

# Enterprise Application Development in SharePoint 2010

— Creating an End-to-End Application without Code —



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## Creating the Business Data Connectivity Services Data Connection, External Content Type, and External List

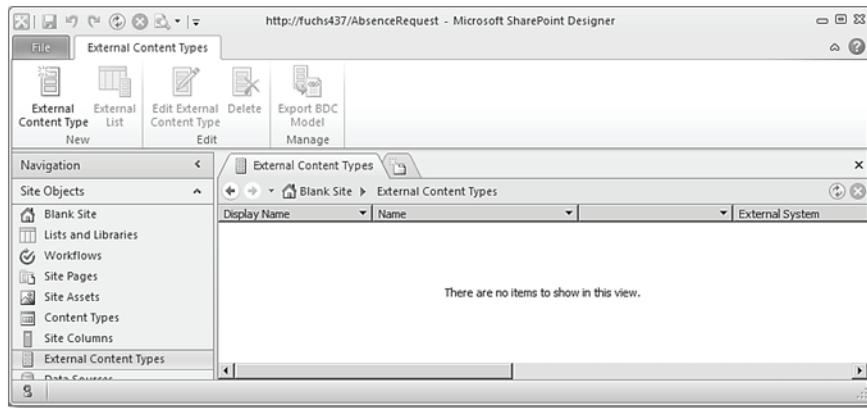
*Business Data Connectivity Services* is the new version of the *Business Data Catalog* that was introduced in *Microsoft Office SharePoint Server 2007*. It is now provided in *Microsoft SharePoint Foundation 2010* with feature extensions in *SharePoint Server 2010 Enterprise Edition*. BCS enables you to declaratively model external systems so that you can expose external data in *SharePoint Server 2010* and also make it available to *Outlook* and *Microsoft Word*. *SharePoint Designer* provides an easy to use Wizard-like tool for connecting to external systems and identifying the information sets that can be accessed; enabling the operations that can be executed on the information sets; and exposing the information as a list within *SharePoint* and mapped to *Microsoft Office* data types for use in *Outlook* and *Word*.

The steps in creating a BCS *External Content Type* (ECT) in *SharePoint Designer* are as follows:

- Create and name the ECT
- Create a data source connection to the information source for the ECT
- Create the operations (Create, Read, Update and Delete) and pick the data source information set will be available to the operation
- Create an *External List* and *InfoPath* form that displays the information from the data source in a *SharePoint* list which can be edited by the *InfoPath* list form.

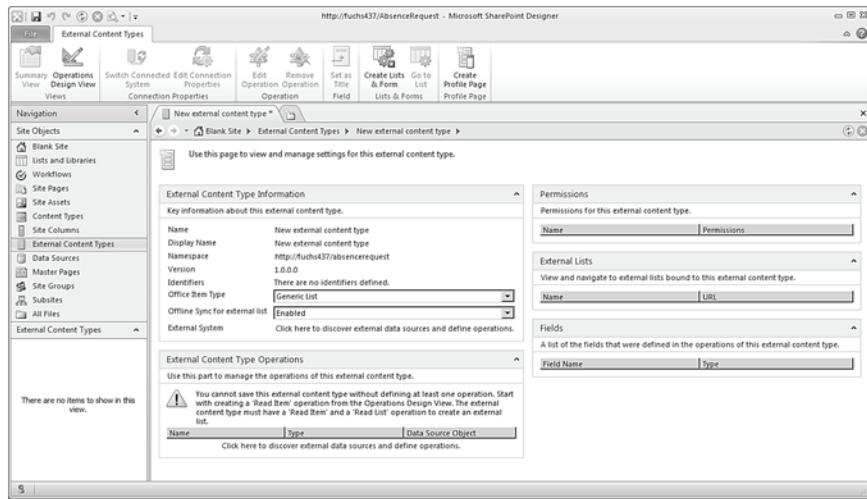
## Creating an External Content Type

Click on the **External Content Types** icon on the *Navigation* pane. The main information section will be empty because no *External Content Types* have been created yet, as shown in **Illustration 42** below.



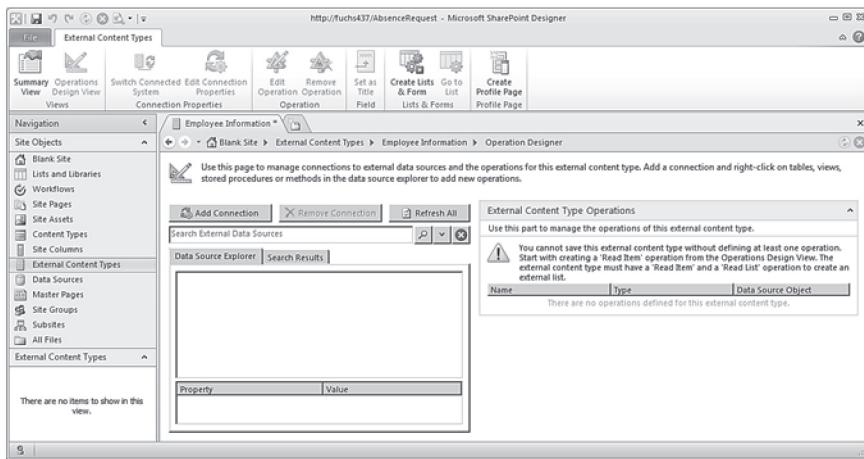
**Illustration 42 - External Content Type page in SharePoint Designer**

Click on the **New External Content Type** button on the *Ribbon*. The *External Content Type* summary page will display as shown in **Illustration 43** below.



