwitch client.

```
<Deployment xmlns="http://schemas.microsoft.com/client/2007/deployment" xmlns:x="http://schemas.microsoft.com/winfx/2006/xaml"
EntryPointAssembly="Microsoft.LightSwitch.Client.Internal" EntryPointType="Microsoft.LightSwitch.Runtime.Shell.Implementation.App"
RuntimeVersion="5.0.61118.0">
  <Deployment.Parts>
    <AssemblyPart x:Name="Contoso Construction.Client" Source="Contoso Construction.Client.dll" />
    <AssemblyPart x:Name="Application.Common" Source="Application.Common.dll" />
    <AssemblyPart x:Name="BingMapControl.Client.Design" Source="BingMapControl.Client.Design.dll" />
    <AssemblyPart x:Name="BingMapControl.Client" Source="BingMapControl.Client.dll" />
    <AssemblyPart x:Name="BingMapControl.Common" Source="BingMapControl.Common.dll" />
    <AssemblyPart x:Name="FilterControl.Client.Design" Source="FilterControl.Client.Design.dll" />
    <AssemblyPart x:Name="FilterControl.Client" Source="FilterControl.Client.dll" />
    <AssemblyPart x:Name="FilterControl.Common" Source="FilterControl.Common.dll" />
    <AssemblyPart x:Name="Microsoft.Data.Services.Client.SL" Source="Microsoft.Data.Services.Client.SL.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.Base.Client" Source="Microsoft.LightSwitch.Base.Client.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.Client" Source="Microsoft.LightSwitch.Client.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.Client.Internal" Source="Microsoft.LightSwitch.Client.Internal.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.CodeMarker" Source="Microsoft.LightSwitch.CodeMarker.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.Cosmopolitan.Client" Source="Microsoft.LightSwitch.Cosmopolitan.Client.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch" Source="Microsoft.LightSwitch.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.ExportProvider" Source="Microsoft.LightSwitch.ExportProvider.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.Extensions.Client" Source="Microsoft.LightSwitch.Extensions.Client.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.Extensions.Design.Client" Source="Microsoft.LightSwitch.Extensions.Design.Client.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.ManifestService.Client" Source="Microsoft.LightSwitch.ManifestService.Client.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.Model.Xaml.Client" Source="Microsoft.LightSwitch.Model.Xaml.Client.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.RuntimeEditor.Internal" Source="Microsoft.LightSwitch.RuntimeEditor.Internal.dll" />
    <AssemblyPart x:Name="Microsoft.LightSwitch.SDKProxy" Source="Microsoft.LightSwitch.SDKProxy.dll" />
    <AssemblyPart x:Name="Microsoft.Maps.MapControl.Common" Source="Microsoft.Maps.MapControl.Common.dll" />
    <AssemblyPart x:Name="Microsoft.Maps.MapControl" Source="Microsoft.Maps.MapControl.dll" />
    <AssemblyPart x:Name="OfficeIntegration.Client.Design" Source="OfficeIntegration.Client.Design.dll" />
    <AssemblyPart x:Name="OfficeIntegration.Client" Source="OfficeIntegration.Client.dll" />
    <AssemblyPart x:Name="OfficeIntegration.Common" Source="OfficeIntegration.Common.dll" />
    <AssemblyPart x:Name="System.ComponentModel.Composition" Source="System.ComponentModel.Composition.dll" />
    <AssemblyPart x:Name="System.ComponentModel.DataAnnotations" Source="System.ComponentModel.DataAnnotations.dll" />
    <AssemblyPart x:Name="System.ServiceModel.DomainServices.Client.Web" Source="System.ServiceModel.DomainServices.Client.Web.dll" />
    <AssemblyPart x:Name="System.ServiceModel.Extensions" Source="System.ServiceModel.Extensions.dll" />
    <AssemblyPart x:Name="System.ServiceModel.PollingDuplex" Source="System.ServiceModel.PollingDuplex.dll" />
    <AssemblyPart x:Name="System.ServiceModel.Web.Extensions" Source="System.ServiceModel.Web.Extensions.dll" />
    <AssemblyPart x:Name="System.Windows.Controls.Data" Source="System.Windows.Controls.Data.dll" />
    <AssemblyPart x:Name="System.Windows.Controls.Data.Input" Source="System.Windows.Controls.Data.Input.dll" />
```

