A. Leonard, *Building Custom Tasks for SQL Server Integration Services*
https://doi.org/10.1007/978-1-4842-6482-9_16

16. Refactoring SourceConnection

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The goal of this chapter is to refactor ExecuteCatalogPackageTask methods related to the `SourceConnection` property . The goals are

- Downgrade from SSIS 2019 to SSIS 2017 so as to run on the Azure platform.
- Refactor connection identification to support the Server ➤ Integration Services ➤ SSIS Catalog ➤ Folder ➤ Project ➤ Package hierarchy.
- Refactor the `SettingsView.SourceConnection` property.
- Identify catalog, folder, project, and package objects in the Server ➤ Integration Services ➤ SSIS Catalog ➤ Folder ➤ Project ➤ Package hierarchy.

We also refactor the Execute Catalog Package Task for two additional goals:

1. Using Expressions – which is one of the main goals for this edition of the

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17. Refactoring the SSIS Package Hierarchy

Thinking Azure-SSIS

At the time of this writing (October 2020), Azure-SSIS does not support SSIS 2019. SSIS 2017 is supported, so we must downgrade the task and Visual Studio solution to run as an SSIS 2017 custom task. Azure-SSIS will likely support SSIS 2019 in the future (I don't know and I have no control over internal Microsoft decisions and priorities).

I advise you move your development effort to a machine configured with Microsoft SQL Server 2017 and not configured with Microsoft SQL Server 2019 to avoid collisions with assemblies in the Microsoft .Net Framework.

Begin by updating the ExecuteCatalogPackageTask project References by expanding the

References virtual folder in Solution Explorer, as shown in Figure 16-1:

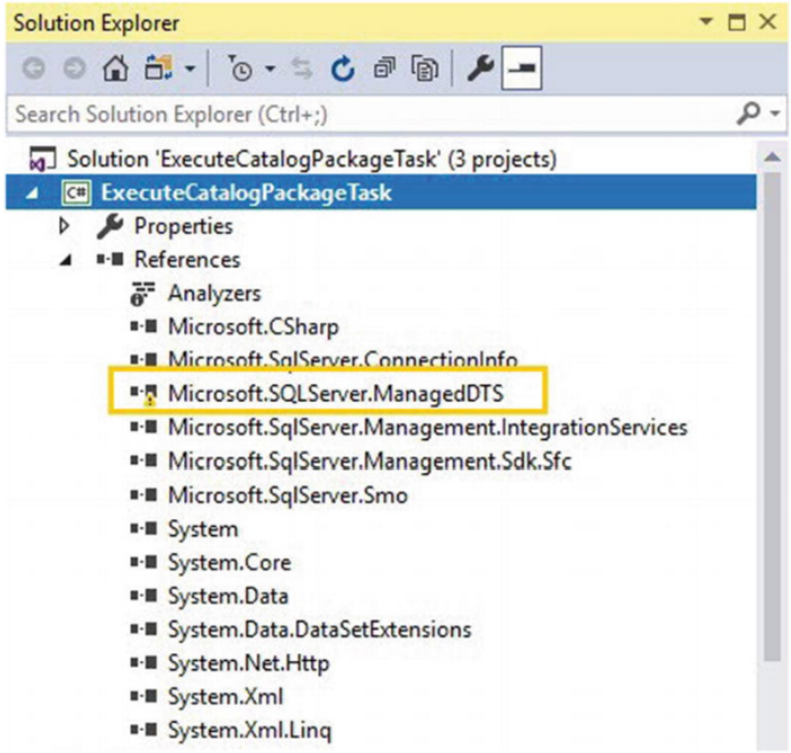


Figure 16-1 ExecuteCatalogPackageTask References

References to certain assemblies – such as the `Micrsoft.SQLServer.ManagedDTS` assembly outlined in Figure 16-1 – may display warning icons. The warning icon indicates an issue with the assembly. In this case, the issue is the SSIS 2019 of the `Micrsoft.SQLServer.ManagedDTS` assembly is not registered on the development server that has SQL Server 2017 (only) installed.

> It is very important to note that your development server may be configured differently than the development server I am using. Your mileage may vary.

Click the reference to the `Micrsoft.SQLServer.ManagedDTS` assembly, and then press the F4 key to display its properties, as shown in Figure 16-2:

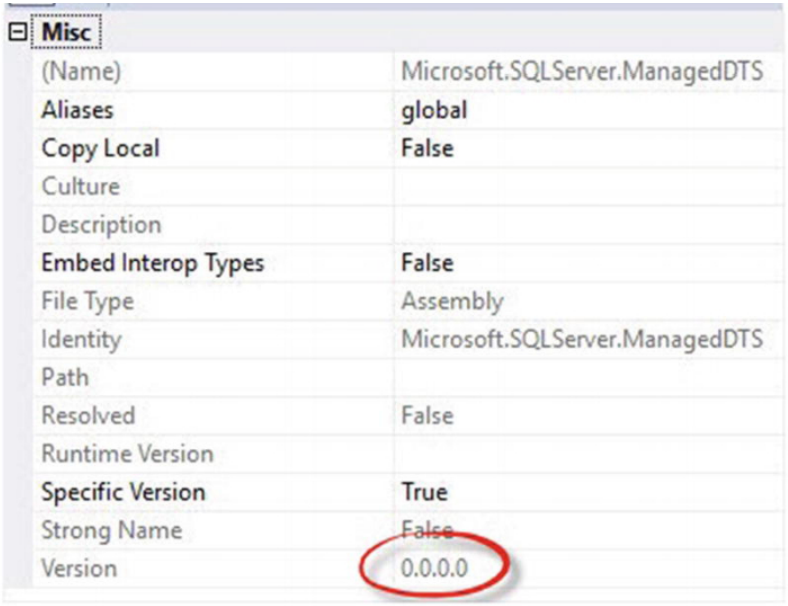
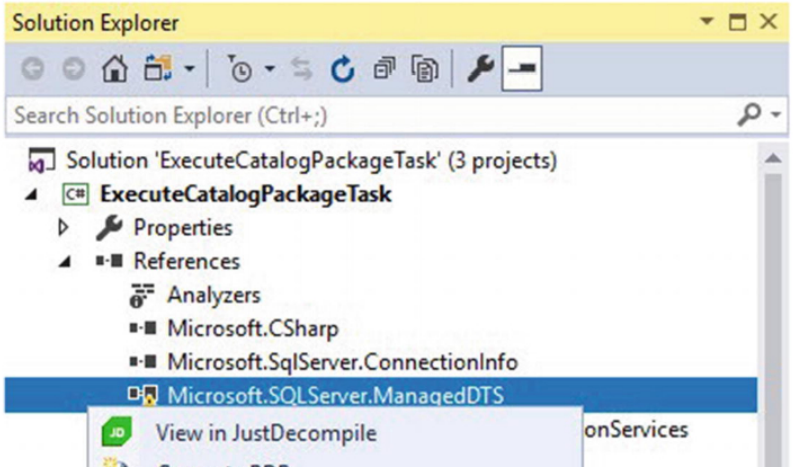


Figure 16-2 Micrsoft.SQLServer.ManagedDTS assembly properties

Note the Version property of the `Micrsoft.SQLServer.ManagedDTS` assembly displays the value "`0.0.0.0`" because the later version of the `Micrsoft.SQLServer.ManagedDTS` assembly cannot be located on this development server.

Delete the `Micrsoft.SQLServer.ManagedDTS` assembly from the ExecuteCatalogPackageTask References collection by right-clicking the assembly and then clicking Remove, as shown in Figure 16-3:



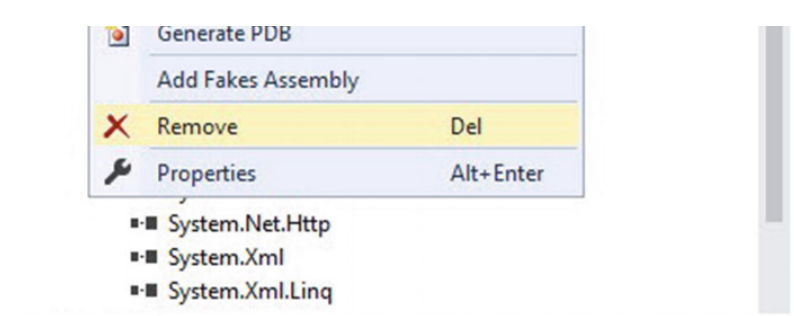


Figure 16-3 Deleting the current version of the Micrsoft.SQLServer.ManagedDTS assembly

As before, right-click the References virtual folder and click Add Reference to add a new reference (or, in this case, a new version of a reference), as shown in Figure 16-4:

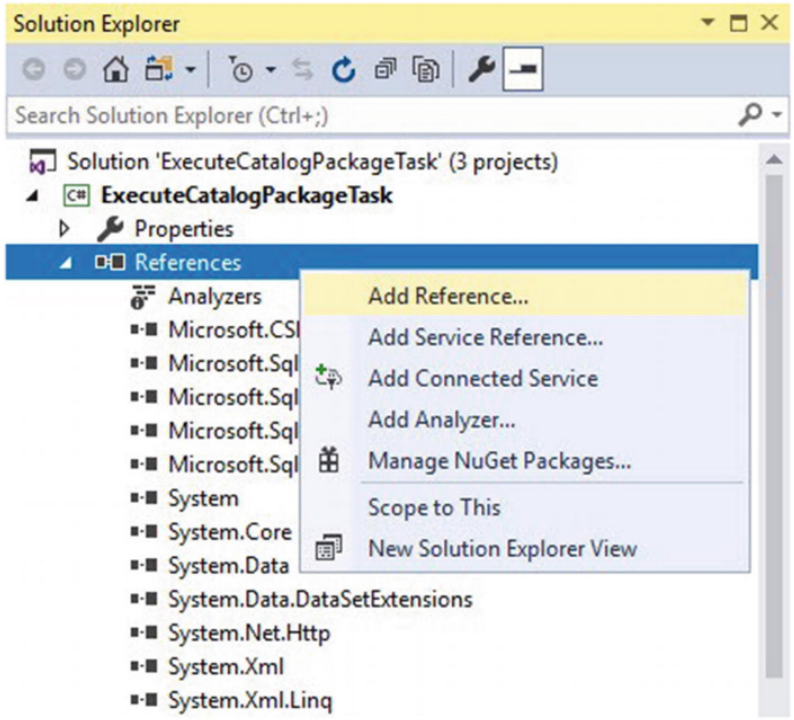
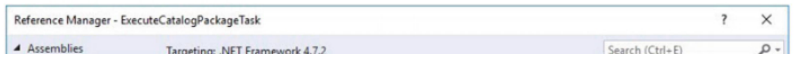