**Illustration 43 - SharePoint Designer Summary Page for new External Content Type**

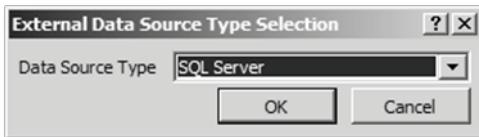
Change the *Name* and *Display Name* to “Employee Information”. Click on the **Click here to discover external data sources and define operations** link either in the *External Content Type Information* section or the *External Content Type Operations* section. The *Operation Designer* screen will be displayed as shown in **Illustration 44** on the next page.



**Illustration 44 - ECT Operation Designer main screen in SharePoint Designer**

## Creating the External Data Source Connection

This page contains the *Data Source Explorer* section and *External Content Type Operations* section. This is where we will create a connection to a data source, in this case to the SQL Server database containing the *Employee Information* table that we created earlier. Click on the **Add Connection** button. The following *External Data Source Type Selection* dialogue box will display as shown in **Illustration 45** below.



**Illustration 45 - External Data Source Type Selection dialogue screen**

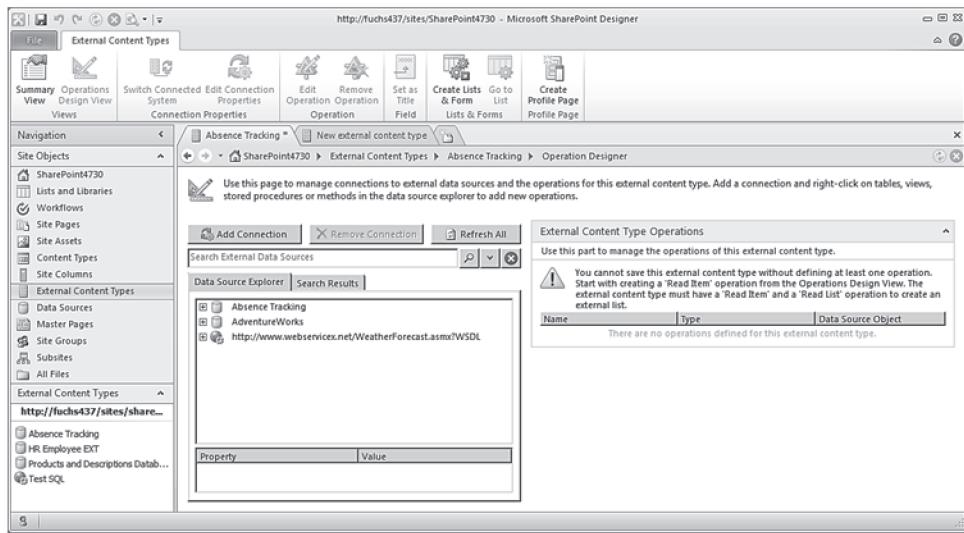
Choose **SQL Server** and click **OK**. The *SQL Server Connection* dialogue box will appear as shown in **Illustration 46** below. Enter the name of your Database Server and the Database Name which was *Absence Tracking*. Leave the default *Connect with User's Identity* radio button value.



**Illustration 46 - SQL Server Connection dialogue screen**

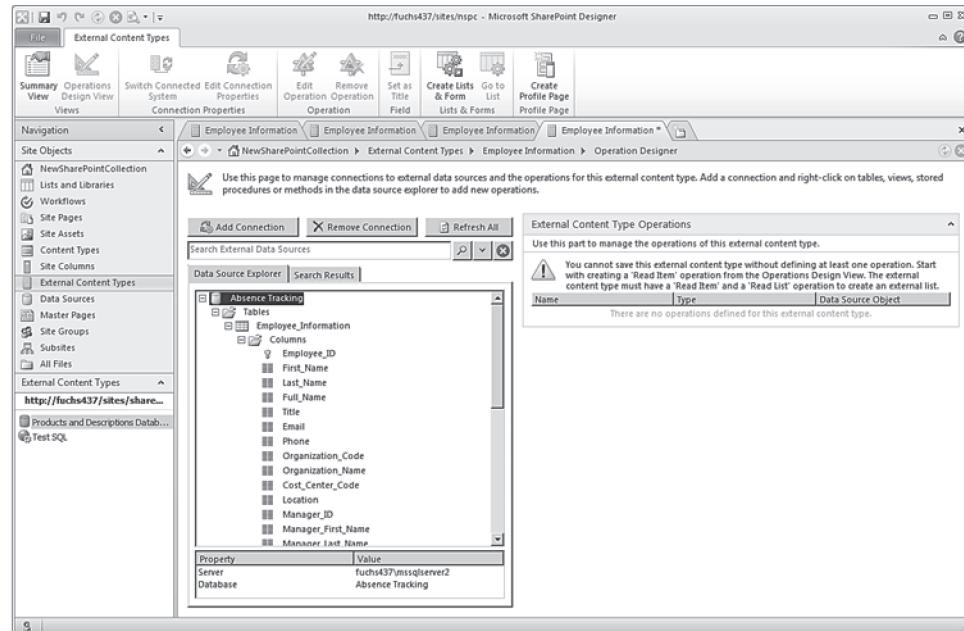
**Important Note** –We will change the authentication credentials later to **Connect with Impersonated Windows Identity** using a Secure Store Service account. We will discuss all the reasons for doing this later in the section on using the Secure Store Service with BCS.