4.3 Config.xml

An interesting file within the client.Xap is the config.xml which contains the additional LightSwitch extensions used/loaded by LightSwitch, and can be used to cross reference any vulnerabilities published for the extension extensions used.



```
Config.xml - Notepad
File  Edit  Format  View  Help

<Configuration>
  <Manifests>
    <Manifest>Microsoft.LightSwitch.Base.Client.Manifest.xml</Manifest>
    <Manifest>Microsoft.LightSwitch.Client.Internal.Manifest.xml</Manifest>

<Manifest>Microsoft.LightSwitch.RuntimeEditor.Internal.Manifest.xml</Manifest><Manifest>Microsoft.VisualStudio.Debugger.Runtime.Dll.Manifest.xml</
nifests>
  <SubsystemPackages>
    <SubsystemPackage>ModelLoader</SubsystemPackage>
    <SubsystemPackage>RuntimeExtensionLoader</SubsystemPackage>
    <SubsystemPackage>PresentationRuntimeLoader</SubsystemPackage>
    <SubsystemPackage>ReportingLoader</SubsystemPackage>
    <SubsystemPackage>RulesLoader</SubsystemPackage>
    <SubsystemPackage>RuntimeServicesLoader</SubsystemPackage>
    <SubsystemPackage>RuntimeShellLoader</SubsystemPackage>
    <SubsystemPackage>ThemingRuntimeLoader</SubsystemPackage>
    <SubsystemPackage>UtilitiesLoader</SubsystemPackage>
    <SubsystemPackage>BaseServicesLoader</SubsystemPackage>
    <SubsystemPackage>DiagnosticsLoader</SubsystemPackage>
    <SubsystemPackage>RuntimeUserCodeLoader</SubsystemPackage>
  <SubsystemPackage>RuntimeEditLoader</SubsystemPackage><SubsystemPackage>AppBridgeLoader</SubsystemPackage></SubsystemPackages>
  <UserCodeAssemblies><UserCodeAssembly>Application.Common, Version=2.0.1.0, Culture=neutral, PublicKeyToken=null</UserCodeAssembly><UserCodeAssem
Construction.Client, Version=2.0.1.0, Culture=neutral, PublicKeyToken=null</UserCodeAssembly></UserCodeAssemblies>
  <ExtensionAssemblies>
    <ExtensionAssembly>Microsoft.LightSwitch.SDKProxy, Version=10.0.11.0, Culture=neutral, PublicKeyToken=31BF3856AD364E35</ExtensionAssembly>
    <ExtensionAssembly>Microsoft.LightSwitch.Extensions.Client, Version=11.0.0.0, Culture=neutral, PublicKeyToken=31BF3856AD364E35</ExtensionAssem
    <ExtensionAssembly>Microsoft.LightSwitch.Cosmopolitan.Client, Version=11.0.0.0, Culture=neutral, PublicKeyToken=31BF3856AD364E35</ExtensionAss
    <ExtensionAssembly>FilterControl.Client, Version=1.0.0.0, Culture=neutral, PublicKeyToken=null</ExtensionAssembly>
    <ExtensionAssembly>FilterControl.Common, Version=1.0.0.0, Culture=neutral, PublicKeyToken=null</ExtensionAssembly>
    <ExtensionAssembly>BingMapControl.Client, Version=1.0.0.0, Culture=neutral, PublicKeyToken=null</ExtensionAssembly>
    <ExtensionAssembly>BingMapControl.Common, Version=1.0.0.0, Culture=neutral, PublicKeyToken=null</ExtensionAssembly>
    <ExtensionAssembly>Microsoft.Maps.MapControl.Common, Version=1.0.1.0, Culture=neutral, PublicKeyToken=498D0D22D7936B73</ExtensionAssembly>
    <ExtensionAssembly>Microsoft.Maps.MapControl, Version=1.0.1.0, Culture=neutral, PublicKeyToken=498D0D22D7936B73</ExtensionAssembly>
    <ExtensionAssembly>OfficeIntegration.Client, Version=1.0.0.0, Culture=neutral, PublicKeyToken=null</ExtensionAssembly>
    <ExtensionAssembly>OfficeIntegration.Common, Version=1.0.0.0, Culture=neutral, PublicKeyToken=null</ExtensionAssembly>
  <ExtensionAssembly>BingMapControl.Client.Design, Version=1.0.0.0, Culture=neutral,
PublicKeyToken=null</ExtensionAssembly><ExtensionAssembly>FilterControl.Client.Design, Version=1.0.0.0, Culture=neutral,
PublicKeyToken=null</ExtensionAssembly><ExtensionAssembly>Microsoft.LightSwitch.Extensions.Design.Client, Version=11.0.0.0, Culture=neutral,
PublicKeyToken=31bf3856ad364e35</ExtensionAssembly><ExtensionAssembly>OfficeIntegration.Client.Design, Version=1.0.0.0, Culture=neutral,
PublicKeyToken=null</ExtensionAssembly></ExtensionAssemblies>
<ApplicationCulture>en-US</ApplicationCulture><ManifestTimeStamp>130225100616492421</ManifestTimeStamp><ApplicationName>Contoso
```

Looking at the above, the following LightSwitch extensions are used by the Contoso application:-

Microsoft LightSwitch Extensions, which provides additional data types, such as money, pictures and phone numbers.

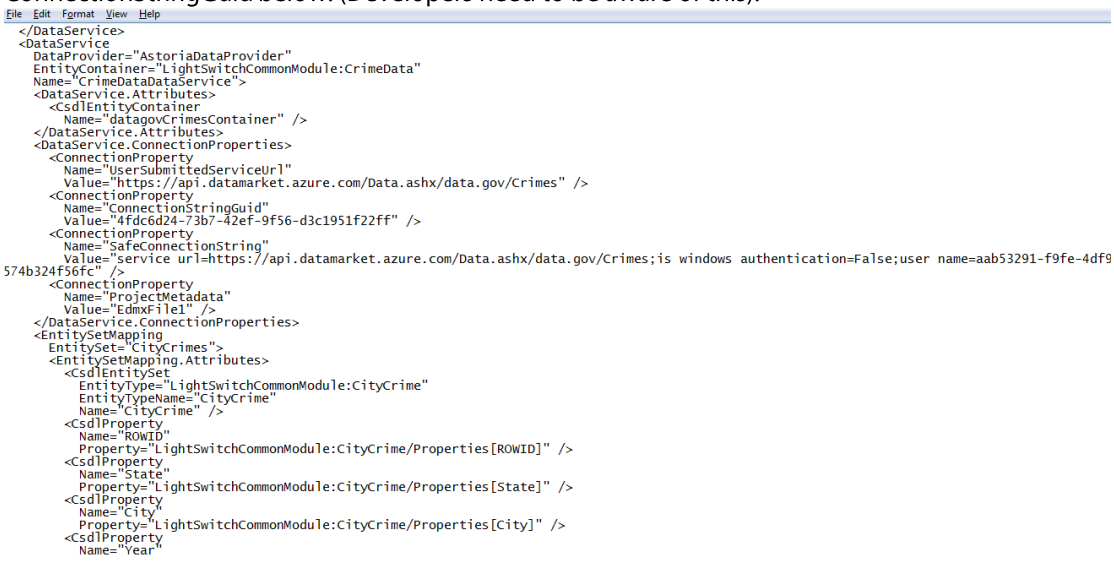
Microsoft Cosmopolitan Shell and Theme, which gives the application the Microsoft Cosmopolitan template look and feel.

