MICROSOFT CORPORATION

Solution: Surface external data from AdventureWorks in SharePoint and Office products

SharePoint 2013 Products Preview

7/20/2012

Some assembly required. Batteries not included. Keep and read all instructions. Fun for all ages!

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Introduction

Business Connectivity Services enables secure, efficient, read/write access to a wide variety of external data. This is done through a comprehensive framework that provides standard user and programming interfaces. Furthermore, you can create a wide range of business solutions, both no-code, SharePoint Composite solutions for simple to intermediate activities and code-based solutions for advanced needs.

Business Connectivity Services is like a big umbrella that encompasses many SharePoint and Office features. But it doesn't work "out-of-the-box" because every external data source is unique and each organization has specific needs. Once you lay the groundwork, you can surface the external data inside SharePoint and Office products.

A critical consideration is security. In a nutshell, securing your external data requires answering two basic questions:

- **Who are you?** This is also called authentication and it is the process of verifying your identity by obtaining your credentials (your username and password).
- **What are you allowed to do?** This is called authorization and it is the process of determining what tasks you can do on which items of data by obtaining the list of permissions you have been granted.

An administrator also creates several layers of security based on permissions, much like several lines of defense around a fort, to ensure appropriate authorization and access to:

- The data in the external database or system.
- The external content type in the Business Data Connectivity metadata store.
- The external list (or external data column).

In this scenario, you learn how to do the following:

- Use a customer view in the SQL Server AdventureWorks sample database (your external data source).
- Configure several SharePoint services and accounts.
- Choose and implement an authentication mode.
- Define an external content type.
- Create and authorize access to an external list.
- Connect the external list to Outlook.

Exercise 1: Prepare the SQL Server AdventureWorks sample database

The AdventureWorks sample database supports standard processing scenarios for a fictitious bicycle manufacturer (Adventure Works Cycles). Scenarios include Manufacturing, Sales, Purchasing, Product Management, Contact Management, and Human Resources.

Task 1: Install Microsoft SQL Server 2008 R2

- To install Microsoft SQL Server 2008 R2, follow the instructions here.

Task 2: Download and install the sample database

1. To download the AdventureWorks2008R2 sample database (.mdf), click here.
2. To install the AdventureWorks2008R2 sample database, follow the instructions in the Read Me file here.

Tip If you have problems attaching the database file by using the **Attach** command, in the **Attach databases** dialog box, remove the reference to the log file in the bottom pane before you click **OK**.

Task 3: Modify the Customer view to return only 1000 rows

The **Sales.vIndividualCustomer** view returns over 18,000 rows. You need to modify the view so that you do not exceed the Business Connectivity Services throttle item default of 2000 rows.

1. In the Object Explorer, expand **Databases**, expand **AdventureWorks2008R2**, and then expand **Views**.
2. Right-click **Sales.vIndividualCustomer**, and then click **Design**.
3. In the SQL pane, insert **TOP 1000** immediately after the SELECT command. Make sure there is a space before and after it.
4. Click **Save** and then click **Execute SQL** to make sure only 1000 rows are returned.
5. Close SQL Server Management Studio.

Exercise 2: Ensure service activation and setup accounts

Although some of these tasks may already have been performed as part of your site's SharePoint installation, it's a good idea to make sure that necessary services are activated and accounts are set up before continuing with the following exercises.

Typically, the Farm Administrator configures various settings in Central Administration and has full access to the SQL Server database.

Task 1: Activate Business Connectivity Service and Secure Store Service

To make sure that Business Connectivity Service is activated:

1. Navigate to the Central Administration page for your site.
2. On the Quick Launch, click **System Settings**.
3. On the System Settings page, under **Servers,** click **Manage services on server**.
4. If necessary, next to **Business Data Connectivity Service**, under the **Action** column, click **Start**.

To make sure that Secure Store Service is activated:

1. Navigate to the Central Administration page for your site.
2. On the Quick Launch, click **System Settings**.

3. On the System Settings page**,** under **Servers,** click **Manage services on server**.
4. If necessary, next to **Secure Store Service**, under the **Action** column, click **Start**.