When the connection is made the *Absence Tracking* database will be displayed in the *Data Source Explorer* panel as shown in **Illustration 47** below. If other data sources were previously created they will be displayed as well.



**Illustration 47 - Data Source Explorer panel in SharePoint Designer**

Expand the *Absence Tracking* database icon in the *Data Source Explorer* to view the Tables, Views and Routines that are exposed. Clicking on the *Tables* or *Views* folder will reveal the database columns for each table or view as shown in **Illustration 48** below.



**Illustration 48 - Opening the SQL Server Tables in the Data Source Explorer**

## Creating the External Content Type Operations

The next step is to create the operations that can be executed on the information in the tables or views and choose what information to make available through the ECT. These operations are the standard Create, Update and Delete (CRUD) functions available in most applications. This is a key enhancement of BCS – enabling the execution of CRUD operations within a *SharePoint* application. In *SharePoint 2007* BDC provided only read-only access to external data sources. Right click on any table or view and the following options will be displayed, as shown in **Illustration 49** below.

- Create All Operations
- New Read Item Operation
- New Read List Operation
- New Create Operation
- New Update Operation
- New Delete Operation
- New Association

The *SharePoint Designer External Content Type* wizard is decidedly granular about what information you expose and what you can do with that information. The underlying assumption here is that Line of Business information is restricted and privileged and should be exposed as an ECT on an explicit need and use basis. The following is a description of the Operation choices:

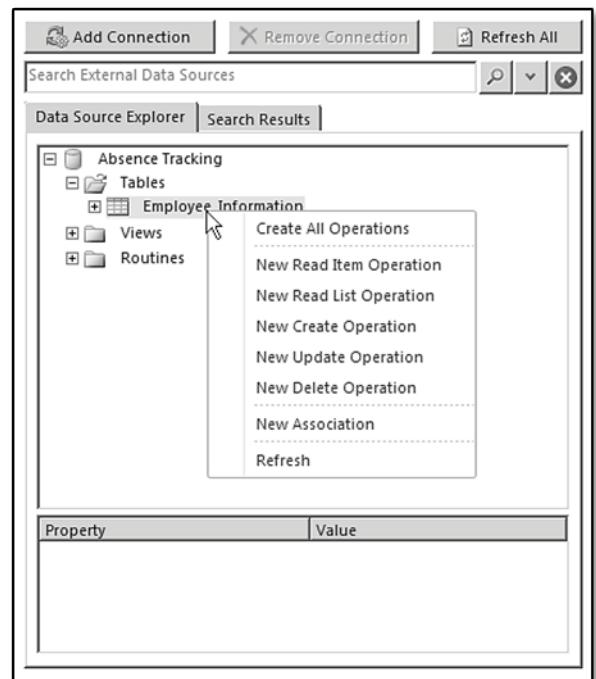
**Create All Operations** – Choosing this option will initiate a Wizard that will create and configure all of the Operations below.

**New Read Item Operation** – Choosing this option will initiate a Wizard that will allow the ECT List Form to access and display a single record from the data source.

**New Read List Operation** – Choosing this option will initiate a Wizard that will create a data set from the data source that will display as a SharePoint List. This Operation is prerequisite requirement of creating an External Content Type List and Form.

**New Create Operation** – Choosing this option will initiate a Wizard that will allow a user to create a new record in the data source using the underlying InfoPath form for the ECT List. This is a new write-back capability of BCS.

**New Update Operation** – Choosing this option will initiate a Wizard that will allow a user to update one or more data source fields with a new value from an ECT List view or from the underlying InfoPath form for the ECT list. This is a new write-back capability of BCS.