LightSwitch filter extension, which is advanced filter allowing users to create custom filters for data that, is displayed on a LightSwitch screen.

Bing Map control, this allows Bing Maps to be integrated with LightSwitch databases allowing addresses and ZIP codes stored within LightSwitch databases, to be geographically displayed on Bing maps.
Office integration pack, when used with a desktop Silverlight client, allows the desktop client to use the local installation of office to create documents.

4.4 Service.lsml

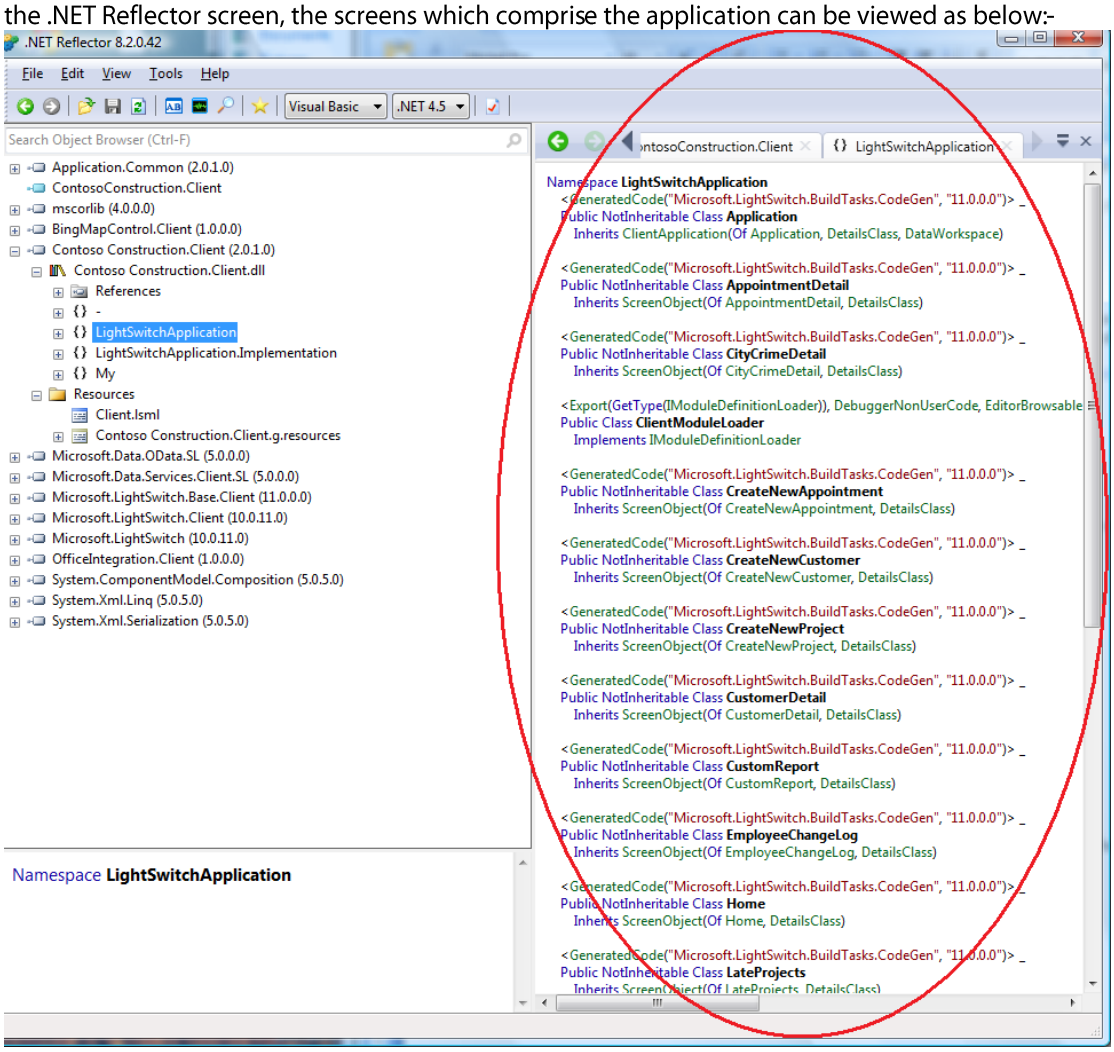
The Service.lsml file contains the database names and their relationships used by the LightSwitch client; it might also contain credentials/Ids for other web services consumed on the Internet, see ConnectionStringGuid below. (Developers need to be aware of this).