Because you will be storing sensitive data in Secure Store Service, it's a good idea to encrypt it. To encrypt the Secure Store Service database:

1. Navigate to the Central Administration page for your site.
2. On the Quick Launch, click **Application Management**.
3. On the Application Management page, under **Service Applications**, click **Manage service applications**.
4. In the list of applications, click **Secure Store** (The application, not the proxy).
5. In the Secure Store Service application page, click **Generate New Key**.

   Important The passphrase you create is not stored so you must write it down and save it.

6. In the Generate New Key page, enter and confirm a pass phrase, follow the instructions on the page, and then click **OK**.

Task 2: Set up the database accounts

A database administrator needs to provide appropriate permission to the data source to ensure that the right people have access to the data and that the data does not end up in the wrong hands. You need to create a database server account and a database account based on that server account and with **db_owner** permissions. The credentials of this database account are mapped to the credentials of all appropriate SharePoint user accounts specified as members of the Target Application ID and through the use of the **Group** Target Application ID type in the Secure Store Service.

To create the AdventureWorks database account:

1. Start SQL Server Management Studio.
2. In the Object Explorer, expand the <database server name>, expand **Security**, and then expand **Logins**.
3. Right-click **Logins**, and then click **New User Logins**.
4. In the **Login Name** box, enter **SharePointGroupAccount**.
5. Select **SQL Server Authentication**, and then enter and confirm a password.
6. For this scenario, clear the **Enforce password policy** check box.
7. Under **Select a page**, click **User Mapping**
8. Under **Users mapped to this login**, select **AdventureWorks2008R2**, and then under **Database role membership for: AdventureWorks2008R2**, select **db_owner**.
9. Click **OK**.
10. Close SQL Server Management Studio.

Task 3: Set up the Business Data Connectivity accounts

Before you create an external content type, add the Farm administrator account to the Business Data Connectivity metadata store, and create a user account that has permissions so that the appropriate user has rights to use the Business Data Connectivity service.

To grant permissions to the Business Data Connectivity metadata store:

1. Navigate to the Central Administration page for your site.
2. On the Quick Launch, click **Application Management**.
3. On the Application Management page, under **Service Applications**, click **Manage service applications**.
4. In the list of services, click **BDC service** (The application, not the proxy).
5. In the ribbon, click **Set Metadata Store Permissions**.
6. Enter the Farm Administrator account name, and then click **Add**.
7. Select the Farm Administrator account name that you just added, and then under **Permissions for <Farm Administrator account name>**, select all check boxes.
8. Select the **Propagate permissions to all BDC Models, External Systems and External Content Types in the BDC Metadata Store** check box to overwrite existing permissions.
9. Enter the user accounts to which you want to grant permissions, and then click **Add**.
10. Select the user accounts that you just added, and then under **Permissions for <user account names>**, select **Execute**.
11. Select the **Propagate permissions to all BDC Models, External Systems and External Content Types in the BDC Metadata Store** check box to overwrite existing permissions.
12. Click **OK**.

Note **Edit** is a highly privileged permission that is required to create or modify external content types in the Business Data Connectivity metadata store. **Execute** permission is required to query the external content type.

Exercise 3: Set up Secure Store Service

The Secure Store Service stores critical information about the target application ID, the authentication mode to use, the credentials to use, and the mapping of those credentials between different sets of user credentials. The Secure Store Service also helps manage the infamous "double hop" issue, where each authentication requires a “hop” between two servers, which can be compromised, unless steps are taken to prevent it.

Note We recommend that the connection between the Microsoft Business Connectivity Services and the external system should be secured with Secure Sockets Layer (SSL). Find more information here, Configuring Secure Sockets Layer in IIS 7.

Task 1: Create the Target Application ID

The Business Data Connectivity external content type uses credentials that are stored in Secure Store to access the data source. You must create a Secure Store target application ID for the external content type to use in accessing these credentials.

Important It’s a good idea to choose a clear, descriptive name because you can’t modify it. Don’t use special characters or spaces when creating the name. Make sure you type the name correctly each time you enter it because there is no validation, and it may be difficult to trace the problem. Consider using copy/paste to ensure correct entry.