Figure 16-4 Adding – replacing, really – a new reference

Expand Assemblies and select Extensions. Navigate to the `Micrsoft.SQLServer.ManagedDTS` assembly in the assemblies list, and select the `Micrsoft.SQLServer.ManagedDTS` assembly, as shown in Figure 16-5:



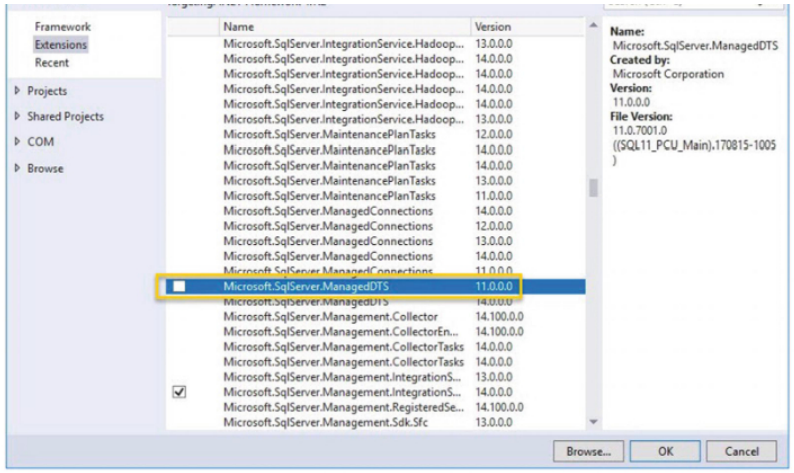
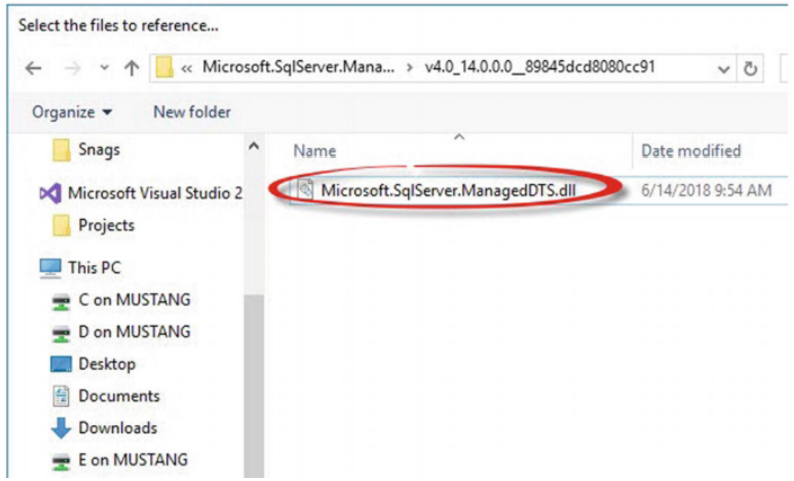


Figure 16-5 Selecting Micrsoft.SQLServer.ManagedDTS

Pay very close attention to the Version column and details in the Reference Manager's right pane. SSIS 2017 is version 14. The selected version of `Micrsoft.SQLServer.ManagedDTS` is version 11.0.0.0 – or version 11. Version 11 is SSIS 2012.

Click the Browse button and navigate to the location of the assembly file. On my server, the location is `C:\Windows\Microsoft.NET\assembly\GAC_MSIL\Microsoft.SqlServer.ManagedDTS\v4.0_14.0.0.0__89845dcd8080cc91`. Note the version of the `Micrsoft.SQLServer.ManagedDTS` assembly is `v4.0_14.0.0.0__89845dcd8080cc91`. We know the version because the folder which contains the `Micrsoft.SQLServer.ManagedDTS` assembly is named `v4.0_14.0.0.0__89845dcd8080cc91`, as shown in Figure 16-6:



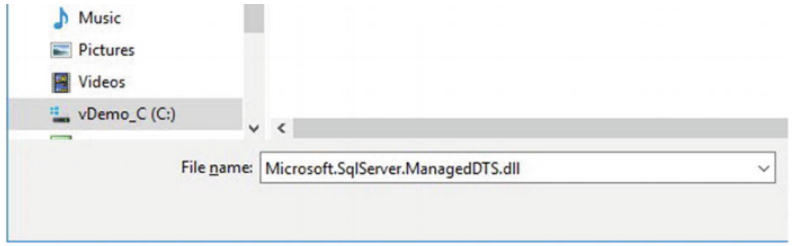


Figure 16-6 Selecting the SSIS 2017 version of the Micrsoft.SQLServer.ManagedDTS assembly

Add the reference to the `Micrsoft.SQLServer.ManagedDTS` assembly, and view the properties to verify SSIS 2017 (version 14), as shown in Figure 16-7:

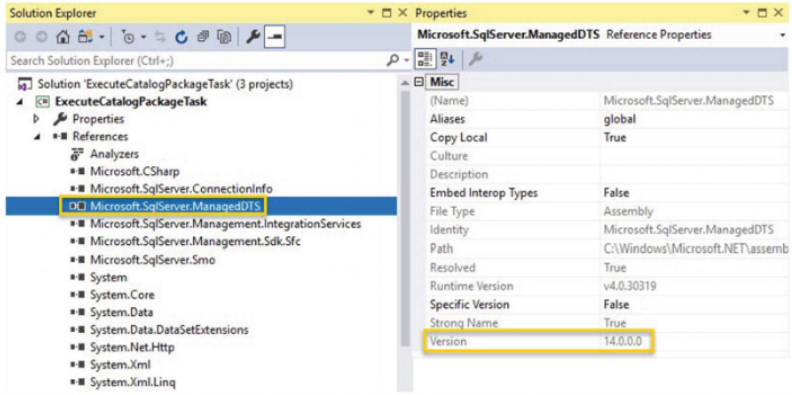
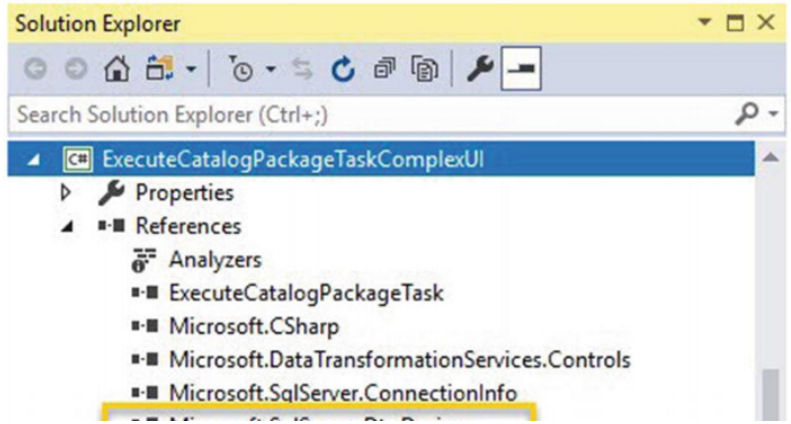


Figure 16-7 The SSIS 2017 version of the Micrsoft.SQLServer.ManagedDTS assembly

Repeat this process, verifying each version of each referenced assembly in *both* the `ExecuteCatalogPackageTask` and the `ExecuteCatalogPackageTaskComplexUI` projects, as shown in Figure 16-8:



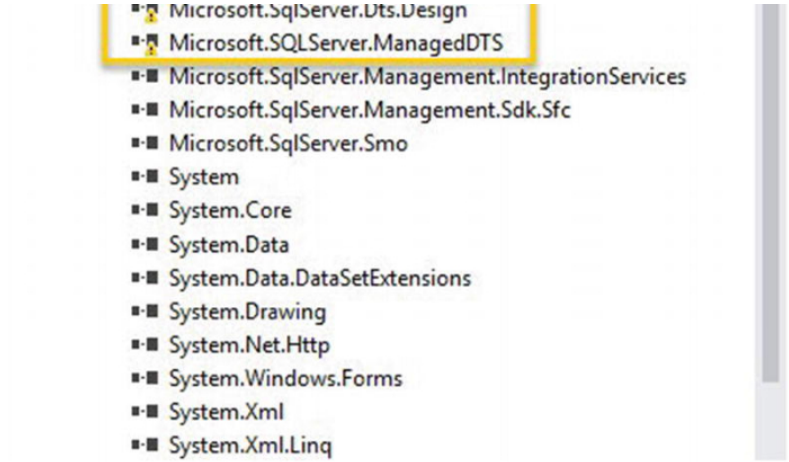


Figure 16-8 Rinse and repeat

Once the References are downgraded, open the ExecuteCatalogPackageTask project's ExecuteCatalogPackageTask.cs file. Update the TaskType attribute in the DtsTask decoration for the ExecuteCatalogPackageTask class, setting the TaskType from DTS150 to DTS140, as shown in Figure 16-9:

```
namespace ExecuteCatalogPackageTask
{
    [DtsTask(
        TaskType = "DTS140"
      , DisplayName = "Execute Catalog Package Task"
      , IconResource = "ExecuteCatalogPackageTask.ALCStrike.ico"
      , Description = "A task to execute packages stored in the SSIS Catalog."
      , UITypeName = "ExecuteCatalogPackageTaskComplexUI.ExecuteCatalogPackage
      , TaskContact = "ExecuteCatalogPackageTask; Building Custom Tasks for SQ
    13 references
    public class ExecuteCatalogPackageTask : Microsoft.SqlServer.Dts.Runtime.T
```

Figure 16-9 Updating the TaskType attribute

The ExecuteCatalogPackageTask solution has been downgraded, and the ExecuteCatalogPackageTask is now ready for Azure-SSIS.