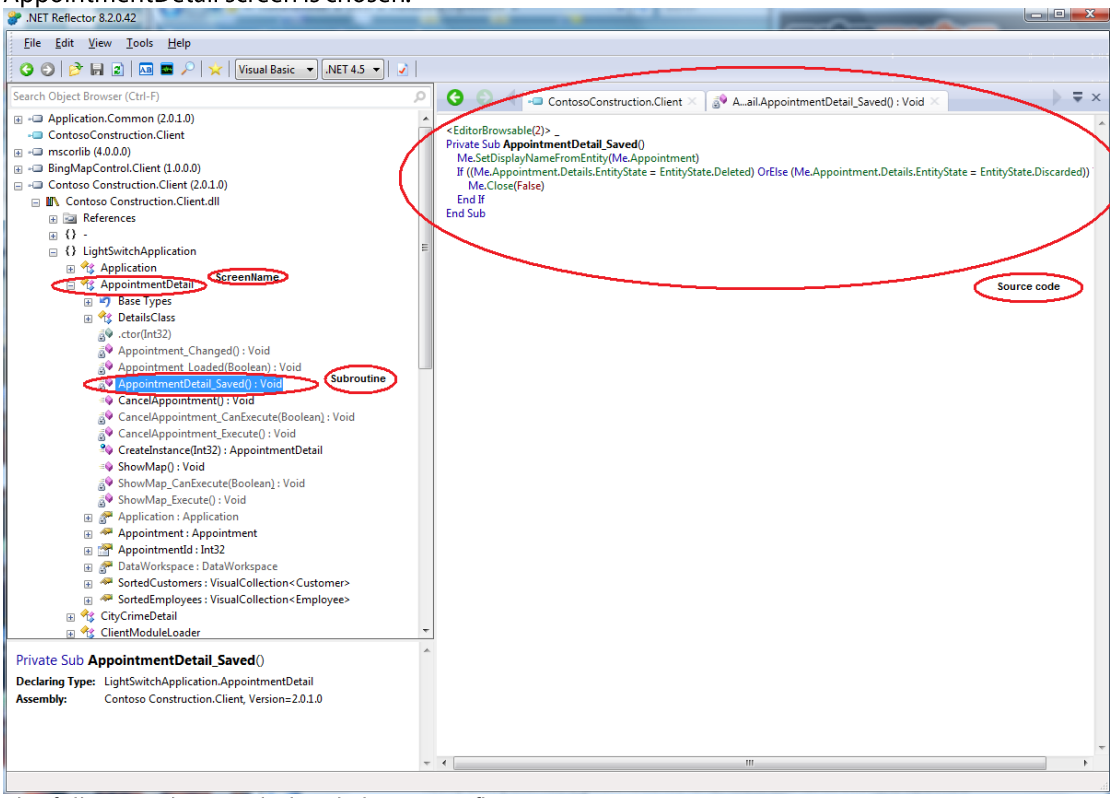
```
File  Edit  Format  View  Help
  </DataService>
  <DataService
    DataProvider="AstoriaDataProvider"
    EntityContainer="LightSwitchCommonModule:CrimeData"
    Name="CrimeDataDataService">
    <DataService.Attributes>
      <CsdlEntityContainer
        Name="datagovCrimesContainer" />
    </DataService.Attributes>
    <DataService.ConnectionProperties>
      <ConnectionProperty
        Name="UserSubmittedServiceUrl"
        Value="https://api.datamarket.azure.com/Data.ashx/data.gov/Crimes" />
      <ConnectionProperty
        Name="ConnectionStringGuid"
        Value="4fdc6d24-73b7-42ef-9f56-d3c1951f22ff" />
      <ConnectionProperty
        Name="SafeConnectionString"
        Value="service url=https://api.datamarket.azure.com/Data.ashx/data.gov/Crimes;is windows authentication=False;user name=aab53291-f9fe-4df9
574b324f56fc" />
      <ConnectionProperty
        Name="ProjectMetadata"
        Value="EdmxFile1" />
    </DataService.ConnectionProperties>
    <EntitySetMapping
      EntitySet="CityCrimes">
      <EntitySetMapping.Attributes>
        <CsdlEntitySet
          EntityType="LightSwitchCommonModule:CityCrime"
          EntityTypeName="CityCrime"
          Name="CityCrime" />
        <CsdlProperty
          Name="ROWID"
          Property="LightSwitchCommonModule:CityCrime/Properties[ROWID]" />
        <CsdlProperty
          Name="State"
          Property="LightSwitchCommonModule:CityCrime/Properties[State]" />
        <CsdlProperty
          Name="City"
          Property="LightSwitchCommonModule:CityCrime/Properties[City]" />
        <CsdlProperty
          Name="Year"
```

4.5 Decompiling the client.xap file using .NET Reflector

.NET Reflector is a class browser and decompiler for software created with the .NET framework, due to the manner in which LightSwitch is designed, the client side code can be decompiled to a good approximation of the original source code. In this case by dropping the captured client.xap file onto the .NET Reflector screen, the screens which comprise the application can be viewed as below:-



.NET Reflector allows the VB.NET source code to be viewed for a particular subroutine within a specific screen. In this case the AppointmentDetail_Saved() subroutine, within the AppointmentDetail screen is chosen.



The following decompiled code by NET Reflector:-

```
Private Sub AppointmentDetail_Saved()
Me.SetDisplayNameFromEntity(Me.Appointment)
If ((Me.Appointment.Details.EntityState = EntityState.Deleted) OrElse (Me.Appointment.Details.EntityState = EntityState.Discarded)) Then
Me.Close(False)
End If
End Sub
```