1. Navigate to the Central Administration page for your site.

2. On the Quick Launch, click **Application Management**.
3. On the Application Management page, under **Service Applications**, click **Manage service applications**.
4. On the Manage Service Applications page, click **SecureStore** (The application, not the proxy).
5. On the Secure Store Services Management page, in the ribbon, click **New**.
6. On the Create New Secure Store Target Application page, do the following:
   - In the Target Application ID box, enter **AWTargetAppID**.
   - in the Display Name box, enter **AdventureWorks Target Application ID**.
   - In the Contact E-mail box, enter an e-mail address to the Farm Administrator or an administrator who supports external data.
   - In the **Target Application Type** box, select **Group** (which indicates the mapping of many credentials to one credential). In this case, the **Target Application Page URL** is not needed and automatically selects to **None**.
7. Click **Next**.
8. On the next Create New Secure Store Target Application page, do the following:
   1. Under **Field Name, c**hange **Windows User Name** to **SQL User Name**, and **Windows Password** to **SQL Password.**
   2. Under **Field Type,** change **Windows User Name** to **User Name, and Windows Password** to **Password**.
9. Click **Next**.
10. On the next page, in the **Target Application Administrators** box, if necessary, enter the Farm Administrator account.
11. In the **Members** box, enter an Active Directory group (universal, global, or domain local). an Active Directory group is required for a **Target Application Type** of **Group.**
12. Click **OK**.

Task 2: Map the credentials for the Target Application ID

By using a group target application type, many users are grouped and mapped to a single set of credentials in the SQL Server AdventureWorks database. This is a common approach because it makes it much easier to manage and maintain credentials.

Note You must map the credentials by using a domain account that has at least read access to the AdventureWorks SQL Server database, or in general, the external data source.

1. On the Secure Store Service application page, select the check box next to the **AWTargetAppID** target application ID.
2. On the ribbon, in the **Credentials** group, click **Set**.

   The Set Credentials for Secure Store Target Application (Group) page appears. Note that the credential owners are the same as the ones you entered above in the **Members** box.

3. In the **SQL User Name** box, enter the SQL Server account you created, **SharePointGroupAccount**.
4. In the password text boxes, enter and confirm the password for that account.
5. Click **OK**.

Important Make sure you enter the correct credentials. Otherwise, users will not be able to access the external data source and it may be difficult to trace the problem.

Exercise 4: Create an external content type

This exercise walks you through building an external content type for Business Connectivity Services using SharePoint Designer 2010 SP1 without writing any code. You learn to discover the database, connect to a database table, and then return the required data. You create an external content type named Customers that is based on the **Sales.vIndividualCustomer** view in the AdventureWorks sample database.

Task 1: Create the initial external content type

1. Start Microsoft SharePoint Designer 2010 SP1.
2. Click **Open Site**, and then enter the appropriate site name.
3. In the **Navigation** pane, under **Site Objects**, select **External Content Types**.
4. In the ribbon, click **External Content Type**.
5. Next to **Name**, click **New external content type**., and then enter **AWCustomers.**
6. Next to **Display name**, click **New external content type**., and then enter **AdventureWorks Customers.**
7. In the **External Content Type Information** section, next to **Office Item Type**, select **Contact**.

   The **Office Item Type** determines the Outlook behavior you want to attach to the external content type. In this case, this **AWCustomers** external content type behaves like a native Contact Item in Outlook.

8. In the **Offline Sync for External List** checkbox, make sure **Enabled** is selected, which is the default.

   If you disable this option, then the **SharePoint Connect to Outlook** ribbon command is not available for an external list.

Task 2: Connect to the external data source

1. Next to **External system**, click **Click here to discover external systems and define operations**.
2. Select **Add Connection**.
3. In the **External Data Source Type Selection** dialog box, select **SQL Server**, and then click **OK**.
4. In the **SQL Server Connection** dialog box:
   - In the **Set the Database Server** box, enter <The name of the database server>.
   - In the **Set the Database Name** box enter **AdventureWorks2008R2**.
   - Optionally, in the **Name** box, enter **AdventureWorks Sample Database**.