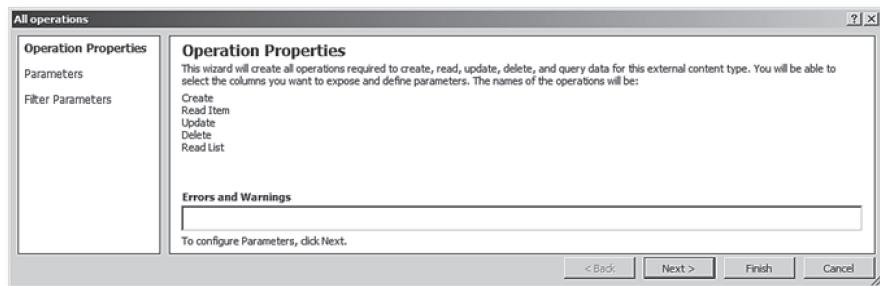
**Illustration 49 - ECT Operations that can be created on a data source with SharePoint Designer**

**New Delete Operation** – Choosing this option will initiate a Wizard that will allow a user to delete an entire record. This can be accomplished by deleting a row in an ECT List view or as an item displayed in the underlying InfoPath form for the ECT list. This is a new write-back capability of BCS.

**New Association** – Choosing this option will initiate a Wizard that is used to link two tables in the same database.

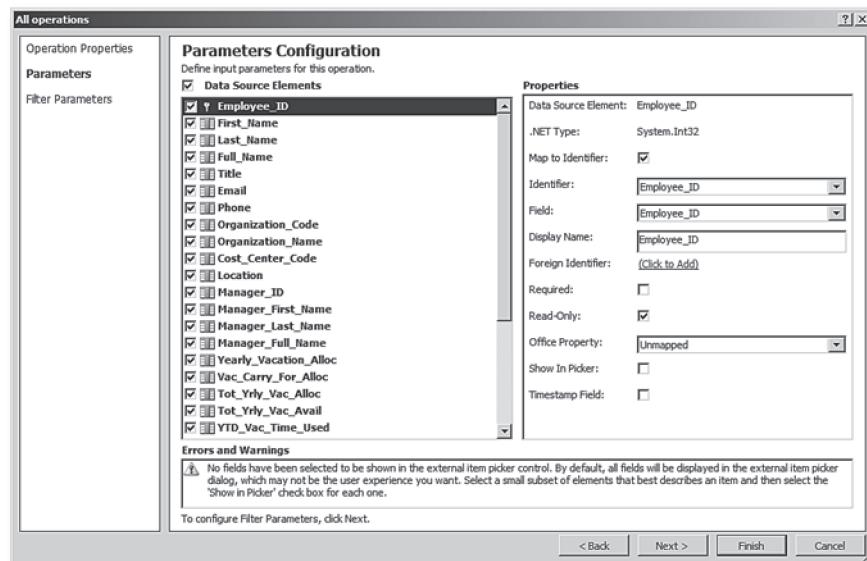
For the *Employee Absence Tracking* application we will *Create All Operations* on the *Employee Information* table that we created in the *Absence Tracking* database earlier.

Right click on the *Employee\_Information* table icon in the *Data Source Explorer* and click on **Create All Operations**. The *Operation Properties* Wizard screen will display as shown in **Illustration 50** below.



**Illustration 50 - Operation Properties page of the ECT Wizard**

Click on the **Next button** to display the *Parameters Configuration* page of the wizard as shown in **Illustration 51** below. Four section panels are displayed: the Wizard steps, the *Data Source Elements*, the *Element Properties* and *Errors and Warnings*.



**Illustration 51 - the Parameters Configuration page of the ECT wizard**

On this Wizard step we can choose the fields from the database table that we want to use in the *External Content Type* and configure settings and properties for the fields. The *Data Source Elements* section displays the available fields from the database table. All fields from the data source are selected for inclusion in the *External Content Type* by default but any field that is not required can be de-selected and omitted from the *External Content Type* record definition. The Wizard accesses the properties defined for these fields in the SQL database and makes sure that any of the choices in this step do not invalidate those properties. For example, if we de-select any of the fields that were set to not nullable (i.e. required) such as the First Name, the Wizard would display an error message in the *Errors and Warnings* panel. An error message is displayed for every instance of an error condition.

Depending upon the operation and data source field selected the *Properties* panel will display different property settings. The following is a description of these property items:

**Data Source Element** – The name of the field in the data source.

**.NET Type** – The data type assigned to the field in the data source.

**Map to Identifier check box** – Used to specify which field will be used as the key (indexed) fields in the External Content Type. At least one field must be specified as the Identifier, typically the same key field defined in the database, such as the *Employee\_ID*. You can create multiple key fields by selecting a field in the *Data Source Elements* panel, clicking *Map to Identifier*. The ECT *Identifier* by default will be the same field specified in the database.

**Identifier** – When a *Data Source Element* is checked to *Map to Identifier* a corresponding ECT field must be identified.

**Field** – The default mapping of the data source field name to the ECT column name.

**Display Name** – If you would like to use a friendly or different name for the ECT column it can be specified here. For example, instead of *Yearly\_Vacation\_Alloc* as the default ECT column name, you can make the Display Name for the column “Yearly Vacation Time Available”.