Compares favourably with the original code:-

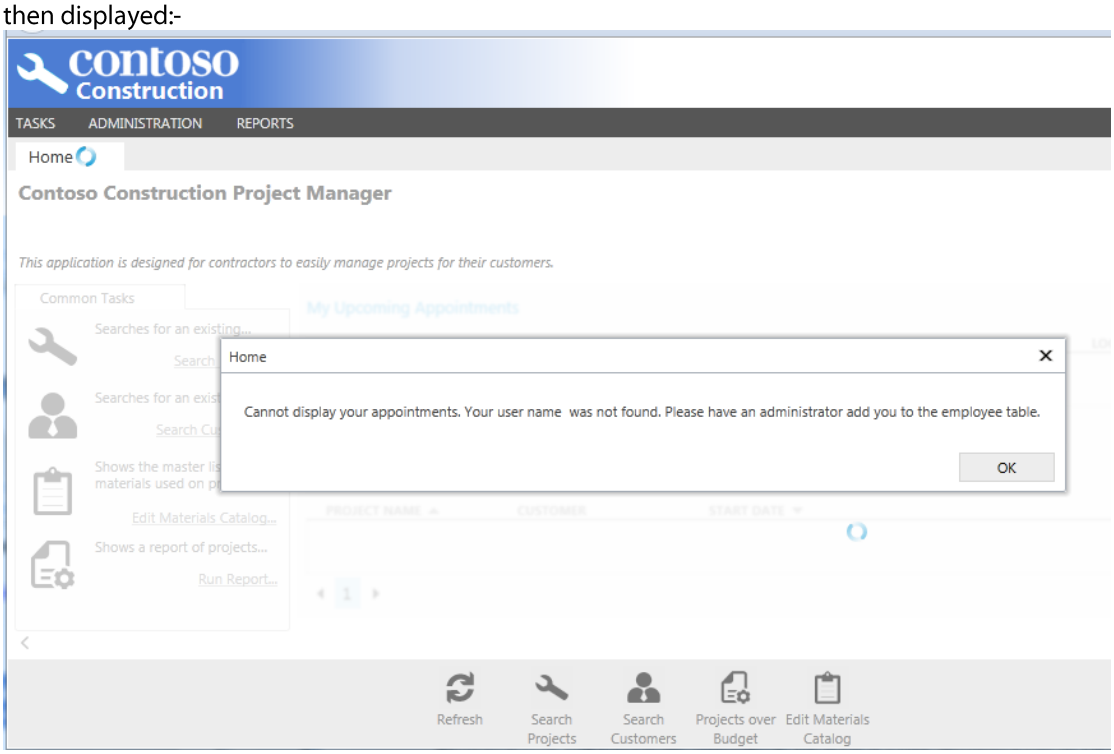
```
Private Sub AppointmentDetail_Saved()
' Write your code here.
Me.SetDisplayNameFromEntity(Me.Appointment)

If Me.Appointment.Details.EntityState = EntityState.Deleted OrElse
Me.Appointment.Details.EntityState = EntityState.Discarded Then
'Close the screen immediately if the appointment was cancelled (deleted)
Me.Close(False)
End If
End Sub
```

5 Using LightSwitch anonymous access to bypass the login screen

By requesting the default URL https://testserv/Contoso/ the login screen is displayed:-

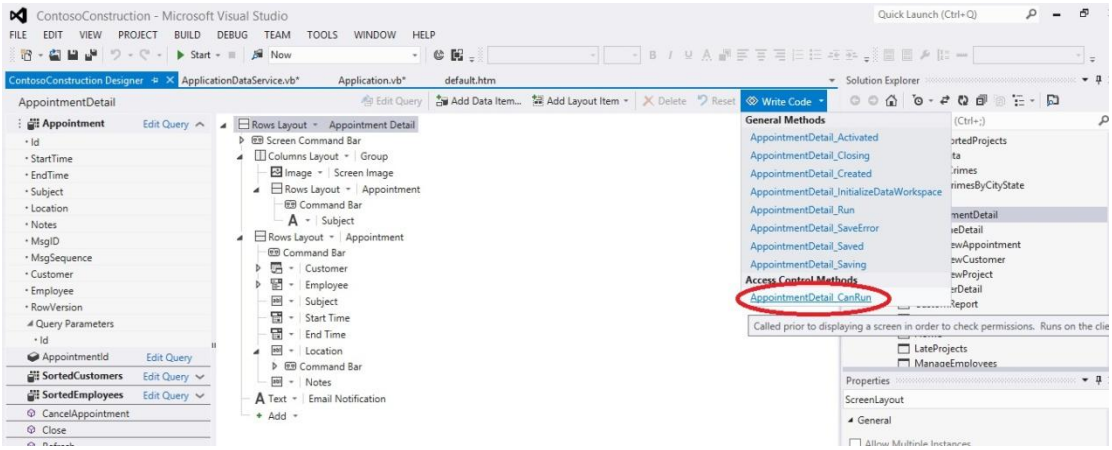
5.2 Testing for anonymous access

However if the application and the databases (see next section) has not been properly secured, authentication can sometimes be bypassed by requesting https://testserv/Contoso/?AuthenticationType=None, in this particular case the following screen is then displayed:-



5.3 Restricting screens access by using the CanRun access control method

Anonymous screen access can be prevented by the developer setting the CanRun access control method, for each of the LightSwitch screens within the application. By opening the screen within Visual Studio 2012 and then selecting the WriteCode method, and selecting the "screen name"_CanRun access control option.