Task 3: Specify the authentication mode and target ID

In this exercise, you will use the RdbCredentials authentication mode, which corresponds with the **Connect with Impersonated Custom Identity** check box in the **Connection Properties** section of the **SQL Server Connection** dialog box. In general, use this mode when the database server uses database credentials (as opposed to Windows credentials).

1. In the **Connection Properties** section of the **SQL Server Connection** dialog box, select **Connect with Impersonated Custom Identity**.
2. In the **Secure Store Application ID** box, enter **AWTargetAppID**.
3. In the **BCS SecureStore AWTargetAppID** dialog box, do the following:
    - In the user name box, enter **SharePointGroupAccount**.
    - In the password box, enter the password you created.

    Note You are entering the username and password here for SharePoint Designer so it can access the database.

4. Click **OK**.

Task 4: Specify the table and methods of operations

1. In the Data Source Explorer, expand **AdventureWorks Sample Database**.
2. Expand **Views**.
3. Right-click, **vIndividualCustomer** and then click **Create All Operations**.

    Note Create All Operations is a convenient way to define all basic methods of operations (**Create**, **Read**, **Read List**, **Update**, and **Delete**).

4. Click **Next**.

Tip Always read carefully the messages in the **Errors and Warnings** pane. They provide useful information to confirm your actions or troubleshoot any issues.

Task 5: Specify table columns

1. To specify the columns you want to display from the view, in the **All Operations** dialog box, click **Next**.
2. In the **Parameters Configuration** dialog box, by default all columns (referred to as **Data Source Elements**) are selected. To remove unnecessary columns, clear the checkboxes next to the following columns: **Suffix** and **Demographics**.
3. To select an identifier field, click and highlight **BusinessEntityID,** and then under **Properties**, click **Map to Identifier.**

Task 6: Map fields to Outlook

This external content type maps to an Outlook item type, so you must map one or more fields from your external content type to the Outlook item fields. You do not need to map all the corresponding fields, but you must at least map the **LastName** field.

For the **FirstName**, **LastName**, **EmailAddress**, and **PhoneNumber** fields, do the following:

1. Click and highlight the field.
2. Under properties, next to Office property, click the down arrow and select the appropriate matching field:
    - **FirstName** to **First Name (FirstName).**
    - **LastName** to **Last Name (LastName).**
    - **PhoneNumber** to **Primary Telephone Phone Number (PrimaryTelephonePhoneNumber)**.
    - **EmailAddress** to **Email 1 Address (Email1Address)**.

Note Unmapped fields, depending on the number, are displayed as extended properties as follows:

- **Adjoining** Appended to the form region at the bottom of an Outlook form's default page (two to five fields).
- **Separate** Added as a new page to an Outlook form (six or more fields).

Task 8: Set up the external content item picker

You can use an external content picker control to retrieve external data throughout the user interface of SharePoint and Office products. It's a good idea to select the identity field and the specific set of columns you want displayed in the control.

For the following fields, **BusinessEntityID, FirstName, LastName, and EmailAddress:**

1. Click and highlight the field, and then under P**roperties**, click **Show in Picker.**
2. Click **Next**.

Task 8: Create a filter and a limit

To limit the external items returned from the external data source, it is strongly recommended that you define at least one filter and limit.

A Comparison filter limits what items are returned based on a condition (such as **CountryRegionName** = Canada) and is converted to an SQL WHERE clause.

In most cases, you should define a Limit Filter for Read and Read List operations. If you do not define a default limit value, no data is retrieved from the external data source. However, ensure that the default value you enter for the limit filter is less than 2000, because the default Business Data Connectivity service throttle is 2000 items. You can increase this limit if necessary.

Note The SQL Server database administrator may want to create specific tables, views, indexes, and optimized queries to limit the results to just what is needed and to help improve performance.