**Office Property** – Options for mapping an ECT field to Office metadata definitions will be displayed in this drop-down list if an Office Item Type (Appointment, Contact, Task or Post) was set for the ECT on the *External Content Type* Information tab of the summary page. This mapping allows ECT information exposed in SharePoint to be used by *Outlook* and *Word*.

**Required** – A check box setting used in the *Create Read List Operation* to indicate that the field is required. If this property was set in the data source it will be checked here.

**Read Only** – A check box setting used in the *Create Read List Operation*. This setting allows you to make the ECT field read only.

**Show in Picker** – A check box setting used in the *Create Read List Operation* that will bind this field to a picker control in the ECT list form.

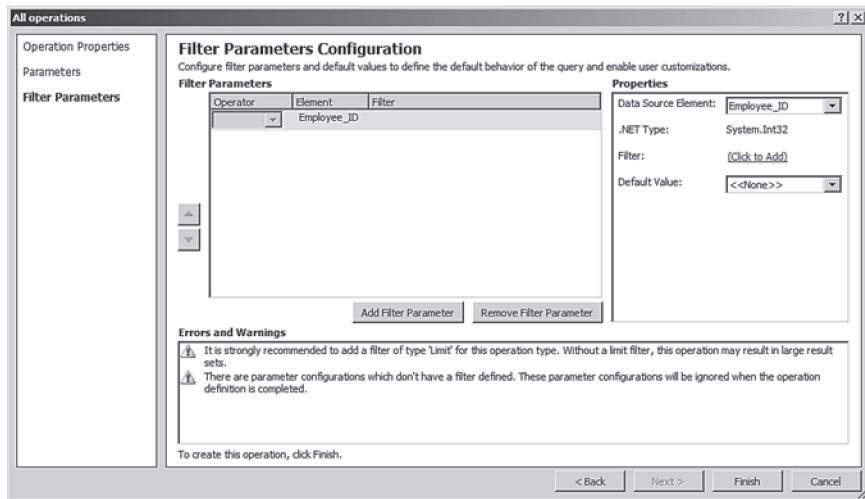
**Time Stamp Field** – A check box setting used in the *Create Read List Operation* to time stamp this field.

**Default Value** – A default value for an ECT field can be specified here. For example if you wanted to set the default value for the *Yearly\_Vacation\_Alloc* to be 80 hours you would enter “80” here.

**Filter** – A context sensitive filter can be applied to any field. We will discuss this in more detail below.

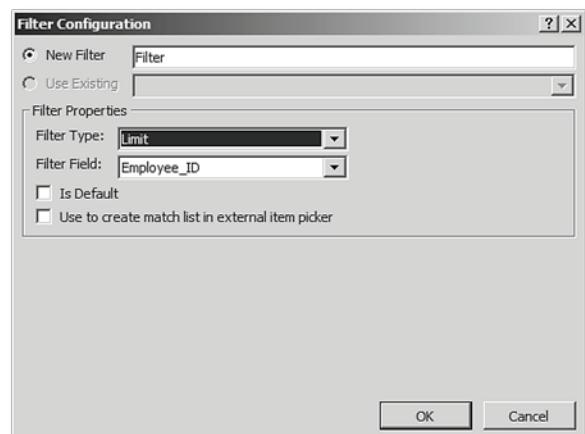
**Foreign Identifier** – Used to link two database tables in an Association.

With the **Employee\_ID** selected check the **Map to Identifier box** and make sure that the Identifier drop-down list displays *Employee\_ID*. Click on the **Next button**. The *Parameters Configuration* page of the wizard will display as shown in **Illustration 52** below.



**Illustration 52 - the Parameters Configuration page of the ECT wizard**

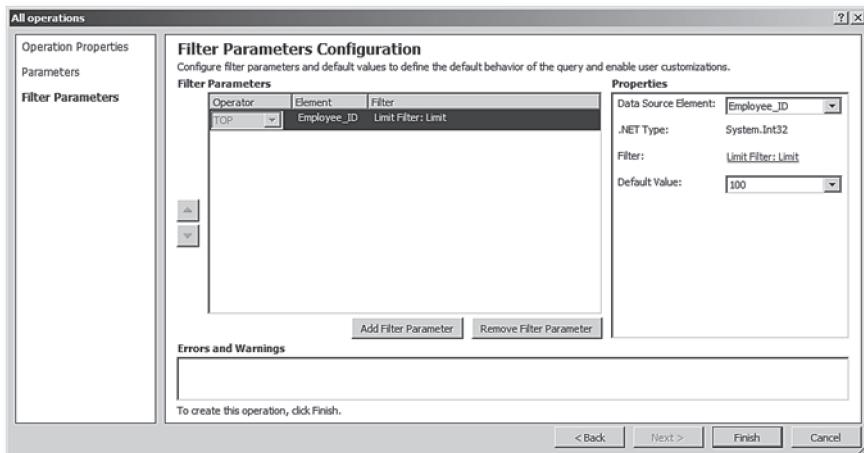
Click the **Add Filter Parameter** button. By default the first field in the data source will display in the *Filter Parameters* panel. Click the **Click to Add** link for Filter in the *Properties* panel. The *Filter Configuration* dialogue box will display as shown in **Illustration 53** below.