Refactor Connection Identification

Connection manager identification is vital – especially when the connection string property is managed dynamically or overridden at execution time. The first step in refactoring connection identification is to add connection-related properties to the ExecuteCatalogPackageTask code using the code in Listing 16-1:

```
public Connections Connections;
public string ConnectionManagerId { get; set; } = String.Empty;
```

```
public int ConnectionManagerIndex { get; set; } = -1;
```

Listing 16-1 Adding Connections, ConnectionManagerIndex, and ConnectionManagerId

Once added, the code appears as shown in Figure 16-10:

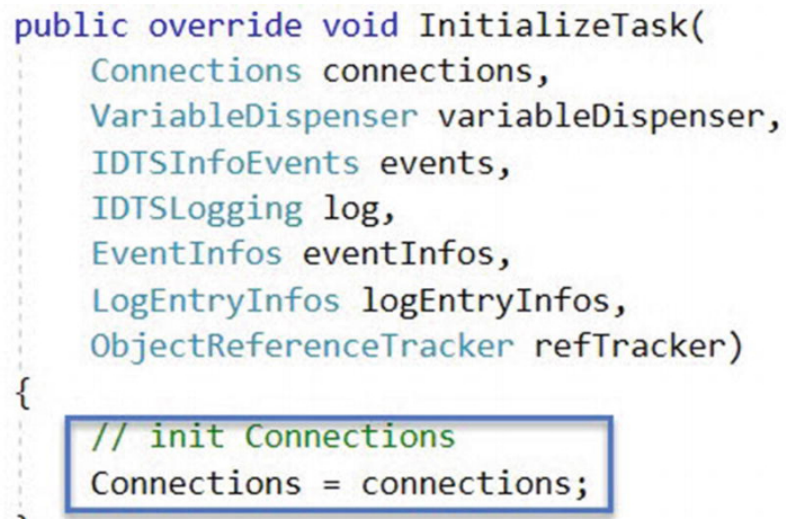
Figure 16-10 Connections, ConnectionManagerId, and ConnectionManagerIndex added to the ExecuteCatalogPackageTask class

Initialize the `Connections` variable by adding the code in Listing 16-2 to the `ExecuteCatalogPackageTask.InitializeTask` method :

```
// init Connections
Connections = connections;
```

Listing 16-2 Initializing Connections

Once added, the `ExecuteCatalogPackageTask.InitializeTask` method appears as shown in Figure 16-11:



```
}
```

Figure 16-11 The ExecuteCatalogPackageTask.InitializeTask method, updated

Initialize the `ConnectionManagerIndex` property value by creating the `returnConnectionManagerIndex` method using the code in Listing 16-3:

```
private int returnConnectionManagerIndex(Connections connections
                                        , string connectionManagerName)
{
  int ret = -1;
  try
  {
    ConnectionManagerId = GetConnectionID(connections, ConnectionManager
    Microsoft.SqlServer.Dts.Runtime.ConnectionManager connectionManager
    ConnectionManagerName = connectionManager.Name;
    if (connectionManager != null)
    {
      for (int i = 0; i <= connections.Count; i++)
      {
        if (connections[i].Name == connectionManager.Name)
        {
          ret = i;
          break;
        }
      }
    }
  }
  catch (Exception ex)
  {
    string message = "Unable to locate connection manager: " + Connectio
    throw new Exception(message, ex.InnerException);
  }
  return ret;
}
```

Listing 16-3 The returnConnectionManagerIndex method

Once added, the `returnConnectionManagerIndex` method appears as shown in Figure 16-12:

```
94  private int returnConnectionManagerIndex(Connections connections
95                                          , string connectionManagerName)
96  {
97      int ret = -1;
98
99      try
100     {
101         ConnectionManagerId = GetConnectionID(connections, ConnectionManagerName);
102         Microsoft.SqlServer.Dts.Runtime.ConnectionManager connectionManager = connections[ConnectionManagerId];
103         ConnectionManagerName = connectionManager.Name;
104
```

```
105         if (connectionManager != null)
106         {
107             for (int i = 0; i <= connections.Count; i++)
108             {
109                 if (connections[i].Name == connectionManager.Name)
110                 {
111                     ret = i;
112                     break;
113                 }
114             }
115         }
116     }
117     catch (Exception ex)
118     {
119         string message = "Unable to locate connection manager: " + ConnectionManagerName;
120         throw new Exception(message, ex.InnerException);
121     }
122
123     return ret;
124 }
```

Figure 16-12 The returnConnectionManagerIndex method

Examining the code shown in Figure 16-12, a return variable named `ret` of the `int` type is declared and initialized to `-1` on line 97. A try-catch block spans lines 99–121, after which – on line 123 – the value of the `ret` variable is returned from the `returnConnectionManagerIndex` method. On line 101, the code attempts to set the value of the `ExecuteCatalogPackageTask.ConnectionManagerId string` type property by calling the `GetConnectionID` method included in the `Microsoft.SqlServer.Dts.Runtime.Task` object methods. On line 102, a variable named `connectionManager`, of the `Microsoft.SqlServer.Dts.Runtime.ConnectionManager` type, is declared and initialized using the value of the `ConnectionManagerId` property to identify a member of the `connections` collection. On line 103, the value of the `ConnectionManagerName` property is set (or reset) to the name of the `connectionManager` object using `connectionManager.Name`. An `if` condition starts on line 105 and verifies the `connectionManager` object is not `null`. If the `connectionManager` object is not `null`, a `for` loop starts on line 107. The `for` loop iterates the number of `connections`. On line 109, an `if` condition uses the iterator `i` to compare the value of the `Name` property of the currently iterating connection – `connection(i).Name` – to the value of the `connectionManager.Name` property. If the value of the `connection(i).Name` equals the value of the `connectionManager.Name` property, the value of the `ret` variable is set to the current value of the iterator, `i`.