To create the Comparison Filter

1. Under **Filter Parameters**, click **Add Filter Parameter**.
2. Under **Properties**, next to **Data Source Element**, select **CountryRegionName**
3. Under **Properties**, next to **Filter**, click **Click to Add** to display the **Filter Configuration** dialog box.
4. In the **New Filter** box, enter **ByRegion**.
5. In the **Filter Type** box, make sure **Comparison** is selected.
6. In the **Operator** box, make sure **Equals** is selected.
7. In the **Filter Field** box, make sure **CountryRegionName** is selected.
8. Under **Properties**, next to **Default Value**, enter **Canada**.
9. Click **OK**.

To create the Limit Filter

1. Under **Filter Parameters**, click **Add Filter Parameter**.
2. Under **Properties**, next to **Data Source Element**, make sure **BusinessEntityID** is selected.
3. Under **Properties**, next to **Filter**, click **Click to Add** to display the **Filter Configuration** dialog box.
4. In the **New Filter** box, enter **AWLimit**.
5. In the **Filter Type** box, select **Limit**.
6. In the **Filter Field** box, make sure **BusinessEntityID** is selected.
7. Click **OK**.
8. Under **Properties**, next to **Default Value**, enter 200 (This is enough for testing purposes).

   Tip Click the **Errors and Warnings** pane and make sure there are no more errors or warnings.

9. Click **Finish**. This completes the definition of the external content type.

Task 9: Set the Title field for the external list

1. In the ribbon, click **Summary View**.
2. In the **Fields** section, under **Field Name**, select **BusinessEntityID.**

   Tip In general, It’s a good idea to make the Title a field with a unique value. The Title field is used to display list or InfoPath forms. Once you set the Title field, you cannot change it.

3. In the ribbon, click **Set as Title**.

Task 10: Complete the external content type

- On the Quick Access Toolbar, click **Save**. This stores the external content type definition in the Business Data Connectivity metadata store.

Note To provide better performance, Business Data Connectivity caches all the objects in the metadata store and updates changes by using a timer job that runs every minute. It make take up to a minute for changes to propagate to all the servers in the farm, but changes are immediate on the server where you make the change.

Task 11: Set up permissions to the external content type

To configure user access and permissions to the external content type:

1. Navigate to the Central Administration page for your site.
2. On the Quick Launch, click **Application Management**.
3. On the Application Management page, under **Service Applications**, click **Manage service applications**.
4. In the list of services, click **BDC service**.
5. Click **AWCustomers**.
6. On the ribbon, click **Set Object Permissions**.
7. Enter the user accounts to which you want to grant permissions, and then click **Add**.
8. Select the user accounts that you just added, and then select **Execute** check boxes.
9. Select the **Propagate permissions to all BDC Models, External Systems and External Content Types in the BDC Metadata Store** check box to overwrite existing permissions.
10. Click **OK**.

The external content type is now available for use in SharePoint and Office products to the appropriate users.

Exercise 5: Create and authorize access to an external list

An external list is a key building block for SharePoint solutions based on external data. You can read and write external data with the familiar experience of using a SharePoint list. An external list looks and behaves a lot like a native list, but there are some differences in behavior. For example, you can create views and use calculated values with formulas, but not attach files or track versions. For this exercise, You create the external list in the browser because that is a common approach, but you can also create an external list in SharePoint Designer 2010 SP1.

Task 1: Create an external list

Note To create an external list, you must have **Contribute** permission to the site.

1. Click **Settings**, and then click **Add an App**.
2. Navigate or find the **External List** tile, and then click it to display the Adding External List page.
3. In the **Name** box, enter **AdventureWorksCustomers**.
4. Under **External Content Type**, click **Select External Content Type**, and then select **AWCustomers**.

5. Click **OK**, and then click **Create**.

Task 2: Manage user permissions to the external list

Once you or an appropriate user has created the external list, it's important to make sure that you set appropriate permissions for other users. If the subsite that contains the external list inherits permissions from its parent site, then you may inadvertently give permission to inappropriate users.

To check the external list permissions on the list:
1. On the **List** tab, in the **Settings** group, click **List Settings**.
2. Under **Permissions and Management**, click **Permissions for this list**.