**Illustration 53 - The Filter Configuration dialogue box of the ECT wizard**

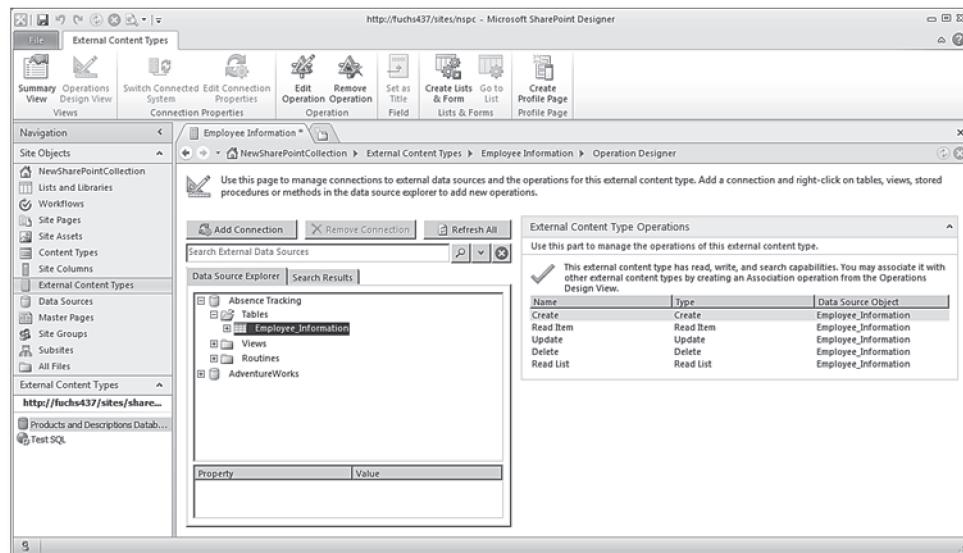
Select the **New Filter radio button** and pick *Limit* for the *Filter Type* and *Employee\_Id* for the *Filter Field*.

Click **OK**. For the default value put in a numeric value that will specify the number of rows the ECT list will return on a page, as shown in **Illustration 54** below.



**Illustration 54 - Entering the filter value for the number of rows the ECT list will return on a page**

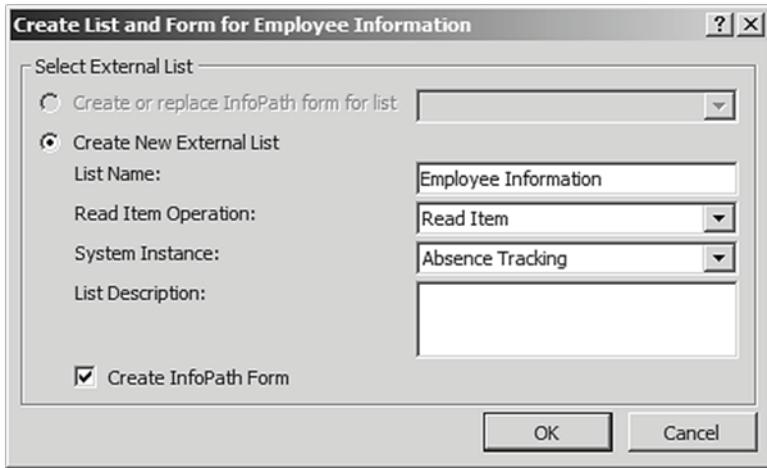
Click the **Finish** button. We have completed the step of creating the *Employee\_Information* ECT operations. If you return to the *Summary Page* by clicking on the **Summary View** Ribbon button you will now see all the operations displayed in the *External Content Type Operations* section as shown in **Illustration 55** below.



**Illustration 55 - Operations Designer main page showing the defined operations**

## Creating the ECT List and Form

The next step is to create the ECT List and Form for this ECT. Click on the **Create Lists & Form** button on the Ribbon. The *Create List and Form* dialogue screen will display as shown in **Illustration 56** below.