To set the value of the ConnectionManagerIndex property, add a call to the `returnConnectionManagerIndex` method in the ExecuteCatalogPackageTask.Execute method using the code in Listing 16-4:

```
ConnectionManagerIndex = returnConnectionManagerIndex(connections, Conne
```

Listing 16-4 Calling the returnConnectionManagerIndex method

Once added, the code appears as shown in Figure 16-13:

```
public override DTSExecResult Execute(
    Connections connections,
    VariableDispenser variableDispenser,
    IDTSComponentEvents componentEvents,
    IDTSLogging log,
    object transaction)
{
    ConnectionManagerIndex = returnConnectionManagerIndex(connections, ConnectionManagerName);

    catalogServer = new Server(ServerName);
    integrationServices = new IntegrationServices(catalogServer);
    catalog = integrationServices.Catalogs[PackageCatalogName];
    catalogFolder = catalog.Folders[PackageFolder];
    catalogProject = catalogFolder.Projects[PackageProject];
    catalogPackage = catalogProject.Packages[PackageName];

    Collection<Microsoft.SqlServer.Management.IntegrationServices.PackageInfo.ExecutionValueParameterSet>
        executionValueParameterSet = returnExecutionValueParameterSet();

    catalogPackage.Execute(Use32bit, null, executionValueParameterSet);

    return DTSExecResult.Success;
}
```

Figure 16-13 Calling returnConnectionManagerIndex in the ExecuteCatalogPackageTask.Execute method

Setting the `ConnectionManagerIndex` property value in this manner supports property management by expressions, which we will cover later.

Refactor the SettingsView.SourceConnection Property

Since connection manager properties may be overridden at execution time, connection manager identification is crucial. Begin refactoring the `SettingsView.SourceConnection` property by replacing the declaration of the `IDtsConnectionService` type `SettingsView` variable named `connectionService` with the code in Listing 16-5:

```
protected IDtsConnectionService ConnectionService { get; set; }
```

Listing 16-5 Replacing the connectionService variable with the ConnectionService prope

Once the `connectionService` variable is replaced, the code appears as shown in Figure 16-14:

```
public partial class SettingsView : System.Windows.Forms.UserControl, IDTSTaskUIView
{
    private SettingsNode settingsNode = null;
    private System.Windows.Forms.PropertyGrid settingsPropertyGrid;
    private ExecuteCatalogPackageTask.ExecuteCatalogPackageTask theTask = null;
    private System.ComponentModel.Container components = null;

    private const string NEW_CONNECTION = "<New Connection...>";
    0 references | Andy Leonard, 1 day ago | 1 author, 4 changes
    protected IDtsConnectionService ConnectionService { get; set; }
```

Figure 16-14 Updating to the ConnectionService property

Changing the `connectionService` variable to the `ConnectionService` property causes errors in the SettingsView class. Fix the first error in the `SettingsView.OnInitialize` method by updating the line `connectionService = (IDtsConnectionService)connections;` with the code in Listing 16-6:

```
ConnectionService = (IDtsConnectionService)connections;
```

Listing 16-6 Updating SettingsView.OnInitialize

Once updated, the code appears as shown in Figure 16-15:

```
    this.settingsNode = new SettingsNode(taskHost as TaskHost, connections);

    settingsPropertyGrid.SelectedObject = this.settingsNode;

    ConnectionService = (IDtsConnectionService)connections;
}
```

Figure 16-15 ConnectionService updated

Two locations in the `SettingsView.propertyGridSettings_PropertyValueChanged` method require an update, using the code shown in Listing 16-7:

```
newConnection = ConnectionService.CreateConnection("ADO.Net");
.
.
.
settingsNode.Connections = ConnectionService.GetConnectionsOfType("ADO.N
```

Listing 16-7 Updating SettingsView.propertyGridSettings_PropertyValueChanged

Once updated, the code appears as shown in Figure 16-16:

```
private void propertyGridSettings_PropertyValueChanged(object s
                                        , System.Windows.Forms.PropertyValueChangedEventArgs e)
{
    if (e.ChangedItem.PropertyDescriptor.Name.CompareTo("SourceConnection") == 0)
    {
        if (e.ChangedItem.Value.Equals(NEW_CONNECTION))
        {
            ArrayList newConnection = new ArrayList();

            if (!((settingsNode.SourceConnection == null) || (settingsNode.SourceConnection == "")))
            {
                settingsNode.SourceConnection = null;
            }

            newConnection = ConnectionService.CreateConnection("ADO.Net");

            if ((newConnection != null) && (newConnection.Count > 0))
            {
                ConnectionManager cMgr = (ConnectionManager)newConnection[0];
                settingsNode.SourceConnection = cMgr.Name;
```

Figure 16-16 SettingsView.propertyGridSettings_PropertyValueChanged updated

Continue updating the `SettingsView.propertyGridSettings_PropertyValueChanged` method by adding the code in Listing 16-8 to the `if` conditional `if ((newConnection != null) && (newConnection.Count > 0))`:

```
theTask.ServerName = returnSelectedConnectionManagerDataSourceValue(sett
theTask.ConnectionManagerName = settingsNode.SourceConnection;
theTask.ConnectionManagerId = theTask.GetConnectionID(theTask.Connection
```