The following table summarizes the default external list permissions for SharePoint user groups:

Name	Permission Levels
Excel Services Viewers	View Only
<Site Name> Members	Edit
<Site Name> Owners	Full Control
<Site Name> Visitors	Read

Task 3: View, filter and sort the external data

To create a view of an external list:
1. On the Quick Launch, click the name of the external list for which you want to create a view.
2. In the ribbon, click the **List** tab, and then click **Create View**.
3. Click a view option, such as **Standard View** or an existing view on which you want to base the new view.
4. In the **View Name** box, enter the name for your view.
5. If you want to make this the default view for the external list, select **Make this the default view**. Only a public view can be the default view.
6. In the **Audience** section, under **View Audience**, select **Create a Personal view** or Create a **Public view**.
7. In the **Columns** section, select the columns that you want in the view and clear the columns that you do not. Next to the selected columns, from the drop-down lists, select the order of the columns in the view.
8. In the **Data Source Filter** section, modify a data source filter you created when you created the external content type, either **ByRegion** or **AWLimit**. For example, you could create several views, one for each region, to limit the view results to a manageable amount.
9. Configure the other settings for your view, such as **Sort**, **Filter**, and **Item Limit**, and then click **OK.**

Exercise 6: Synchronize the external list with Outlook

The external list contains customer data mapped to Outlook contacts and you have enabled **Offline Sync for External List**, so you can connect the list with Microsoft Outlook 2013 Preview. Once connected, you can view, edit, and print the data using the familiar Outlook user interface. You can even send e-mail messages and make meeting requests.

The synchronization of the data is two-way or bi-directional. Changes made in Outlook are automatically synchronized with the external data source. Changes made to the external data source are synchronized with the items in Outlook, although a refresh operation may be needed.

Tip By default, the data automatically refreshes every six hours, but this value can be changed. To make sure you are seeing current data from the external data source, right-click the folder and then click **Sync now**.

Task 1: Connect the external list to Outlook

To synchronize external data with Office products, you must have Windows 7 or later and the following free software products, SQL Server Compact 4.0 and .NET Framework 4, on each client computer (If necessary, users are automatically prompted to download the software).

Also, make sure the Office installation option, **Business Connectivity Services** is enabled (This is the default). This option installs the Business Connectivity Services Client Runtime which does the following: caches and synchronizes with external data, maps business data to external content types, displays the external item picker in Office products, and runs custom solutions inside Office products.

1. Navigate to the SharePoint site that contains the external list.
2. In the ribbon, on the **List** tab, and then in the **Connect & Export** group, click **Connect to Outlook**.
3. In the **Microsoft Office Customization Installer** dialog box, click **Install**.
4. The installation should take a minute or two.
5. Once the installation is complete, click **Close**.

Task 2: Send e-mail to a customer

The SharePoint external list is displayed by default as an address book because the external content type was created as a contact type. The synchronization process understands the type and chooses the address book format.

1. Start Microsoft Outlook 2013 Preview.
2. On the left pane, click **SharePoint External Lists**.

   The first time you access the external list, Outlook opens and creates a new Outlook Data File (BCSStorage.pst), called **SharePoint External Lists** in the Navigation Pane, and then creates a folder with the name <Site> - <External List>.

3. Click <**Team Site Name> AWCustomers**.
4. You should be able to see the customers in an address book format.
5. Right-click a contact, and click Create. You have the option to create an email message or a meeting request.

Task 3: Update customer data offline and refresh it online

1. To take Outlook 2013 Preview offline, click **Send/Receive**, and in the **Preferences** group, click **Work Offline**.

2. Make a change or two to one of the AdventureWorks customers.
3. To bring Outlook 2013 Preview back online, click **Send/Receive**, and in the **Preferences** group, click **Work Offline**.
4. To synchronize the data, on the left pane, right-click the **<Team Site Name> AWCustomers** external list and click **Sync now**.

Conclusion

This completes the *Surface external data from AdventureWorks in SharePoint and Office products* exercise. For more information about using external data, see the following:

- Introduction to External Data
- Plan for Business Connectivity Services in SharePoint 2013 Preview
- Business Connectivity Services in SharePoint 2013