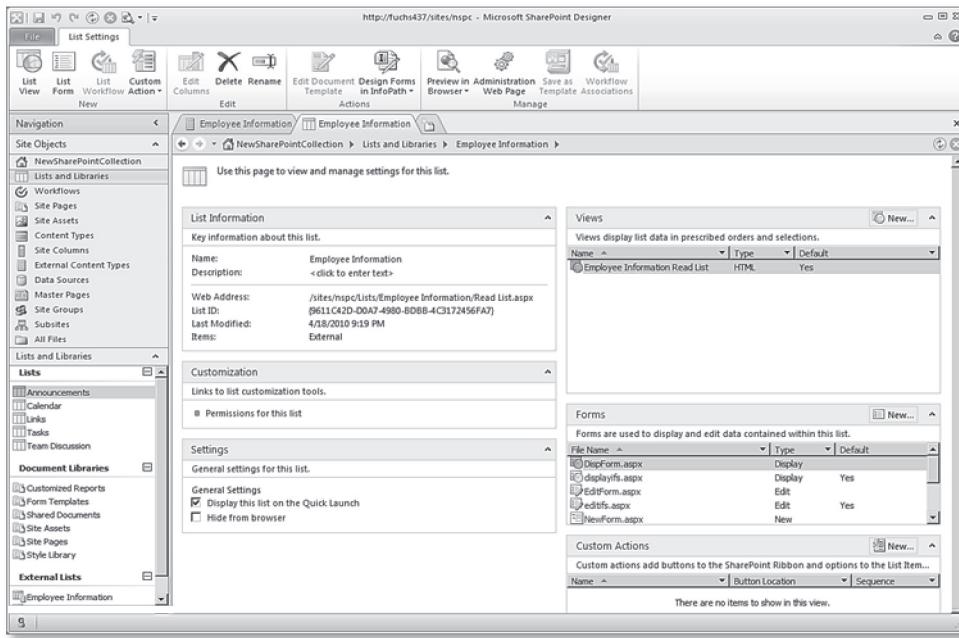
**Illustration 56** - Create List and Form dialogue screen for the ECT

The radio button for *Create New External List* will be displayed. Enter a List Name and make sure you **check** the **Create InfoPath Form check box**. You can create multiple external lists for an ECT. Click the **OK** button. SharePoint Designer will now generate an *External List* for the ECT. Click on the **Lists and Libraries** icon in the *SharePoint Designer Navigation* pane and you will see the *Employee Information* list under the *External Lists* group as shown in **Illustration 57** below.

The screenshot shows the Microsoft SharePoint Designer interface with the URL "http://fuchs437/sites/nspc - Microsoft SharePoint Designer". The top navigation bar includes File, Lists and Libraries, and various SharePoint icons. The ribbon tabs are Lists and Libraries, List From Spreadsheet, List Settings, Columns, Edit, Rename, Delete, and Manage. The left navigation pane shows Site Objects like NewSharePointCollection, Lists and Libraries, Workflows, Site Pages, Site Assets, Content Types, Site Columns, External Content Types, Data Sources, Master Pages, Site Groups, and Subsites. The main content area displays the "Employee Information" list under the "External Lists" category. The list table has columns: Name, Type, Items, Advanced..., Modified Date, and Description. The list contains items such as Customized Reports, Form Templates, Shared Documents, Site Assets, Site Pages, and Style Library. Below this, another "External Lists" section shows Employee Information and Products and Descriptions External.

**Illustration 57** - External List for ECT displaying in SharePoint Designer List and Libraries page for the site

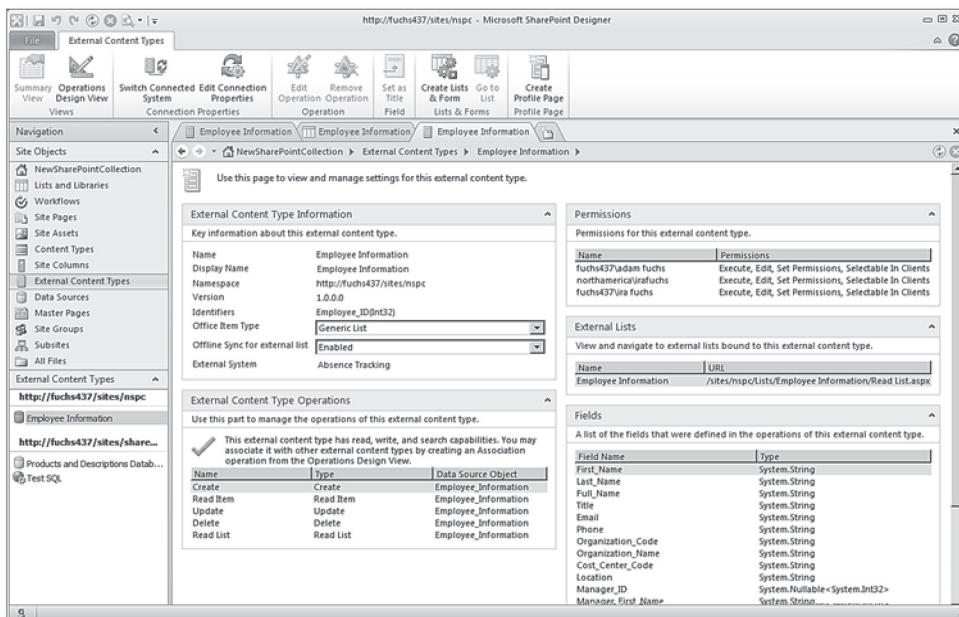
If you click on the **Employee Information list item**, SharePoint Designer will open the summary page for the list as shown in **Illustration 58** on the next page.