For more information study the following URL:-
http://msdn.microsoft.com/en-us/library/vstudio/ff852062.aspx

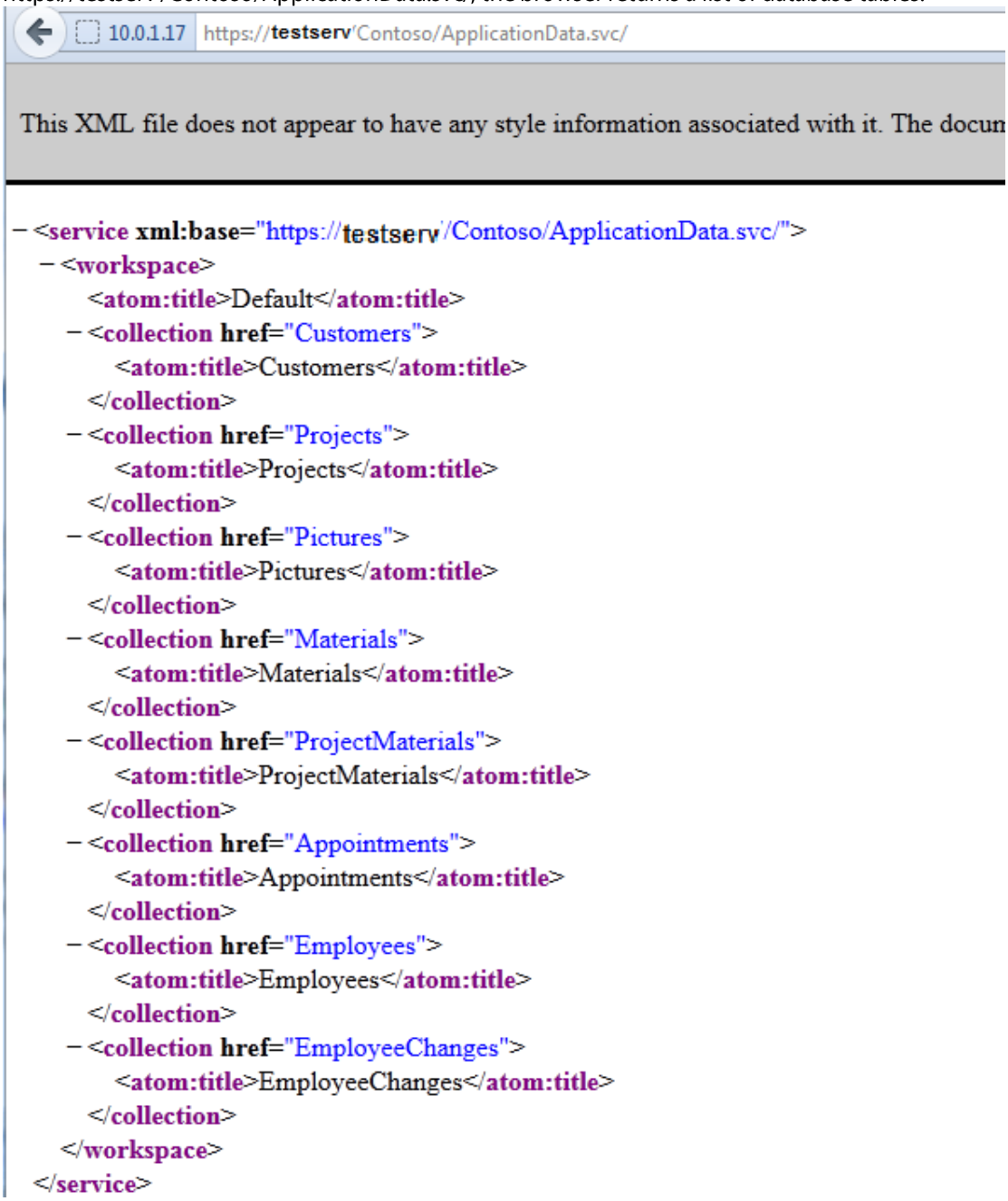
6 Querying OData services

As mentioned earlier, LightSwitch provides by default two WCF OData services ApplicationData.svc and Microsoft.LightSwitch.SecurityData.svc, which are simply accessed by requesting their name https://testserv /Contoso/ApplicationData.svc/ from the web server.

The OData request syntax is described in the following page http://msdn.microsoft.com/en-us/library/dd728283.aspx.

6.2 Browser based OData queries

For instance, if forms authentication is disabled or the correct credentials have already been entered by submitting within a browser the following URL
https://testserv /Contoso/ApplicationData.svc/, the browser returns a list of database tables:-



To request the list of customers simply submit the following query:-
https://10.0.1.17/testserv/ApplicationData.svc/Customers

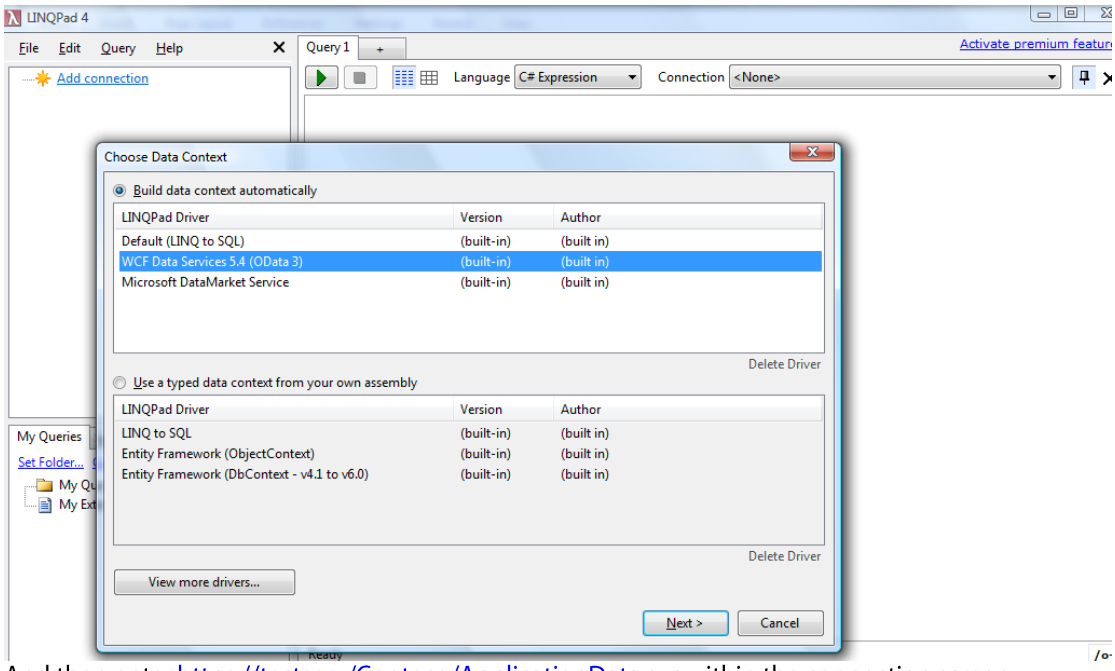
Which then returns the following results:-