Listing 16-8 Updating the SettingsView.propertyGridSettings_PropertyValueChanged

Once added, the code appears as shown in Figure 16-17:

```
if ((newConnection != null) && (newConnection.Count > 0))
{
    ConnectionManager cMgr = (ConnectionManager)newConnection[0];
    settingsNode.SourceConnection = cMgr.Name;
    theTask.ServerName = returnSelectedConnectionManagerDataSourceValue(settingsNode.SourceConnection);
    theTask.ConnectionManagerName = settingsNode.SourceConnection;
    theTask.ConnectionManagerId = theTask.GetConnectionID(theTask.Connections, theTask.ConnectionManagerName);
    settingsNode.Connections = ConnectionService.GetConnectionsOfType("ADO.Net");
}
```

Figure 16-17 SettingsView.propertyGridSettings_PropertyValueChanged method's new connection code, updated

Refactor the `SettingsView.propertyGridSettings_PropertyValueChanged` method by adding the code in Listing 16-9 by adding an `else` statement to the `if` conditional `if (e.ChangedItem.Value.Equals(NEW_CONNECTION))`:

```
else
{
  theTask.ServerName = returnSelectedConnectionManagerDataSourceValue(se
  theTask.ConnectionManagerName = settingsNode.SourceConnection;
  theTask.ConnectionManagerId = theTask.GetConnectionID(theTask.Connecti
  settingsNode.Connections = ConnectionService.GetConnectionsOfType("ADO
}
```

Listing 16-9 Adding the SettingsView.propertyGridSettings_PropertyValueChanged m

Once added, the code appears as shown in Figure 16-18:

```
else // if not a new connection
{
    theTask.ServerName = returnSelectedConnectionManagerDataSourceValue(settingsNode.SourceConnection);
    theTask.ConnectionManagerName = settingsNode.SourceConnection;
    theTask.ConnectionManagerId = theTask.GetConnectionID(theTask.Connections, theTask.ConnectionManagerName);
    settingsNode.Connections = ConnectionService.GetConnectionsOfType("ADO.Net");
}
```

Figure 16-18 SettingsView.propertyGridSettings_PropertyValueChanged method's not-new connection code, added

The next step is to refactor the way we identify the catalog, folder, project, and package in the ExecuteCatalogPackageTask.

Identifying Catalog, Folder, Project, and Package

"What is the problem we are trying to solve?" This is a question I learned from a mentor. It is a good question. The problem we are trying to solve is *better* connection management. Until now, connection management has been…*adequate*. Connection management in the current design ignores two valid use cases (at least):

1. Connecting to an Azure-SSIS Catalog hosted by an Azure SQL DB that requires a SQL login (username and password) for authentication
2. Using property expressions to override the ConnectionManagerName property value

We begin with a second look at how the task code assigns the catalogProject property value, found in the ExecuteCatalogPackageTask's `Execute()` method. In the ExecuteCatalogPackageTask's `Execute()` method, the task currently populates the Server ➤ Integration Services ➤ SSIS Catalog ➤ Folder ➤ Project ➤ Package hierarchy using the code shown in Listing **16-10** and shown in Figure **16-19**:

```
public override DTSExecResult Execute(
    Connections connections,
    VariableDispenser variableDispenser,
    IDTSComponentEvents componentEvents,
    IDTSLogging log,
    object transaction)
{
    catalogServer = new Server(ServerName);
    integrationServices = new IntegrationServices(catalogServer);
    catalog = integrationServices.Catalogs[PackageCatalogName];
    catalogFolder = catalog.Folders[PackageFolder];
    catalogProject = catalogFolder.Projects[PackageProject];
    catalogPackage = catalogProject.Packages[PackageName];

    Collection<Microsoft.SqlServer.Management.IntegrationServices.PackageInfo.ExecutionValueParameterSet>
        executionValueParameterSet = returnExecutionValueParameterSet();

    EnvironmentReference environmentReference = returnEnvironmentReference(catalogProject);

    catalogPackage.Execute(Use32bit, null, executionValueParameterSet);

    return DTSExecResult.Success;
}
```

Figure 16-19 The Execute() method

```
catalogServer = new Server(ServerName);
integrationServices = new IntegrationServices(catalogServer);
catalog = integrationServices.Catalogs[PackageCatalogName];
catalogFolder = catalog.Folders[PackageFolder];
catalogProject = catalogFolder.Projects[PackageProject];
```

Listing 16-10 Populating the Server ➤ Integration Services ➤ SSIS Catalog ➤ Folder

The code in Listing 16-10 – shown in Figure 16-19 – identifies one SSIS project based on property values configured from the `SettingsNode` in `SettingsView`. At execution time, this code is prone to errors if one or more of the `SettingsNode` properties are improperly configured. Identifying key artifacts – such as catalog, folder, project, and package objects – is important in the Server ➤ Integration Services ➤ SSIS Catalog ➤ Folder ➤ Project ➤ Package hierarchy. In this section, the code to identify catalog, folder, project, and package is collected and refactored into more robust and independent methods.

Let's refactor this code by moving it to a new function named `returnCatalogProject` in the ExecuteCatalogPackageTask class.