**Illustration 58 - Summary page for the Employee Information ECT list**

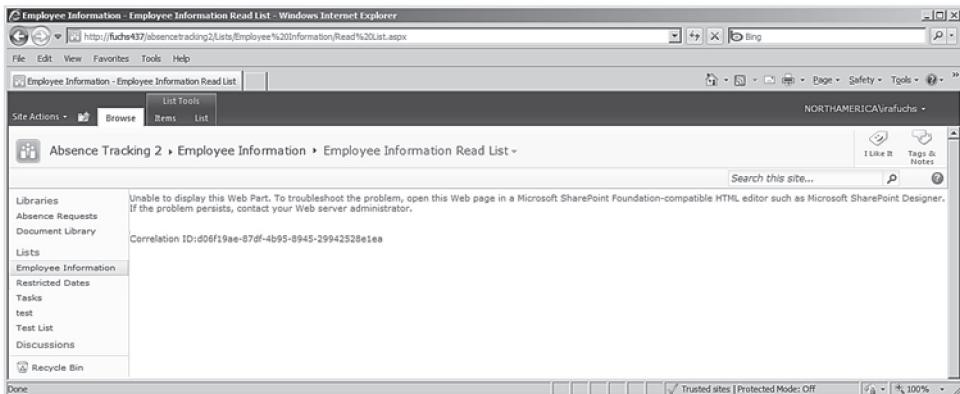
From the summary page you can set the permissions for the list, create custom actions and view and modify the underlying *InfoPath* list form.

Return to the summary page for the *Employee Information External Content Type*. You will now see all the fields listed in the *Fields* tab as shown in **Illustration 59** below.



**Illustration 59 - Summary page for the Employee Information ECT displaying Fields**

**Important Note – Configuring Object Permissions for External Content Types in SharePoint Central Administration.** The external list that we just created from the *Employee Information ECT* will not be accessible to a user until they are granted permissions to access the *External Content Type*. Accessing the ECT within *SharePoint* requires a separate permission from the permission to access the list itself. Without the ECT permission the following screen message, as shown in **Illustration 60** below will be displayed when a user accesses the *Employee Information* list.



**Illustration 60 - How the ECT list will display if access permissions to the ECT are not set**

## Setting the External Content Type Permissions

Permissions to access the ECT are set in *Business Data Connectivity Services of SharePoint Central Administration*. In a production environment the procedure described below would be done by the *SharePoint* farm administrator. Since your development environment is a complete *SharePoint* installation you will be able to do this step directly. In *Central Administration* click **Manage service applications**. The Service Applications page will display as shown in **Illustration 61** below.

Name	Type	Status
Access Services	Access Services Web Service Application	Started
Access Services	Access Services Web Service Application Proxy	Started
Application Discovery and Load Balancer Service Application	Application Discovery and Load Balancer Service Application	Started
Application Discovery and Load Balancer Service Application Proxy_eb706682-eccc-4d1a-bdbb-5f281ec55bec	Application Discovery and Load Balancer Service Application Proxy	Started
Application Registry Service	Application Registry Service	Started
Application Registry Service	Application Registry Proxy	Started
Business Data Connectivity Service	Business Data Connectivity Service Application	Started
Business Data Connectivity Service	Business Data Connectivity Service Application Proxy	Started
Excel Services Application	Excel Services Application Web Service Application	Started
Excel Services Application	Excel Services Application Web Service Application Proxy	Started
Managed Metadata Service	Managed Metadata Service	Started
Managed Metadata Service	Managed Metadata Service Connection	Started

**Illustration 61 - SharePoint Central Administration Service Applications page**

Click **Business Data Connectivity Services** to display the *External Content Types* that have been created. ECT's are farm level objects and are accessible from any site collection in the farm. In the drop-down list of the Views tab on the Ribbon make sure that *External Content Types* are selected. The *Employee Information* ECT will be displayed as shown in **Illustration 62** below.

Name	Display Name	Namespace	Version	External System	Default Action
<input type="checkbox"/> Employee Information	Employee Information	http://fuchs437/absentctracking	1.0.0.0	Absence Tracking	http://fuchs437:80/_bdc/http_fuchs437_absentctracking/E20Information_1.aspx?Employee_ID={0}

**Illustration 62 - Business Data Connectivity Services External Content Types page**

Select the *Employee Information ECT* by checking its **checkbox**. Now click the **Set Object Permissions button** on the *Ribbon*. The Set Object Permissions dialogue screen will display as shown in **Illustration 63** below.

**Illustration 63 - The Set Object Permissions screen in Central Administration BCS**

Use the *People Picker* control to add the *Windows user accounts* you created including your own user account. For each user select all the permissions in the *Permissions* list and click **OK**.