<?xml version="1.0" encoding="utf-8"?><feed xml:base="https://testserv/Contoso/ApplicationData.svc/" xmlns="http://www.w3.org/2005/Atom" xmlns:d="http://schemas.microsoft.com/ado/2007/08/dataservices" xmlns:m="http://schemas.microsoft.com/ado/2007/08/dataservices/metadata"><id>https://testserv/Contoso/ApplicationData.svc/Customers</id><title type="text">Customers</title><updated>2013-09-01T18:35:43Z</updated><link rel="self" title="Customers" href="Customers" /><entry m:etag="W/"X'00000000000007D1'""><id>https://testserv/Contoso/ApplicationData.svc/Customers(1)</id><category term="LightSwitchApplication.Customer" scheme="http://schemas.microsoft.com/ado/2007/08/dataservices/scheme" /><link rel="edit" title="Customer" href="Customers(1)" /><link rel="http://schemas.microsoft.com/ado/2007/08/dataservices/related/Projects" type="application/atom+xml;type=feed" title="Projects" href="Customers(1)/Projects" /><link rel="http://schemas.microsoft.com/ado/2007/08/dataservices/related/Appointments" type="application/atom+xml;type=feed" title="Appointments" href="Customers(1)/Appointments" /><title /><updated>2013-09-01T18:35:43Z</updated><author><name /></author><content type="application/xml"><m:properties><d:Id m:type="Edm.Int32">1</d:Id><d:LastName>John</d:LastName><d:FirstName>Smith</d:FirstName><d:HomePhone>02073075000</d:HomePhone><d:MobilePhone m:null="true" /><d:Fax m:null="true" /><d:Email>john.smith@hotmail.com</d:Email><d:Address1>44 Russell Square</d:Address1><d:Address2 m:null="true" /><d:City>London</d:City><d:State m:null="true" /><d:ZIP m:null="true" /><d:Website m:null="true" /><d:Notes m:null="true" /><d:RowVersion m:type="Edm.Binary">AAAAAAAAB9E=</d:RowVersion></m:properties></content></entry></feed>

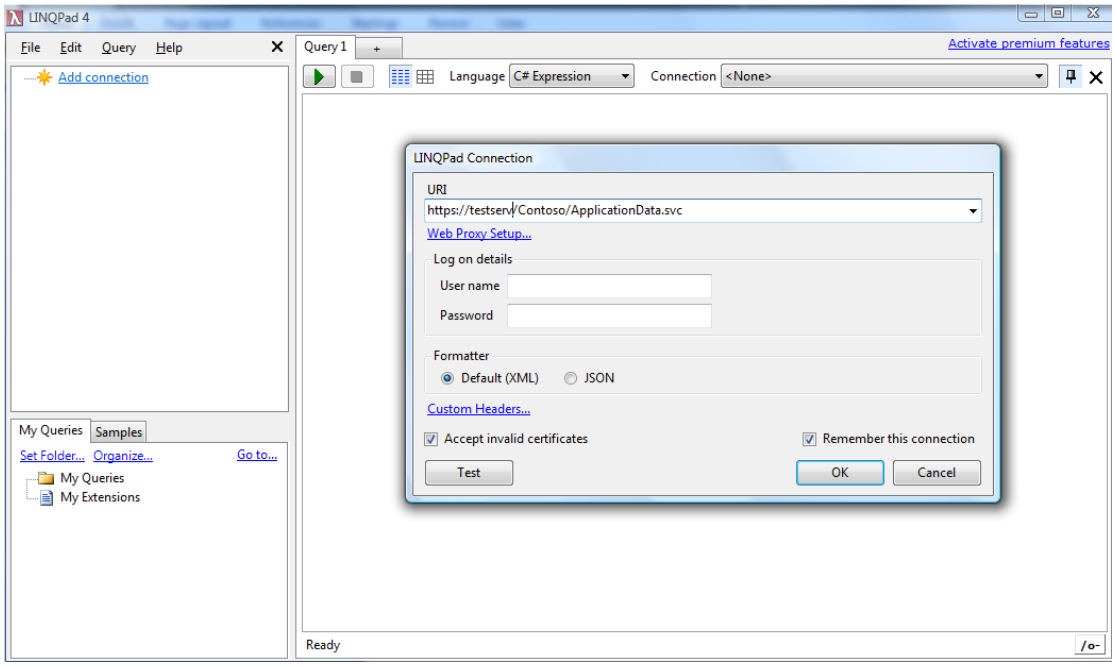
6.3 Using LinqPad

Or to make matters easier, LinqPad can be downloaded from http://www.linqpad.com, which provides a friendlier graphical interface for OData queries.