Adding the returnCatalogProject Method

Continue refactoring the `Execute()` method by adding the returnCatalogProject method to the ExecuteCatalogPackageTask using the code in Listing 16-11:

```
public ProjectInfo returnCatalogProject(string ServerName
                                        , string FolderName
                                        , string ProjectName)
{
  ProjectInfo catalogProject = null;
  SqlConnection cn = (SqlConnection)Connections[ConnectionManagerId].Acq
  integrationServices = new IntegrationServices(cn);
  if (integrationServices != null)
  {
    catalog = integrationServices.Catalogs[PackageCatalogName];
    if (catalog != null)
    {
      catalogFolder = catalog.Folders[FolderName];
      if (catalogFolder != null)
      {
        catalogProject = catalogFolder.Projects[ProjectName];
      }
    }
  }
  return catalogProject;
}
```

Listing 16-11 Adding ExecuteCatalogPackageTask.returnCatalogProject

Once added, the new function appears as shown in Figure 16-20:

Figure 16-20 The returnCatalogProject function

If "SqlConnection" has a red squiggly line beneath it, right-click `SqlConnection`, expand Quick Actions, and then click `using System.Data.SqlClient;` to add the `using System.Data.SqlClient;` directive near the top of the ExecuteCatalogPackageTask.cs file.

Once the `using System.Data.SqlClient;` directive is added, the code appears as shown in Figure **16-21**:

```
public ProjectInfo returnCatalogProject(string ServerName
                                        , string FolderName
                                        , string ProjectName)
{
    ProjectInfo catalogProject = null;

    SqlConnection cn = (SqlConnection)Connections[ConnectionManagerId].AcquireConnection(null);
    integrationServices = new IntegrationServices(cn);
    if (integrationServices != null)
    {
        catalog = integrationServices.Catalogs[PackageCatalogName];
        if (catalog != null)
        {
            catalogFolder = catalog.Folders[FolderName];
            if (catalogFolder != null)
            {
                catalogProject = catalogFolder.Projects[ProjectName];
            }
        }
    }

    return catalogProject;
}
```

Figure 16-21 The returnCatalogProject function

Declaring the `returnCatalogProject` function as `public` allows access to the `ExecuteCatalogPackageTask.returnCatalogProject` function from the `ExecuteCatalogPackageTaskComplexUI` project.

Additional "returnCatalog*" methods are similar and demonstrate a very helpful pattern for interacting with SSIS connection managers: The `Connections.AcquireConnection` method returns a `SqlConnection` type object. Acquiring a `SqlConnection` by calling the `Connections.AcquireConnection` method is one way – perhaps the only way – to obtain a connection that requires a username and password from a connection manager.

> Later in this book, we demonstrate connecting an ExecuteCatalogPackageTask to an Azure-SSIS Catalog deployed on an Azure SQL DB instance. One way to connect to Azure SQL DB instances uses a SQL Login with username and password.

Edit the code in the `Execute()` method, replacing the code that populates the Server ➤ Integration Services ➤ SSIS Catalog ➤ Folder ➤ Project hierarchy using the code shown in Listing 16-12:

```
catalogProject = returnCatalogProject(ServerName, PackageFolder, Package
```

Listing 16-12 Updating the Execute() method

Once updated, the new `Execute()` method appears as shown in Figure 16-22:

```
public override DTSExecResult Execute(
    Connections connections,
    VariableDispenser variableDispenser,
    IDTSComponentEvents componentEvents,
    IDTSLogging log,
    object transaction)
{
    ConnectionManagerIndex = returnConnectionManagerIndex(connections, ConnectionManagerName);

    catalogProject = returnCatalogProject(ServerName, PackageFolder, PackageProject);
    catalogPackage = catalogProject.Packages[PackageName];
```

Figure 16-22 A portion of the updated Execute() method

The next step is to add a method to return the catalog package in a similar fashion.

Adding the returnCatalogPackage Method

Next, add the `returnCatalogPackage` function using the code in Listing 16-13:

```
public Microsoft.SqlServer.Management.IntegrationServices.PackageInfo re
    string ServerName
  , string FolderName
  , string ProjectName
```

```
    , string PackageName)
{
  Microsoft.SqlServer.Management.IntegrationServices.PackageInfo catalog
  SqlConnection cn = (SqlConnection)Connections[ConnectionManagerId].Acq
  integrationServices = new IntegrationServices(cn);
  if (integrationServices != null)
  {
    catalog = integrationServices.Catalogs[PackageCatalogName];
    if (catalog != null)
    {
      catalogFolder = catalog.Folders[FolderName];
      if (catalogFolder != null)
      {
        catalogProject = catalogFolder.Projects[ProjectName];
        if (catalogProject != null)
        {
          catalogPackage = catalogProject.Packages[PackageName];
        }
      }
    }
  }
  return catalogPackage;
}
```

Listing 16-13 Adding the returnCatalogPackage function

Once added, the code appears as shown in Figure 16-23:

```
public Microsoft.SqlServer.Management.IntegrationServices.PackageInfo returnCatalogPackage(
                                    string ServerName
                                  , string FolderName
                                  , string ProjectName
                                  , string PackageName)
{
    Microsoft.SqlServer.Management.IntegrationServices.PackageInfo catalogPackage = null;

    SqlConnection cn = (SqlConnection)Connections[ConnectionManagerId].AcquireConnection(null);
    integrationServices = new IntegrationServices(cn);
    if (integrationServices != null)
    {
```