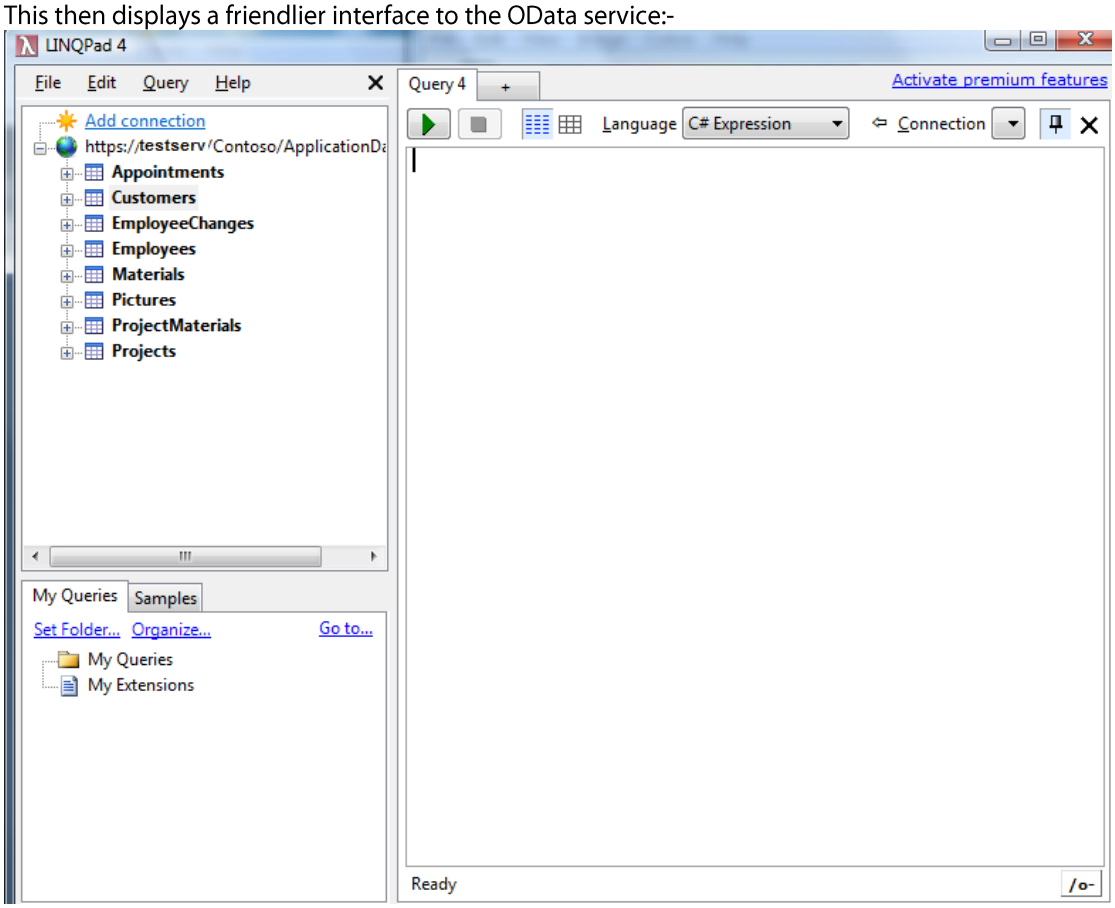
To use LinqPad first select add connection:-



And then enter https://testserv/Contoso/ApplicationData.svc within the connection screen:-

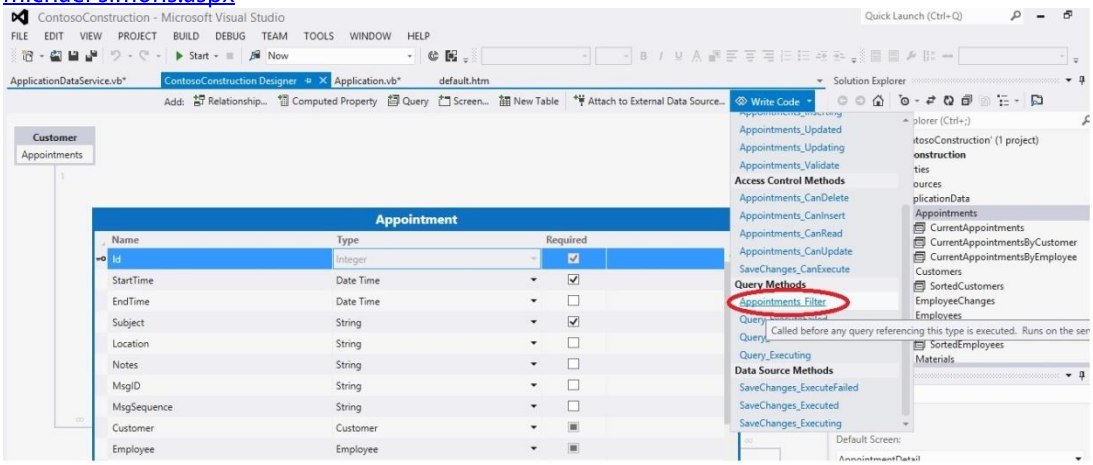


This then displays a friendlier interface to the OData service:-



6.4 Restricting OData access by using the Set_Filter method

OData access can be restricted by using the Set_Filter query on the database table, for more information study the following URL:-
http://blogs.msdn.com/b/lightswitch/archive/2012/04/17/filtering-data-using-entity-set-filters-michael-simons.aspx



7 Credits

Research and paper by Richard Brain of ProCheckUp Ltd.

8 About ProCheckUp Ltd

- ProCheckUp Ltd, is a UK leading IT security services provider specialized in penetration testing based in London. Since its creation in the year 2000, ProCheckUp has been committed to security research by discovering numerous vulnerabilities and authoring several technical papers.
- ProCheckUp has published the biggest number of vulnerability advisories within the UK in the past two years.
- More information about ProCheckUp's services and published research can be found on:
- http://procheckup.com/procheckup-labs.aspx

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